PLANNING COMMISSION

सत्यमेव जयते

XIIth Five Year Plan

Report of the Working Group on

Horticulture and Plantation Crops

Chairman - Prof. D.P. Ray
Vice Chancellor
OUAT, Bhubaneswar

Member Secretary - Bijay Kumar, IAS
Managing Director
National Horticulture Board

NOVEMBER 2011

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Preface

The Planning Commission of India constituted the *Working Group on Horticulture and Plantation Crops* for 12th Five-Year Plan by notification issued vide its office memorandum number - F.No.M-12043/2/2011-Agri dated 16th March, 2011 and subsequently modified vide its OMs of even number dated April 27th 2011 and 5th May 2011. The composition and Terms of Reference of the Working Group are given as **Annexure-1**.

In order to organize the operation, nine sub-groups were set up to examine issues related to (i) Role of Government of India in Development of Horticulture & Plantation Sector capacity, (ii) Review of Growth of Horticulture & Plantation Sector and projecting its future growth rate, (iii) Farm Inputs, Farm Mechanization, Credit & Risk mitigation, HRD and Extension Services, (iv) Post Harvest Management and Marketing, (v) WTO Regime and Export Competitiveness, (vi) Review of on-going Schemes of Horticulture & Plantation Sector and Recommend Restructuring of Schemes and Delivery Mechanism etc, (vii) Plantation Crops, Spices, Aromatic & Medicinal Plants, Mushroom and Bee Keeping, (viii) Horticulture Statistics and (ix) Urban Horticulture. The composition of the nine sub-groups are given as **Annexure-2**.

The Working Group had consultations with a wide cross-section of the stakeholders for which it had organized six of its meetings at different centers viz., New Delhi, Guwahati, Bangaluru, Kolkata, Chennai and Ahmedabad. The stakeholders invited for consultations included the senior officers of the State Departments of Agriculture / Horticulture, Vice Chancellors of State Agriculture Universities, KVKs, SAMETI, leading producers, exporters, industries, associations etc.

The work done by these sub-groups provided very useful inputs in drafting the Report of the Working Group. Finalization of the Report was greatly facilitated by the discussions held with Shri Suresh Kumar, former Principal Secretary (Agriculture), Government of Maharashtra and Dr. H. P. Singh, DDG (Horticulture), ICAR. I would like to thank all the members of the Working Group for taking time off from their busy schedule and actively participating in the meetings and contributing to the work of the Working Group. I would also like to place on record my appreciation of the work carried out by all the Chairmen and members of the sub-groups.

I would like to thank the experts, individuals and organizations who provided valuable inputs, particularly the Principal Secretaries of Agriculture/Horticulture of all States and Union Territories, Shri A. K. Gupta from APEDA, Vice Chancellors / Director Research /Director Extension/ Deans of faculties of different State Agricultural Universities.

I put on record my sincere thanks to Shri Bijay Kumar, IAS, the Managing Director of National Horticulture Board (Ministry of Agriculture) & Member Secretary of the Working Group for his valuable contribution in functioning of the Working Group, in making effective consultation with stake-holders and in analyzing the facts and figures and bringing out this report in time.

The Working Group received a great deal of assistance from a large number of organizations such as Industries Associations, Growers' Organizations, Exporters, Processors and Traders, progressive farmers; Secretary, APMC Azadpur (New Delhi); CEO SAFAL unit of NDDB and entrepreneurs. At this juncture, I would like to acknowledge and place on record my deep appreciation to Dr. S. K. Malhotra and Shri Chander P. Gandhi who have helped in the task of putting together the reports of the sub-groups and inputs received from a large number of experts and stakeholders was accomplished. My special thanks to Dr. V. A. Parthasarathy, former Director, Indian Institute of Spices Research, ICAR, Marikunnu, Calicut, Kerala for editing the report.

It is my earnest hope that the Report will reinvigorate the work already being done in the Department of Agriculture & Cooperation and DARE, Ministry of Agriculture in the Government of India on several elements of the recommendations and that work will be initiated on the new suggestions contained therein. Such follow-up action on this Report of the Working Group on Horticulture & Plantation Crops will give renewed impetus to measures for sustained growth of India's Horticulture & Plantation Sector along with enhanced export competitiveness and thereby ensure economic well-being of horticulture farmers and nutritional security for our population.

Date: November 11, 2011
Place: New Delhi

CHAIRMAN 11/11/2011
Working Group on Horticulture &
Vice-Chancellor, OUAT, Bhubaneswar

CONTENTS

Abbreviations

APMC	:	Agricultural Produce Market Committee
APPTA	:	Agricultural Products Producers and Traders Association
ATMA	:	Agricultural Technology Management Agency
AYUSH	:	Ayurveda, Yoga & Naturopathy, Unani, Siddha & Homoeopathy
BEE	:	Bureau of Energy Efficiency
BIS	:	Bureau of Indian Standards
CADP	:	Comprehensive Area Development Plan
CAIES-H	:	Central Agriculture Infrastructure & Establishment Schemes – Horticulture
CBRI	:	Central Building Research Institute
CCRI	:	Central Coffee Research Institute
CDAP	:	Comprehensive District Agriculture Plan
CDB	:	Coconut Development Board
CDDP	:	Comprehensive District Development Plan
CES-F & V	:	Crop Estimation Survey on Fruits and Vegetables
CFC	:	Common Facility Centre
CIH	:	Central Institute for Horticulture
CIPHET	:	Central Institute of Post Harvest Engineering Technology
CONCOR	:	Container Corporation of India
CPIS	:	Coconut Palm Insurance Scheme
CRIS	:	Coffee Rainfall Insurance Scheme
CWHC	:	Central Ware House Corporation
DAC	:	Department of Agriculture and Cooperation
DARE	:	Department of Agricultural Research and Education
DASD	:	Directorate of Areca nut and Spices Development
DCCD	:	Directorate of Cashew nut and Cocoa Development
DES	:	Directorate of Economics and Statistics
DGCIS	:	Director General of Commercial Intelligence & Statistics

EARAS	:	Establishment of an Agency for Reporting Agriculture Statistics
ECA	:	Essential Commodities Act
F & V	:	Fruits and Vegetables
FHEL	:	Fresh and Healthy Enterprises Ltd.
GCCA	:	Global Cold Chain Alliance
GCES	:	General Crop Estimation Survey
HIS	:	Horticulture Information Systems
HMNEH	:	Horticulture Mission for North-East and Himalayan States
HOPCOMS	:	Horticultural Producers' Co-operative Marketing and Processing Society
ICAR	:	Indian Council of Agriculture Research
ICRI	:	Indian Cardamom Research Institute
IIP	:	Indian Institute of Packaging
IIPM	:	Indian Institute of Plantation Management
IISR	:	Indian Institute of Spices Research
INHDP	:	Integrated National Horticulture Development Programme
IRB	:	Indian Rubber Board
KVIB	:	Khadi and Village Industries Board
MAIS	:	Modified Agriculture Insurance Scheme
MFM	:	Mission on Farm Mechanization
MFPI	:	Ministry of Food Processing Industries
MRL	:	Maximum Residue Limits
MSPM	:	Mission on Seed and Planting Materials
NBB	:	National Bee Board
NBM	:	National Bamboo Mission
NCCD	:	National Centre for Cold Chain Development
NCPAH	:	National Committee on Plasticulture Applications in Horticulture
NER	:	North Eastern Region
NHB	:	National Horticulture Board
NHM	:	National Horticulture Mission

NLA	:	National Level Agency
NMBA	:	National Mission on Bamboo Application
NMBP	:	National Medicinal Plant Board
NMMI	:	National Mission for Micro Irrigation
TMNE	:	Technology Mission for North East
NR	:	Natural Rubber
NTA	:	Non Traditional Area
NVI	:	National Vegetable Initiative
OPDP	:	Oil Palm Development Programme
PFDC	:	Precision Farming Development Centre
PHM	:	Post Harvest Management
PPV & FR	:	Protection of Plant Varieties and Farmers' Right
QUPDS	:	Quality Up-gradation and Product Diversification Scheme
RPM	:	Rural Primary Market
RPS	:	Rubber Producers' Society
RRII	:	Rubber Research Institute of India
SAMETI	:	State Agricultural Management and Extension Training Institute
SASA	:	State Agriculture Statistics Authorities
SFAC	:	Small Farmers' Agri-Business Consortium
SOP	:	Standard Operating Procedure
SPTF	:	Special Purpose Tea Fund
TMC	:	Terminal Markets Complex/Technology Mission on Coconut
TMNEHA	:	Technology Mission for North-East and Hilly Areas
TMOP & M	:	Technology Mission on Oil Palm and Maize
TSG	:	Technology Support Group
VIUC	:	Vegetable Initiative for Urban Clusters
WBCIS	:	Weather Based Crop Insurance Scheme
WFLO	:	World Food Logistic Organization

Executive Summary

- Comprehensive policy and budgetary support has been extended for development of horticulture sector in the Country during XIth five-year plan period. It is during this period that three flagship schemes having impact on horticulture development namely, National Horticulture Mission, Horticulture Mission for NE and Hilly Areas and Rashtriya Krishi Vikas Yojana are being implemented simultaneously for the entire plan period. The effort made for horticulture development through the said flagship schemes have been reinforced by other ongoing schemes of National Mission on Micro Irrigation, schemes of Coconut Development Board and National Horticulture Board.
- In the background of comprehensive policy and budgetary support extended to the horticulture sector, expectation of its 6% average annual growth rate had been pegged but as per the latest estimations the sector may finally achieve annual average growth rate of nearing 5% only. In addition, very wide fluctuations in prices of fruits & vegetables have been recorded during the first four years of XIth plan which has pinched common consumers badly. It is also said that not only a lot remains to be accomplished in terms of convergence of two simultaneously launched flagship schemes of NHM and RKVY but expenditure made under the Mission mode schemes of NHM and HMNEHA must also promote horticulture development with respect to a base-line survey and carefully drafted District Horticulture Development Programme.
- It is noteworthy that generally the States have made their matching grant available for Centrally Sponsored Schemes of NHM, RKVY and NMMI; but inadequacy of man-power deployed by them for implementation of schemes of horticulture development for which States have been seeking Central assistance is a matter of concern. The aspect of fund flow to States bypassing State treasuries and heavy dependence on ad hoc Mission Directorates and Technology Support Groups for monitoring & control of the horticulture development programmes too have been examined in detail.
- It is also observed that strengthening of extension system not only means its re-organisation and imparting routine training to extension workers but it also means that economically viable technology solutions for addressing to the field level problems in project mode must be made available to them.
- In order to critically analyse our past performance and projected growth of horticulture sector during XIIth plan period, a SWOT analysis has been carried out and an average growth rate of 6.5% per annum has been projected for Horticulture and Plantation Sector during XIIth plan period. With the projected growth rate and after making provision for PHM losses @ 25% and exports and

processing @ 5% of horticulture produce, the country may attain the desired availability level of 120 g / capita/ day of fruits by the end of year 2015-16 and 280 gms / capita / day of vegetables during the year 2016-17. The crop category wise projected growth rate is as shown below-

Chart 0.1

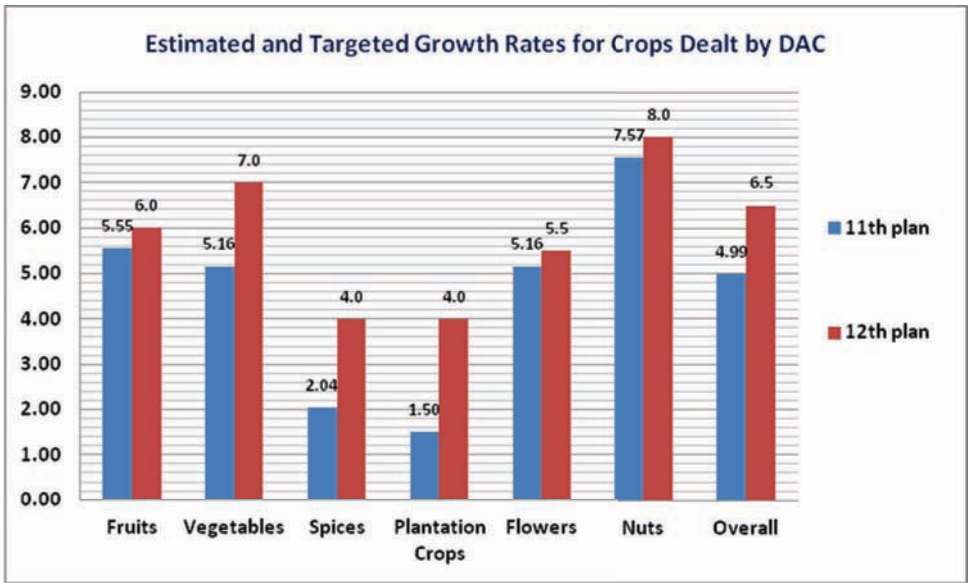


Chart 1.1 Present and proposed growth rate

Gist of Recommendations for XIIth plan Period

Part-1- For Crops and Schemes Dealt by Ministry of Agriculture-

A. *Strategy-* The Working Group recommends a multi-pronged strategy for achieving the projected growth rate, main features of which may be listed as follows –

i. Efficient Resource Utilisation by integration and convergence of schemes, integration of multiple organizations, re-defining roles of key-functionaries and business process re-engineering.

ii. Project Mode of operation for pre-determined outcome, shifting from component mode of scheme implementation and thereby providing complete technology solution to issues like productivity, higher proportion of quality produce, plant protection, PHM, storage, transport and marketing.

iii. Enhancement of productivity of existing orchards by promoting technology-solutions in project mode,

iv. Introducing a system of securing availability of quality seeds and planting materials in a planned manner dovetailing the same with area expansion programmes

v. Prioritization on the basis of Focus Crop and Focus Production Cluster / Production Area

vi. To promoting sustainable higher growth rate for short duration crops such as vegetables and spices etc during the gestation period for perennial fruit & plantation crops with the objective of achieving targeted growth rate since the beginning of XIIth plan period,

vii. Promotion of capital investment for development of critical infrastructure for horticulture development,

B. Regarding Schemes of Horticulture Development**-** The Working Group has examined various aspects of ongoing schemes which are essential and pre-requisite for securing sustained growth of horticulture sector and made recommendations as follows-

i. *Continuation of ongoing Schemes in Integrated Form*- The Working Group has recommended integrating ongoing schemes of NHM, HMNEHA, NHB, CDB, NMMI and NBM into *Integrated National Horticulture Development Programme*.

ii. *Discontinuation of scheme Components*- discontinuing following scheme components has been recommended by the Working Group-

a. Mini Mission –I under HMNEHA

b. Mini Mission IV under HMNEHA

c. National Vegetable Initiative

d. Crop Estimation Survey (Fruits and Vegetables)

iii. *Introduction of New Scheme Components*- It is proposed to introduce following new scheme components

a. Capital Investment in *automatic weather stations* for Crop Insurance Scheme

b. Long distance, multi-modal transport solutions for perishables

c. Export Promotion and Enhancing Export Competitiveness of Horticulture Sector by measures such as identification of target crops by estimating export opportunity, introduction of suitable varieties, technology development and transfer for export competitiveness, promoting investment in export support Infrastructures,

d. Horticulture Database

e. Market related HRD

f. Setting up of NCCD

g. Urban Horticulture (Extension and Education Component)

C. Strategic Change in Programme Orientation / Emphasis- The Working Group recommends following reorientations or strategic changes in programme orientation/ emphasis-

i. *Area Expansion plan after securing availability of quality farm inputs-* the Working Group has recommended some concrete measures such as-

a. Putting in place a system of accreditation and rating of horticulture nurseries
b. Developing General and Specific Guidelines for DUS Testing of horticulture crops followed by notification of horticulture crops for being eligible for registration under PPV & FR Act, 2001.
c. Introduction of a system of Advance Production planning for Quality Planting Materials
d. Continuation of ongoing schemes promoting setting up of quality Nurseries
e. Only Accredited Nurseries and TC Labs for Sourcing Planting Materials
f. Permitting Private Sector Research Seeds after their registration under PVR & FR Act 2001; until then, they may be allowed, subject to general normative cost, if purchased from licensed outlets for sales of seed and planting materials.
g. Continuation of existing Policy regarding Import of Seeds and Planting Materials
h. Introduction of Transgenic Plant Varieties after getting due statutory approvals
i. No purchase functions for programme implementing officers regarding seed and planting materials and introduction of Normative Cost for them

ii. *Technology Solutions for productivity, quality of produce, Post Harvest Management, Packaging, Transport and Storage of Horticulture Produce- t*he Working group has examined the constraints in promoting PHM solutions in spite of increased rate of financial assistance. It has also looked into technology gap / knowledge gap in respect of PHM protocols and Technical Standards in respect of PHM related infrastructures. Thereafter, the Group has made several recommendations:

a. Development & Transfer of Technology / Technology Solutions for increasing productivity of crops and percentage of quality fruits in a production lot,
b. Developments of appropriate design of packaging for horticulture produce which is techno-economically viable,
c. Validation of critical storage conditions and other PHM protocols for fresh horticulture produce,
d. Development of economically viable solutions to scientific fruit ripening for fruits like banana, mangoes, papaya
e. Development and Introduction of *Long Distance Transport Solutions* for fresh horticulture produce,

iii. *Project Mode of Scheme Implementation*- It is proposed that during XIIth plan period, financial assistance for area expansion should be given in project mode. Similarly, assistance for standalone PHM component should also be given in integration with new area expansion project or in integration with existing orchards in project mode. Thus, components for assistance will be decided keeping in view the system of production, aggregation of farm produce, its transportation to market and trading system in vogue. Following items may be given due importance while preparing such a project-

a. Plastic crates / bins and handling system among producer farmers and registered brokers / commission agents in APMC markets,

b. Fruit ripening Chambers for banana, mangoes, papaya etc.

c. Mechanized sorting, grading and handling systems,

d. Cold storages with appropriate technical standards and storage conditions

e. Development of Infrastructure suitable for storing & grading and handling fresh horticulture produce at market centres, Inland Container Deports and Ports including sea ports, air cargo centres, Land Port Stations.

iv. *Continuation of ongoing schemes of PHM*-It is proposed to continue with ongoing schemes relating to Post Harvest Management of horticulture produce. As the cost norms and subsidy norms have been revised recently, same level of assistance may be continued. However, ceiling of 5000 MT put on cold storage capacity need to be relaxed in case of infrastructure under National Green Grid and Terminal and Wholesale Markets.

v. *Scheme for Common Facility of perishable cargo handling at Inland Container ports, Railway Yards, Dry Ports, Sea Ports, Air Cargo centres, Land Custom Stations etc*- this new component too may be operated on assistance pattern of Horticulture Park / Common Facility Centre.

vi. *Market Information and Market Intelligence*- Current agri-marketing Information system like AGMARKNET and NHB depend on information received from the office of APMCs which is more often based on information furnished by brokers. This information is not real time and doubts are raised about the correctness of information for obvious reason of conflict of interest. Even the direct procurement by processors and those operating organized retail chain outlets has not provided alternative channel for price discovery and market information. Introduction of Standard Operating Procedures *(SOP)* for regulated markets will facilitate having access to correct and real time market information which may be disseminated by modern electronic technology.

vii. *Higher scale of financial assistance for inclusive Development*- Several measures have been recommended for inclusive development of horticulture sector

including to provide assistance to projects in tribal sub-plan districts, A & N Islands and Lakshadweep Islands at par with hilly & scheduled areas.

viii. *Schemes Relating to Risk Mitigation*- Horticulture related schemes are capital intensive and therefore, need to be provided with insurance cover. The Working Group recommends following steps to be taken during XIIth Plan Period-

ix. Introduction of Regular Scheme of Crop Insurance on line with Modified Agriculture Insurance Scheme (MAIS) and Weather Based Crop Insurance Scheme (WBCIS) by the concerned Division of DAC.

x. Orchards of other perennial crops like mangoes, dates, apples etc shown may be covered by Insurance scheme on line with Coconut Palm Insurance Scheme (CPIS).

xi. Hi-tech, capital intensive infrastructure like poly-houses, net houses etc may be covered by a suitable Insurance Scheme for which cost of premium may be shared between beneficiary, State and Central Govt on the ratio of MAIS or WBCIS.

D. New Policy Frame-work required- Working Group has recommended need for putting in place following policy frame–

i. *Launch of new schemes only in integration / coordination with ongoing schemes*- It has been noticed that new schemes are launched without considering aspects of integration and coordination with ongoing schemes. For example- NHM and HMNEHA vis a vis NMMI or NHM and HMNEHA vis a vis schemes of NHB. Now, National Mission of Seeds & Planting Materials and National Mission on Farm Mechanisation are on anvil. This disturbs the very integrated nature of projects for horticulture development. It is, therefore, proposed that desired level of emphasis on certain critical components may still be laid just by effecting suitable modifications in operational guidelines of ongoing schemes instead of launching a new scheme in mission mode or otherwise. In this context, the policy of entrusting role of Mission Director to one or another functionary in Secretariat may amount to *role-conflict* which may ultimately affect quality of programme monitoring.

ii. *Free Movement of fresh horticulture produce across the Country*- it is recommended that Central Government may, using powers vested in it under entry 42 of Union List, enact “Inter-State Agriculture Produce Trade and Commerce Regulation Act” providing for Country as one market for fresh horticulture produce and removal of inter-state barriers for Unified National Market.

iii. *Rationalization of Cold Storage Licensing System*- At present, cold storage licensing is handled by State Government officials from horticulture / marketing directorates. The procedure and provisions regarding licensing

revolve around administrative powers and penalty for defaulters but do not prescribe technical conditions which are necessary for securing licenses. There is a need to introduce a uniform protocol and procedure in this regard and, possibly, entrust this task to NCCD.

iv. *Market Access and Market Sector Reforms*- After critical examination of various aspects associated with horticulture marketing the Working Group has not endorsed to the school of thought of bringing horticulture produce out of ambit of APMC Act. Its main recommendations, in addition to promotion of Model APMC Act, includes Redefining Role for Management of Regulated Markets and Introduction of Standard Operating Procedure (SOP) , Removal of inter-state barriers for Unified National Market, Introduction of Quality Standards in Sales through organized Retail Chain Outlets, Extending Status of Ware House to Cold Storages / CA Storages and extending coverage of scheme of ware house slip to Horticulture Produce fit for long duration storage such as potato, onion, apples and simplification of procedure for documentation clearances (Anugya Patra, Gate Pass, 9R/6R etc) for every dispatch from the respective APMC.

v. *Rationalization of Procedure for Registration of Farm Chemicals*- this is imperative so as to make the procedure more scientific and transparent. Moreover, there is a need of coordination between experts' prescriptions regarding farm chemicals for plant protection, growth regulation, enhancing shelf life of produce, inducing fruit ripening and process of registration of new molecules / products under category of farm chemicals.

vi. *Introduction of Agriculture Diploma and Certificate Courses*- It is recommended that State Governments should introduce diploma and certificate courses in the field of agriculture, cold chain / refrigeration etc so as to meet the gap of man-power availability to carry out skilled and semi-skilled jobs

vii. *Single window system for agriculture& horticulture extension*- In order to overcome constraints of shortage of man-power for horticulture extension and for carrying out extension function s keeping integrated production system in view, it is recommended to promote integration of agriculture and horticulture extension work at grass-root level. This will further facilitate unified system of crop statistics for agriculture and horticulture.

E. Convergence of ongoing schemes of DAC and Other Departments / Ministries-

a. It has been recommended that while preparing District Horticulture Development Plan convergence of schemes of horticulture development with those of Ministry of Rural development need to be provided for.

Convergence of programmes of horticulture programmes with schemes like MNREGS implemented by Ministry of Rural Development may help in developing irrigation tanks on individual farmer's field and community irrigation facilities, in providing connectivity of production clusters and rural markets through rural roads etc.

b. So far as schemes of Ministry of Food Processing Industries (MFPI) are concerned, it has been noticed that there is overlap of schemes relating to cold chain by way of backward linkage and area of primary processing. It is being been suggested that MFPI may concentrate on projects relating backward linkage when there is organic linkage of the project with processing units. Similarly, it has been proposed that horticulture development programmes may take up projects of primary processing when the same is an integral part of area expansion project or existing orchards. It is also proposed that as MFPI does not have its State level offices, the present office set up of NHB may be entrusted with task of implementing schemes of MFPI relating to processing of F & V.

c. Ministry of commerce handles all aspects of rubber, coffee and tea, ranging from research to marketing, while, Spice Board is mandated to deal exclusively with cardamom and other 51 spices. It is recommended that during XIIth plan period, horticulture division of DAC may continue to implement production related schemes of all the spices such as seeds and planting materials production and plant protection etc. As far as possible, the schemes relating to exports of spices may be implemented through Spice Board.

d. Similarly, it has been proposed that a new Central Sector scheme component of Enhancing Export Competitiveness be introduced under Integrated National Horticulture Development Programme. This will facilitate taking up under horticulture development programmes such projects inside the country which may enhance our export competitiveness. With this, APEDA may be able to concentrate more on strategic aspects of export promotion through initiatives in potential export destinations.

e. Further, National Medicinal Plant Board (NMPB) has been set up by Department of AYUSH to coordinate development of medicinal plants. However, NMPB does not have its State level offices and as such it depends on State Directorates of Horticulture for programme implementation. Therefore, it is proposed that projects relating to scheduled medicinal and aromatic plants notified by NMPB from time to time may not be taken up under schemes of Horticulture Division of DAC.

f. There is a need for convergence of scheme components of bee-keeping

under schemes of horticulture division of DAC and schemes for promoting production, processing and marketing of honey implemented by Khadi & Village Industries Boards. This can be done by having a joint monitoring committee with Khadi and Village Industries Commission and Horticulture Division of DAC.

g. Similarly, convergence between scheme components of *National Bamboo Mission* and *National Mission on Bamboo Application which is implemented by Department of Science & technology is required.*

h. The Working group is of the view that convergence with RKVY is generally achieved with Comprehensive District Development Plan (CDAP) prepared under RKVY, in the following manner.

   i. Increasing expanse of NHM like scheme to areas which have been consciously excluded from coverage of NHM

   ii. Providing additional subsidy to components eligible for subsidy under NHM

   iii. Funding large infrastructure projects not figuring into CDAP

   There is a need to review this as a general policy to be adopted by several States and necessary guidelines may be issued in this regard.

F. Recommendation regarding Restructuring *Schemes of Horticulture Division of DAC regarding Horticulture Development-*

i. Integration of central schemes of horticulture development; namely, schemes of NHB, NHM, HMNH, NMMI, CDB and NBM and the same may be named as "*Integrated National Horticulture Development Programme*" under which different cost norms and subsidy norms for hilly and scheduled areas and States in NE region of the Country may continue. Suggestive structure of "*Integrated National Horticulture Programme*" has also been enclosed with the report as *Appendix 14.2*.

ii. Secondly, it will be desirable to have a proper *Mission Directorate* for mission mode schemes of restructured "*Integrated National Horticulture Development Programme"* which should be a duly constituted statutory body which may be part of *Central Agriculture Infrastructure and Establishment Scheme (CAIES- Horticulture)* or it may continue as present plan scheme of NHB. There may be two sub-divisions into it; one for mandate crops of fruits, vegetables, flowers and medicinal, aromatic plants, bamboo, mushroom and bee-keeping with HQ in NCR and another for mandate crops of coconut, areca nut, cashew nut, spices and cocoa (plantation and spice crops).

iii. For effective transfer of technology, there is a need to have a *Unified Technology Support Group* for the *Integrated National Horticulture Development Programme* which will be responsible for ensuring proper identification and transfer of technology solutions to field level issues relating to horticulture projects.

iv. Fourth, the schemes of *Integrated National Horticulture Development Programme* may be re-designed and it should have two components; namely, *Central Sector Components (100% central grants)* and *centrally sponsored components (85% Centre and 15% State share)*. Item having catalytic effect on horticulture development, those relating to creation of infrastructures of national importance, projects benefitting more than one State, projects and schemes pertaining to exports promotion and involving higher level of technology may be kept as *Central Sector Components* and others may be classified as C*entrally Sponsored Components* implementation of which may be made on the pattern of RKVY which will secure integration of horticulture development programmes with Comprehensive Area Development Plan (CDAP). As Mission Mode Programmes are meant for certain time period, provision may be made to ensure that the *Central Sector Components do* not get discontinued automatically on *Mission Mode Programme components* coming to an end.

v. Present office premise and other infrastructure available at NHB HQ may be converted as HQ of *Integrated National Horticulture Development Programme* and infrastructure belonging to CDB may be HQ for Plantation and Spice crops division of Integrated National Horticulture Development Programme).

vi. The production of seed spices can be intensified by sanction of a thrust programme for seed spices. Mechanization of seed spices by introducing labour saving devices such as combine harvesters may be given priority.

G. Status of NCCD, CDB, NHB, CIH, NBB and NCPAH-

i. **CDB:**- It is recommended that the mandate of CDB may be expanded to act as an umbrella organisation for development of all plantation crops like coconut, cashew nut, areca nut, cocoa and spices. Functions of the two Directorates namely, the Directorate of Cashew nut & Cocoa Development and the Directorate of Areca nut and Spice Development may be merged with CDB. Schemes of CDB may be restructured on line with scheme of *Integrated National Horticulture Development Programme.* For introducing crops like areca nut, cashew, cocoa and spices as mandate crops for the CDB amendment in its

constitution shall be required and CDB may be named as *"Plantation and Spice Crops Development Board"*.

ii. **NHB:**- NHB is a plan scheme started in the year 1984 as a result of recommendations of a committee headed by Dr. M. S. Swaminathan. Prior to recommendation of Expenditure Reforms Commission regarding restructuring Horticulture Division of DAC, NHB had received treatment of main instrumentality of Horticulture Division. It is recommended by the Working Group that it is in the interest of programme implementation that NHB may be entrusted with responsibility of implementation of Integrated National Horticulture Development Programme during XIIth period as an Umbrella Organisation. However, Centrally Sponsored Scheme Components and their equivalents for NE region, Hilly and Scheduled Areas may be implemented through State Directorates of Horticulture; Central Sector Component may be implemented by NHB through its State Centres. For this purpose, NHB may be constituted under Parliament Act on line with CDB.

iii. **NCCD:**- NCCD has been created during the year 2010-11 as a Society registered under Societies Registration Act 1860. It is mandated to function in participatory mode with stake holders of PHM and cold chain sector. It is recommended by the Working Group to entrust NCCD with applied R & D and HRD functions in addition to its role in *standards setting* and *certification of infrastructures relating to Cold Chain and PHM*. This will pave the way for fetching benefits of schemes of Ware Housing Slips for scheduled F & V stored in cold storages. In order to avoid proliferation of new organisations with skeleton administrative support system it is also recommended to keep NCCD in PPP mode or as part of NHB.

iv. **CIH Dimapur:** – it is recommended that keeping in view the significance of role played by CIH in promoting technology transfer relating to production, PHM and Market Links in the same may be continued in its present form during XIIth plan period. However, its Governing Body may be strengthened for making the organisation more effective.

v. **National Bee Board (NBB) and National Committee on Plasticulture Applications in Horticulture (NCPAH):** – it is proposed that NBB and NCPAH may be discontinued during XIIth plan period.

Part-2- For Crops and Schemes Dealt by Ministry of Commerce and Department of AYUSH -

1. ***Recommendations Regarding Tea, Coffee, Rubber and Spices (Cardamom)-*** It has been recommended to continue with ongoing schemes for tea, coffee, rubber and spice development, export promotion, market development, HRD etc. However, special

thrust of the programme for tea development should be laid on re-plantation and rejuvenation, development of tea gardens on small tea planters' farms and maintaining quality of output from processing units based on plucked tea leaves. Similarly, coffee development in NE and other non-traditional areas and farm mechanisations need to be given special thrust. In case of rubber, rubber wood should also be given due attention. Statistics relating to tea, coffee, rubber and spices may be covered in unified manner under new scheme of Horticulture Database.

Chart 0.2

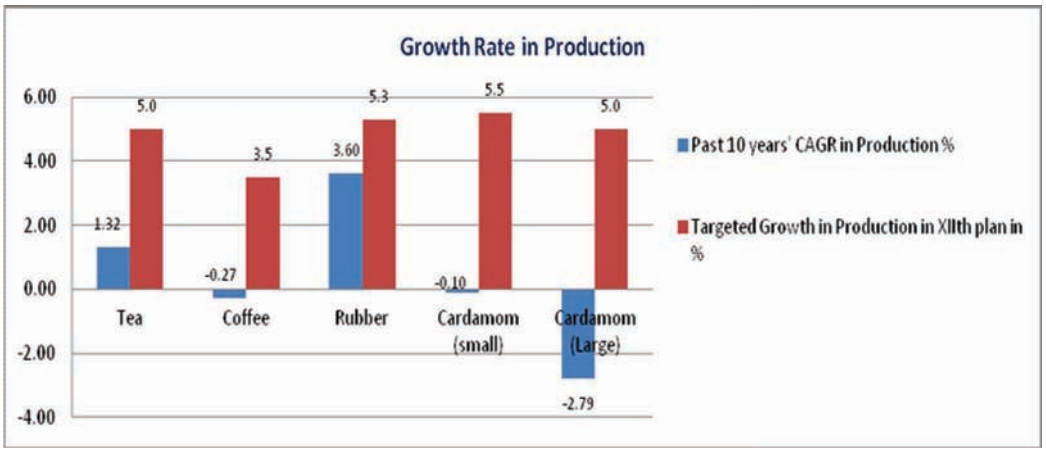
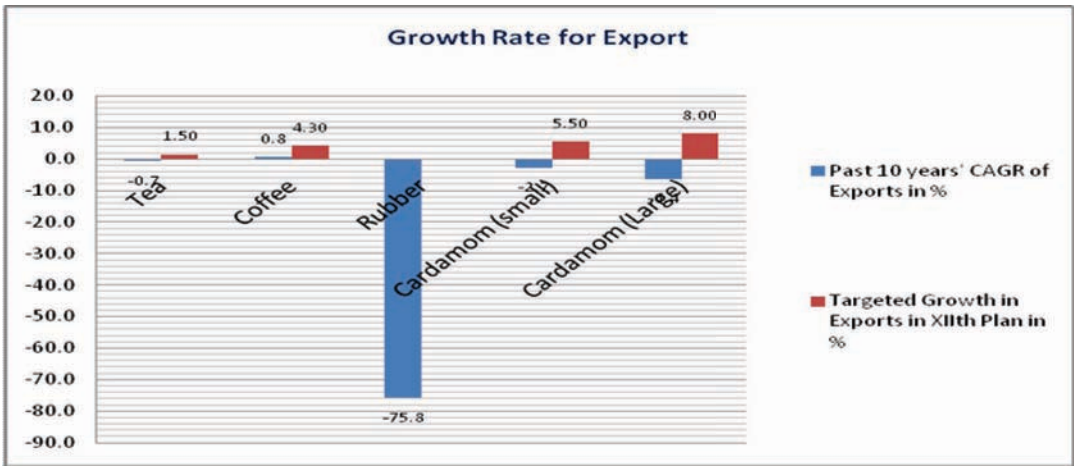


Chart 0.3



Recommendations Regarding Medicinal and Aromatic Plants- On going schemes of medicinal and Aromatic Plants covered under Integrated Horticulture Development Programme should, in coordination with schemes of NMPB under AYUSH should suffice.

H. Estimated Budgetary Requirement for Horticulture Development Programmes of Horticulture Division of DAC and Commodity Boards of the Ministry of Commerce-

Estimated Budgetary Requirement for 12th Plan		
S. No.	**Restructured Programmes**	**Rs. in Crores**
1	Area Expansion Programmes in Integrated Project Mode including protected cultivation	10000
2	For Productivity Enhancement of Existing Orchards / Production Clusters in Project Mode including pollination support	10000
3	Additional Provision for NE region, Hilly areas and scheduled areas and small & marginal Farmers etc for above two schemes	3000
4	Infrastructure development for Input production	250
5	Supply Chain Management, Post Harvest Management	7300
6	Marketing Infrastructure, HRD & Market information	2000
7	Enhancing Export Competitiveness	250
8	Human Resource Development	250
9	Horticulture Database	175
10	Crop Insurance and Setting up Weather Stations	250
11	Schemes of Coconut Development Board	1000
12	Schemes Components of Bamboo Development	500
13	Horticulture Promotion Services- NCCD	25
14	Schemes of Tea Board	1600
15	Schemes of Coffee Board	1200
16	Schemes of Rubber Board	1180
17	Schemes of Spice Board	900
Total		**39880 say, 40000 crores**

Chapter 1: Introduction

This Working Group on Horticulture and Plantation Crops for XIIth Five-Year Plan has been constituted by the Planning Commission of India by a notification issued vide its office memorandum number - F.No.M-12043/2/2011-Agri dated 16th March, 2011 and subsequently modified vide its OMs of even number dated April 27th 2011 and 5th May 2011. The Terms of Reference for the Working Group is enclosed at Annexure -1.

At the outset, it is necessary to define Horticulture Crops. As per definition given by the *International Society for Horticulture Science*- horticultural crops include the following:-

i. Tree, bush and perennial vine fruits;

ii. Perennial bush and tree nuts;

iii. Vegetables (roots, tubers, shoots, stems, leaves, fruits and flowers of edible and mainly annual plants);

iv. Aromatic and medicinal foliage, seeds and roots (from annual or perennial plants);

v. Cut flowers, potted ornamental plants, and bedding plants (involving both annual or perennial plants); and

vi. Trees, shrubs, turf and ornamental grasses propagated and produced in nurseries for use in landscaping or for establishing fruit orchards or other crop production units,

vii. Honey and Cultivated or gathered mushrooms (edible fungi)

On the other hand, the Planning Commission Working Group on Horticulture Crops, Plantation Crops and Organic Farming for the XIth Five Year Plan had attempted to re-define the phrase '*Horticulture'* as "the science of growing and management of fruits, vegetables including tubers, ornamental, aromatic & medicinal crops, spices, plantation crops and their processing, value addition and marketing". In fact, in our planning process *horticulture sector* has been considered to encompass a wide range of crops namely fruit crops, vegetables crops, potato and tuber crops, ornamental crops, medicinal and aromatic crops, spices, and plantation crops. New introductions such as mushroom, bamboo, and bee keeping have been accepted for improving the crop productivity, which has further expanded the scope of horticulture. In view of this, the Working Group for XIIth Five-Year Plan on Horticulture & Plantation Crops has decided to continue with present definition and connotation in which the phrase has been in use in planning process.

Horticulture accounts for about 30% of India's agricultural GDP from 13.08% of

cropped area. It also provides about 37% of the total exports of agricultural commodities. The sector has received focused attention in Country's five-year plans mainly from the VIIth plan period. A growth rate of 6% per annum has been targeted for the horticulture sector for the IXth as well as the Xth plan periods but could not be achieved. A sustained growth rate of 6% per annum for horticulture sector has again been targeted for the XIth five-year plan too, but according to mid-term appraisal for the XIth plan the horticulture sector may achieve near 4% average annual growth rate. The Working Group has attempted a diagnostic study into this aspect and projected growth rate for XIIth plan period keeping in view the growth potential and market susceptibility to increase in production of perishables. Frequent and sharp price fluctuation of fruits and vegetables in domestic market has been area of concern of policy makers. Attempt has been made to address to this issue during XIIth Plan.

It is noteworthy that the crops cashew, coconut, areca nut, cocoa and spices in general are dealt by Horticulture Division of Department of Agriculture & Cooperation, Ministry of Agriculture whereas the crops like tea, coffee, rubber and cardamom are dealt exclusively by respective Commodity Boards under Ministry of Commerce & Industries. Similarly, Medicinal and Aromatic Plants are now dealt by National Medicinal plant Board under Ministry of AYUSH and the crop of Palm Oil is dealt by Crop Division of DAC. However, as per clarification received from the Planning Commission, the Working Group has covered all the mentioned crops for the purpose of planning for XIIth plan period.

The Working Group has studied the issue of continued low rate of public and private sector investments under schemes of horticulture development in States in eastern part of the Country, NE region and Hilly States even after introduction of mission mode interventions. Though, micro level scenario may be more complex; at macro level, the issues of economics of operation appear to be the main determining factor which is influenced by several parameters including issues relating to aggregation and evacuation of horticulture produce from production areas to consumption centres.

The Working Group has also examined the extent to which the on-going schemes of horticulture development have resulted into inclusive growth for small and marginal farmers, landless labourers, women and people from, SC, ST and OBC categories. The issues concerning horticulture development in special problem areas like NE States and Hilly Areas and Scheduled areas and the extent to which the inhabitants of such areas may have been benefited by ongoing schemes has also been examined by the Working Group.

Effort has been made by the Working Group to get the information about any systematic study based on which various figures relating to assessment of post harvest losses are being officially quoted from time to time for planning purposes. However, no

information about any scientific study carried out for making assessment of PHM losses has been received except of a recent exercise undertaken by CIPHET the results of which are yet to be published. Though, in the stated circumstance it may sound to be too much simplification of an issue of importance, the Working Group attaches weightage to consequences of PHM losses and taken its present average value to be of the tune of 30%.

Market Reforms had been outlined by introduction of Model APMC Act. However, *free movement* of horticulture produce through various States across the country, de-listing of horticulture produce from ambit of APMC Act; removal of AMPC cess on horticulture produce and allowing corporate farming are some of the new issues being raised with a view to promoting investment in organised value chain for perishables and their processing units. The Working Group has attempted to critically examine this issue in consultation with another Working Group on Agriculture Marketing and make recommendations in this respect too.

Indian horticulture has attracted attention of foreign players too; seed and planting materials have been areas of interest for them for a long period resulting into introduction of a number of hybrids of vegetables, cucurbits and melons and temperate fruits. India is now looked as a promising market-destination and arguments favouring corporate farming, foreign direct investment in supply chain management and retail marketing of fresh horticulture produce are also being advanced at various forums.

According to a World Bank report of year 2007 entitled as "From *Competition At Home to Competing Abroad: A Case Study of India's horticulture"*- while India is a large, low cost agricultural producer, its share in global agriculture exports is minuscule. India produces nearly 11 per cent of all the world's vegetables and 15 per cent of all fruits, yet its share in global exports of vegetables is only 1.7 per cent and in fruits a meagre 0.5 per cent and indicates towards vast opportunity for Indian horticulture sector in WTO regime. In addition to issues like quality production, cost of transportation etc, higher domestic price of most of the horticulture produce and a vast consumer base within the Country may also be responsible for lower levels of exports. The Working Group has attempted to analyse the issue and recommend strategy for XIIth Plan Period based on existing level of export competitiveness of the Country, which may, side by side, be further enhanced during the XIIth plan period.

A number of Central Sector (100% central grant and implemented by Central Govt) and Centrally Sponsored Schemes (funded by Centre with our without State Share but implemented mainly by States) including the schemes in Mission Mode with substantial funding have been in operation concurrently during the XIth Plan Period with the common objective of horticulture development. In addition, horticulture development initiative is essential ingredient in Comprehensive District Development

Plan prepared under RKVY. Attempt has been made to critically examine the scope of integration and convergence of Central Sector and Centrally Sponsored Schemes as well as State Sector schemes with a view to remove duplication of effort, multiplicity of implementing agencies and to put in place an efficient delivery mechanism.

Increasing urbanisation throws upon new challenges and opportunity in the form of urban horticulture. It is a multifaceted issue concerning not only urban landscaping but also relates to issues like maximising returns from unit land-area under horticulture crops, nutritional horticulture and livelihood security etc. Therefore, it had been decided by the Working Group to incorporate urban horticulture in its *Terms of Reference*.

For the purpose of simplification, growth of horticulture sector has been computed by Working Groups for earlier plan periods in terms of growth in production of horticulture sector in contrast to increase in GDP of the sector. This report seeks to continue the same practice.

Prevalent system of compilation of horticulture statistics is at a nascent stage of development; the scheme of Crop Estimation Survey (Fruits & Vegetables), which was launched as a Pilot Project in year 1983-84, continues to be so even after lapse of about 25 years. Only 11 States, 7 fruits, 2 vegetable & 2 spice crops are covered by the scheme. Statistics regarding other crops is generated by State Departments of Horticulture, Directorates, Directorate of areca nut & spices, Directorate of Cashew & Cocoa and Directorate of Economics & Statistics of DAC by process of general assessment of area and productivity. Satellite imagery technology for area and productivity assessment has been at signature verification and field level verification stage and has not reached a stage where definite statistics can be generated regarding crop wise area and productivity. Therefore, the Working Group has used horticulture statistics as approved by DAC and published by National Horticulture Board and Commodity Boards for plantation crops of tea, coffee and rubber under Ministry of Commerce.

The limitations of Market Information System in getting information about price and market arrivals of horticulture produce are considered by the Working Group. Such limitations are applicable not only for markets regulated under APMC Act, but also for cases of direct procurement by processors and organised retail chain outlets and Commodities not covered by provisions of AMPC Act. Therefore, the Market Information disseminated by public sector organisations is taken into account for the purpose of analysis. Likewise, the Working Group has sourced exports data from APEDA and sensitive imports from the web site of Ministry of Commerce & Industries, Govt of India.

There is a felt need to find innovative solution to shortage of manpower and inadequacy of service delivery mechanism in respect of scheme implementation and

rendering horticulture extension services. The Working Group has attempted to analyse intricacies of this and recommend viable solutions.

***L**ast but not the least*; this Working Group wishes that the two documents of the Planning Commission namely, Mid Term Appraisal of XIth Plan and Approach Paper to XIIth Plan could have contained a detailed SWOT Analysis for horticulture sector; resultantly interaction between the Working Group and the Steering Committee could have been more fruitful and satisfying.

Chapter 2: Horticulture Sector- Growth Trends and SWOT Analysis for Crops Covered by Schemes of DAC

Horticulture & Plantation Sector has received focused attention in our planning process from 7th five year plan period onwards; as a result, there has not only been sustained increase in production of horticulture & plantation crops but hi-tech horticulture has also been recognised as a commercial proposition. It is a fact that horticulture & plantation sector has provided opportunity of crop diversification, resulting into increased income from the land and also the nutrition security. The benefit of area expansion in horticulture in clusters supported by post harvest management infrastructure has percolated down to even small and marginal farmers a number of whom contribute to exports of horticulture produce too.

A. ***Analysis of Growth Trends of Horticulture Sector***- Area-Expansion trend analysis has been carried out by plotting the area, productivity and production of fruits, vegetables, spices and plantation crops (for cashew nut, coconut, cocoa, areca nut and excluding tea, coffee and rubber) for a period ranging from the year 1991-92 to 2009-10. Trend analysis for plantation crops of tea, coffee, rubber and cardamom has been dealt separately. From the Trend Analysis for growth of the horticulture sector following inferences regarding strength & weaknesses of our strategy of horticulture development and opportunity and risks involved may be drawn-

a. ***Production Trend***- estimated production figures for fruits, vegetables, spices and plantation crops (cashew nut, coconut, cocoa, areca nut) for period from year 1991-92 to year 2009-10 have been tabulated in Table 2.1 and shown in graphical form as Chart 2.1. It can be observed that there has been general increase in production of fruits, vegetables, spices and plantation crops however; production of vegetables has recorded very high level of fluctuations. It is also noteworthy that vegetable and spice production has recorded increase in spite of the fact that these two crops have not been substantially covered under schemes of NHM, TMNE and NHB. Further, *inference may be drawn that due to low gestation period and relatively higher rate of increase in production the vegetable and spice crops may enable us to achieve desired growth rate of horticulture sector during XIIth plan period for which there is a need for inclusion of vegetable crops in horticulture development programmes in project mode with focus on capital formation in terms of irrigation, crop protection structures, PHM and transport infrastructures, farm mechanisation etc.*

Chart 2.1

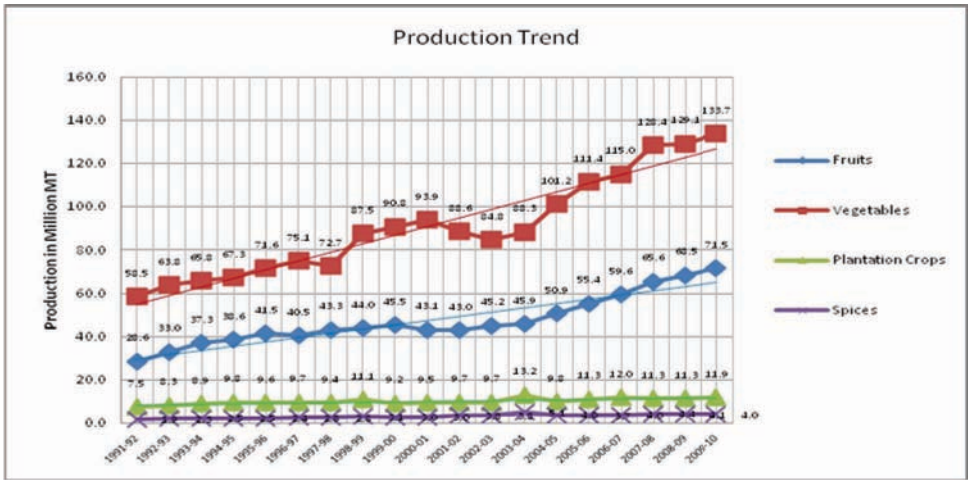


Table 2.1

Production in 000 MT

YEAR	Fruits	Vegetables	Plantation Crops	Spices
1991-92	28632	58532	7498	1900
1992-93	32955	63806	8347	2291
1993-94	37255	65787	8866	2515
1994-95	38603	67286	9767	2477
1995-96	41507	71594	9630	2410
1996-97	40458	75074	9730	2805
1997-98	43263	72683	9449	2801
1998-99	44042	87536	11063	3091
1999-00	45496	90831	9204	3023
2000-01	43138	93850	9458	3023
2001-02	43001	88622	9697	3765
2002-03	45203	84815	9697	3765
2003-04	45942	88334	13161	5113
2004-05	50867	101246	9835	4001
2005-06	55356	111399	11263	3705
2006-07	59563	114993	12007	3953
2007-08	65587	128449	11300	4357
2008-09	68466	129077	11336	4145
2009-10	71516	133738	11928	4016

b. Area expansion trend- area under fruits, vegetables, nuts, plantation crops (coconut, cashew nut, cocoa and areca nut) and spices for the period ranging from year 1991-92 to year 2009-10 have been tabulated in Table 2.2 and plotted as Chart 2.2. The trend lines for crop-area on year-to-year basis indicate that though there has been general increase in area under fruits, vegetable, plantation crops and spices during initial period followed by a phase of stagnation for fruits and vegetables during IXth plan period. The area expansion trend for fruits and vegetables has not only got restored during later half of Xth plan and during XIth plan period but the rate of growth has recorded increase. It is noteworthy that the existing Schemes of NHB were launched in the year 2000-01 followed by launch of TMNE (NE) States during the year 2001-02; which in turn was followed by TMNE (Hilly States) during the year 2003-04

and launch of ambitious scheme of NHM during the year 2005-06. There does not seem to be a clear correlation between launch of new schemes of horticulture development and area-expansion trends but it can be said that the launch of new schemes of NHB, TMNE and NHM have influenced the general preference of entrepreneurs to go in for horticulture crops.

Chart 2.2

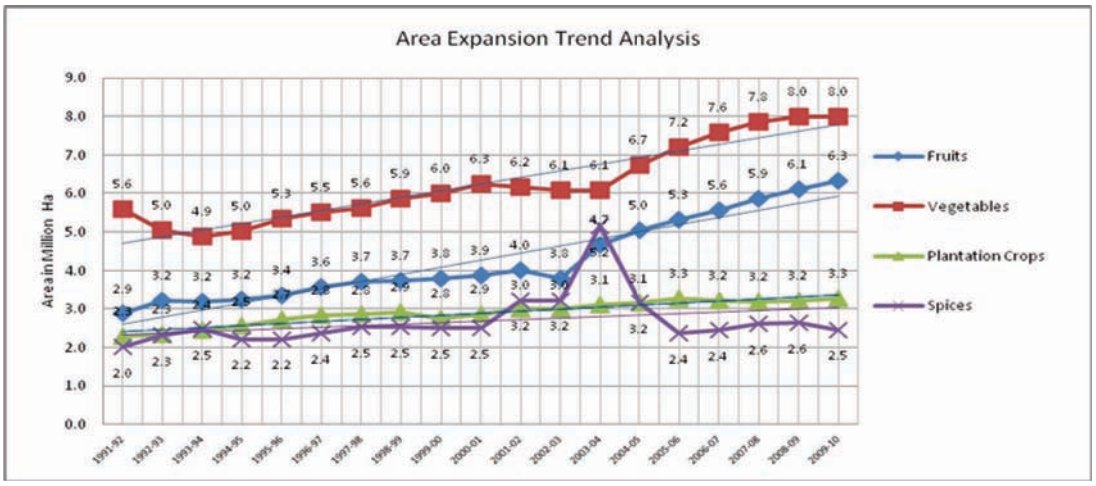


Table 2.2

Area of Horticulture Crops in "000" Ha

YEAR	Fruits	Vegetables	Plantation Crops	Spices
1991-92	2874	5593	2298	2005
1992-93	3206	5045	2337	2315
1993-94	3184	4876	2448	2472
1994-95	3246	5013	2546	2215
1995-96	3357	5335	2733	2216
1996-97	3580	5515	2824	2372
1997-98	3702	5607	2847	2524
1998-99	3727	5866	2905	2531
1999-00	3797	5993	2753	2500
2000-01	3869	6250	2862	2500
2001-02	4010	6156	2984	3220
2002-03	3788	6092	2984	3220
2003-04	4661	6082	3102	5155
2004-05	5049	6744	3147	3150
2005-06	5324	7213	3283	2366
2006-07	5554	7581	3207	2448
2007-08	5857	7848	3190	2617
2008-09	6101	7981	3217	2629
2009-10	6329	7985	3265	2464

c. Productivity trend- Productivity trend for fruits, vegetables, spices and plantation crops (coconut, cashew nut, cocoa and areca nut) is shown in Table 2.3 and plotted as Chart 2.3. *Trend lines for productivity indicate that there has been a sustained trend of increase in productivity of vegetables, though with frequent fluctuations. Frequent fluctuations in productivity of vegetables may be attributed to vagaries of monsoon and incidence of diseases like late blight in potatoes etc. This in turn, flags the need for capital investment*

in respect of production system of vegetables, which can ensure protective irrigation and also promote farm mechanisation; at the same time there is a need for plant disease forecasting and firming up and promotion of IPM protocols. On the other hand, the productivity of fruits and plantation crops have not recorded increase. As only the factor of long gestation period of new plantations of fruit and plantation crops may not fully explain this therefore; productivity of fruits and plantation crops continue to be a matter of serious concern during planning process for 12th plan period. This pattern of growth of productivity of fruits and plantation crops may be attributed to lack of linkage between area expansion programme and availability of quality planting materials, low productivity of old and senile plantations and lack of scheme components dealing with productivity of existing orchards in project mode through technology interventions, promotion of capital investment for infrastructure development etc. In addition, stagnation in productivity of spices is also a matter of concern for XIIth plan period.

Chart 2.3

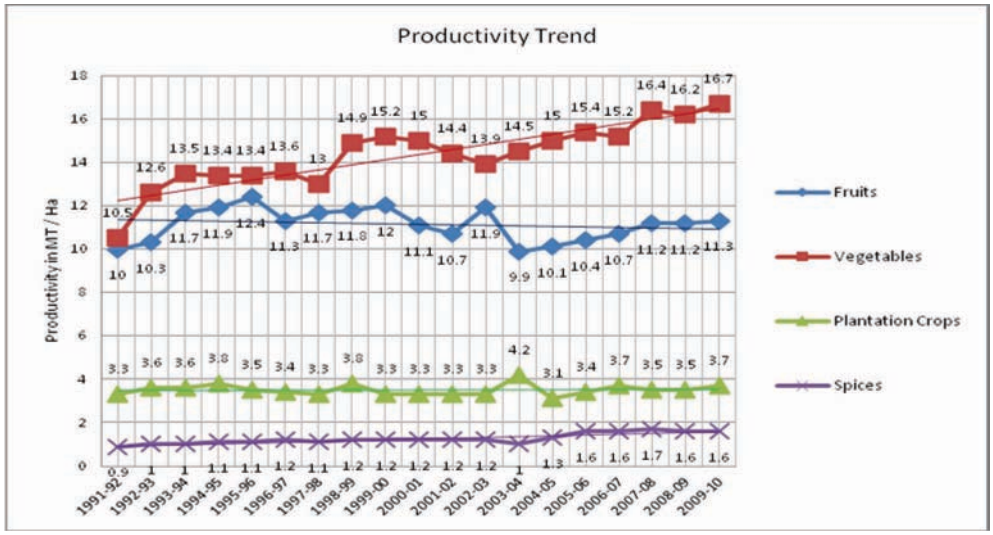


Table2.3

Productivity MT/Hectare

YEAR	Fruits	Vegetables	Plantation Crops	Spices
1991-92	10.0	10.5	3.3	0.9
1992-93	10.3	12.6	3.6	1.0
1993-94	11.7	13.5	3.6	1.0
1994-95	11.9	13.4	3.8	1.1
1995-96	12.4	13.4	3.5	1.1
1996-97	11.3	13.6	3.4	1.2
1997-98	11.7	13.0	3.3	1.1
1998-99	11.8	14.9	3.8	1.2
1999-00	12.0	15.2	3.3	1.2
2000-01	11.1	15.0	3.3	1.2
2001-02	10.7	14.4	3.3	1.2
2002-03	11.9	13.9	3.3	1.2
2003-04	9.9	14.5	4.2	1.0
2004-05	10.1	15.0	3.1	1.3
2005-06	10.4	15.4	3.4	1.6
2006-07	10.7	15.2	3.7	1.6
2007-08	11.2	16.4	3.5	1.7
2008-09	11.2	16.2	3.5	1.6
2009-10	11.3	16.7	3.7	1.6

B. Analysis of Growth Trends for Fruit Crops- It may be observed that the increase in production of fruit crops may be generally attributed to general increase in area under fruit crops whereas stagnating / sagging productivity of fruit crops is a matter of concern for XIIth plan period. For further analysis, area, production and productivity of major fruit crops has been plotted which leads us to inference that productivity of crops like banana, citrus, papaya, pineapple, guava and sapota have recorded sustained increase but the productivity of mangoes and litchi are almost stagnant or sagging whereas, grapes, apples and pineapples have recorded fluctuating productivity due to adverse weather conditions and disease infestation. These indicate towards key interventions which may be required to be made during XIIth plan period for achieving targeted growth. Moreover, addressing to productivity of banana, papaya and existing orchards of mangoes, citrus, apples, grapes and litchi may further help in achieving higher growth rate without any significant problem of marketing.

Chart 2.4

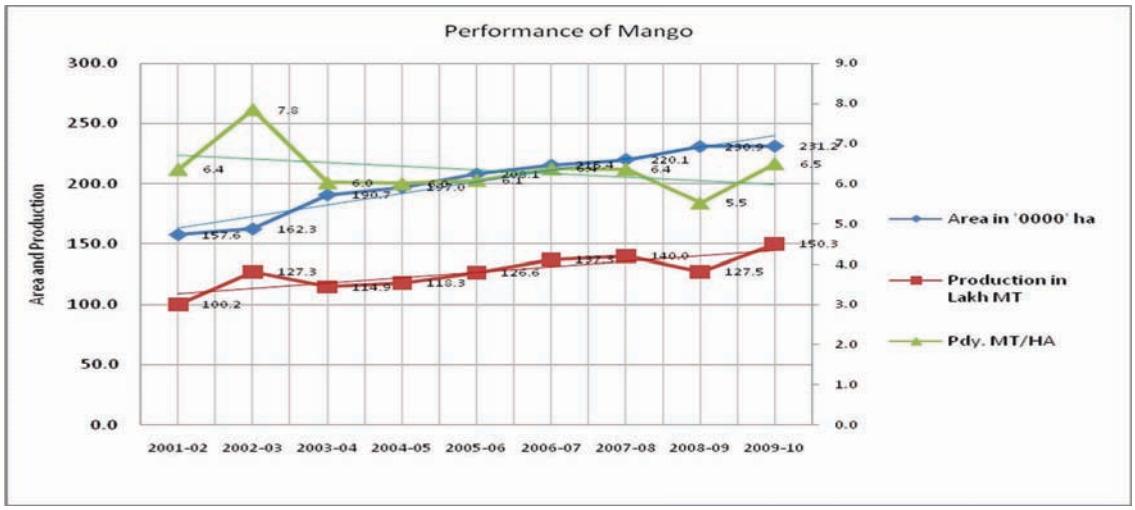


Chart 2.5

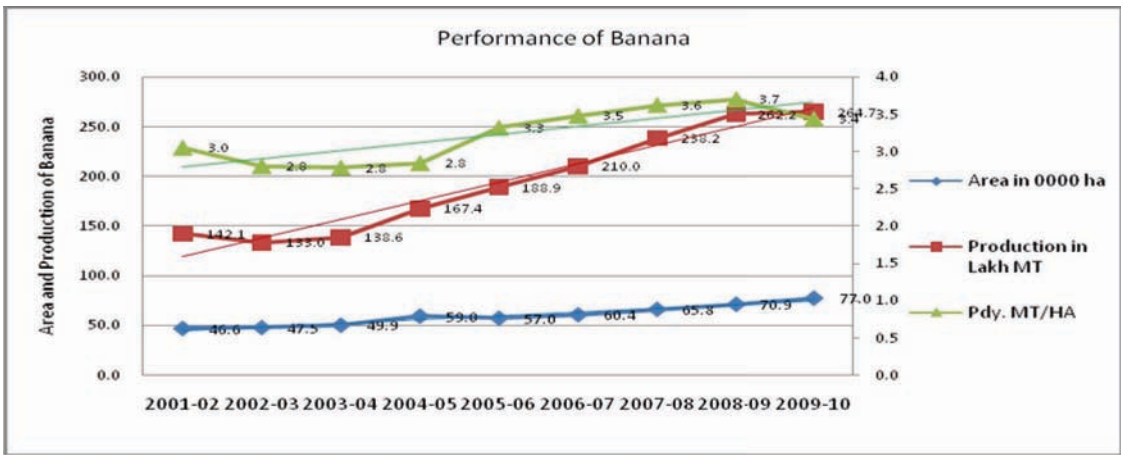


Chart 2.6

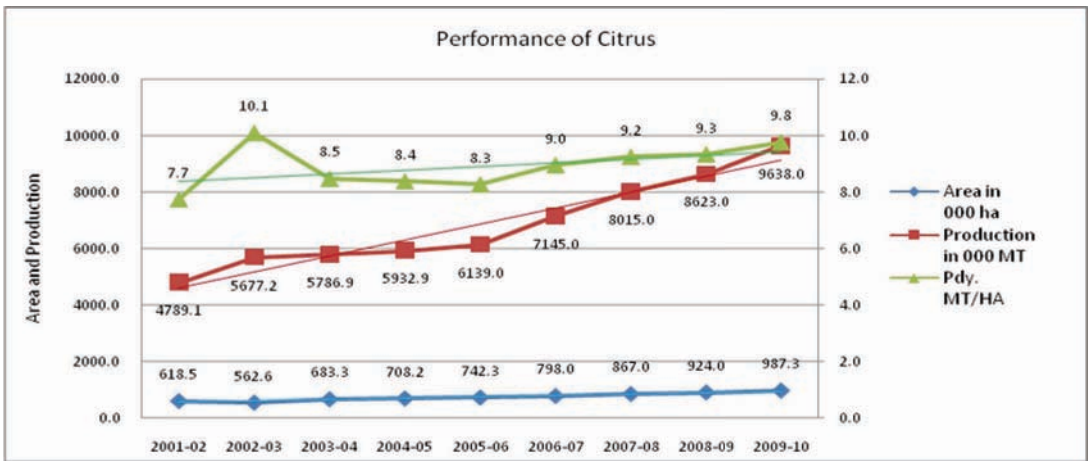


Chart 2.7

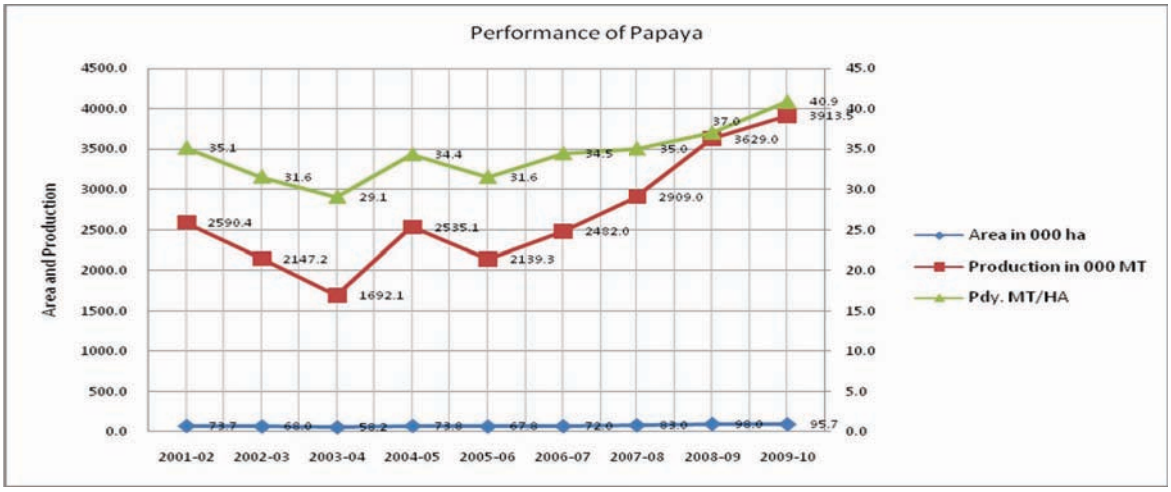


Chart 2.8

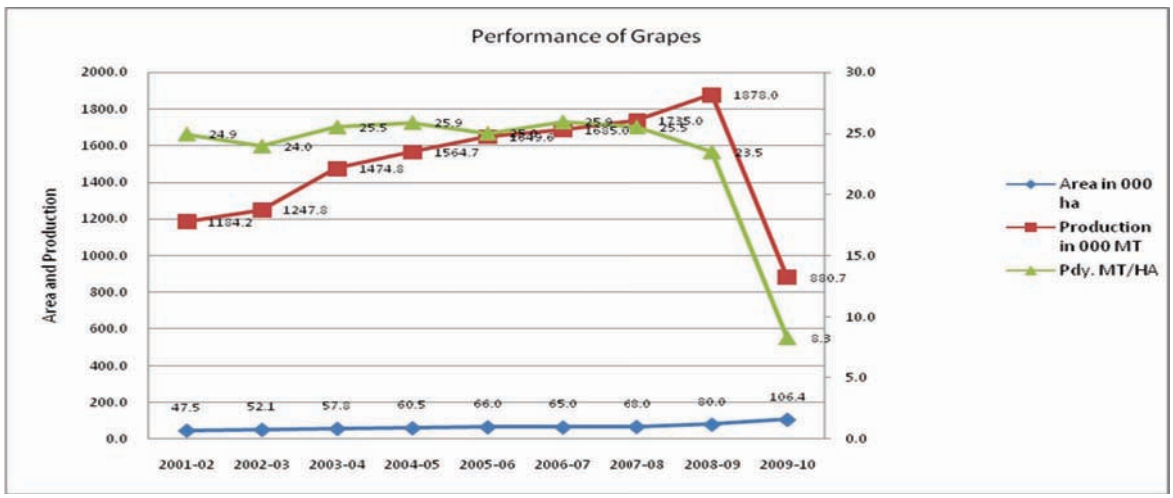


Chart 2.9

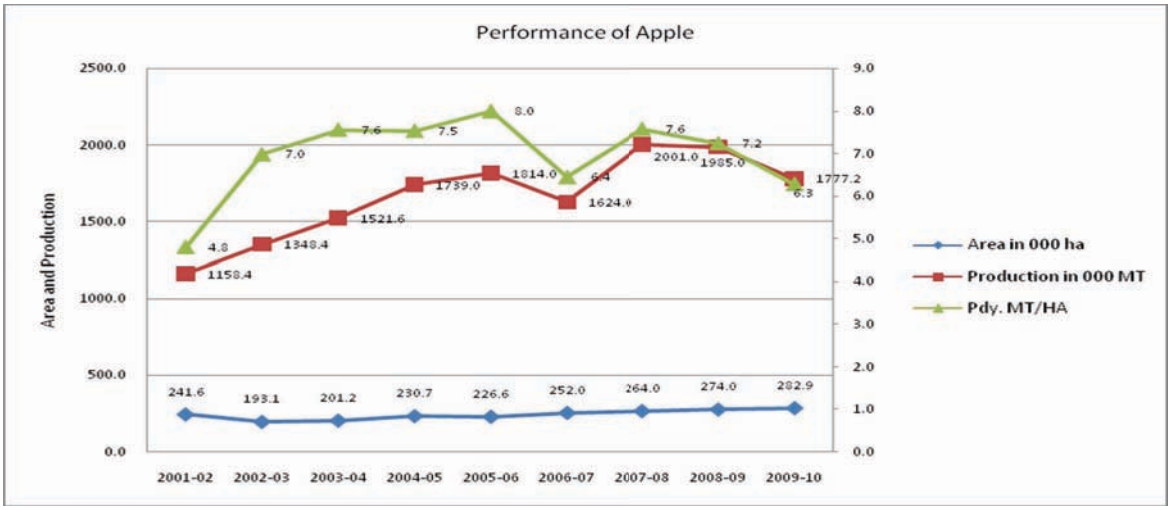


Chart 2.10

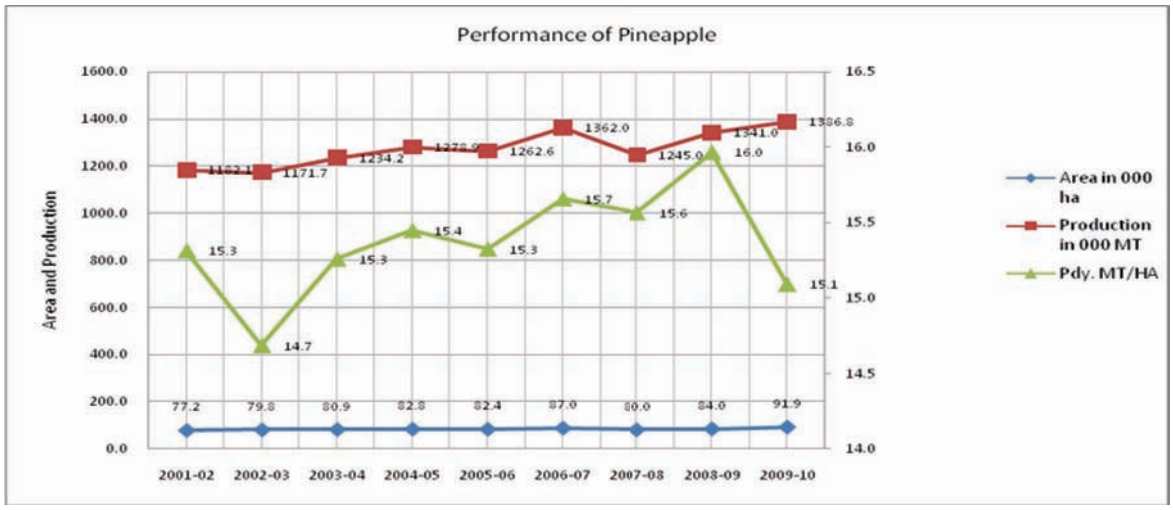


Chart 2.11

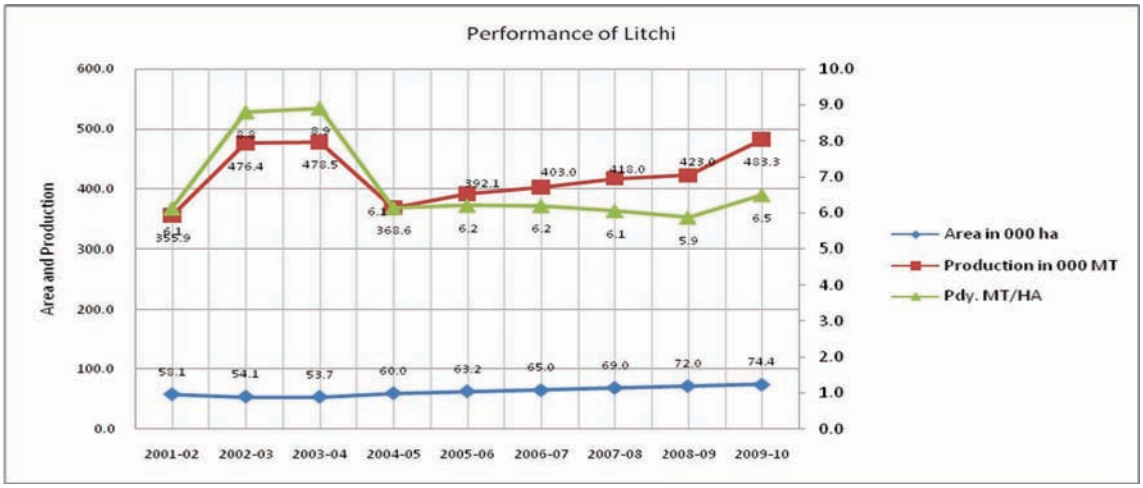
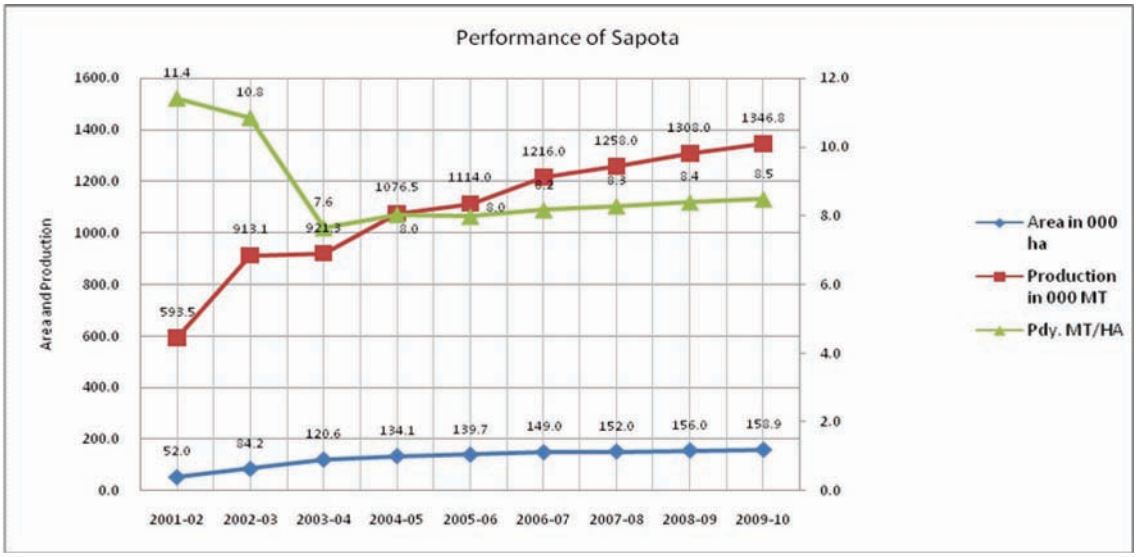


Chart 2.12



C. Analysis of Growth Trends for Vegetable Crops- As has been noticed earlier, there has been a general increase in area, productivity and production of vegetable crops during past plan periods in spite of the fact that plan schemes did not have substantial components supporting development of this crop segment. On plotting area, productivity and production of major vegetable crops for last ten years, it may be inferred that production potato, tomato and onion have been fluctuating to influence the production very much. Similarly, productivity of peas and cabbage are not recording sustained growth.

Chart 2.13

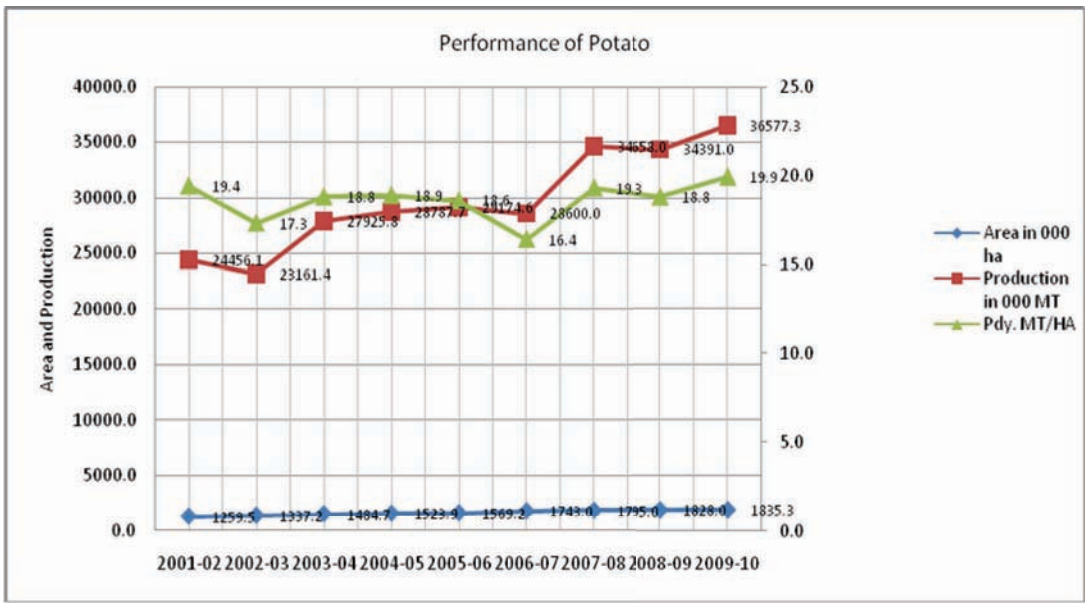


Chart 2.14

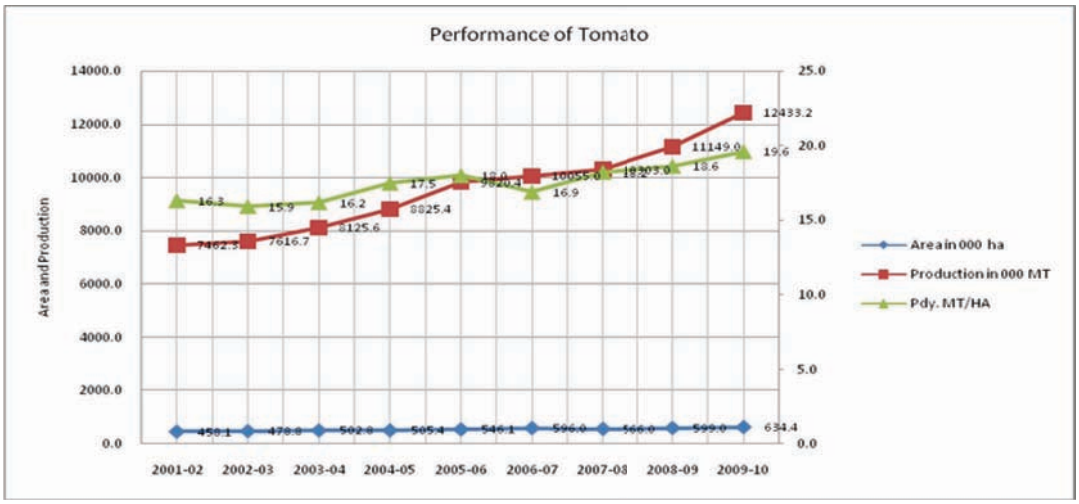


Chart 2.15

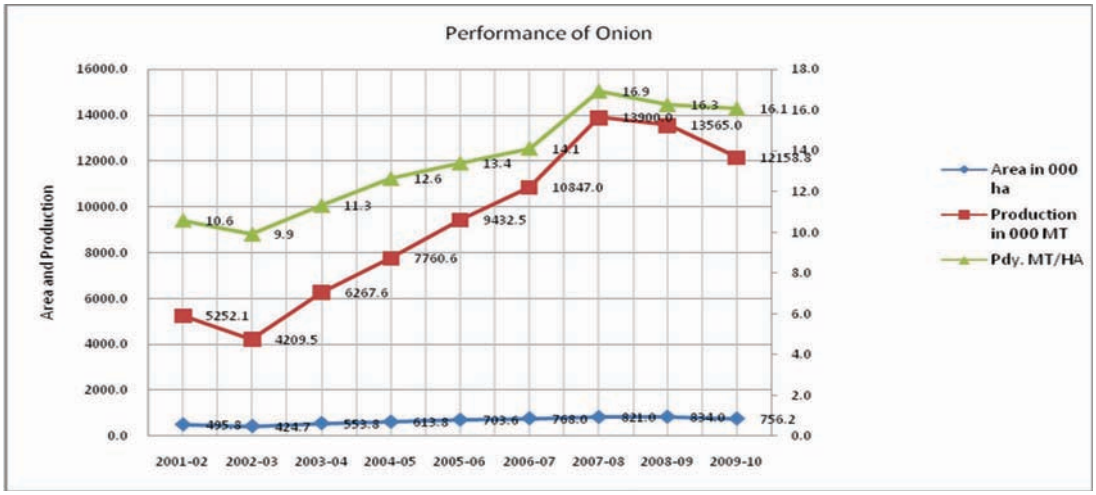


Chart 2.16

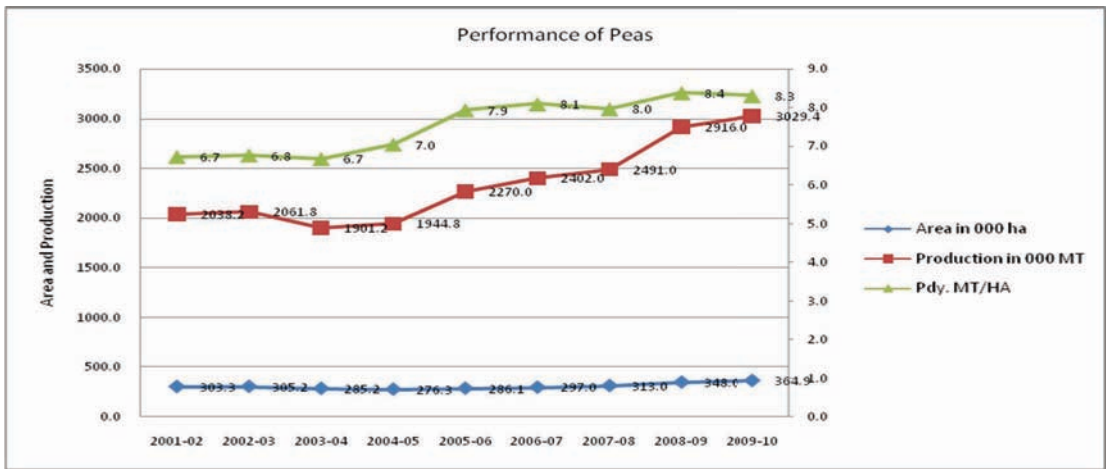


Chart 2.17

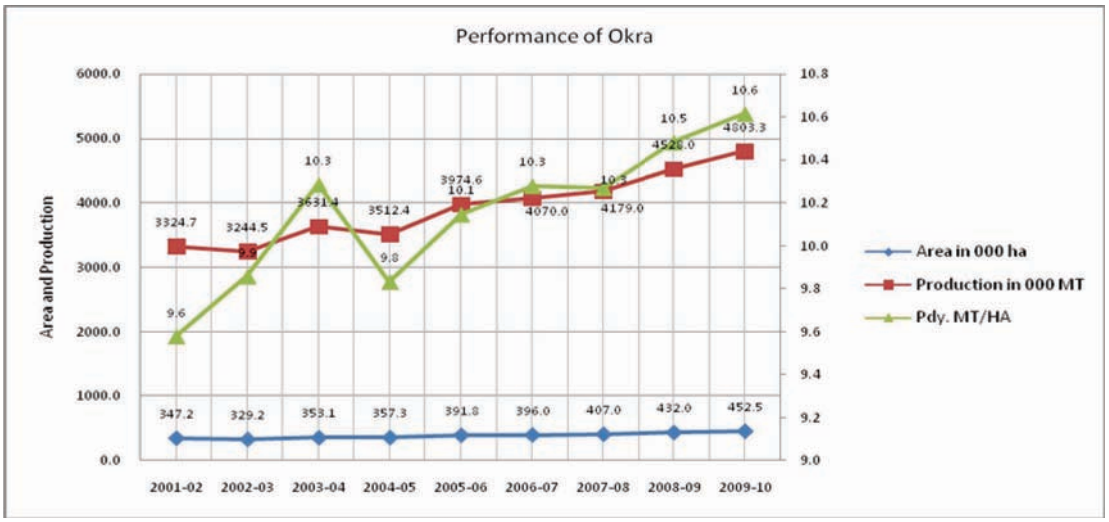


Chart 2.18

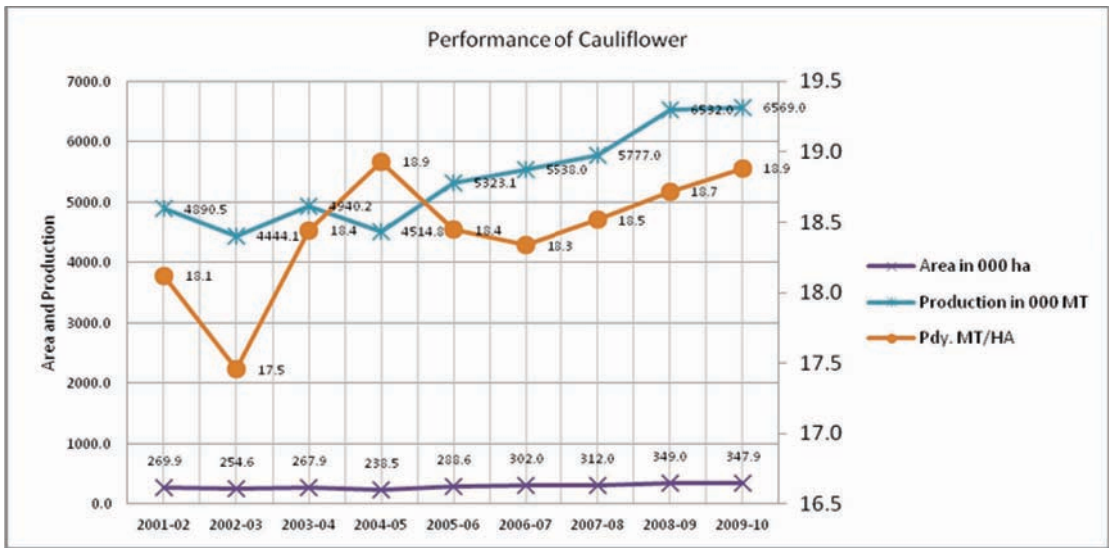


Chart 2.19

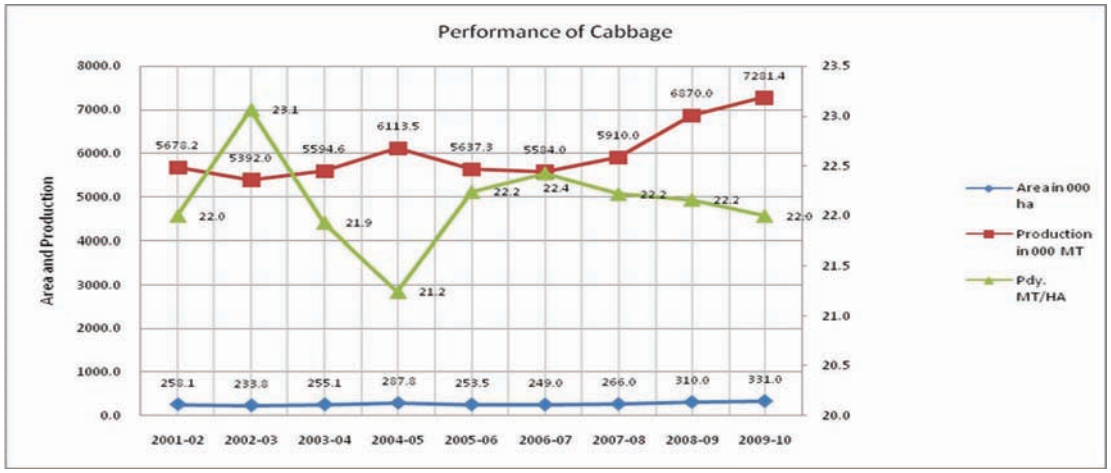
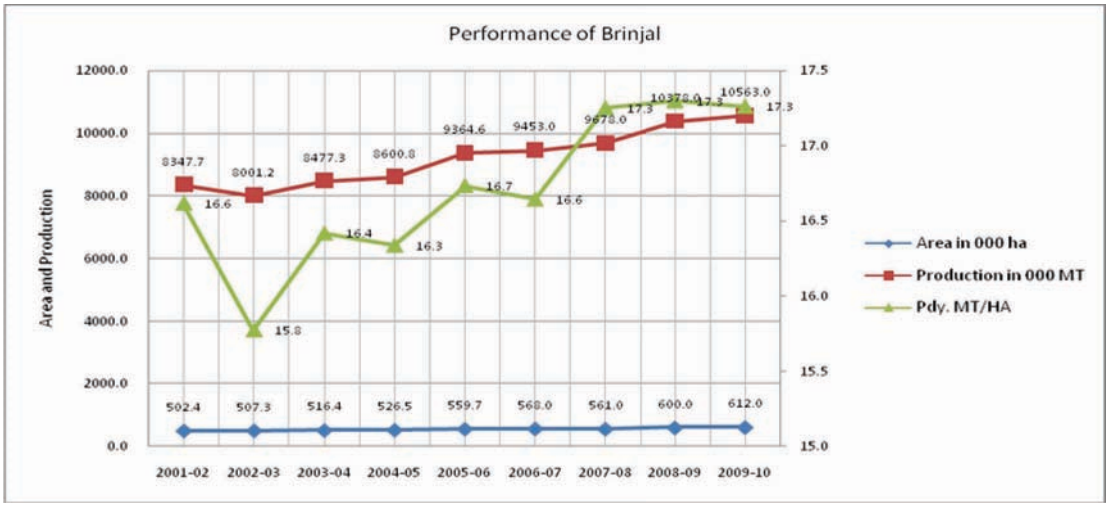
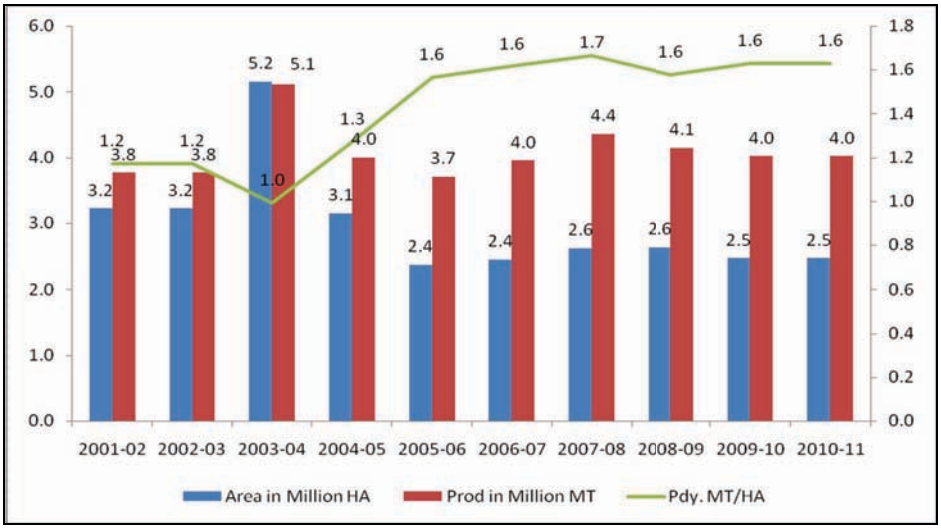


Chart 2.20



D. Analysis of Growth Trend of Spices- Area, production and productivity trend for spices too is a matter of concern for XII[th] plan due to stagnation which will not only adversely affect our exports of spices but may compel us to import the same. This segment of crop has also been analysed in details for which area, production and productivity for 8 varieties of spices over a period from year 2000-01 to 2009-10 has been plotted and trend is analyzed as follows-

Chart 2.21
Area, Production & Productivity Growth Pattern for Spices Crops



i. *Analysis of Growth Trend of Tuber Spices-* It is observed that area of turmeric has not recorded sustained growth; its production and productivity has been stagnant during XI[th] plan period. But, area, production and productivity of ginger has recorded sustained growth.

Chart 2.22

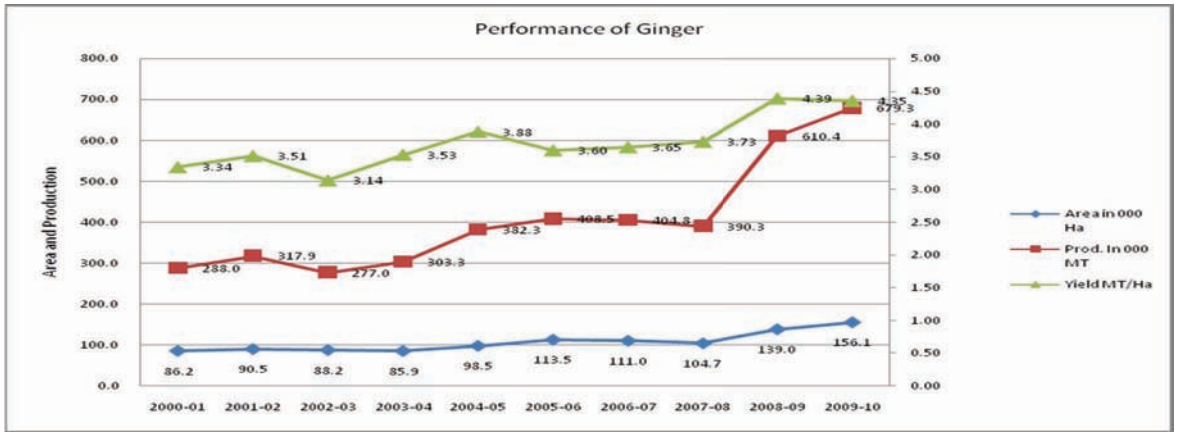
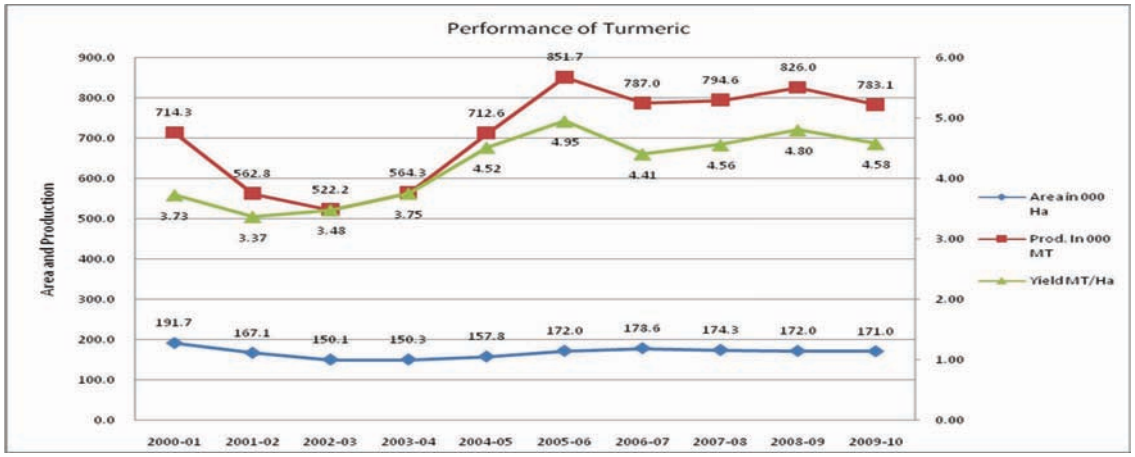


Chart 2.23



ii. ***Analysis of Frowth-Trend of Seed Spices***- It is also observed that pepper and cardamom have not recorded growth in terms of area, production and productivity during XIth plan period but corriandor, cummin, fennel and fenugreek have shown improvement in area, production and productivity during XIth plan period.

Chart 2.24

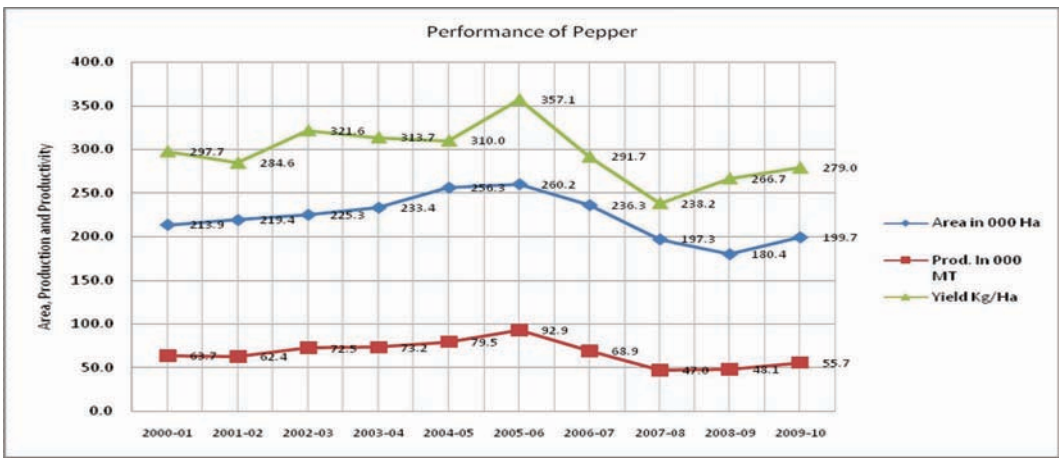


Chart 2.25

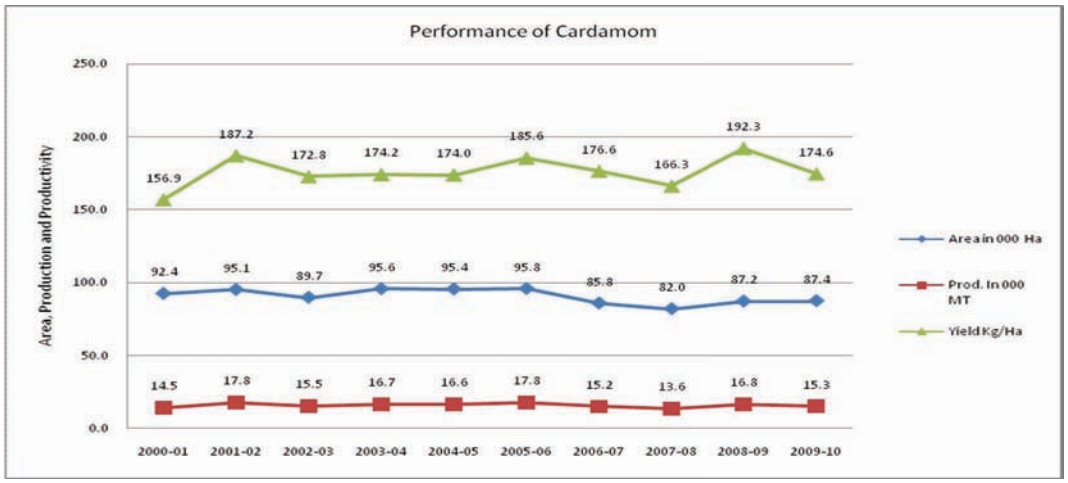


Chart 2.26

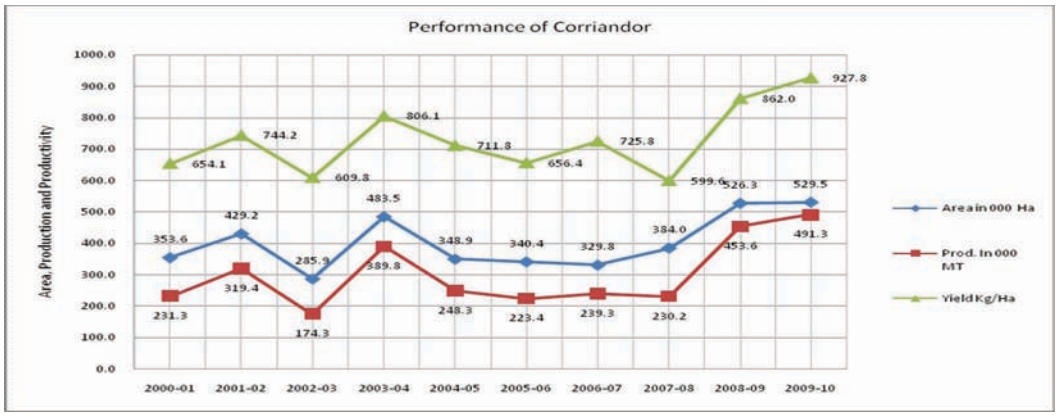


Chart 2.27

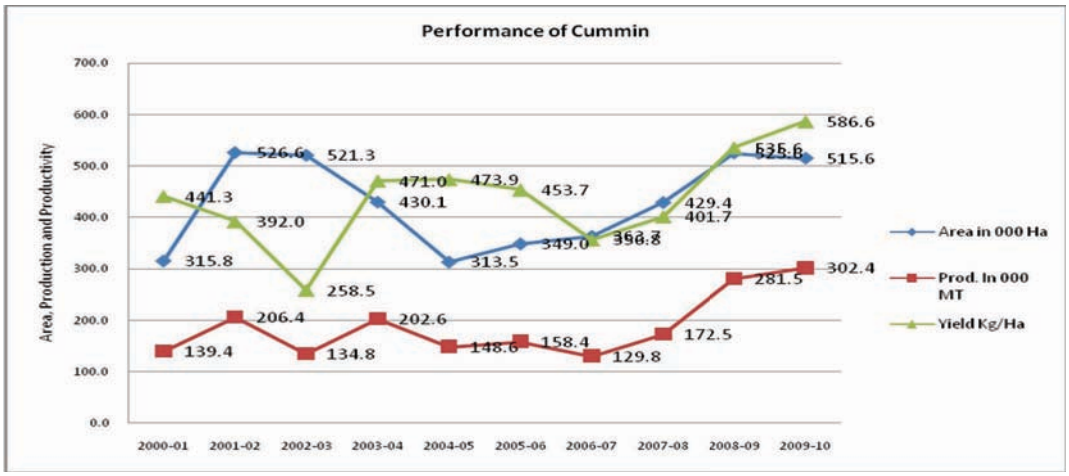


Chart 2.28

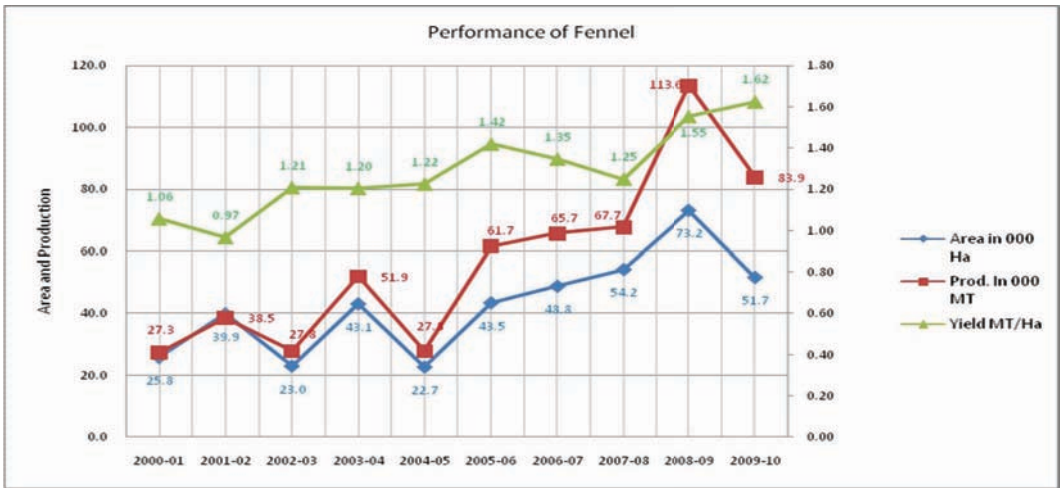
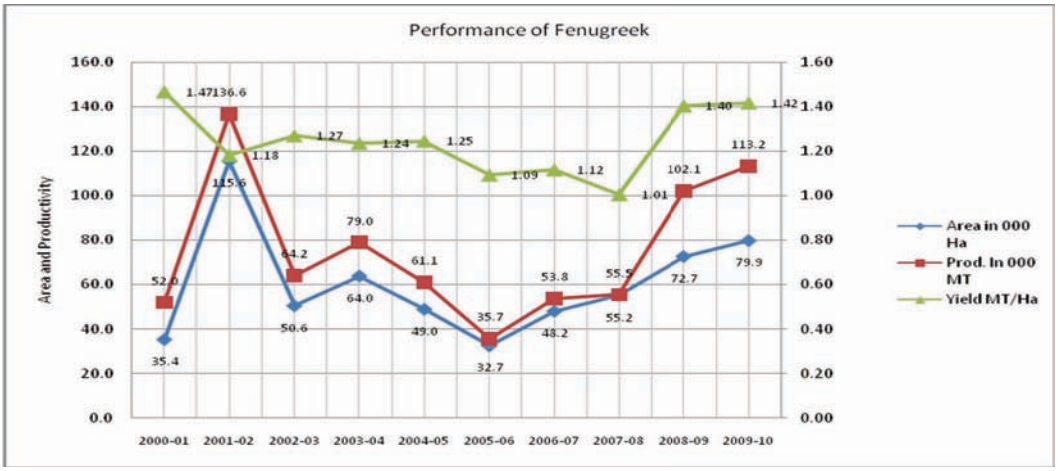
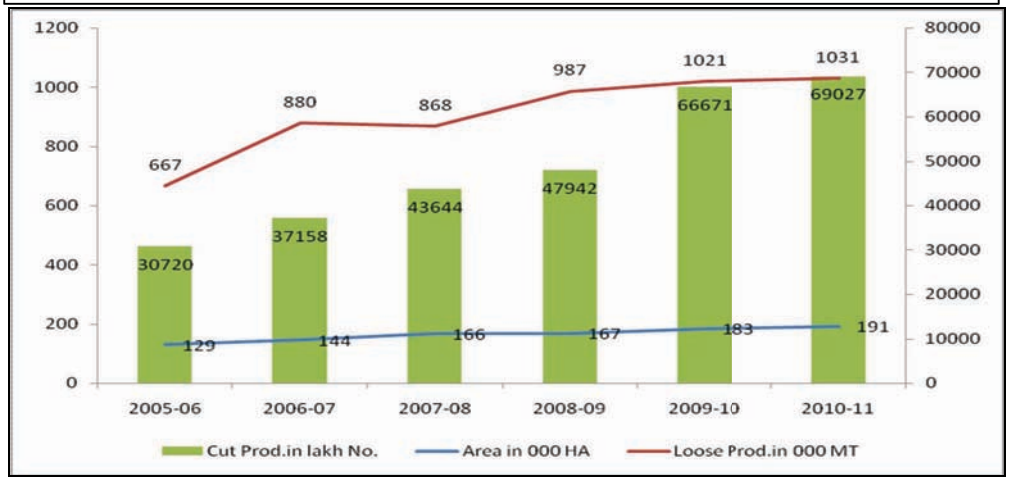


Chart 2.29



E. Flowers- During the last ten years there has been commercial scale introduction of protected cultivation of cut flowers all across the country. A number of floriculture units have become exporters of cut flowers to Europe, Middle0East, Japan, USA, Australia and SE Asian Countries. Improvement in varieties and PHM practices and development of market, even the segment of cut flowers has initially recorded impressive growth rate which has slowed down during XIth plan period mainly due to lack of packaging and long distance transport solutions. It is noteworthy that consumer demand for flowers like Merygold, Jasmine and Rose is not very much price-elastic and contributes to calculation of infletion. In the segment of cut flowers too, our exports has not been very encouraging during XIth plan period which too needs attention during XIIth plan period for achieving sustainablehigher growth rate of horticulture sector in general.

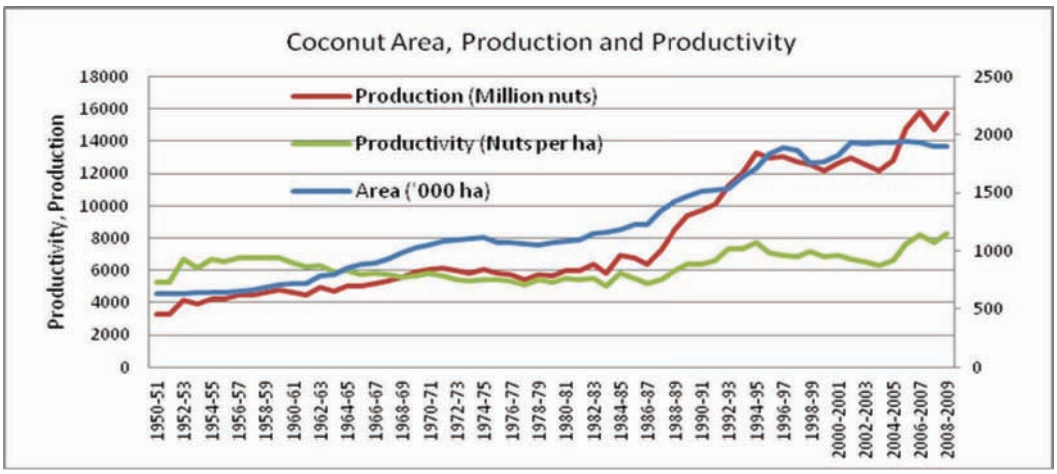
Chart 2.30
Area, Production & Productivity Growth Pattern for Flower Crops



F. Analysis of Growth-Trend of Plantation Crops-

*Coconut- C*ultivation of coconut crop has extended in traditional and non-traditional areas during a long initial period from year 1960-61 onwards from a level of about 0.7 million Ha. and production level of 4.6 million nuts to 1.8 million Ha and production of about 13 million nuts in mid nineties. Now, as per estimates for the year 2008-09, India accounts for about 22.34 per cent of the world's coconut production and is one of the major players in the world's coconut trade and the crop was grown in 1.894 million ha with an annual production of nearly 15730 million nuts. The area, production and productivity trend characterized by graph below indicates stagnation in area, production and productivity of coconut during intermittent long periods and lastly during past over a decade.

Chart 2.31

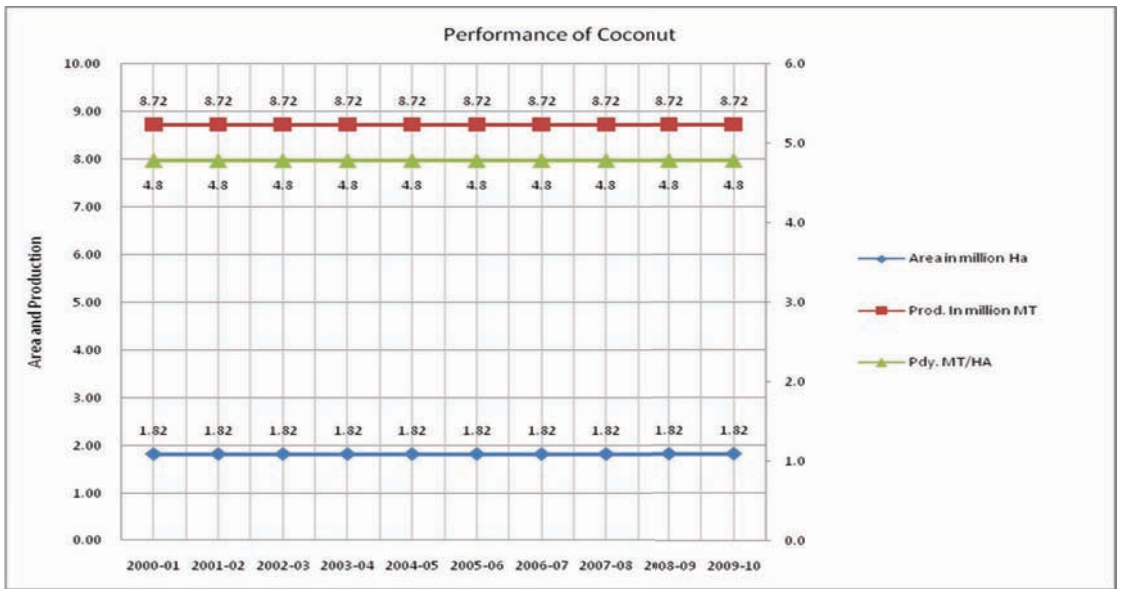


Source- Coconut Development Board

Though, copra processing, coconut oil extraction and coir manufacturing are main traditional coconut based industries in the country, it has been a fact that the price of the coconut in the country has been dependent on the prevailing price of coconut oil which is characterized by recurring violent fluctuations. The behaviour of coconut oil price is relatively dependent on overall supply of oils and fats in the country. The

fluctuation in the price of the coconut oil simultaneously reflects on the price of coconut. The volatile price situation often ends in the negligence of the coconut gardens, leading to attack of pests and diseases and low productivity. Stagnant in area, production and productivity of coconut crop during last decade ranging from year 2000-01 to 2009-10 as reported by CDB is plotted below-

Chart 2.32



Source- Coconut Development Board

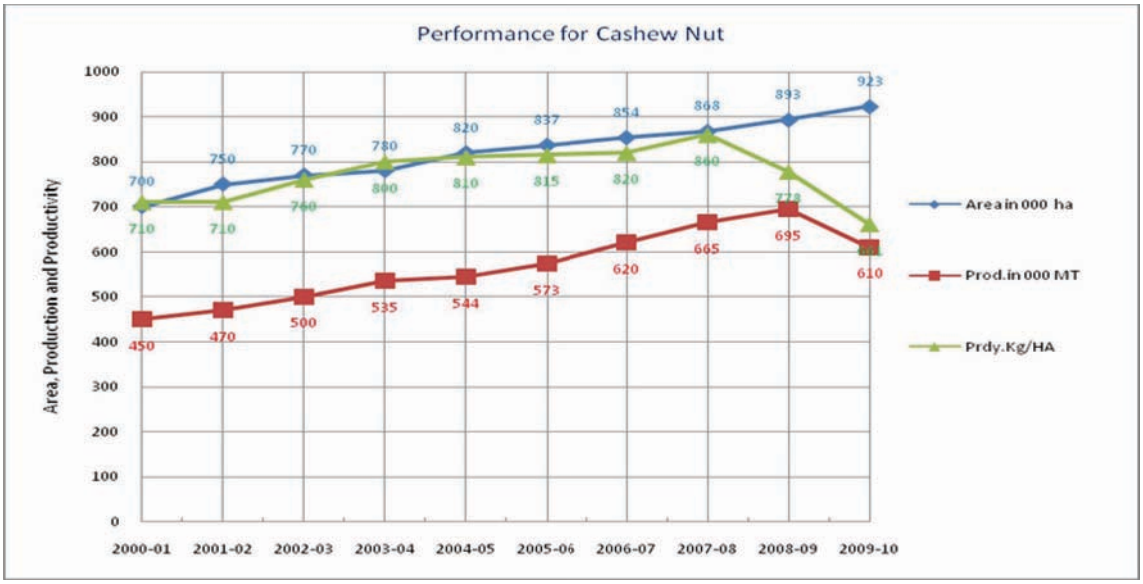
The problems of low income from the coconut holdings due to price fluctuations and decline in the prices of coconut and its products necessitated the need for the development of appropriate coconut based farming systems to enhance the farm level income and the development of broad based processing technologies for the sustainable growth of the industry. However, imposition of stiff import duties on the edible oils and restriction on import of the coconut products played an important role in keeping the domestic price high which has the side-effect of structural rigidities in the coconut industry which has kept a hold on performance of coconut industry. The industry has not been able to unleash its true potential mainly because of its oil driven market and therefore, the sector has recorded stagnation in area, production and productivity of the coconut plantations.

Consequent to the liberalization of the Indian economy, the domestic coconut industry has not been catching up commensurate with the growth of other world leaders like Philippines, Indonesia, Thailand and Sri Lanka. However, new vistas could be opened up in value addition and products development due to the timely interventions and concerted efforts of the organizations like Coconut Development Board, Central Plantation Crops Research Institute, Central Food Technological Research Institute, Defence Food Research Laboratory, Regional Research Laboratory, SAUs etc. by development and infusion of appropriate technologies which have resulted in value

addition in coconut and emergence of variety of products in edible and non-edible sector. Now, the coconut industry has realised the imperative need to become competitive and the industry is now undergoing modernization, product diversification and by-product utilization and restructuring process. Consumer demands for varied high value coconut products have started recording increasing trend and hence the domestic industries have become vibrant. Price for coconut products has been on an upward trend. The market promotional measures undertaken in pursuit of the popularization of health benefits of coconut oil and tender coconut water have attributed a stimulating effect on the less dependency of coconut oil driven coconut economy. This in turn would help make the industry globally competitive.

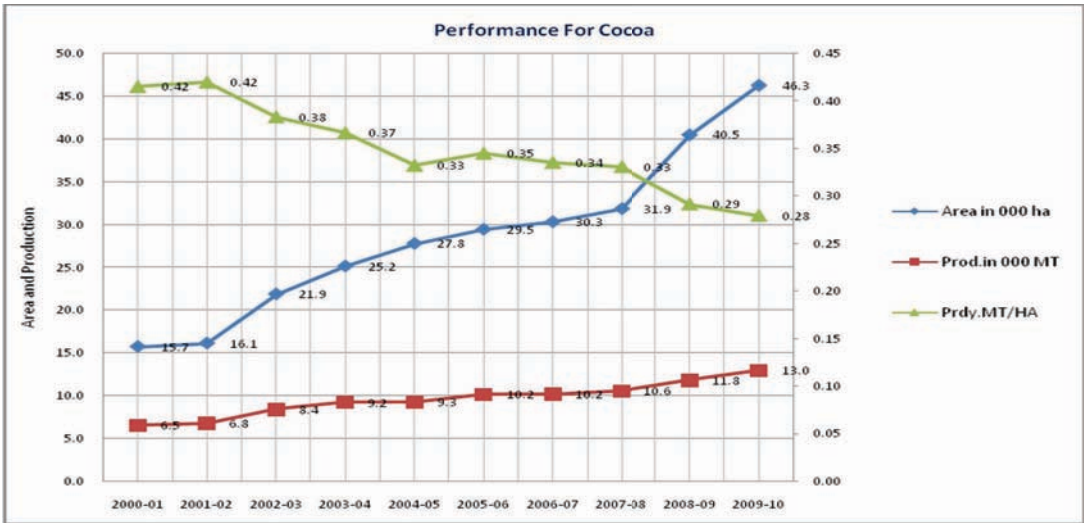
Cashew Nut- Though area and production of cashew has been increasing in non-traditional areas of Odisha, Jharkhand, West Bengal and NE States, its productivity is recording decline during XIth Plan period. There is vast scope for expanding area under cashew in the plains (Maidan Pradesh) of Karnataka, Chattisgarh and non-traditional areas of Gujarat, Jharkhand, North Eastern Hilly Region and Andaman and Nicobar Islands. About 40,000 ha of area can be brought under cashew in Chattisgarh state alone and considerable area can be identified for cashew cultivation in other non-traditional areas also. About 7.50 lakh ha of total potential area is estimated to be available for cultivation of cashew in different cashew growing states. Annually, about 50,000 ha of fresh cashew area is added, by planting about 10 million cashew grafts at the rate of 200 plants per ha. The technique of rejuvenation is not found to be successful in all parts owing to the incidence of cashew stem and root borers (CSRB) in the top worked trees. Presently, this method of rejuvenation is not widely practiced and no specific area can be demarcated in this activity. However, rejuvenation is possible in old and senile gardens if plant protection measures are taken up against CSRB.

Chart 2.33



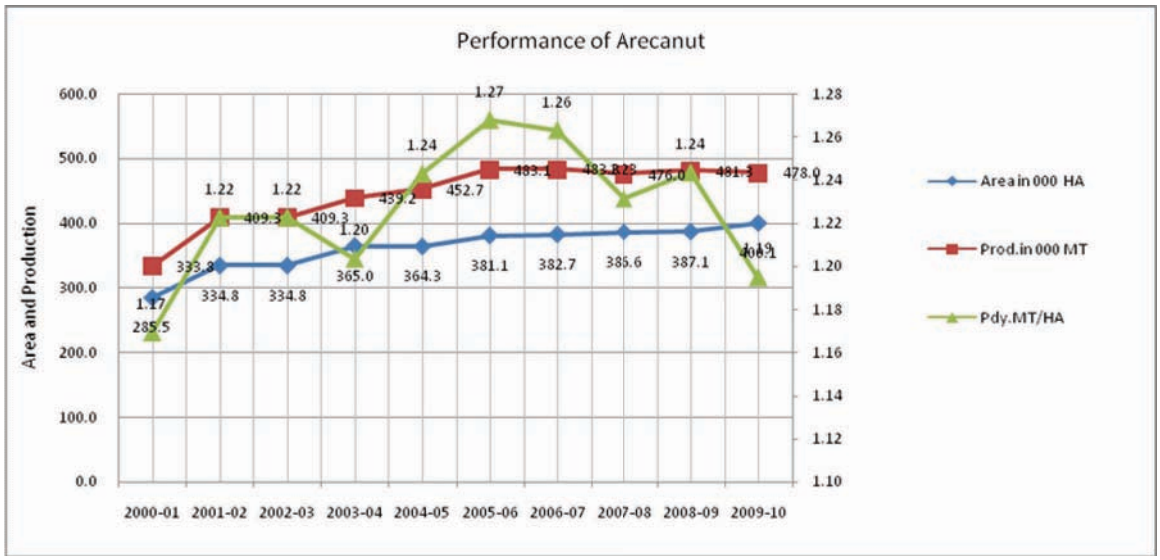
Cocoa- Area and productivity of cocoa too has recorded increase, and may be due to gestation period of new plantations the productivity is recording decline.

Chart 2.34



Areca nut- This crop is not favoured with assistance under schemes of NHM, HMNEHA and NHB treating it as part of "gutaka- tobacco" culture. In spite of this, this crop is recording increase in area and production. Decline in productivity of areca nut may be attributed to gestation period of new plantations. There is a need for clear policy statement and development pogrammes for this crop during XIIth plan period.

Chart 2.35



No doubt, the impact of all the interventions made is seen in sustained growth trends of horticulture sector in terms of area expansion, production and productivity. Not only that there is handsome increase in area under horticulture crops during this period, but the

fact is that hi-tech horticulture has been adopted by our farmers, horticulture has been accepted by all as a commercial proposition, credit institutions have moved forward for funding horticulture related projects and gaps in inputs, extension and technology have been identified so as to address to the issue of productivity, quality of production, export competitiveness etc.

G. ***Mushroom*****-** Seasonal production of mushroom in cottage sector has been remarkabe development as a result of interventions under various schemes of horticulture development. However, even economically viable technical design and standards for hi-tech mushroom production unit has not been introduced by any of the agencies in public sector. NHB under technical support from NRC Mushroom and management consultancy support from IIM Bangaluru has not been able to come out with a commercially viable production and business model for economically viable,hi-tech mushroom production and business model. During XIIth plan period, this needs special attention.

H. **Honey-** Honey bees are one of the most important beneficial insects primarily yielding honey and wax besides bee pollen, royal jelly, bee venom and propolis. They are also doing yeoman service to man by pollinating various agricultural and horticultural crops and play a vital role in conserving biodiversity of plants by acting as "Natural Breeders". Honey bees have coevolved with flowering plants and have undergone several morphological, anatomical and nutritional adaptations and have emerged as the most reliable sources of crop pollination in the world. Due to their high floral constancy, individual bee makes repeated visits to the same floral sources till it is exhausted. Experiments conducted in various parts of the world have demonstrated significant increase in seed/ fruit yield in cross-pollinated crops. Cross pollination by honey bees provides the plant species with greater genetic variability in the off-springs than that by self pollination, thereby providing the plant species greater opportunity to produce new varieties enabling them to adapt to new environments and to occupy different ecological areas.

India is blessed with all the species of honey bees mainly *Apis cerana, Apis mellifera, Apis dorsata* and *Apis florea* in addition to sting less bees and non - *Apis* solitary bees. *A. dorsata* occurs throughout India, while *A. florea* is mainly confined to peninsular, Western and Eastern India. *Apis mellifera* beekeeping is practiced in Punjab, Haryana, Bihar, Uttar Pradesh, Jharkhand and parts of Himachal Pradesh and Jammu & Kashmir. *Apis cerana* beekeeping is traditionally being practiced in peninsular India, Himachal Pradesh, Jammu & Kashmir and North- East India. India is also bestowed with different ecosystem as well as diversified bee flora with very high potential in high honey yield and other hive products. However, in spite of many government and non government agencies involved in promoting beekeeping, significant progress has

not been achieved so far. Even in absence of data from formal source in this regard, it is felt that honey production has not recorded expected growth inspite of concerted effort under various horticulture development programmes thorugh an organisation named as National Bee Board set up in PPP mode.

The dwindling production of honey may be first attributed to the outbreak of Thaisac brood virus disease during 1976 in India, more than 90 per cent *Apis cerana* bee colonies were lost which resulted in a catastrophic decline in honey yield. *Apis mellifera* bee colonies suffer from ravages of brood mites, predatory birds and wasp. Present state of stagnation in production of honey may be attributed mainly to-shortage of honey-bee colony and standard bee keeping equipments and lack of skilled human resources.

There is also a conceptual dimension to the problem of promotion of bee-keeping under programmes of horticulture development. Honey-bee-keeping is being promoted under such programmes of horticulture development by way of pollination support for increased production of horticulture crops. Honey production is, in other words, a by-product of pollination support initiative under horticulture development programmes. Bee keeping for only pollination support for any one horticulture crop may not be economically viable proposition unless it is adopted as an all-season economic activity which inter alia means management of bee colonies after the flowering season of horticulture orchard is over, including the general lean period when the pollination availability is at its lowest level. It also involves aspects of pest and disease control of honey-bee colonies.

Not only stagnation in production but lack of small scale processing technology and a system of traceability and quality control is adversely affecting the growth of this sector. The problem is further aggravated by absence of scientific prescriptions for disease control in European species of honey bee and indiscriminate import of chemical laden honey from neighbouring countries by certain exporters which has resulted into ban of import of Indian honey by EC Countries during XIth plan period. Therefore, bee keeping and honey production is yet another area of concern for XIIth plan period.

Honey production, processing and marketing is also looked after by Khadi & village Industries Boards. But the major problem of shortage of honey-bee colonies, securing availability of pollens by facilitating migration of bee boxes, small scale processing units, lack of availability of prescriptions regarding pest & disease control in bee-colonies and quality control need to be addressed by any central agency for which coordination among Ministry of Environment & Forest, Horticulture Division of DAC and Khadi & Village Industries Commission of Department of Micro, Small and Medium Enterprises, Government of India is needed most. Following developmental activities may, then be taken in coordinated manner-

i. Establishment of bee breeding centers for supply of bee colonies with improved strains
ii. Single window centers for distribution of bee keeping equipments and accessories.
iii. Establishment of hands on training centers at Talukas / districts in model apiaries
iv. Establishment of regional bee disease diagnostic centers and quality testing laboratories.
v. War footing afforestation with bee foraging tree and plant species
vi. Strengthening of existing national level Apex body by bringing all the agencies involved in promotion of bee keeping under the fold of this apex body
vii. Extension of National Insurance policy to apiculture industries
viii. Promotion of migratory beekeeping policies
ix. Development of scientific human resources
x. Inclusion of Apiculture in the curricula from middle school to degree level
xi. In line with krishi mission, national horticulture mission, organic mission a separate Bee keeping mission may be initiated
xii. Declaring all honey bee species as national assets and bringing them under relevant acts (wild life/biodiversity act)
xiii. Development of non-destructive methods to extract honey from wild bee species
xiv. Popularizing beekeeping among women folk and tribes
xv. Use of safer/bee friendly pesticides
xvi. Preparation, extraction and popularization of plant species based branded honey (Coriander honey, Honge honey etc.,)
xvii. Development of literature and audio-video tools to promote beekeeping

The above SWOT analysis for horticulture sector will used for setting out growth target and strategy for XIIth plan period.

Chapter 3
Other Plantation Crops, Oil Palm, Medicinal and Aromatic Plants- Growth Trends and SWOT Analysis

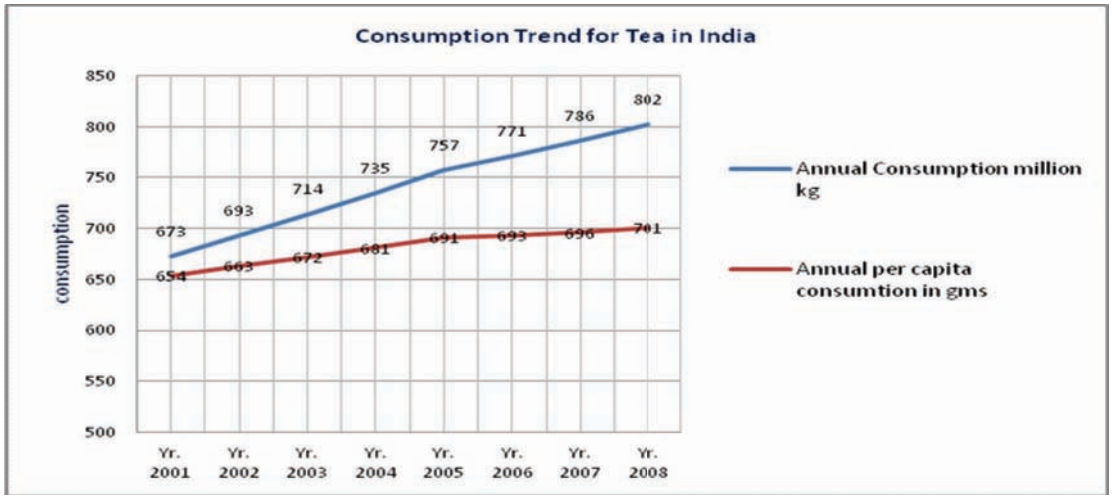
Background- Plantation crops of tea, coffee, rubber, cardamom, oil palm and medicinal & aromatic plants have been analysed in this chapter. Out of the fore-mentioned crops, tea, coffee, rubber and cardamom are dealt by respective Commodity Boards under Ministry of Commerce; oil palm is dealt by Crops Division of Department of Agriculture & Cooperation, Ministry of Agriculture and medicinal plants by the Department of Ayurveda, Yoga Naturopathy, Unani and Homeopathy, Unani, Siddha and Homeopathy (AYUSH). In view of this fact, growth trend with factors affecting the same have been analysed for making policy recommendations for XIIth plan period.

Tea- **Status of the Crop:** Currently Tea is grown in about 36 countries spread over 3.3 million hectares. The major tea producing countries are China, India, Sri Lanka, Kenya and Indonesia. These five countries alone account for 78% of world tea production and 75% of exports.

India is the largest producer of black tea as also the largest consumer of tea. It occupies the second position in the world with regard to the area under tea cultivation and is the fourth largest tea exporter in the world. Indian tea contributes to about 26% of the total world tea production. Tea Plantations in India are mainly located in the hills of North-eastern and Southern States. Major tea growing areas of the country are concentrated in Assam, West Bengal, Tamil Nadu and Kerala. The other areas where tea is grown to a small extent are Karnataka, Tripura, Himachal Pradesh, Uttarakhand, Arunachal Pradesh, Manipur, Sikkim, Nagaland, Meghalaya, Mizoram and Bihar. There are about 1,59,190 tea holdings with an area of 5.79 lakh hectares of which 1,57,504 are small holdings having an area less than 10.12 ha. and 1686 big gardens. About 30 lakh workers are employed in the tea sector directly or indirectly.

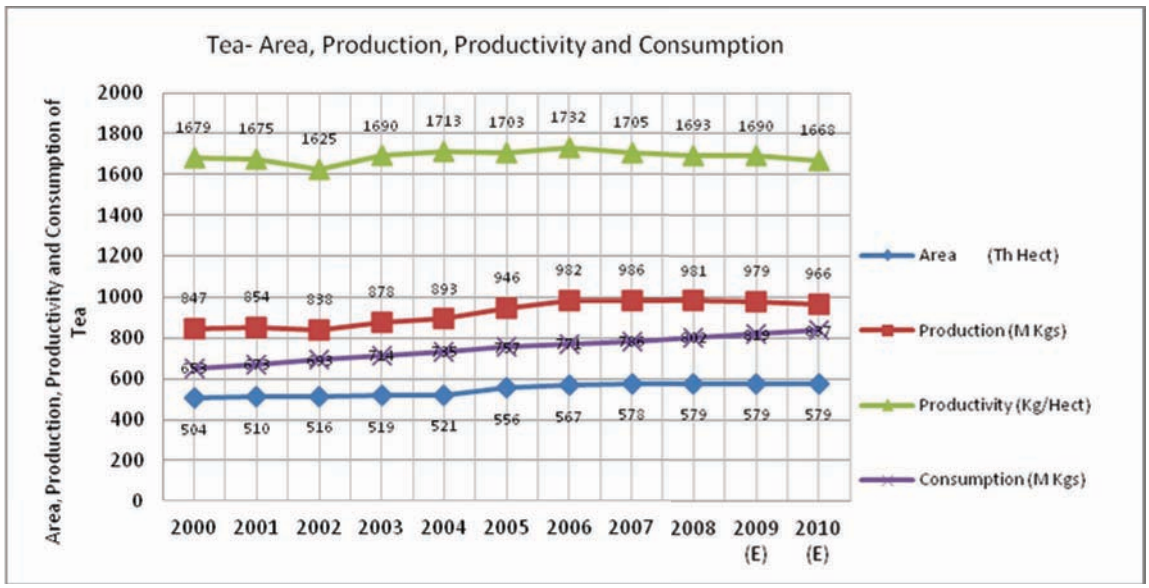
From the following graph it is clear that there has been continuous increase in overall domestic consumption and daily per head consumption of tea in India. As may be seen, while the cumulative annual growth rate in respect of area, production, imports and consumption has been positive, in respect of productivity and exports it has been negative.

Chart 3.1



The modest increase in productivity was due to low yield from old aged bushes. Nearly 40% of the total tea area is having tea bushes are senile and have crossed the economic threshold age limit of 50 years. There is, therefore, an urgent need for renovation of the field assets either by way of replanting/replacement planting or rejuvenation and consolidation. For accelerated renovation programme during the 12th plan period, there is a huge demand for planting materials.

Chart 3.2



Export and Import of tea for the period extending from year 2000 to 2010 in respect of India, as reported by the Ministry of Commerce is as follows-

Chart 3.3

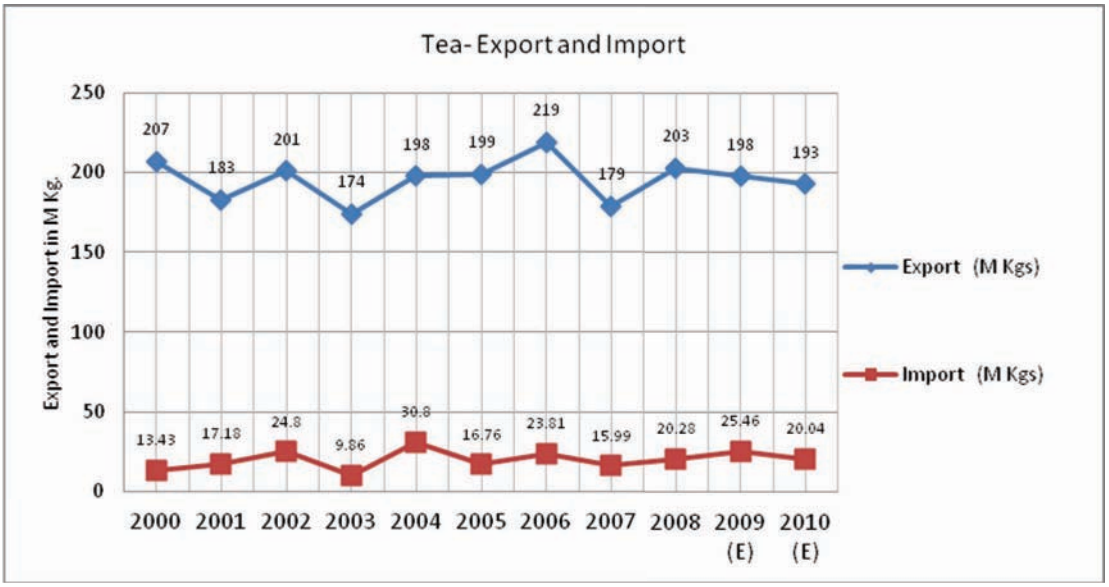


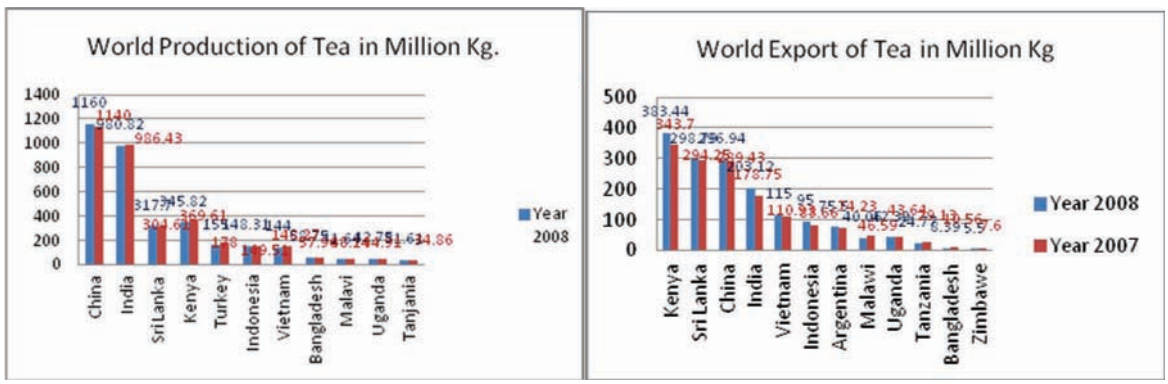
Table 3.1

Area, Production, Productivity, Export, Import and Consumption Data for Tea

Year	Area (Th Hect)	Production (M Kgs)	Productivity (Kg/Hect)	Export (M Kgs)	Import (M Kgs)	Consumption (M Kgs)
2000	504	847	1679	207	13.43	653
2001	510	854	1675	183	17.18	673
2002	516	838	1625	201	24.80	693
2003	519	878	1690	174	9.86	714
2004	521	893	1713	198	30.80	735
2005	556	946	1703	199	16.76	757
2006	567	982	1732	219	23.81	771
2007	578	986	1705	179	15.99	786
2008	579	981	1693	203	20.28	802
2009 (E)	579	979	1690	198	25.46	819
2010 (E)	579	966	1668	193	20.04	837
^{2000} CGR $_{2010}$	**1.40**	**1.32**	**- 0.07**	**- 0.70**	**4.08**	**2.51**

India's share in world production of tea has been almost constant but its share in exports has increased during last two years reported by Tea Board.

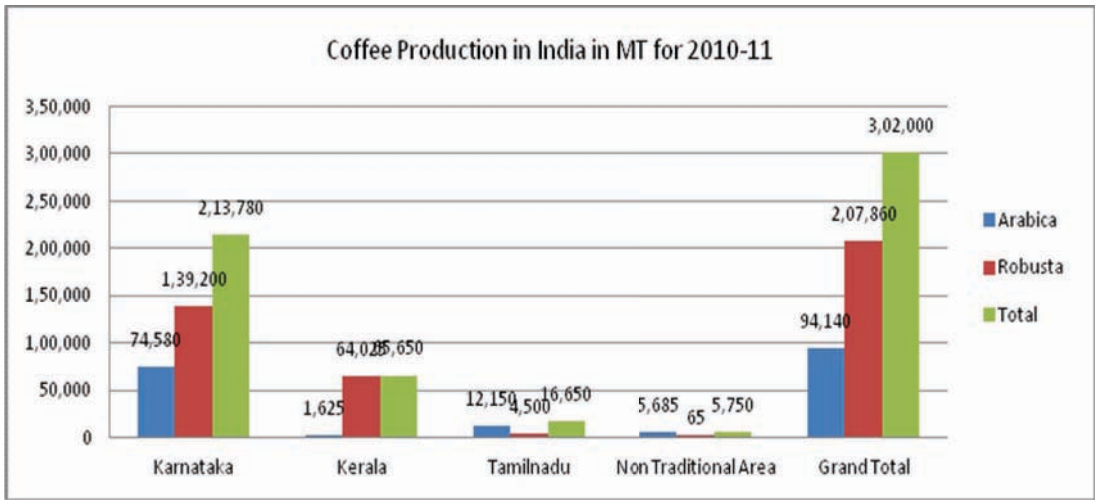
Chart 3.4 and 3.5



COFFEE-

Domestic Scenario- India is a producer of both Arabica and Robusta varieties of coffee. It is grown mainly in Karnataka, Kerala, Tamilnadu and has spread in non traditional areas too. As per report of Coffee Board of India coffee is cultivated in about 4.0 lakh hectares mainly confined to southern states of Karnataka (57%), Kerala (21%) and Tamilnadu (8%), which form traditional coffee tracts. To a lesser extent, coffee is also grown in non-traditional areas like Andhra Pradesh & Orissa as well as North eastern states (14%), with main emphasis on tribal development and afforestation.

Chart 3.6

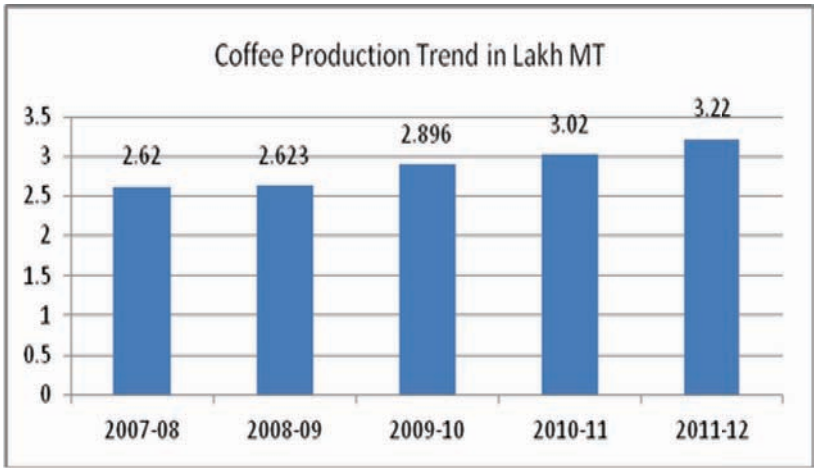


Indian coffee industry registered a remarkable progress and the area under coffee plantations increased steadily by four fold from 92,523ha to 4,04,645ha during the period between 1950-51 to 2010-11. There are approximately 2.58 lakh holdings in India, of which 99% come under small holder category (10 hectares and less). These small holdings occupy 75% of the total area under coffee and contribute around 70% of the country's production. The remaining 1% of the holdings come under large grower sector (above 10 hectares) and occupies 25% of the area and contributes 30% to the total production. Coffee sector provides employment opportunities to more than five lakh workers in growing sector and an equal numbers get indirect employment in processing and trade.

Table 3.2

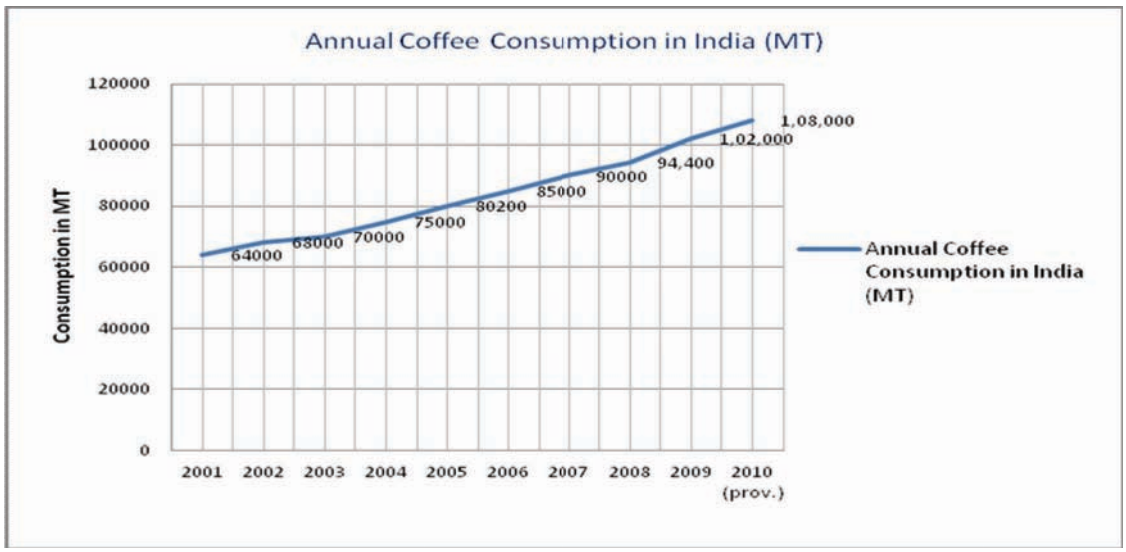
Year	Coffee Consumption in India (MT)
2001	64000
2002	68000
2003	70000
2004	75000
2005	80200
2006	85000
2007	90000
2008	94,400
2009	102,000
2010 (prov.)	1,08,000

Chart 3.7



***Domestic Consumption of Coffee*-** Domestic consumption of coffee is increaing steadily.

Chart 3.8



***Crisis Period for Coffee*-** The period from 2001-02 to 2004-05 has been categorized as most severe crisis period in the history of Indian Coffee. Due to excess supply in the world market, the coffee prices fell sharply and reached their lowest levels in a century. Because of un-remunerative prices, growers could not maintain their estates. Besides, the coffee growing regions experienced prolonged drought during the period from 2002 to 2004 which not only reduced the yields but also encouraged outbreak of major pests and diseases like White stem borer and leaf rust. The combined effect of low prices and adverse weather conditions has produced a devastating effect on the overall economy of coffee growers. The growers failed to service their bank loans and defaulted. Thus most part of the X Five Year Plan period, the coffee industry was in great distress. The Govt. of

India announced many relief measures like Special Coffee Term Loans (SCTL), Interest subsidy on working capital loans etc. In addition to the relief provided by the Government, the weather conditions and coffee prices have started improving from 2007-08 onwards.

At the beginning of the XIth Plan the coffee sector was still under the recovery path from the ravages of worst ever crisis that prevailed during 2001 to 2004 period. Hence, the main focus of the XIth Plan programmes was to sustain and consolidate the production through replanting of old, senile plantations with high yielding & disease resistant material especially in case of Arabica coffee and improving productivity of Robusta coffee by providing support towards water augmentation. Emphasis was given for improving the quality of coffee at estate level by providing necessary support for on-farm processing. On export front, the focus was increasing the share of value added coffees and export of high value coffees to priority countries. In the domestic market, efforts were made to boost consumption of coffee through various promotional activities and entrepreneurial development programme.

World Coffee Scenario- Coffee is the second largest traded commodity in the world, next only to petroleum and hence aptly described as 'Brown Gold'. It is grown in about 80 countries across the globe, of which over 50 are considered to be the major producers. Majority of these countries are developing countries, whose economies depend largely on coffee for foreign exchange earnings. The major producing countries in the world are Brazil, Columbia, Vietnam, Indonesia, Mexico, India and Guatemala. World produces around 75 lakh metric tons of coffee annually. The major consuming countries are developed countries. India is one of the major producing as well as consuming countries in Asia. India occupies around 2% of global area and an average share of around 4% of world production as well as international trade.

India is sixth in coffee production and ranks after Brazil, Vietnam, Columbia, Indonesia and Ethiopia. India is the producer of both Arabica and Robusta varieties of coffee in the proportion of 33:67. Karnataka produces 71% coffee in India. In Karnataka, Coorg, Chikmagalur and Hassan are the major districts which produce both Arabica and Robusta in almost equal proportion, while Kerala specializes in Robusta and Tamilnadu in Arabica. Coffee production rose steadily from 1950-51 onwards and reached the peak in 2000-01 (3,00,600MT) but subsequently slumped during the period from 2001-02 to 2005-06 mainly on account of cumulative impact of slump in global coffee price, occurrence of drought and outbreak of pests & diseases during the period.

In India, coffee is predominantly an export oriented commodity and over 70% of the coffee produced in the country is exported earning a foreign exchange to the tune of over Rs. 3,700 crores. Italy, Russian Federation, Germany, Belgium and Spain are the major destinations where Indian Coffee is in great demand.

Coffee Board undertakes periodical studies to assess the coffee consumption in the country and also the attitude to coffee drinking. Based on the findings of this study, to

enhance the domestic coffee consumption, the Board has been participating in important national festivals/exhibitions, imparting training for coffee brewing to the hotel and restaurant staff, organizing coffee festivals throughout the country, making aggressive generic promotion efforts through public relation campaigns and providing intensive training on roasting and brewing of coffee for the benefit of private coffee entrepreneurs.

The details regarding area, production, productivity, exports, imports and consumption of coffee for the last 11 years are as under:

Table 3.3

Year	Area (ha.)	Production (MTs)	Productivity (kg/ha)	Exports Qty (MT)	Imports Qty (MT)	Consumption (MT)
2000-01	346716	301200	959	246908	4212.73	60000
2001-02	346995	300600	937	213586	2768.56	64000
2002-03	354052	275275	859	207333	5613.48	68000
2003-04	354840	270500	832	232684	8886.94	70000
2004-05	363084	275500	826	211765	22414.82	75000
2005-06	379709	274000	803	201555	38430.31	80200
2006-07	381085	288000	840	249029	19769.31	85000
2007-08	388195	262000	761	218996	26816.53	90000
2008-09	394352	262300	748	197173	29160.15	94400
2009-10	399683	289600	815	196099	40885.02	102000
2010-11	404645	302000	838	319892	28802.91 (P)	108000
CAGR (2000-2010)	1.73	-0.27	-1.63	0.77	29.29	6.01

Chart 3.9

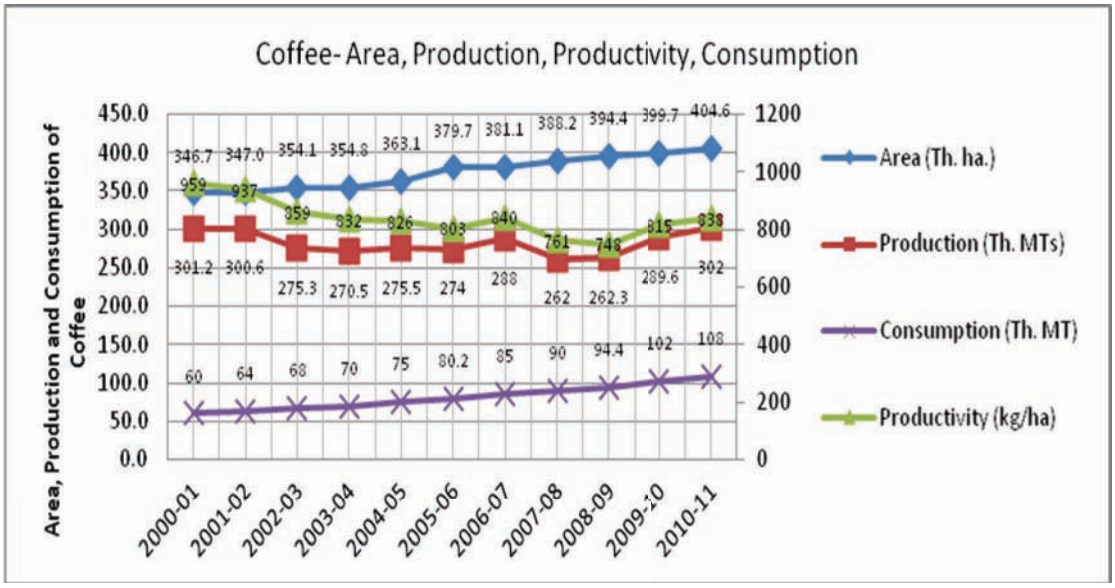
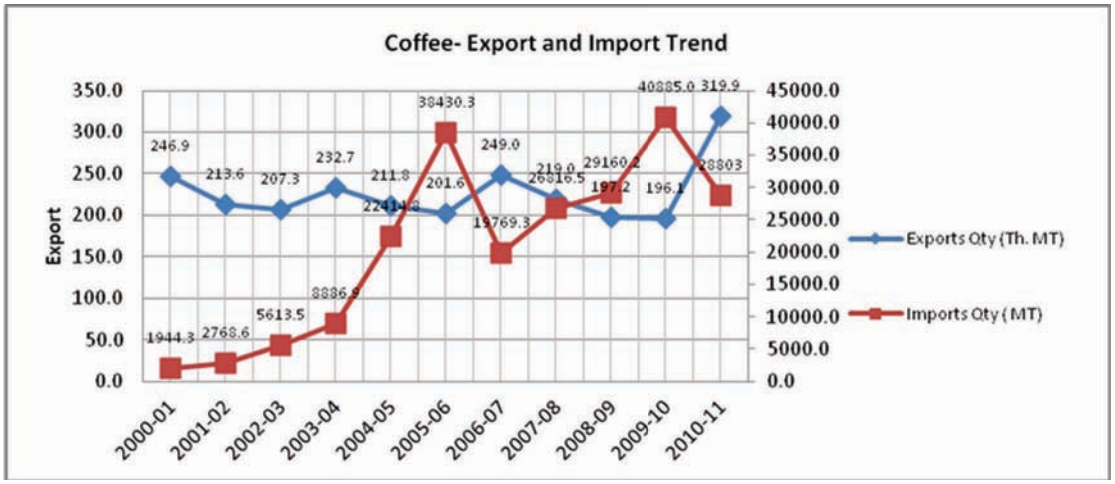


Chart 3.10



As may be seen from the above, while the cumulative annual growth rate in respect of area, exports, imports and consumption has been positive, in respect of production and productivity it has been negative.

NATURAL RUBBER

Status of the crop: Natural Rubber (NR) is a crucial raw material with a wide range of industrial applications. Rubber products can be broadly classified into latex and dry rubber based products. The main latex based products are gloves, foam, thread, catheters and other medical devices, band, condoms and balloons. The main dry rubber based products are tyres /inner tubes of cycles, cars, trucks and other vehicles; aero tyres, other vehicle parts, tubes and pipes; belts & hoses and footwear.

Rubber cultivation in India has been traditionally confined to the hinterlands of the southwest coast, mainly in Kanyakumari District of Tamil Nadu and Kerala. Non-traditional rubber growing areas are hinterlands of coastal Karnataka, Goa, Konkan Region of Maharashtra, hinterlands of coastal Andhra Pradesh and Orissa, the north-eastern states, Andaman and Nicobar Islands etc, where rubber is now being grown. Humid tropical climate prevails in the rubber-growing tract. Average annual rainfall in the tract varies from about 2000-4500 mm. The southern parts of the traditional tract enjoy southwest and northeast monsoons almost equally while the northern areas receive mostly the southwest monsoon. From south to north the drought period extends from two to five months in a year and the distribution of rainfall becomes more uneven. However, variation in temperature and humidity in the rubber tract is not so marked as that of the rainfall. The temperature remains very warm and humidity very high throughout the year.

During the initial years of a rubber plantation, the land area is not fully occupied by the rubber plants and inter spaces are available in the plantation which receive plenty of

sunlight. These interspaces can be utilized for growing intercrops, which will help the farmer to generate additional revenue. Intercrops should be planted at least 1.5 M away from plant bases. Intercrops should be separately and adequately manured. The topography of the rubber plantations vary from level lands to gentle, moderate and steep slopes. The high rainfall in the rubber growing regions and the undulating topography in many situations make the soil vulnerable to erosion hazards. Growing of inter crops necessitates soil disturbing tillage operations of various kinds. This will predispose the top soil to erosion losses in steep and undulating lands. The growing of inter-crops, therefore has to be restricted to level lands and gentle slopes. Even in such lands it should be ensured that leguminous cover crops are established side by side with intercrops or immediately after the intercropping is stopped. The general practice of growing leguminous ground covers has to be strictly followed in plantations of moderate and steep slopes.

Area, production and productivity -Rubber planted area in the world is estimated to be 11.06 million hectare, producing 10.29 million tonne of Natural Rubber, of which Asia continues to account for more than 90% of NR production. Smallholding sector accounts for a dominant share in NR production in major producing countries with the sole exception of Vietnam. World NR consumption in 2010 amounted to 10.67 million tonnes. China dominates in NR consumption with a relative share of 34.1 %.

In India, smallholdings dominate the NR sector. Smallholdings (plantations having area below 10 ha) account for 90 % of rubber planted area and 93% of production and holdings below 2 ha account for 86 % of rubber planted area in the smallholding sector. Traditional rubber-growing regions consisting of Kerala and Tamil Nadu account for 79% of total area under rubber and 93% of production. Major non-traditional regions are the North Eastern states (Tripura, Assam and Meghalaya in particular) Orissa, Karnataka, Maharashtra and West Bengal.

The details regarding area, production, productivity, exports, imports and consumption of Rubber for the last ten years are as under:-

Chart 3.11

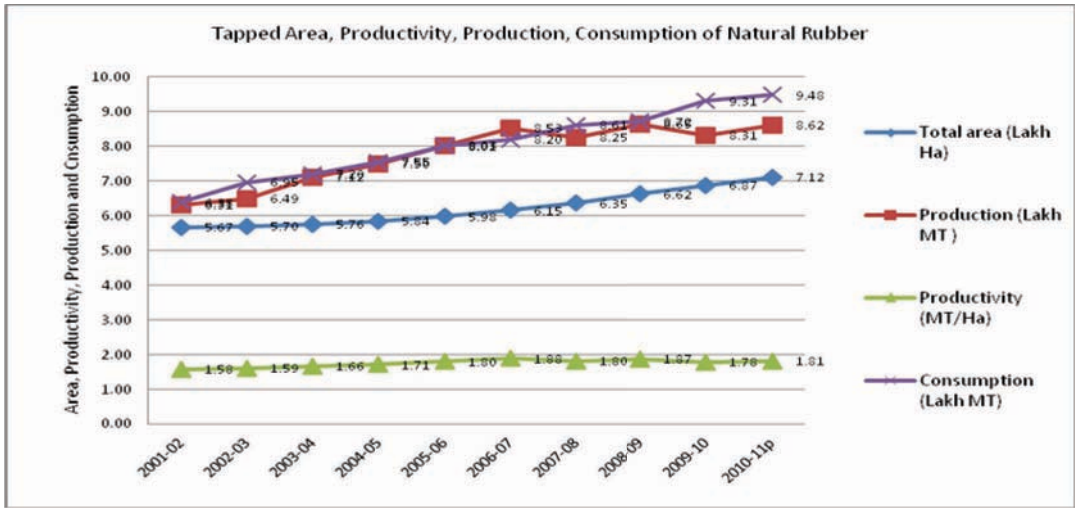


Chart 3.12

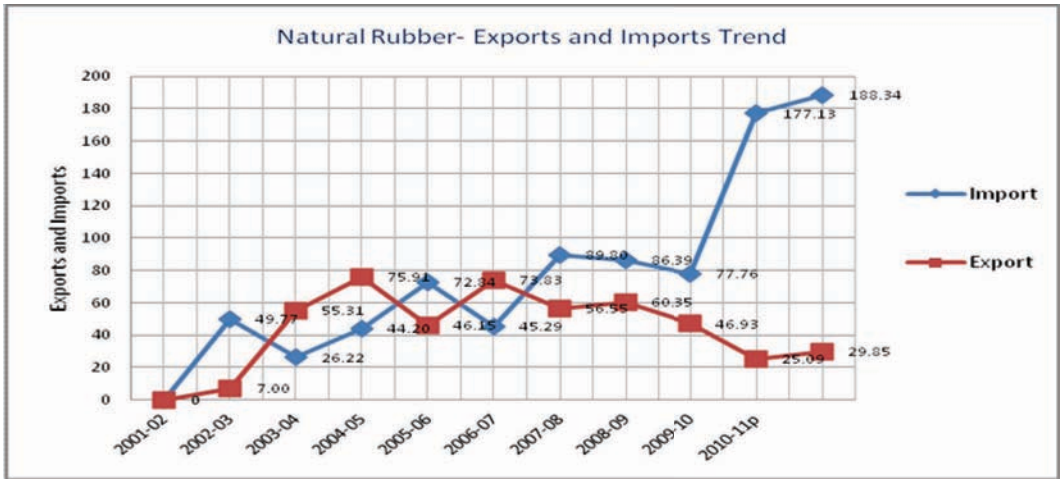


Table 3.4

Natural Rubber

Year	Total area (Lakh Ha)	Production (Lakh MT)	Productivity (MT/Ha)	Consumption (Lakh MT)	Import (Thousand MT)	Export (Thousand MT)
2001-02	5.67	6.31	1.58	6.38	49.77	7.00
2002-03	5.70	6.49	1.59	6.95	26.22	55.31
2003-04	5.76	7.12	1.66	7.20	44.20	75.91
2004-05	5.84	7.50	1.71	7.55	72.84	46.15
2005-06	5.98	8.03	1.80	8.01	45.29	73.83
2006-07	6.15	8.53	1.88	8.20	89.80	56.55
2007-08	6.35	8.25	1.80	8.61	86.39	60.35
2008-09	6.62	8.65	1.87	8.72	77.76	46.93
2009-10	6.87	8.31	1.78	9.31	177.13	25.09
2010-11p	7.12	8.62	1.81	9.48	188.34	29.85
CAGR	2.6	3.6	1.6	4.5	29.65	-75.81

p:provisional

As may be seen from the above, the cumulative annual growth rate in respect of area, production, productivity, consumption and imports has been positive; in respect of exports it has been negative.

Small and Large Cardamom:

The Department of Commerce through the Spices Board is responsible for the overall development, marketing and export promotion of both small and large cardamom. The details regarding area, production, productivity, exports, imports and consumption of cardamom (small and large) for the last eleven years are as under:-

Small Cardamom-

Table 3.5

Small Cardamom

Year	Area (Hects.)	Production (MT)	Productivity (Kgs/Hect)	Exports MT	Import MT	Domestic consumption MT
2000-01	72,320	10,480	195	1,545	88	8,500
2001-02	72,663	11,365	210	1,031	321	10,100
2002-03	73,125	11,920	218	682	323	10,900
2003-04	73,237	11,580	210	757	60	10,300
2004-05	73,725	11,415	206	642	352	10,600
2005-06	73,795	12,540	227	863	437	11,500
2006-07	73,228	11,235	208	650	623	10,600
2007-08	69,300	9,450	191	500	875	9,300
2008-09	71,170	11,000	219	750	180	9,900
2009-10	71,110	10,075	201	1,975	95	7,800
2010-11	71,012	10,380	206	1,175	75	8,800
CAGR	-0.18	-0.1	0.54	-2.7	-1.59	0.35

Chart 3.13

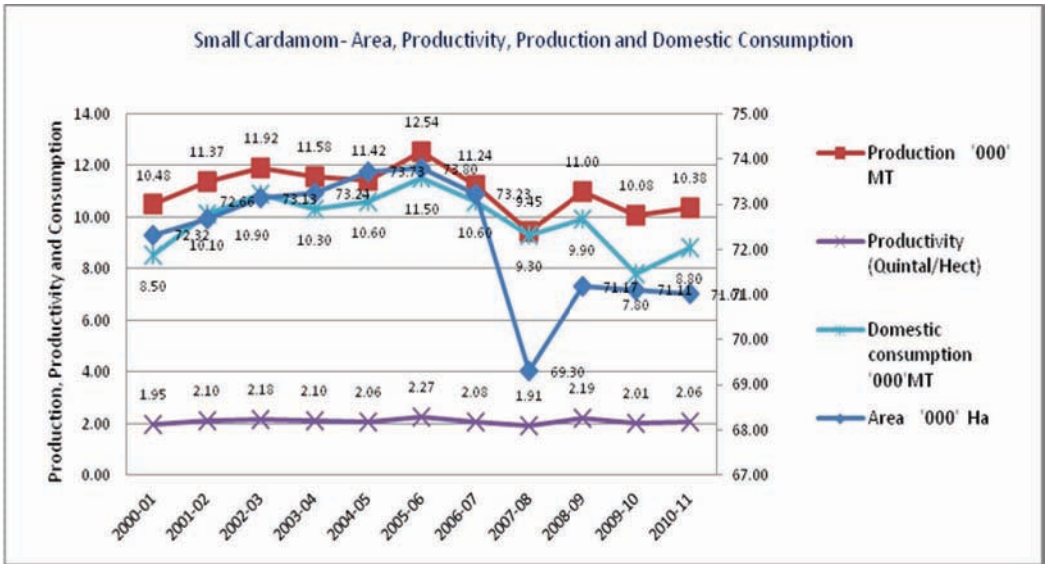
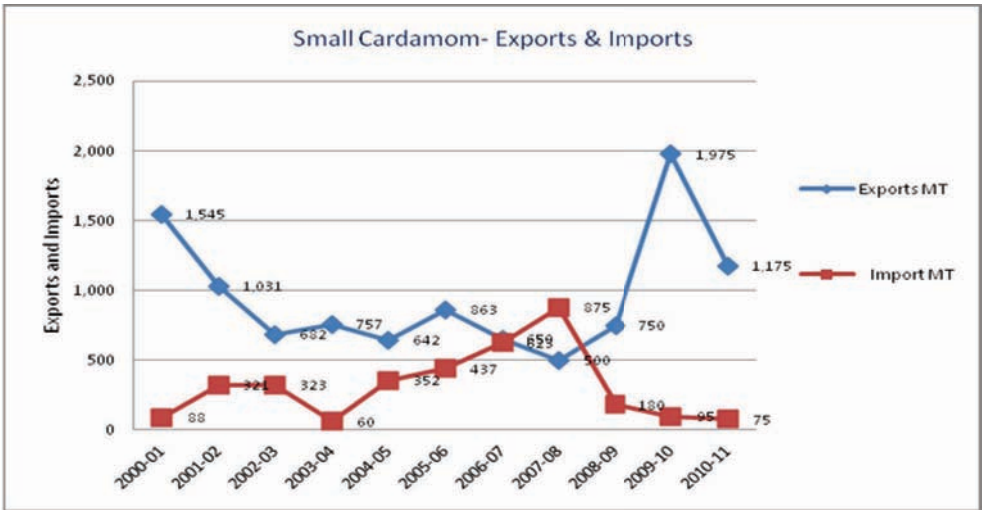


Chart 3.14



As may be seen from the above, while the cumulative annual growth rate of Cardamom (small) in respect of area, production, exports and imports has been negative, in respect of productivity and domestic consumption it has been positive.

Large Cardamom-

Table 3.6

Large Cardamom						
Year	**Area 000 Ha**	**Production MT**	**Productivity Kg / Ha**	**Export MT**	**Import MT**	**Domestic Consumption MT**
2000-01	26,358	5,200	232	1,506	4,816	8,510
2001-02	30,008	5,850	239	1,577	4,038	8,311
2002-03	30,008	5,300	209	1,450	4,319	8,169
2003-04	30,039	6,154	246	924	4,141	9,371
2004-05	30,039	5,773	230	954	4,100	8,919
2005-06	30,039	5,185	207	1,046	4,935	9,074
2006-07	30,039	4,480	200	1,500	6,297	9,277
2007-08	30,039	4,920	225	1,325	5,850	9,445
2008-09	27,034	4,300	214	1,875	5,950	8,375
2009-10	27,034	4,180	208	1,000	6,000	9,180
2010-11	26,984	3,918	208	775	4,050	7,193
CAGR	0.23%	-2.79%	-1.09%	-6.43%	-1.72%	-1.67%

Chart 3.15

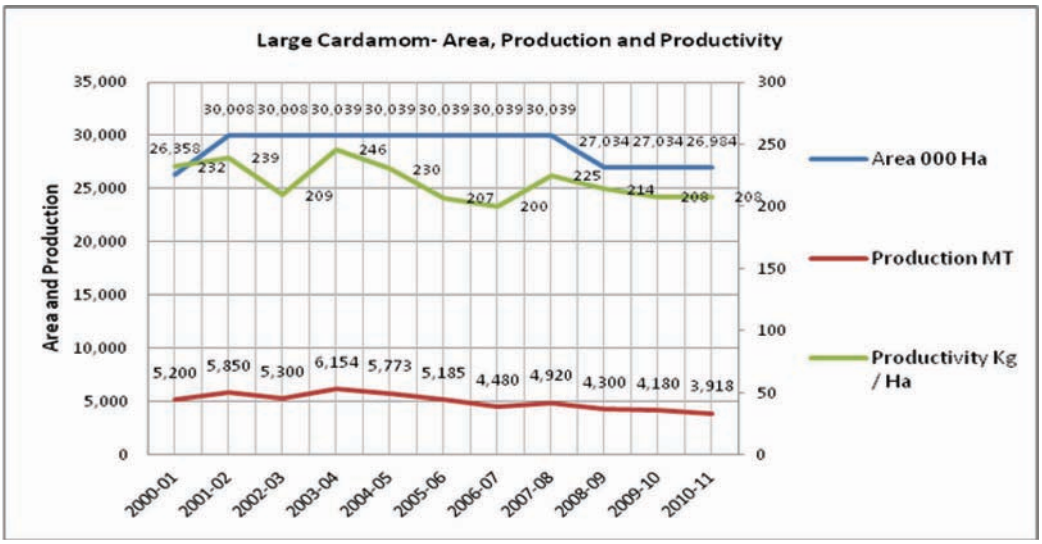


Chart 3.16

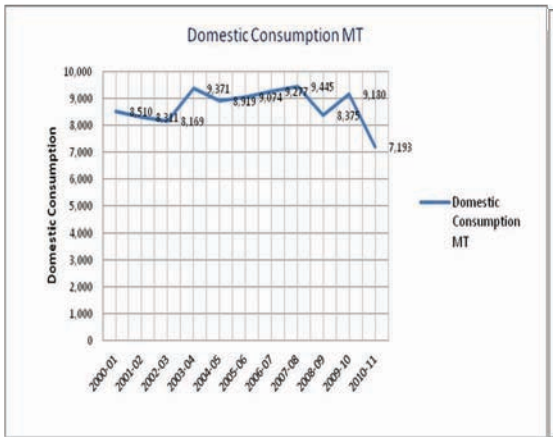
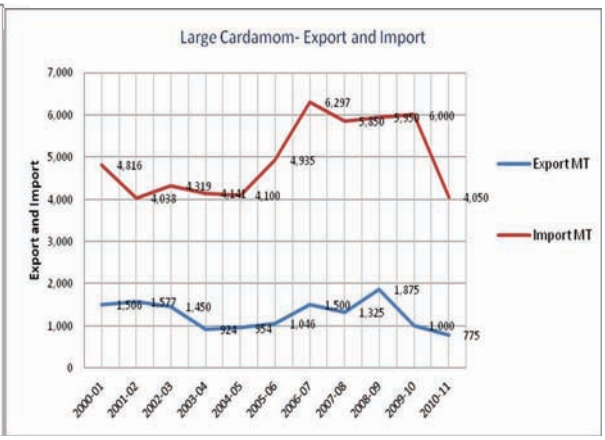


Chart 3.17



As may be seen from the above, while the cumulative annual growth rate of Cardamom (large) in respect of production, productivity, exports, imports and consumption has been negative, in respect of area it has been positive.

Oil Palm- Oil palm is the highest yielder of vegetable oil which was initially introduced in the country in Kerala and Andaman & Nicobar Islands. Subsequently, under the aegies of TMOP&M. Cultivation of oil palm was extended through the centrally sponsored Oil Palm Development Programme (OPDP) to other potential areas in the states of Andhra Pradesh, Karnataka, Tamilnadu, Orissa, Gujarat and Goa since 1992 onwards. Though the programme was also sanctioned for Assam and Tripura but no tangible progress was made in these two states upto Nineth Plan. Under OPDP, an area of 59229 ha. was planted during the period from 1992 to 2003. However, uprooting of the palms took place in some areas due to sharp decline in domestic edible oil prices due to huge imports

of edible oils at cheaper prices during 1999 to 2002 and lack of processing back up in some of the states. To support the oil palm development programmes, following infrastructure and other facilities have already been created:

a. Seed gardens with a production capacity of producing 1.5 million seed sprouts alongwith nurseries set up by the entrepreneurs.

b. Processing capacity to the extent of 110.5 tonnes FFB per hour (i.e..5.525 lakh tonnes FFB per annum @ 20 hr.X250 days running).

c. Leaf analysis laboratory.

d. National Research Centre for Oil Palm to provide requisite research support to the crop development programmes.

Medicinal and Aromatic Plants- India has 15 Agro-climatic zones and 17000-18000 species of flowering plants of which 6000-7000 are estimated to have medicinal usage in folk and documented systems of medicine, like Ayurveda, Siddha, Unani and Homoeopathy. About 960 species of medicinal plants are estimated to be in trade of which 178 species have annual consumption levels in excess of 100 metric tones. Medicinal plants are not only a major resource base for the traditional medicine & herbal industry but also provide livelihood and health security to a large segment of Indian population. The domestic trade of the AYUSH industry is of the order of Rs. 80 to 90 billion (1US$ = Rs.50). The Indian medicinal plants and their products also account of exports in the range of Rs. 10 billion. There is global resurgence in traditional and alternative health care systems resulting in world herbal trade which stands at US$ 120 billion and is expected to reach US$ 7 trillion by 2050. Indian share in the world trade, at present, however, is quite low. Not much of data is available about area, production and productivity of medicinal and aromatic plants in the Country.

The National Medicinal Plants Board (NMPB) set-up in November 2000 by the Government of India has the primary mandate of coordinating all matters relating to medicinal plants and support policies and programmes for growth of trade, export, conservation and cultivation. The Board is located in the Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha & Homeopathy (AYUSH) of the Ministry of Health & Family Welfare. In addition, Ministry of Commerce through Council for Scientific & Industrial Research (CSIR) has set up Central Institute Medicinal and Aromatic Plants at Lucknow with research centres at Bangaluru, Hyderabad, Pantnagar and Purara (Uttarakhand) for varietal development, setting certification standards for seeds, processing, quality control etc.

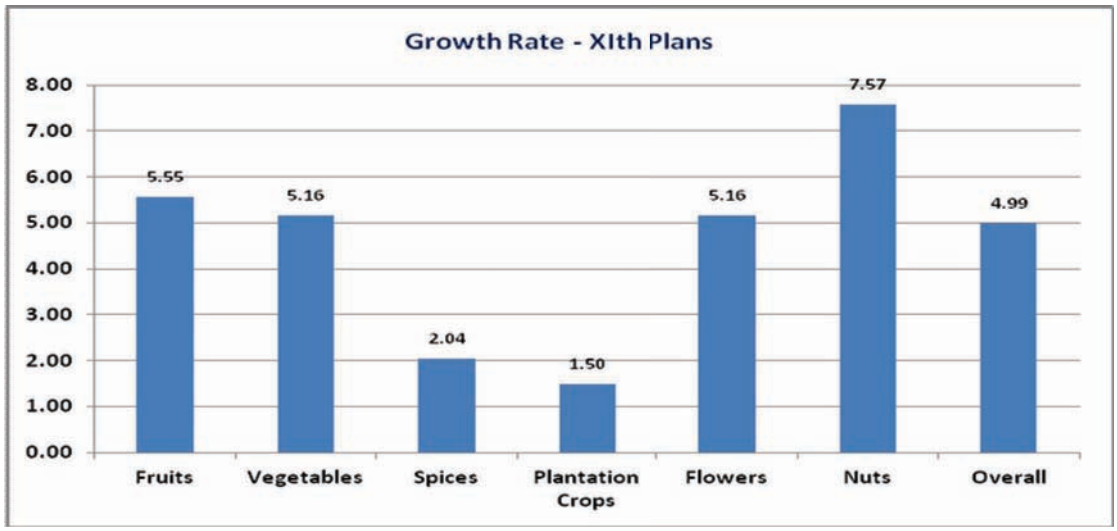
Presently, schemes of NMPB are implemented through NHM and the crops of medicinal & aromatic plants are covered by ongoing schemes of horticulture development relating to area expansion and processing.

Chapter 4
Projection of Growth Rate of Horticulture Sector for XIIth Plan Period and Outlining Strategy

A. Crops Dealt by DAC i.e. Fruits, Vegetables, Flowers, Plantation Crops, Nuts, Spices–

A.1 Midterm review document of XI th plan period throws light on the midterm performance of horticulture sector during first four years of the XI th Plan period. However, by this time, the first advance estimates for area, productivity and production for horticulture crops are available and therefore, yet another attempt has been made by this Working Group to critically examine the performance of Horticulture Sector during XI th Plan Period especially in the light of recommendations of the Working Group for XI th Plan Period. Though, an overall growth rate of 6% had been targeted for horticulture & plantation sector during 11th plan period, a growth rate of 4.99% is expected to be achieved for this sector.

Chart 4.1



A.2 The Working Group on Horticulture & Plantation Crops and Organic Farming for XIth Plan period does not appear to have projected crop segment wise growth rate; instead it had outlined general strategy of- *'Providing dynamism to the sector by consolidating the gains made during Xth plan period and implement programmes which could ensure holistic development of horticulture sector"* for achieving the targeted growth rate. In that process, said Working Group had made recommendations in terms of sort listing schemes and programmes to be continued with or without modifications, schemes to be restructured and launching of new programmes; restructuring organisational set up of Horticulture Division of DAC and recommending budgetary requirements.

A.3 Mission mode programmes have been main instruments for effecting targeted growth rate of horticulture sector; however, due to ad hoc organisational structure of Mission Directorates, programme monitoring reports have not been generated periodically. Similarly, the mission-mode programmes depend heavily on a very loose set up of Technology Support Group for giving technology input for the projects / programmes; resultantly, information regarding technology gaps faced while dealing with particular production clusters too, is not available in specific terms with Mission Directorates. In this background, it has been a daunting task to analyse the strengths and weaknesses which might have affected sector's performance. However, some of the issues which have precipitated during consultative process of this Working Group are listed below-

i. There has been main thrust on Area Expansion Programmes which lack proper backward linkage with supply of quality seeds & planting materials,

ii. Increase in productivity of existing clusters of orchards of fruits and plantation crops have not been focused in project mode with technology intervention and promotion of capital investment in terms of fertigation, input management, plant protection, farm mechanisation etc.

iii. The has been no scheme for promoting capital investment for development of infrastructures for irrigation, farm mechanisation, PHM etc in projects relating to production of open field vegetable and other seasonal crops. National Vegetable Initiative under RKVY and a extending benefit of scheme relating to hi-tech commercial horticulture to vegetable crops have been taken up only during the year 2011-12,

iv. Schemes relating to Rejuvenation of Old and Senile Plantations has not triggered as yet,

v. The schemes in Mission Mode Schemes are generally not implemented in project mode linked with production clusters; various schemes dealing with horticulture development need integration in project mode

vi. Various schemes of horticulture development deal with similar components in one or other way, with varying size of assistance and delivery system and therefore, several critical areas remain attended

vii. Infrastructure created in the form of plant disease forecasting lab, tissue analysis labs, bio control labs etc are yet to be used fully for the benefit of production and plant protection purposes

viii. Private sector investment in PHM and marketing infrastructures has not materialised to the desired extent;

ix. Technology solutions prescribed under scheme components for ensuring quality production, effecting PHM and providing transport and storage solutions generally lack techno-economic viability

x. Market Sector Reforms have not taken shape in promoting efficient marketing of perishables, putting in place transparent system of auction and price discovery and promoting investment in infrastructure development in markets.

xi. There is a gap in linking production clusters with marketing centres situated over long distances

xii. Absence of pro-active steps for developing export competitiveness for high-end export destinations.

xiii. The last but not the least, implementing agency which could have utilised its man-power resources in extension and technology transfer has, in a number of cases, assumed input purchase/ supply functions and thereby, developed interface with suppliers of inputs like planting materials, poly house, micro irrigation system etc.

A.4 Targeted Annual Growth Rate for XIIth Five Year Plan Period –

a. Targeted Growth Rate for horticulture sector has been worked out with main considerations of nutritional security and our capacity and preparedness to achieve the same keeping in view the SWOT Analysis.

b. Population projections made by Registrar General of Census, Government of India have been taken in to account for the purpose of calculating per capita gross availability of fruits & vegetables. However, for the purpose of calculation of per capita net availability of fruits & vegetables, PHM losses to tune of 25% and deduction of 5% for export & processing purpose is applied.

c. With above presumptions in place, it is targeted to achieve recommended level of per capita net availability of fruits and vegetables i.e. 120 gm and 280 gm per capita per day as recommended by Indian Institute of Nutrition during 12th plan period. For this purpose, growth rate of 6.5 % per annum is targeted for 12th plan period in view of the fact that the Country must have enough surpluses to develop its exports market on sustainable basis.

d. It is noteworthy that our country has recorded a growth rate of 4.4% % in respect of fruits production and 5 % per annum in vegetable production during the year 2010-11 and the same has been taken into account for calculation of base production levels at the beginning of 12th Plan period. However, a higher growth rate of 6% for fruits and 7.5% for vegetables has been targeted during 12th Plan period. If the targeted growth rate is achieved, the country may attain the desired availability level of 120 gms / capita/ day of fruits by the end of year 2015-16 and

280 gms / capita / day of vegetables during the year 2016-17. On the front of each of the spices and plantation crops, annual growth rate of 4% per annum in production has been taken into account and growth rate of 5% per annum in production has been taken into account for floriculture. A growth rate of about 7.57% has been taken into account for nut crops. In totality, the horticulture crops which have so far recorded annual growth rate of 4.7% per annum in production is targeted to achieve a growth rate of 6.5 % per annum during XIIth Plan period, which does not include tea, coffee, rubber and medicinal and aromatic plants related crops, referred to in this report as "*Other Plantation Crops, Medicinal and Aromatic Plants*".

Chart 4.2

Targeted Growth Rate for 12th Plan and Estimated Growth Rate for 11th Plan Period

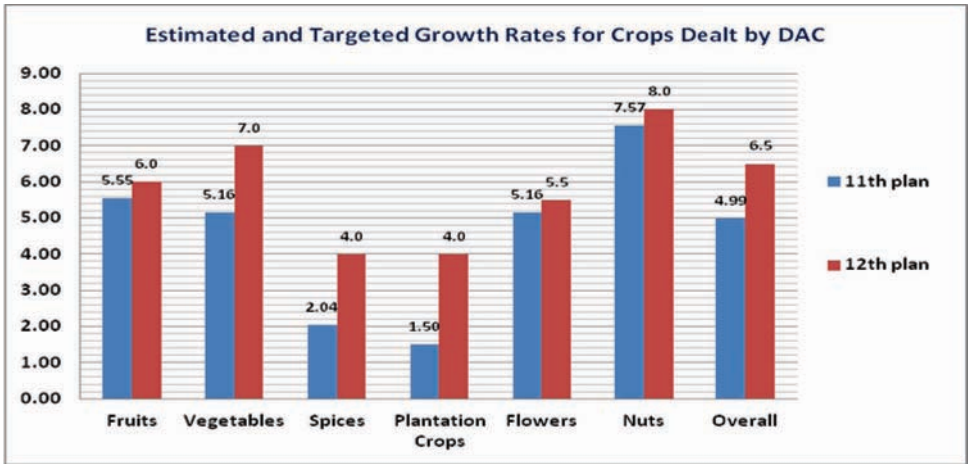


Table 4.1

Crop Category wise Projected Production of Horticulture Produce and Average Annual Growth Rate (Production in million MT)

Crop group	Base Period Production 2011-12	Production by end of XII Plan 2016-17	Average Annual Growth Rate (%)
Fruits& Nuts	78.16	105.01	6.0
Vegetables including potato and tuber crops	147.45	206.80	7.0
Spices	4.34	5.28	4.0
Plantation Crops (Cashew, Areca nut, Cocoa and Coconut)	12.87	15.66	4.0
Flowers (cut & loose)	1.46	1.95	5.5
Nuts	0.21	0.32	8.0
Miscellaneous (Honey, Mushroom, medicinal & Aromatic crops	0.6	1.02	6.5
Total Horticulture	245.09	336.42	6.5

- Coconut conversion 1450 nuts/tonne.
- Cut flowers converted as 15000 Nos= 1 tonne

Table 4.2

Projections of Production, Area, and Productivity for Horticulture Crops for 12th Plan Period (Area in million HA, Prod.Million MT, Pdy.MT/HA)																	
S. No.	Crop Category	Item	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Fruits	*Pdn*	43.00	45.20	45.94	50.87	55.36	59.56	65.59	68.47	71.51	74.66	77.94	82.62	87.57	92.83	98.40	104.30
		A	4.01	3.90	4.60	5.00	5.30	5.50	5.80	6.10	6.30	6.45	6.60	6.80	7.00	7.20	7.40	7.60
		Pdy	10.72	11.59	9.99	10.17	10.45	10.83	11.31	11.22	11.35	11.57	11.81	12.15	12.51	12.89	13.30	13.72
2	Vegetables	Pdn	88.62	84.81	88.33	101.24	111.40	114.99	128.45	129.08	133.74	140.43	147.45	157.77	168.81	180.63	193.27	206.80
		A	6.15	6.09	6.08	6.74	7.21	7.58	7.84	7.98	7.99	8.00	8.10	8.20	8.30	8.40	8.50	8.60
		Pdy	14.41	13.93	14.53	15.02	15.45	15.17	16.38	16.17	16.75	17.55	18.20	19.24	20.34	21.50	22.74	24.05
3	Spices	Pdn	3.76	3.76	5.10	4.00	3.71	3.95	4.36	4.14	4.01	4.17	4.34	4.51	4.69	4.88	5.07	5.28
		A	3.20	3.20	5.10	3.10	2.30	2.40	2.44	2.61	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.620
		Pdy	1.18	1.18	1.00	1.29	1.61	1.65	1.79	1.59	1.53	1.59	1.66	1.72	1.79	1.86	1.94	2.01
4	Plantation Crops	Pdn	9.70	9.70	13.20	9.80	11.30	12.00	11.30	11.30	11.90	12.38	12.87	13.39	13.92	14.48	15.06	15.66
		A	2.98	2.98	3.10	3.14	3.28	3.20	3.19	3.21	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26
		Pdy	3.26	3.26	4.26	3.12	3.45	3.75	3.54	3.52	3.65	3.80	3.95	4.11	4.27	4.44	4.62	4.80
5	Flowers	Pdn	0.54	0.74	0.58	0.66	0.65	0.88	0.87	0.99	1.02	1.08	1.14	1.20	1.26	1.33	1.41	1.49
		A	0.11	0.07	0.10	0.12	0.13	0.14	0.17	0.17	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.19
		Pdy	5.05	10.50	5.74	5.58	5.07	6.11	5.23	5.91	5.58	5.87	6.18	6.50	6.84	7.19	7.57	7.96
6	Nuts	Pdn	0.11	0.11	0.12	0.12	0.15	0.15	0.18	0.17	0.19	0.20	0.21	0.23	0.25	0.27	0.29	0.31
		A	0.12	0.12	0.11	0.11	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.15
		Pdy	0.97	0.97	1.14	1.14	1.15	1.14	1.34	1.27	1.36	1.40	1.50	1.60	1.70	1.80	1.90	2.00
7	Total	Pdn	145.73	144.32	153.27	166.69	182.57	191.53	210.75	214.15	222.37	232.91	243.95	259.71	276.52	294.42	313.50	333.84
		A	16.56	16.36	19.09	18.20	18.35	18.96	19.57	20.20	20.49	20.66	20.91	21.21	21.51	21.81	22.11	22.41
		Pdy	8.80	8.82	8.03	9.16	9.95	10.10	10.77	10.60	10.85	11.28	11.67	12.25	12.86	13.50	14.18	14.90

Table 4.3

Projection Regarding Per Capita Availability in gms/ day							
S. No.	2007-08	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Production of Fruits Million MT	59.56	62.18	65.91	69.87	74.06	78.50	83.21
Production of Vegetables Million MT	128.45	134.87	144.31	154.42	165.22	176.79	189.17
Projected Population (Crores)	112.8	119.20	120.80	122.30	123.80	125.40	126.80
Per Capita Gross availability of Fruits in gms /day	144.66	142.92	149.49	156.51	163.89	171.51	179.79
Per Capita Gross availability of Vegetables in gms /day	311.98	309.99	327.30	345.92	365.65	386.25	408.72
Per Capita Net Availability of Fruits in gms / day (25% loss+ 5 % exports and Processing)	97	100	105	110	115	120	126
Per Capita Net Availability of Vegetables in gms / day (25% loss+ 5 % exports and Processing)	209	217	229	242	256	270	286

A.5 Strategy to Achieve the Targeted Growth Rate in Sustained Manner- In the present context, in order to achieve desired growth rate in a sustainable manner during 12th plan period, there is a need for prioritisation in a rational manner between various fruits, vegetables, plantation crops and spices and also to set targeted productivity for major production clusters / States. The prioritisation may vary from State to State and from one production cluster to another.

i. ***Focus Crops***- The crops of significance for achieving higher growth rate may generally be termed as *"Focus Crops"*, however, the crop having special significance in terms of local economy (e.g. litchi, saffron, straw berry, passion fruit, dates etc) and important for processing (peas, white onion etc) and export (grapes, white onion, walnut, almond etc) may also be included in this category. From the pie chart given below banana, mango, citrus, papaya, guava, apple, pine apple, Sapota, grapes, pomegranate and litchi may be considered as *Focus Fruit Crops* for National level planning during 12th plan period. Stone fruits too have significant role in exports so may also be included in some States. Likewise, potato, tomato, onion, brinjal, cabbage, cauliflower, okra and green peas may be taken as focus crops for 12th plan period. Drum stick, white onion and curry leaves may be added keeping in view export demand. Coconut, cashew nut and areca nuts may be taken as focus crops among plantation crops covered by DAC. Figures in parenthesis indicate the percentage share of a spice crop in total production of spices. Accordingly, Chilly (30%), Garlic (21%), Turmeric (20%), Ginger (9.6%), Coriander (5.9%), Tamarind (4.6%), Cumin (3.9%), Fenugreek (1.4%), Fennel (1.4%), Pepper (1.3%), Cardamom (0.4%) and Saffron may be taken as focus crops for respective areas of production.

Chart 4.3 and 4.4
Identification of Focus Crops

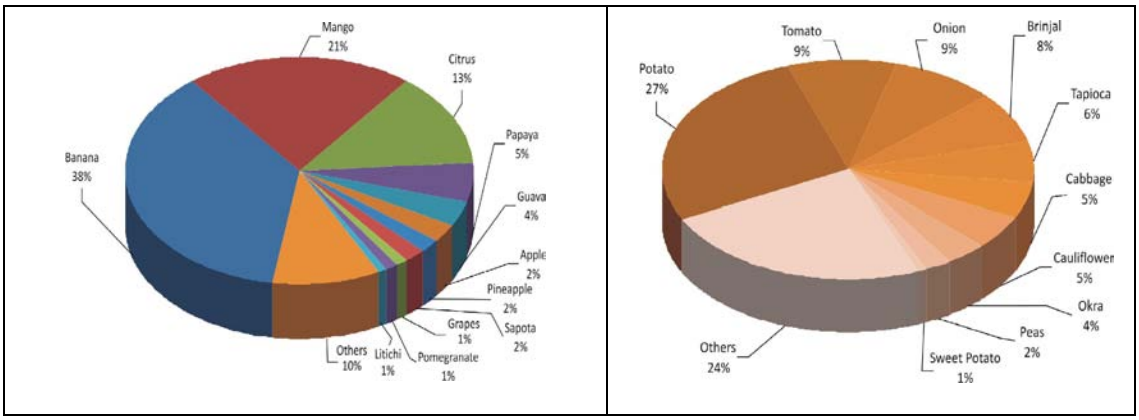
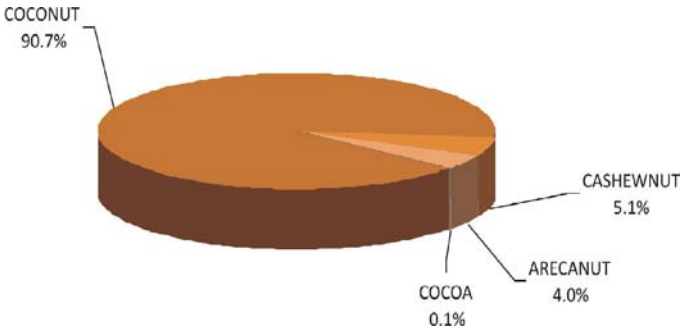


Chart 4.5



ii. ***Targeted Productivity***- It may be noticed from following charts as examples that there is wide gap in productivity of any crop from State to State even when there is no varietal difference. This leads us to infer that our extension messages for horticulture crops should incorporate production and plant protection technology which enables us bridge the gap between potential achievable productivity and actual productivity. Seasonal and annual crops like vegetables, spices, banana, papaya and selected production technology for perennial crops may contribute to growth in initial period itself which can be supplemented by perennial crops like citrus, mangoes, apples, Sapota. This alone may enable us achieve targeted growth rate in a sustainable manner.

Chart 4.6

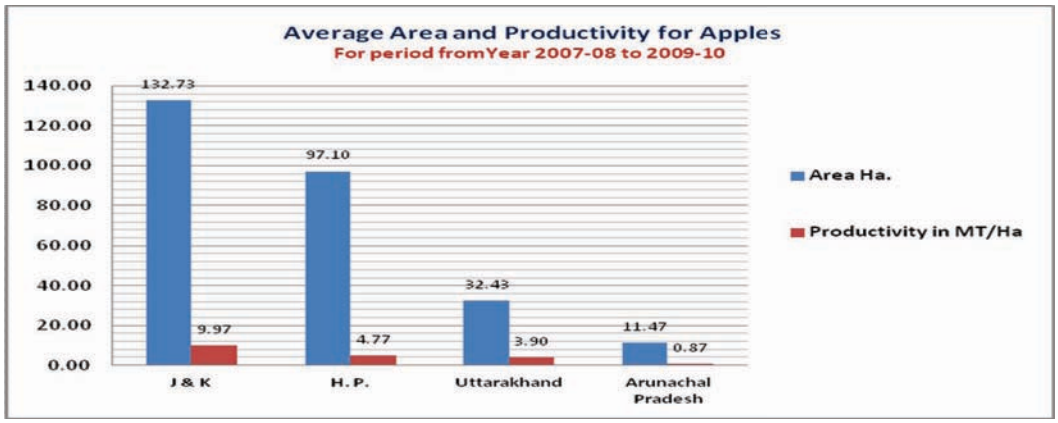


Chart 4.7

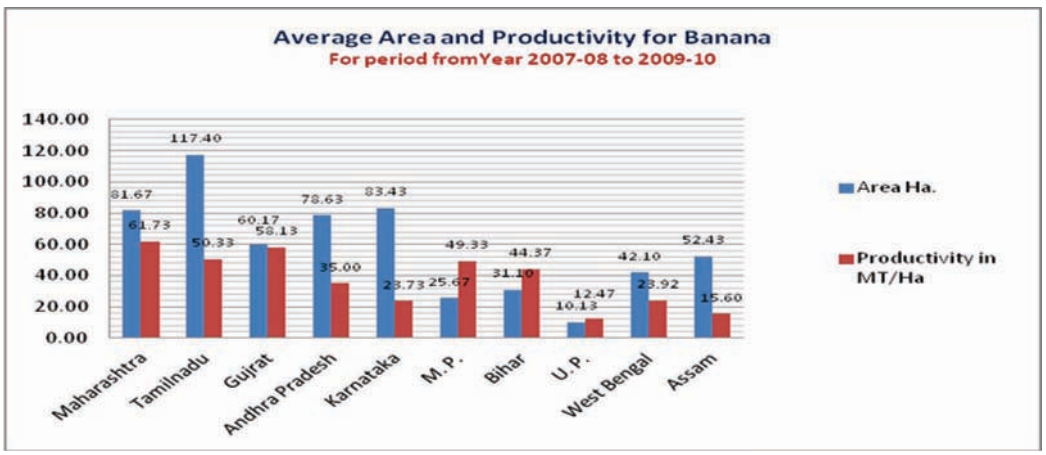


Chart 4.8

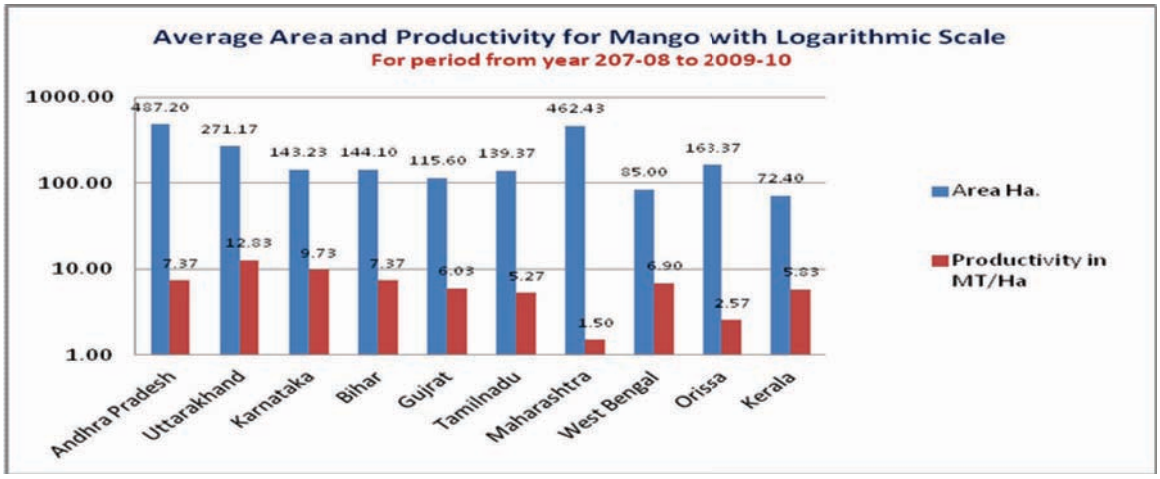


Chart 4.9

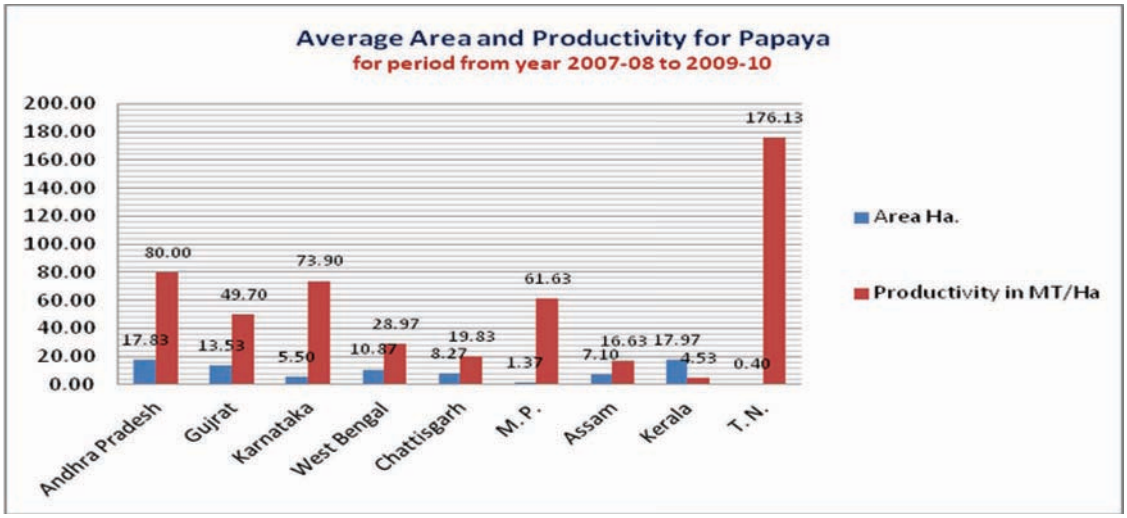


Chart 4.10

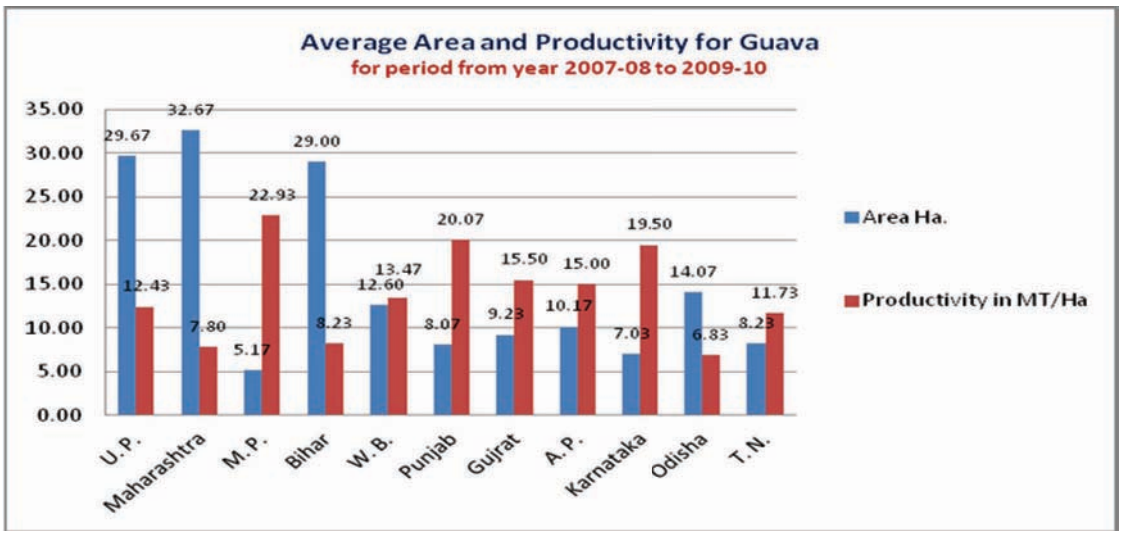


Chart 4.11

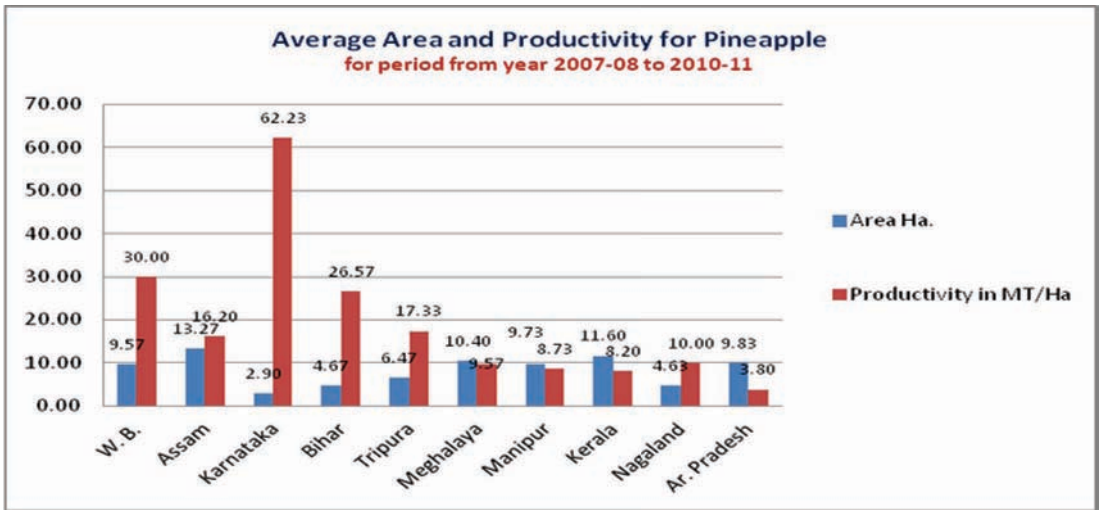


Chart 4.12

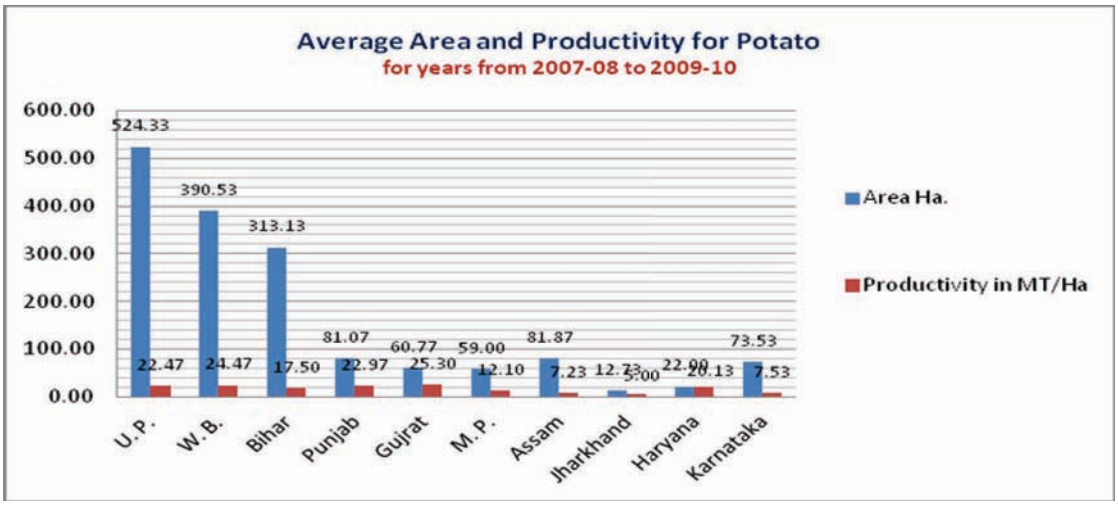


Chart 4.13

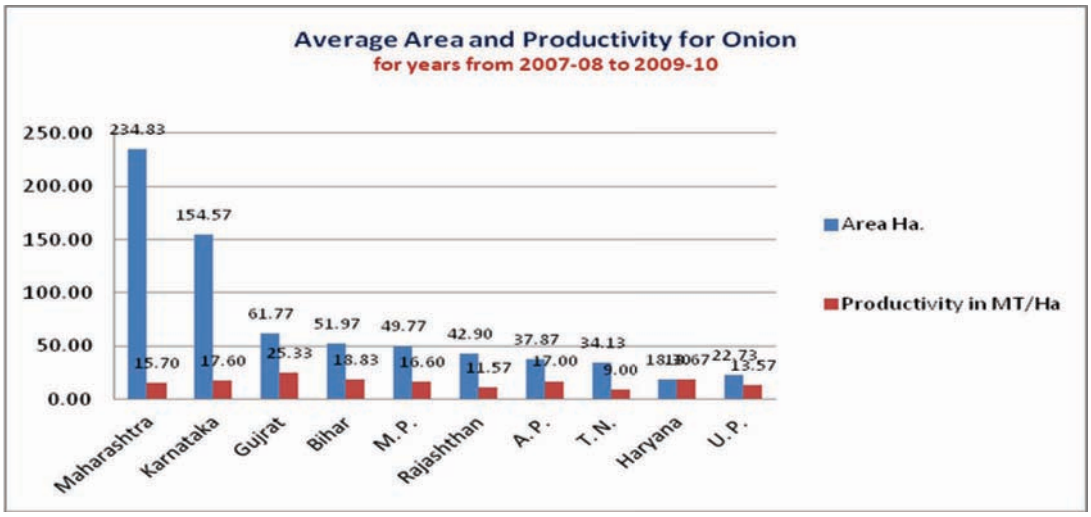
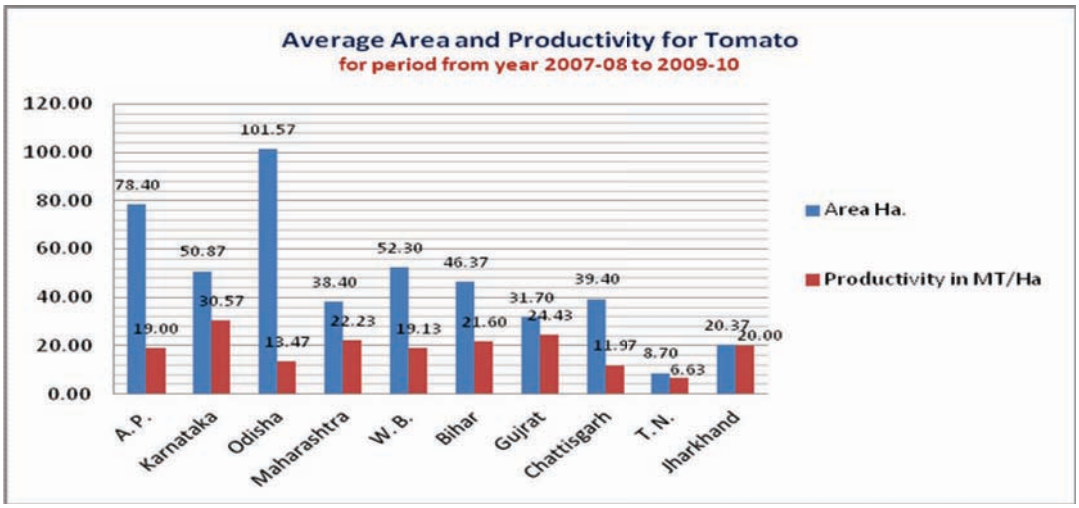


Chart 4.14



A.6 Projected growth rate is achievable! – The Working Group has been of the view that with the help of micro planning the projected growth rate is possible to achieve. It is proposed to identify production clusters for Focus Crops, take average reported and published productivity of any crop in a production cluster / State during first four years of 11th five year plan period as the base-line productivity of the Cluster and prepare a road map with ample actionable details to achieve the projected productivity and increase in production-area. Similarly, area expansion needs to be undertaken in project mode only and not only by way of disbursement of input subsidy; new investment in infrastructure needs to be made ensuring its commissioning and manpower and fund arrangement for operation & maintenance in place to keep the same operational; technology solutions to address to the issue of productivity enhancement, drought proofing, protection against water-logging during heavy rains, protection against plant disease and pest etc needs to be put in place as a preparatory work. This needs to be backed by conducive-environment for farmers, investors and other stake-holders to participate in the process which may require certain reforms like Market Sector Reforms, Extension Strategy, Credit Linkage and Risk Mitigation Measures too. These issues are discussed in detail in following chapters. All these may lead us to achieve the projected growth rate too.

A.7 Budgetary Requirement Mode during 12th Plan Period-

Table 4.4

(a). *For Area Expansion in Project in integrated Project Mode-*

Estimated Budgetary Requirement for Area expansion							
S. No.	**Crop Category**	**Area Increase in Million Ha**	**Cost Norm (Rs. /acre)**	**Subsidy Rate %**	**Subsidy Rs. Per acre**	**Subsidy Rs. Per Ha**	**Fund Required in Rs. Crores**
A	B	C	D	E	F	G	H
1	Fruits	0.4	150000	30%	45000	112500	4500
2	Vegetable (Open field)	0.35	150000	30%	45000	112500	3937.5
3	Vegetable (protected Cult)	0.001	4000000	35%	1200000	3000000	300
4	Spices	0.003	150000	30%	45000	112500	33.75
5	Plantation Crops	0.003	150000	30%	45000	112500	33.75
6	Cut Flowers	0.003	4000000	35%	1200000	3000000	900
7	Loose Flowers	0.001	4000000	30%	1200000	3000000	300
8	Nuts	0.001	150000	30%	45000	112500	11.25
Total Requirement							10005 Say Rs. 10000 crores

(b). *For Productivity Enhancement of Existing Orchards /Production Clusters in Project Mode-* so far, primarily the methodology of passing on extension messages through seminars / workshops etc has been considered to suffice for this purpose. However, extension initiatives need to be backed with promotion of capital investment in farm mechanisation, rejuvenation, irrigation infrastructure, micro irrigation / fertigation, drainage, packing & grading facility, transport; cold chain infrastructure etc in integration for existing orchards. It is proposed to deal with existing production clusters / orchards from point of view of enhancement of productivity and percentage of quality-fruits in project mode during 12th plan period. A budgetary provision of equal to the budgetary requirement for setting up of new integrated projects of orchards i.e. of Rs. 10000 crores is suggested for this component.

(c). ***Central Sector Scheme for States in NE Region, Hilly States of J & K, H. P. and Uttarakhand and scheduled areas***- It is recommended that continuing with the present policy, centrally sponsored scheme components of Integrated National Horticulture Development Programme be implemented in States NE Region, Hilly States of J & K, H. P. and Uttarakhand and scheduled areas as Central Sector Scheme Component. Similarly, about 25% of annual budgetary grants may be earmarked for these areas maintaining the present policy of having separate budget earmarked for NE Region and Hilly & scheduled areas. Additional requirement of budgetary grants on this account is estimated to the tune of Rs. 2000 crores.

(d) ***Area Expansion Scheme for Small & Marginal Farmers and Kitchen Garden Scheme-*** It is proposed to extend benefits of area expansion programmes without credit link for small and marginal farmers without making credit link mandatory. Similarly, kitchen garden scheme in which mini-kits for seeds for vegetable crops is distributed among small and marginal farmers and tribal farmers in NE, hilly, scheduled and TSP areas. A provision of Rs. 1000 crores is proposed for this component.

Table 4.4

S. No.	Scheme Component	Budgetary Provision in Rs. Crores
1	Area Expansion Programmes in Integrated Project Mode	10000
2	For Productivity Enhancement of Existing Orchards /Production Clusters in Project Mode	10000
3	Central Sector Scheme for States in NE Region, Hilly States of J & K, H. P. and Uttarakhand and scheduled areas	2000
4	Area Expansion Scheme for Small & Marginal Farmers and Kitchen Garden Scheme	1000
Total		**23000**

Total Budgetary requirement for new projects of area expansion and productivity enhancement of existing orchards in integrated project mode sums up to Rs. 23000 crores. In addition, provision of Rs. 1000 crores is being made for schemes to be implemented by CDB abd Rs. 500 crores for scheme components relating to NBM. In addition, provision of Rs. 25 crores is being proposed for NCCD to meet any unfulfilled commitment of giving one time grant to it made during XIth plan period.

B. Targeted Growth Rate for Tea, Coffee, Natural Rubber and Cardamom-

B.1 Cumulative Annual Growth Rate (CAGR) during last about ten years in terms of production and exports for crops of tea, coffee, natural rubber and spices of small & large cardamom has not been very encouraging. However, as per necessity to meet our domestic demand and achieve certain growth in exports following targets, as proposed by the Ministry of Commerce have been proposed for XIIth Plan Period.

Chart 4.15

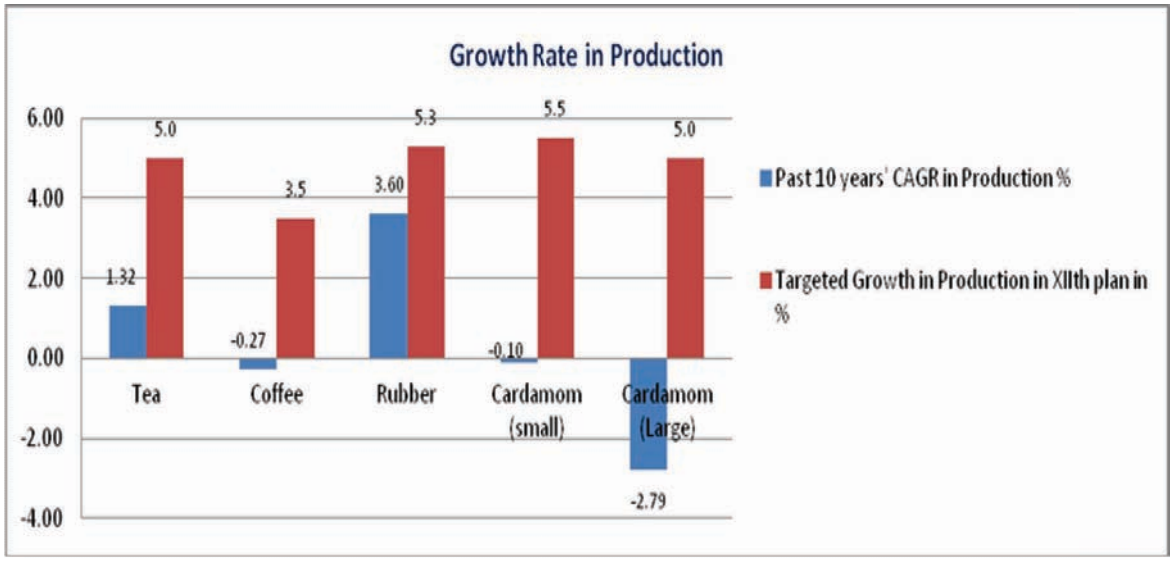
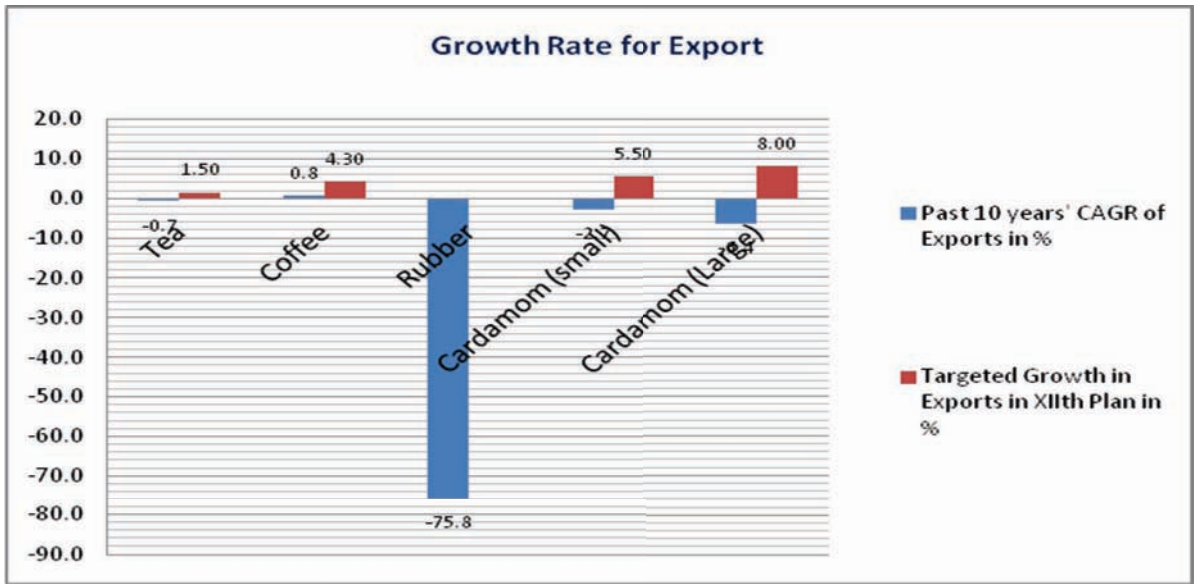


Chart 4.16



B.2 Budgetary Requirement during XIIth Plan for growth of tea, coffee, natural rubber and spices sector-

Table 4.5

S. No.	Crop	Estimated Budgetary Requirement during XIIth Plan in Rs. Crores
1	Schemes of Tea Board	1600
2	Schemes of Coffee Board	1200
3	Schemes of Rubber Board	1180
4	Schemes of Spice Board	900
	Total	**4880**

Chapter 5: Seed and Planting Materials, Farm Chemicals, Farm Mechanization, Technology and Credit

Background Facts-

a. Quality Seeds and Planting Materials, Farm Chemicals, Farm Machineries, Appropriate Technology and Credit are important inputs for horticulture development. It is observed with concern that availability of quality inputs has not been fully secured simultaneously with launch of horticulture development programmes involving large investments.

b. At first case of quality planting materials is taken up for review. It may be noticed from the area statistics given in Table 3.1 that about 2.735 million Ha additional area had been brought under horticulture crops during the first five years of the last decade whereas addition of new area under horticulture crops had been to the tune of about 1.829 million Ha during the period from year 2005-06 to 2009-10. It is a matter of concern that in spite of known trend for area expansion, system of production planning for seed & planting material for horticulture crops commensurate with crop and variety wise targets for area expansion has not been put in place. This anomaly needs to be rectified during 12th plan period.

Table 5.1

Trend of Area Expansion under Horticulture Crops

YEAR	FRUITS Area (000 Ha)	VEG. Area (000 Ha)	FLOWERS Area (000 Ha)	HORTICULTURE Area (000 Ha)	Increase in Area (000) Ha
2009-10	6478	8215	176	21156	1829
2005-06	5510	7164	126	19327	2735 **(Start of NHM)**
2001-02	4010	6156	106	16592	**Year of start of HMEH**

c. *Statutory Provisions*- The Seed Act 1966 followed by the Seed (Amendment) Act 1972 and the Seeds Control Order 1983 have been able to put a quality regime in respect of notified varieties of seeds. However, the provisions of the Seed Act are not adequate in dealing with the seeds which are not notified. As public sector research in respect of seeds of fruits, vegetables and flowers has not been able to cope up with the needs of the sector, large varieties of open private sector hybrids and imported hybrid seeds of horticulture crops, even though not offered for certification, has captured major share of the Indian market. Moreover, the provisions of Seed Act 1966 and Seed (Amendment) Act 1972 do not address to

the quality needs of vegetatively propagated crops. The Union Government has, therefore, introduced a Seeds Bill, 2004 in Rajya Sabha in which for the first time clauses have been made for the registration of seed varieties and also the registration of horticulture nurseries in India. However, the Seed Bill is yet to be passed and come in to force as an Act. In this background, the farmers generally select the seeds for horticulture crops based on brand name and past performance but they are continue to have difficulties in accessing quality planting materials for vegetatively propagated horticulture plants.

d. *Recommendations of the Working Group on Horticulture Crops, Plantation Crops and Organic Farming for 11th Five Year Plan Period*- The Working Group on Horticulture, Plantation Crops and Organic Farming for 11th five year plan period had projected the requirement of planting materials for 11 fruit crops viz, Apple, banana, Citrus, Grapes, Guava, Litchi, Mango, Pineapple, Pomegranate, Sapota and Papaya by taking into account a modest area expansion rate of 4% per annum. It has also taken stock of the fact that a number of States select the nurseries by inspection for sourcing planting materials for supply to beneficiaries under NHM and HMNEH. *However, the Working Group has not critically analyzed the protocol being followed for evaluation of nurseries.* The Working Group had recommended setting up of horticulture nurseries at ICAR Institutions, State Agriculture Universities and Commodity Board assisted farms for ensuring availability of quality planting materials.

e. ***Nurseries Proposed to be set up during 11th Plan Period***- Though the Working Group for 11th Plan had prepared the list of nucleus nurseries to be developed during 11th plan period.

A. Fruit Crops-

i. *Establishment of National Horticulture Nurseries*- the working group for 11th plan had proposed to develop *National Horticulture Nurseries* at ICAR Institutions and State Agriculture Universities to function as dedicated centres responsible for large scale production and distribution of genuine quality seeds and planting material for the entire country to meet requirement of area expansion programmes of plan schemes. It was proposed to set up 9 centres for mango, 3 for grapes, 4 for banana, 2 for pomegranate, 3 for litchi, 3 for guava, 2 for walnut, 3 for apple, 4 for papaya, 1 for passion fruit, 1 for Kiwi fruit and 2 for Ber.

ii. *Establishing Regional Fruit Nurseries*- The Working Group for 11th Plan also recommended setting up of 30 *Regional Horticulture Nurseries* at ICAR Institutions, State Agriculture Universities and Commodity Boards under Ministry of Commerce. The Regional Fruit Nurseries had been envisaged to be of 4 Ha size and

would be set up with capital investment of RS. 18 lakh each under Mission Mode Programmes and Working Capital Revolving Fund of Rs. 7 Lakh and shall be under commitment to produce minimum of two lakh plants per year.

iii. *National Centres for Production of Disease Free Citrus Plants*- The Working Group for 11th Plan had also recommended setting up 5 additional *National Centres for Production of Disease Free Citrus Plants* on the pattern of NRC Citrus Nagpur and PAU Ludhiana.

B. Vegetable Seeds- The Working Group for 11th Plan had also reviewed requirement of seeds for vegetable crops and concluded that adequate infrastructure had been developed for the breeder seed production of vegetable crops at 14 centres developed under National Seed Project (NSP-Vegetables). It only identified the difficulty in open field production and in making assessment of demand of seeds by the producer farmers resulting into poor off take.

C. Tuber Crops- The working Group for 11th Plan had analyzed the seed materials required for potato, Sweet potato and Tapioca and assessed breeder seed requirement of the country for potato seeds as 3000 MT per year and availability as 2100 MT per year. Breeder seed of potato is produced by CPRI at its 5 regional research stations located at Kufri- Fagu (HP), Modipuram (UP), Jalandhar (Punjab), Gwalior (MP) and Patna (Bihar). Private farm of Chambal Agritech and Sangha Farm etc too produce breeder seeds on limited basis. The Working Group for 11th plan had flagged the issue of no multiplication cycle of breeder seed in States like West Bengal, Karnataka, Maharashtra, Orissa, NEH Region, Gujrat and Bihar and multiplication up to $\mathbf{F_1}$ stage only in other States as the main reason for shortage of seed potato. The Working Group had been satisfied with seed multiplication for sweet potato and tapioca by CTCRI Triruvanantpuram to be adequate to meet the demand for the same.

D. Floriculture Crops- The Working Group for 11th Plan had recognized the fact that public sector research in floriculture sector is not adequate to meet the demand of the market in terms of varieties of flowers. New hybrids of cut flowers are imported by multinational companies and multiplied in India for sales among producer farmers. Even, in case of loose flowers, the industry is not solely depended on public sector varieties and hybrids. Therefore, there is a need to facilitate import of new varieties / hybrids of flowers and their multiplication for meeting sectors demand.

E- Spice crops- Indian Institute of spice Research (IISR) *Calicut* and NRC for Seed spices at Ajmer, Spice Board assisted farms, Kerala Agriculture University are main producers of seed and quality planting materials for spice crops.

***F- Plantation Crops*-** Central Plantation Crop Research Institute (CPCRI) *Kasargod* is the main producer of seed nuts and hybrid seedlings for coconut, nuts & seedlings for areca nut, seed / seedlings for cocoa. CPCRI has established seed gardens at *Kidu* and *Kasargod* for commercial production of coconut hybrids and varieties. A seed garden has been developed at *Kayamkulam* for commercial production of root wilt tolerant planting material of coconut. As regards, cashew nut, a number of nurseries have been set up under assistance from the Directorate of Cashew Nut and Cocoa Development under its plan scheme of "Establishment of Regional Nursery" which was implemented during 8th five year plan period and continued till year 2003--04. Similar programme had been started for cocoa in the year 2001-02 promoting setting up regional nurseries for cocoa in the six States namely- Kerala, Karnataka, Goa, Tamil Nadu, Andhra Pradesh and Maharashtra.

***G- Medicinal and aromatic plants*-** At present, the planting materials for medicinal and aromatic plants are grown mainly at MAP Anand, CIMAP Lucknow and IHBT Palampur. This area needs focused attention by Medicinal Plant Board. The Working Group was of the view that the production is adequate to meet the 11th plan requirements.

H. Micro Propagation of Elite Genotypes and Root Stocks- the Working Group for 11th Plan Period had taken stock of development of micro propagation technology and recommended setting up of capital investment for infrastructure strengthening in ICAR Institutions during 11th plan period as the required intervention; namely , setting up six *National Centres for production of Certified virus free citrus plants*, setting up of six *National Hardening Centres for production of Tissue Culture Plants* and *Up-scaling of micro propagation activities* in 50 target horticulture crops.

Review of Initiatives for Securing Quality Planting Materials during 11th Plan Period-

a. From the reports received from concerned it appears that no concerted effort was made to develop nurseries as recommended by the Working Group for XIth Plan as result only a few institutes like NRC Citrus, Nagpur and CISH Lucknow have developed mother plan nurseries. However, two new scheme sub-components of Accreditation & Rating of Horticulture Nurseries and Setting up of Nucleus Nurseries have been introduced under NHB scheme component of *Development and Transfer of Technology*. Protocol for accreditation and rating of horticulture nurseries too have been firmed up and approved by DAC in consultation with ICAR. About 15 mother plant nurseries have been sanctioned under this scheme by NHB.

b. Financial assistance is being extended for setting up of one Ha horticulture nurseries and four Ha Model Horticulture Nurseries under NHM and HMNEH; however, the assistance is available without ensuring that the candidate nursery

fulfills criterion for its accreditation or not. It is also noticed that a large number of nurseries assisted are existing ones and assistance has been extended for strengthening infrastructure of shed net etc which may not necessarily be meant for production of planting materials of fruits and vegetable plants.

c. Financial assistance has been given under NHM and HMNEH to ICAR Institutions too, for setting up National Horticulture Nurseries, Regional Horticulture Nurseries and National Centre for Production of Disease Free Planting Materials for Citrus Crops.

Recommendations for 12th Five-Year Plan Period- Keeping in view the importance of seed and quality planting materials for horticulture development both Policy and Programme interventions are required. Recommendations in this regard are as follows-

i. *Accreditation and rating of horticulture nurseries*- As the first step towards quality regime in regard to planting materials, DAC should designate agencies like NHB for carrying out function of accreditation and rating of horticulture nurseries. Protocols for accreditation of Horticulture Nurseries, as approved by DAC in consultation with ICAR and being adopted by NHB may be adopted for carrying out accreditation and rating of candidate horticulture nurseries. The protocol and arrangement made by DBT for accreditation of Tissue Culture Labs may be accepted under horticulture development programmes of DAC.

ii. *Developing General and Specific Guidelines for DUS Testing of horticulture crops followed by notification of horticulture crops for being eligible for registration under PPV & FR Act, 2001*- During the 12th Plan Period, steps need to be taken for developing General and Specific Guidelines for DUS Testing of horticulture crops including grapes followed by notification of horticulture crops including grapes for being eligible for registration under PPV & FR Act, 2001. While doing so, temperate fruit crops, grapes, strawberry, potato, vegetable crops and flower varieties need to be given priority in view of higher dependence on imported planting materials and truthfully labeled seeds mostly sourced through private sector R & D and imports.

iii. *Advance Production planning for Quality Planting Materials*- For securing supply of planting materials for horticulture crops during XIIth plan period, it is imperative that its availability is assessed by completing process of accreditation of horticulture nurseries and limit area expansion programmes to the extent of availability of quality planting materials. Similarly, it is required to compile information regarding crop variety wise production

capacity of new horticulture nurseries reported to have been set up during Xth and XIth plan period under Mission Mode schemes. This may give us fairly good idea regarding need of setting up new horticulture nurseries for certain crop varieties in which the availability of quality planting materials need to be augmented during XIIth plan period.

iv. *Continuation of schemes promoting setting up of quality Nurseries*- Keeping in view blue-print for development of new horticulture nurseries, NHB scheme of promoting setting up of nucleus nurseries, as source of mother plants and root stock for development of commercial horticulture nurseries should be continued during 12th plan period. Other schemes of providing financial assistance for setting up horticulture nurseries and tissue culture laboratories for commercial production of quality planting materials, under NHB, NHM and HMNEH, too should be continued during 12th plan period but in credit-linked, back ended subsidy mode. For ensuring desired quality of projects this component should be implemented only through one of the National Level Agencies. Financial assistance for such projects should be released on accreditation of nursery by designated agency and tissue culture laboratory by DBT.

v. *Only Accredited Nurseries and TC Labs for Sourcing Planting Materials*- Horticulture nurseries and tissue culture labs, both in public and private sectors, should be taken as source of supply of planting materials under government schemes only on getting accreditation as per approved protocol. List of such accredited horticulture nurseries and tissue culture labs should be made available in public domain.

vi. *No purchase functions for programme implementing officers regarding seed and planting materials* - Instead of programme implementing officer getting involved in purchase functions for planting materials, the beneficiaries under government schemes should be given liberty to source the same from accredited horticulture nurseries / tissue culture labs, as the case may be.

vii. *Normative Cost for subsidy calculation*- Normative cost of planting material for the purpose of calculation of subsidy in area expansion projects should be determined by a Committee headed by Mission Directors of Mission Mode Programmes on year to year basis, keeping in view the input cost and overheads involved in production of such plants.

viii. *Private Sector Seeds*- Private sector research hybrids may be freely allowed in government programmes after their registration under PVR & FR Act 2001;

until then, they may be allowed, subject to general normative cost, if purchased from licensed outlets for sales of seed and planting materials.

ix. *Import of Seeds and Planting Material-* The import policy on planting material should ensure the availability of best planting material to Indian farmers aiming enhanced productivity, farm income and export earnings. Seeds and planting materials imported/obtained for use in the country must meet the minimum seed standards of seed health, germination, genetic and physical purity as prescribed. To ensure quality in perennials the process should be legislated. It may be made mandatory on part of importers to make available a reasonable size of sample of the imported planting material to the Gene Bank maintained by NBPGR. The existing policy, which permits free import of seeds of vegetables, flowers and ornamental plants, cuttings, saplings of flowers, tubers and bulbs of flowers by certain specified categories of importers may continue. Tubers and bulbs of flowers should be subjected to post-entry quarantine.

x. *Transgenic Plant Varieties- The Working Group has considered the fact that b*iotechnology will continue to play a vital role in the development of the horticulture sector. This technology can be used not only to develop new crops/varieties, which are tolerant to disease, pests and abiotic stresses, but also to improve productivity and nutritional quality of food. After getting statutory transgenic variety may be released for commercial sale for which labelling requirement must be prescribed. Transgenic varieties can be protected under the PVP legislation in the same manner as non-transgenic varieties after their release for commercial cultivation.

Farm Chemicals-

a. Though insecticide and pesticides manufactured by domestic companies constitute major part of farm chemicals used in our farm sector in general, our own R & D in respect of water soluble fertilizers, liquid fertilizers, plant growth regulating hormones and insecticide & pesticide molecules being far behind internationally matching levels; our horticulture farmers have dependence of high order on imported farm chemicals. However, our legal framework for protection of intellectual property rights is said to be not adequate so as to encourage foreign manufacturers of farm chemicals to introduce their new produce with efficacy of higher order and lesser toxicity into Indian market. Procedure followed by Directorate of Plant Protection, Quarantine & Storage for registration of farm chemicals / formulations under provisions of the Insecticides Act, 1968 is said to be time-consuming, cumbersome and costly affair; as such a large number of farm chemicals are used for crops for which they are not registered.

b. With the results received from *Pesticide Residue Monitoring System* put in place by DAC in the year 2006 it was revealed that pesticides not registered for a range of crops have been in use under technical advice of experts. At present, Plant Protection Division of DAC is engaged in resolving this issue of use of farm chemicals for crops for which the later have not been registered but there is a problem regarding availability of substitute chemicals.

c. Yet another aspect of Registration Process under Insecticides Act, 1968 relates to registration of bio-pesticides; a large number of bio-pesticide labs set up under various schemes of horticulture development who are based on strains sourced from common source of SAUs / ICAR Institutions and who follow similar procedure for manufacturing have not been able to get registration for the reason of not being able to fulfil data requirement.

d. There is general feeling in the industry that the process of registration of farm chemicals needs restructuring; farm chemicals which are awaiting registration in India for quite a long time are being used worldwide and fruits processed using such chemicals are allowed to enter into the India through import route.

Recommendations for 12th Five0Year Plan Period-

Existing legal framework for protection of intellectual property rights needs fresh look so as to make them commensurate to encourage foreign manufacturers of farm chemicals to introduce new molecules of higher order efficacy into Indian market.

Procedure followed by Directorate of Plant Protection, Quarantine & Storage for registration of farm chemicals / formulations under provisions of the Insecticides Act, 1968 also needs fresh look from point of view of protocol being followed, capacity of the organisation to handle applications for registration and time frame of handling etc. Possibility of substituting present system of crop wise registration of farm chemicals by a procedure of single registration of farm chemicals for multiple crops may be examined critically.

So long as we have crop-wise registration of farm chemicals, there is a need for plant protection division to bridge the gap between the farm chemicals registered by it for various crops and prescriptions made by our plant-protection experts for controlling incidence of pests & disease.

Farm Machineries & Tools and Precision Lab Equipments-

Under set up of ICAR, Central Institute of Agriculture Engineering, Bhopal is the nodal institute in India to carry out R & D in farm mechanisation and Central Institute of Post Harvest Engineering Technology is nodal institution for carrying out R & D in the field of post harvest management of agriculture / horticulture crops. In addition, agriculture engineering divisions in Indian Institute of Technology Kharagpur and in State Agriculture Universities also carry out R & D on farm mechanisation, micro-irrigation, protected farming etc. The product catalogue of

these pioneer institutions itself shows that there is a wide gap between need of commercial horticulture sector in respect of mechanisation of farm operations and hi-tech production and post harvest management systems.

Needs of hi-tech commercial horticulture sector cannot be fulfilled by providing them with very basic tools and equipments like potato peeler, potato-slicers, banana comb-cutters, potato planters and diggers. This explains our heavy dependence on imported technology for manufacturing micro-irrigation system, fertigation systems, farm machineries and tools, lab equipments, design of structures for protected cultivation, cold chain infrastructures, machinery and equipments for pack-houses, refrigerated transport system etc.

Our policies regarding import of farm tools, equipments and machineries are sufficiently facilitating necessary imports of these items. However, there is a need for demonstration and trials of selected farm machinery, tools and equipments selected by expert committee headed by expert from ICAR sourcing the machinery, tools & equipments both from our own R & D and imported ones.

Recommendations for 12th Five- Year Plan Period- The scheme permitting import of selected farm machineries, equipments and tools by National Level Agencies for the purpose of field trials and demonstration needs to be continued during 12th plan period. The machineries requiring higher capital investment and which are more suitable as common facility may be procured and placed at the disposal of some public institution for making them available to the farmers on custom hiring service basis.

Input of Technology of higher Order-

Continued emphasis had been given during 11th plan period to setting up of high tech input generating infrastructures in terms of crop-specific Model R & D Farms, Plant Disease Forecasting Labs, Plant Tissue analysis Labs, National Centre for IPM etc. However, these investment projects have not made visible impact during the 11th plan period. Some examples under this category are as follows-

a. A number of crop-specific Model R & D and Extension based farms have been set up under with or without international collaboration. However, technology for export quality production of several crops is mostly given to producers by overseas buyers; for example- grapes, banana, gherkins, walnut, cut & frozen fruits and vegetables and cut-flowers. In a number of cases, the overseas buyers are also imparting training for production, PHM and supplying packing materials too. Some of our public institutions are working in close liaison with our farmers, overseas buyers etc to adapt such technologies to Indian conditions and adopt them in our farming system. However, our own R & D in this regard is lagging behind.

b. During 10th and 11th Five Year plan period, over 60 number of Plant Disease Forecasting labs have been set up by various public institutions under scheme of NHM. However, these labs are not able to generate plant disease forecast bulletins.

c. Sanitary and Phyto-sanitary requirements are becoming more and more important in world trade. However, our domain knowledge in respect of Integrated Pest Management is far from desired level.

d. Similar is the case of Plant Tissue Analysis Labs set up under Mission Mode scheme of horticulture development which is highly underutilized.

e. Substantive inputs from 17 Precision Farming Development Centres (PFDC) located in different parts of the Country is not available even to large size commercial horticulture projects set up under plan schemes. A number of such projects being export-oriented depend on technology inputs given by overseas buyers.

f. Inputs regarding infrastructure design for protected cultivation are largely coming from private sector. Schemes of horticulture development prescribe various types of poly houses and shed-nets without having technical specifications for each of them. Even the cost norms for such structures have been fixed without any cost analysis, which combined with direct interface between suppliers, and implementing agencies has resulted into higher cost norms.

g. Scientists dealing with post harvest engineering technology are not able to combine the knowledge of life-sciences which is essential for designing PHM infrastructure for fresh horticulture produce. As a result, technical design specifications for mushroom production units, fruit ripening units, reefer vans, cold storages etc had not been firmed up and cost norms are often fixed by heavy dependence on inputs from suppliers / manufacturers.

h. Personnel engaged in scheme implementation are not equipped with domain knowledge to implement above mentioned technical standards even if the same is put in place.

i. Substantial improvement in scientific inputs to farming community for taking appropriate decision in respect of our response to climate change if felt.

j. In respect of honey-bee keeping, standardizing management practices for different species of bees, pest and disease control, processing of honey, quality control.

Recommendations for 12th Plan Period-

i. Effective use of hi-tech infrastructure already created during 11th plan period should be given top-most priority during 12th Plan Period.

ii. A suitable agency may be designated as nodal agency for prescribing technical specifications and design of infrastructures like fertigation system, poly houses and shed nets, mushroom production units etc.

iii. Our regular R & D should be oriented towards bridging the technology gap in this regard.

Credit Needs- Credit needs for horticulture sector are being met by banking and non banking financial institutions. Cost norms approved by NHB by a consultative process involving field officers, experts from ICAR / SAU, Bankers and representatives of stake-holders is generally acceptable to the bankers. The introduction of back-ended subsidy scheme has resulted into inflow of properly appraised projects. However, there is a recent trend of State Governments providing additional subsidy by applying its own budgetary resources which needs to be looked into critically from point of view of efficiency of grant utilization and involvement of implementing agencies in purchase functions for farm inputs.

Budgetary Requirement- Projected Budgetary requirement for farm inputs may be computed by taking planting material requirement for 1.0 million Ha area under new plantation as well as re-plantation during 12th plan period. A nursery area of about 2000 Ha may be required for the purpose half of which may have to be developed as balance half may exist by end of 11th Plan Period. Investment @ Rs. 12 lakh /Ha may be required for which financial assistance @ 40% of normative cost is recommended. As there are several other components like nucleus blocks, tissue culture lab etc; therefore, budgetary requirement for planting material security may be taken as **Rs. 250 Crores**.

Chapter 6: Supply chain Management - Post Harvest Handling, Packaging, Transport and Storage

Back Ground Facts-

a. The concept of post harvest food loss reduction as a significant means to increase food availability was advocated by the World Food Conference held in Rome in 1974. The 7th session of the U.N. General Assembly in 1975 passed a resolution calling for 50 per cent reduction of post harvest losses by 1985. Food loss prevention became a priority area with the FAO and an Action Programme became operational focusing mainly on durable food grains, because of their prominence in our daily diet. In May 1980, an Expert Consultation on Food Loss Prevention in Perishable Crops, mainly covering fruits and vegetables was held in Rome. As fresh horticulture produce are highly perishable in nature, management of entire supply chain has special significance in enhancing shelf-life of horticulture produce and in retaining nutritive values. Supply chain management or popularly known as post harvest management (PHM) of fresh horticulture produce includes on-farm handling, sorting & grading, packaging, transport and storage solutions maintaining required cold chain in economically viable manner from farm to fork.

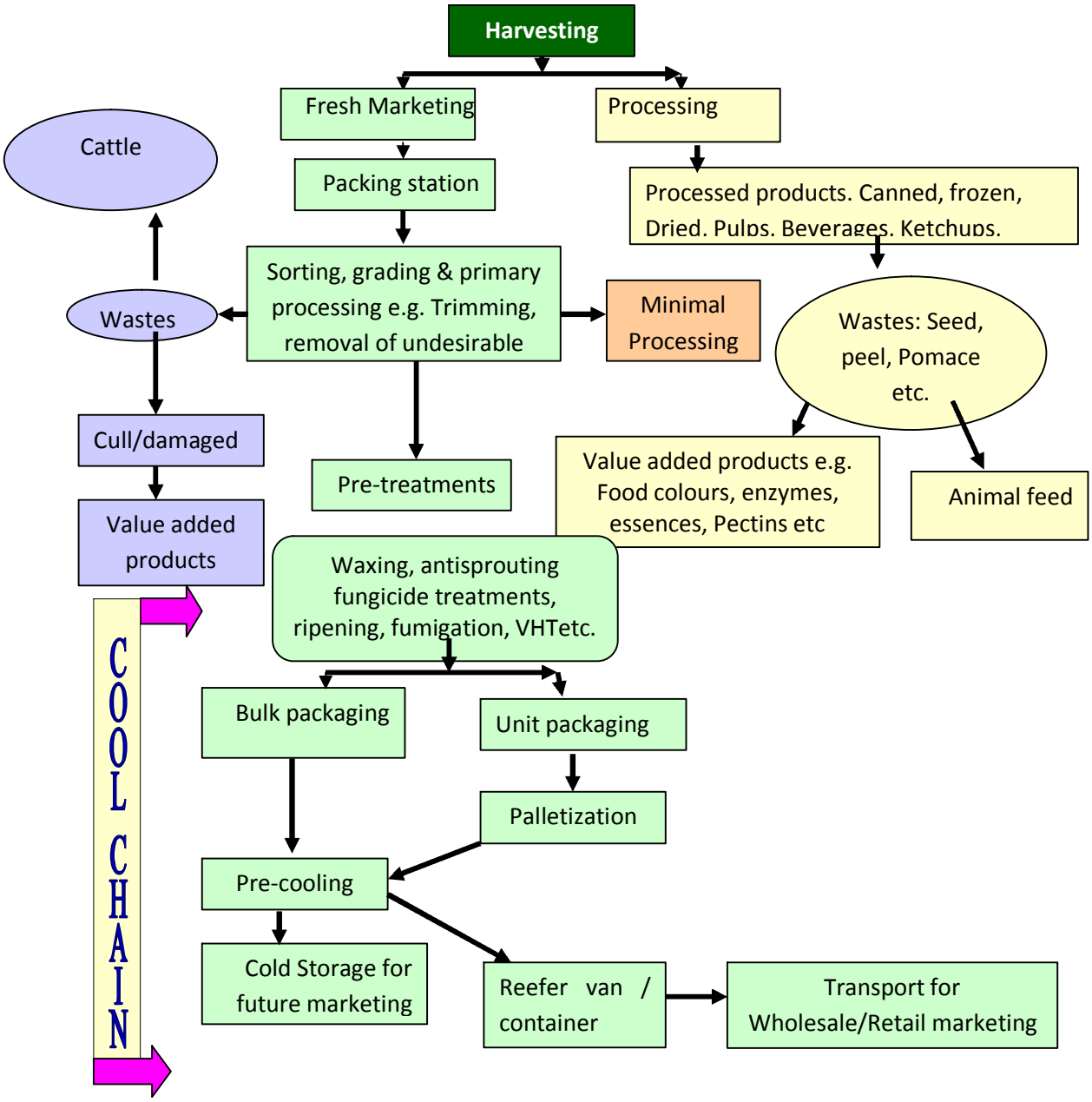
b. Various estimates of post-harvest losses of horticulture produce have been quoted at various forums which have, in one or other manner, influenced policy decisions including those relating to investment incentives for post harvest and processing related infrastructures. However, the Working Group has learnt that no formal study has been carried out adopting statistically recommended method of data sampling and analysis in order to estimate post harvest losses of fresh horticulture produce. Recently, CIPHET has undertaken a proper scientific study in this regard, the report of which is yet to be available in public domain. But, this does not; in anyway, diminish the merit of country's concern about high level of post harvest losses of fresh horticulture produce.

c. Latest information indicates that only a small part of the plan fund provided for horticultural development efforts goes for dealing with post-harvest related areas of concern, while the larger chunk is allocated to trying to area expansion programme under horticulture crops. Further, it is noteworthy that the present strategy of tackling post-harvest losses in fresh horticulture produce revolves mainly around extending financial incentives and tax relaxations for promoting capital investment in pack-houses and cold chain infrastructures which in turn has found limited acceptance by stake-holders in spite of increasing pattern of financial assistance for pack houses, mechanized sorting & grading system, pre-cooling equipments, reefer vans and multi-commodity cold storages. *A Classic Model of integrated Post Harvest Management being promoted by crop scientists can be depicted as given below in Chart 6.1.* The Working Group has, therefore, gone into detail of this model and come to conclusion that, in a very large number of cases issues concerning aggregation of produce, its evacuation to nearby market, trading system in vogue for fresh horticulture produce and economic

viability of PHM solutions have not been considered in an integrated project mode while implementing schemes relating to PHM; to the contrary, too much reliance has been made on the classic / theoretical model which may be one of the most important reasons for lower level of adoption of recommendations regarding post harvest management of horticulture crops.

Chart 6.1

Classic Model of Integrated Post Harvest Management (IPHM)



Strategy of Tackling Issue of PHM under Plan Schemes During XIth Plan Period- The issue of tackling post harvest losses of fresh horticulture produce has been given focused attention from eighth five year plan period. However, strategy mainly revolved around promoting capital investment in PHM Infrastructures for which scheme components promoting capital investment in setting up of pack houses and integrated cold chain, fruit ripening chambers, specialised storage structures had been initially introduced with financial assistance of 25% of normative project cost in general areas and 33.3 % in Hilly and NE Region which has been raised to 40% of normative project cost in general area and 55% in Hilly and NE Region during 11th plan period. However, off-take of scheme of pack houses and reefer transport system has been generally limited for projects relating to high value commodities meant for exports or limited high-end domestic markets. In spite of effort made to promote multi-chamber, multi-commodity cold storages, majority of cold storages have been set up for storage of potatoes which are also used for storage of a few other commodities like red chillies, tamarind, apples etc. Integrated pack houses have been set up mainly for products like table grapes and chives produced for exports to developed countries.

Present Status of Supply Chain for fresh Horticulture Produce and Gap Analysis-

a. *Adoption Level for Sorting & Grading Practices in Vegetables* - Producer farmers all over the Country are generally better aware of maturity indices of vegetables as compared to maturity indices of fruits. Due to introduction of improved varieties of vegetable crops accompanied by production technology the percentage of quality fruits in harvested lots is quite high and therefore, the producer farmers are not averse to size grading; in addition to grading on the basis of maturity level. Recommended practice of curing and healing before long term storage, harvesting in the evening/ night or early morning so as to reach the market before sun-rise, harvesting with or without leaf-cover so as to provide protection to outer surface against mechanical damages, limiting application of chemical fertilizers to crops like onion for improved shelf life and restricting irrigation before harvesting etc are also being adopted. However, in absence of proper prescriptions for IPM, indiscriminate use of pesticides takes place which in turn results into quality deterioration in terms of very high residue levels.

Chart 6.2

b. *Lowers Adoption of Sorting & Grading Practices in Fruits- To* the contrary, with exception of certain fruits like papaya, sweet lime, kinnow, acid lime and fruits for export markets, there is generally lack of prescription regarding production of quality fruits in terms of size, shape, weight, uniform colour, texture, TSS: acid ratio, fruit pressure etc. It is observed that when percentage of quality fruits in a harvested lot is low, the producer farmers are reluctant to carry out size grading. There is generally absence of prescription regarding maturity indices of fruits too; as a result the fruits are harvested at pre-mature stage or over-ripe stage which may not have co-relation with requirements of marketing. Indiscriminate use of pesticides is a problem in case of several high value fruits as well. Due to poor canopy and nutrient management in orchards, fruit bearing may be low, fruit quality in terms of uniform size and colour is absent and deficiency in management of orchards do result into occurrences of diseases like Bacterial Blight in pomegranate, Leaf-Spot or Yellow Sigatoka in banana crop etc.

6.3 Low Percentage of Quality Fruits in a Lot

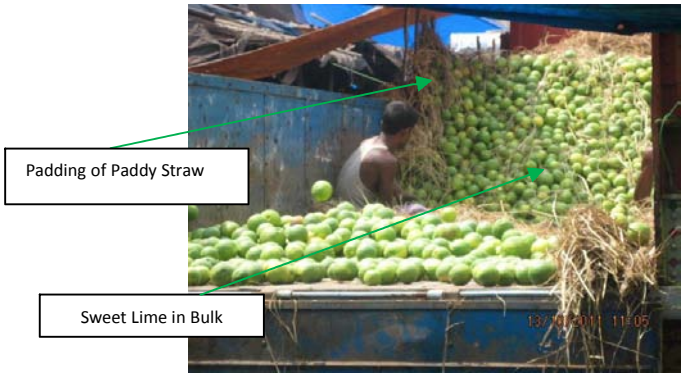
6.4 Sorting & grading when economically viable

c. *Adoption of Sorting & Grading Practices in Fruits and Vegetables for Exports*- Adoption level of recommended practices for sorting & grading, packaging etc is quite high in fruits & vegetables produced for exports to developed Countries for example- table-grapes and banana, cut-flowers, chives, gherkins, process-worthy quality of wine variety of grapes etc. For the purpose of export competitiveness, as far as possible, our producers and entrepreneurs prefer quality planting materials, farm inputs, packaging materials and production and PHM technology prescribed by experts and overseas buyers. In a number of cases of production for export on contractual basis i.e. with buy-back arrangements, the overseas buyers supply inputs and carry out technology transfer function themselves.

6.5 Under Private Sector Extension for Export Quality Production

d. *Scenario of Packaging and Transport* - For domestic markets, fruits and vegetables are generally loose packed or packed using traditional bulk packing solutions like in bamboo-baskets / gunny bags / plastic bags / large size carton boxes etc. It has been observed that the availability of IIPM (Indian Institute of Packaging) approved designs of CFB boxes for fresh horticulture produce has been limited to only a few crops for which applied R & D has been sponsored by agencies like APEDA or by end-users. Therefore, large number of models of CFB boxes in circulation have not been tested for their suitability for packing targeted horticulture produce and in taking care of handling, stacking and transport related risk-factors. As a result, the

popularity of CFB boxes gets further reduced which is already low due to cost implications.



6.6 Bulk Transport of Sweet Lime by Road

6.7 Bulk Transport of pineapples by Road

e. *Limited Adoption of Plastic Crates*- Plastic crates are generally used in cases of short distance transport or when the prevalent business model facilitates its circulation at affordable cost. Use of folding plastic crates has been limited due to these crates being prone to damages at hinges. Advocating use of plastic crates and bins at whatever rate of subsidy does not convinces end-users about their suitability in business system.

6.8 Traditional Packaging of F & V

6.9 Modern Packaging of Tomato

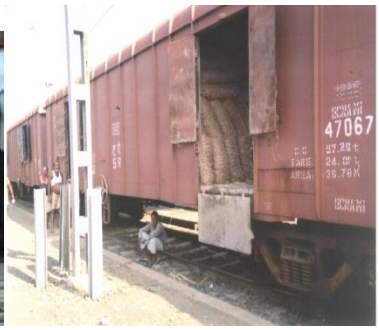
6.10 Transport of F & V by open lorry

f. Packaging Materials Used for Long Distance Transport- Long distance transportation of fragile and highly perishable fruits / vegetables is made in wooden boxes when option of recovery of plastic crates is not available. CFB boxes are generally used for packing high value fruits and vegetables like apples, apricot, peach etc and in cases when transportation in palletised conditions is to be carried out. Large size CFB boxes are also used in rail transport of fruits when it is mandatory under railway rules like is case of transport of mangoes by rail-rakes of goods train.

6.11 Long Distance Rail Transport of Banana for Domestic Market

6.12 Rail Transport of Banana

6.13 Rail Transport of mangoes



6.14 Rail Transport of Onion

g. *Mode of long distance transportation of fragile and highly perishable fruits / vegetables-* Lorries are most commonly used for road transport of fresh horticulture produce. Though Indian railways permits transport of horticulture produce in brake vans and parcel vans which are attached to passenger trains, loading and unloading of produce on these on passenger platforms has several operational problems. In recent past, railways had procured about ten numbers of refrigerated parcel vans to facilitate transport of fresh horticulture produce however, due to demand constraints, these refrigerated parcel vans are being used for transport of other commodities like chocolates etc. For bulk transport of banana, mangoes, onion, potato etc Indian railways provides rail rakes of goods trains; however, rake availability with railways is very limited due to their demand for transport of food grains and other bulk commodities. A large number of rakes are engaged in transport of food grains under PDS systems which do not have assured return journey cargo. On such routes, railways rakes are made available for transport of horticulture produce at concessional rates. But the ordinary wagons of goods train are not sufficiently

ventilated and do get heated during summer season resulting into damages to the produce being transported. CONCOR, Central Ware House Corporation or any other similar service providers have so far not offered containerised transport facilities for long distance transport of horticulture produce for the reason that they had not visualised beyond introducing refrigerated containers for this purpose which, at present, may not be technically suitable in absence of infrastructure of pre-cooling and also may not be economically viable for most of the horticulture produce.

h. Packaging and Transport in Exportable Horticulture Produce- In case of exportable horticulture produce the protocol for PHM, packaging and transport is given by overseas buyers.


6.15 Modern Pack house and Transport System in Export oriented units

i. Constraints in Availability of Validated PHM Protocols in Public Sector - There are serious constraints in availability of validated PHM protocols in public sector extension system in respect of fresh fruits & vegetables. There are cases of loss of consignments of litchi, mangoes, onion, leafy vegetables when transported in cold chain under close supervision of experts. It is a matter of concern that critical storage conditions prescribed by World Food Logistic Organisations which are commonly used by engineers for designing cold chain storage structures have not been validated for Indian agro-climatic conditions and cultivars.

6.16 Case Study of Damage to Litchi during Transport in Reefer Van from Muzaffarpur to New Delhi

6.17 Case Study of Loss of Alphonso mangoea from Pune and Mallika mangoes from Bangaluru to Delhi

6.18 Sprouting of onion bulbs during shipment by sea route to Europe in Reefer Containers- unresolved case

6.19 Damage to leafy vegetables during air shipment from Kolkatta to Netherlands- unresolved case

i. *Adoption of Low Level of Technology in Warehousing Business Model of Cold Chain Infrastructure-* As majority of cold storages render services as warehouses; in this business model the risk of weight loss and quality loss of horticulture produce is owned by the user of facility; therefore, enhancement of rate of financial assistance for capital investment in terms of subsidy has not resulted into adoption of proper technical design and use of performance-tested components by the cold storage owners. Two successive studies carried out first by a High powered Committee Chaired by Shri J. N. L. Srivastava in the year 1998 followed by the Task Forces on Cold Chain Development in India chaired by Shri Karnail Singh, in the year 2007 had pointed out the low level of technology adopted in setting up Cold Storages. This was followed by a diagnostic study carried out by a Technical Standards Committee set up by the Department of Agriculture & Cooperation under Chairmanship of Managing Director, National Horticulture Board in the year 2009 which has revealed that majority of cold storages set up for storing fresh fruits & vegetables in ware housing business model in the Country have not been designed by qualified engineers, rather they have been constructed on the basis of ad hoc advice of suppliers of plant & machineries for refrigeration & cooling system and thermal insulation materials under consultancy

services provided by Chartered Accountants who prepared bankable projects for securing credit link for the projects. It is also a matter of concern that there are only a few manufacturers of critical components of cold chain infrastructures who have performance rating certificates issued by internationally accredited labs as per internationally accepted standards and protocols for their components. Scenario is not different in cases of reefer vans / containers and fruit ripening units which have been promoted during previous five year plan periods too. In absence of national standards, these have been constructed and commissioned without following proper technical design procedures with respect to any of the internationally accepted standards. In absence of adoption of any technical standards and performance-test facilities, the reefer vans / containers are not certified and therefore, it is not possible for a user of reefer vans to know the storage conditions for which the same has been designed.

j. Absence of Technical Standards for Specialised / Reefer Transport System- Though, a lot of emphasis has been given during various plan periods on specialised transport system including reefer transport system for maintaining cold chain; but, until recently, no technical standards have been put in place about them. It is during year 2011-12 that UNECE Standards in this regard have been adopted by NHB followed by their adoption by Horticulture Division of DAC, no test laboratory is yet available in India for testing performance rating of specialised transport vehicles including reefer transport vehicles and refrigerated containers.

k. Low level of involvement of BIS and BEE in setting Standards for Energy-Efficient Cold Chain Infrastructure and its components- It is surprising that BIS has not been able to keep pace with technical advancement in respect materials used for thermal insulation in cold chain infrastructures. It has also not set up BIS standards for critical components used in cold chain infrastructure. Bureau of Energy Efficiency too, has not put in place any test protocol for performance rating for cold chain infrastructure from energy-efficiency point of view. In absence of these, it is not possible to carry out performance rating test for cold storages. However, theoretically energy efficiency is represented in terms of co-efficient of performance but in simple terms it may be determined by comparing design rate of consumption of electricity with actual rate of consumption of electricity in storing per MT of horticulture produce at recommended storage conditions on per day basis during holding period which may, for potato crop, normally range from month of May to July-August. As shown in Chart 6.20 and 6.21 below, electricity consumption for actual operating conditions and design conditions have been plotted for first few cold storages set up in UP (Agra, Aligarh region) and Rajashthan (Bharatpur district) during year 2010-11 by taking units of electricity consumed per MT of potato on per day basis on Y-axis and identity code of cold storage and makes of critical components of compressor and cooling coil marked on X axis. It may be seen that actual energy consumption levels have been much higher compared

to benchmark level of electricity consumption. This is primarily due to the reason that most of the manufacturers of critical components for refrigeration system make supply of stand-alone components manufactured by them and do not own responsibility for right configuration and setting of the entire system. In other words, proper service-delivery model is yet to be developed by our consultants and suppliers of critical components of cold storages in respect of cold storages set up in warehousing business models.

Chart 6.20

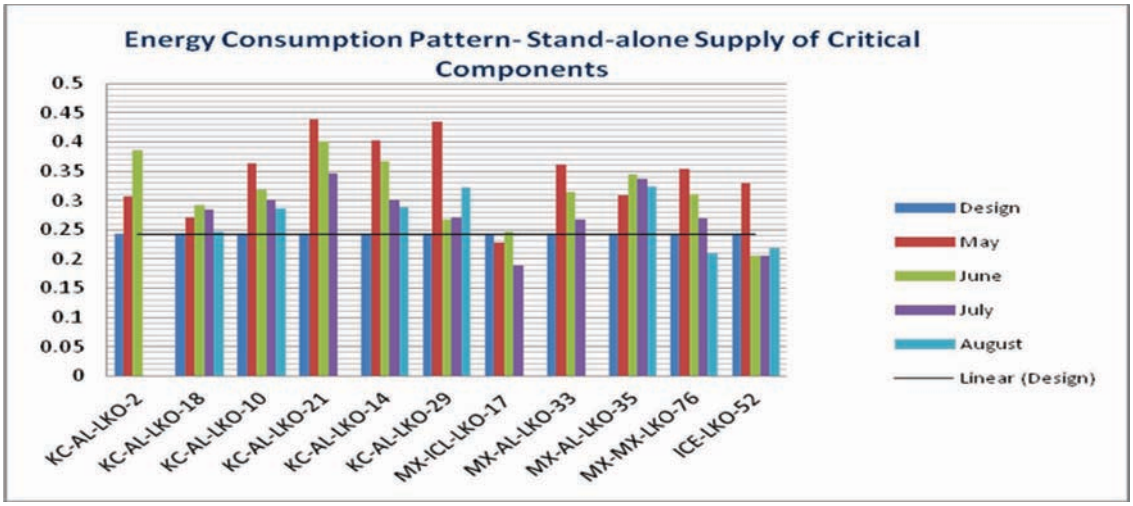
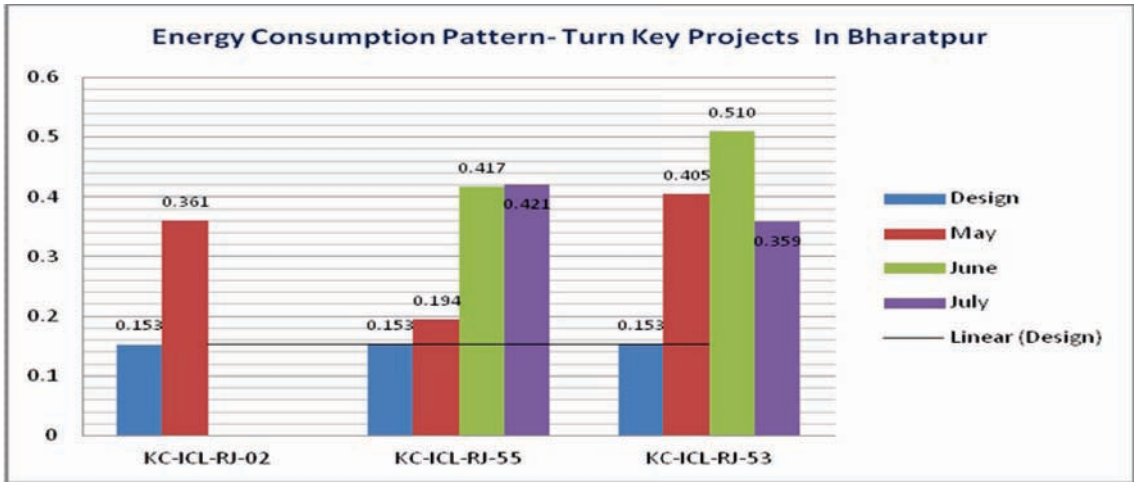


Chart 6.21



l. Absence of economically viable technology solutions for fruit ripening- Ethylene based fruit ripening system has been strongly recommended for ripening of climatic fruits like banana, mangoes, papaya, tomato etc. However, such a system is highly capital intensive and it is not possible to enforce the same for ripening of huge volume of fruits produced in our Country.

l. Limited Availability of Skilled Man-Power- It has been noticed that the engineering curriculum does not equip graduate engineers with knowledge of biological science

involving perishable commodities and therefore, they lack skill of designing cold chain infrastructures for fresh horticulture produce. As the engineers coming out of engineering colleges have no knowledge of critical storage conditions of fresh horticulture produce, they find it difficult to make heat load calculation and configure the plant & machineries in energy-efficient manner. Operators of cold chain infrastructure too are not equipped with knowledge of special nature of fresh horticulture produce in terms of their sensitivity to storage conditions and safety and therefore, there is a crying need for human resource development to meet the requirement of skilled man-power in cold chain sector.

New Initiatives taken by NHB during XIth Plan Period for Improving Post Harvest Management of Horticulture Produce- During XIth Plan period, following new initiatives have been taken by NHB jointly with cold storage industry, BIS, BEE, IITs, CONCOR and ICAR Institutions to address to above mentioned issues relating to post harvest handling and cold chain for fresh horticulture produce-

a. Technical Standards have been firmed up for cold storages for different types of horticulture produce, scientific fruit ripening chambers and specialised transport vehicles including refrigerated vans / containers,

b. Differential cost norms for cold storages, promoting advance stacking system and mechanised handling have been introduced,

c. Training modules for certificate course in cold storage operation & maintenance have been designed and courses for training of cold storage operators are going on,

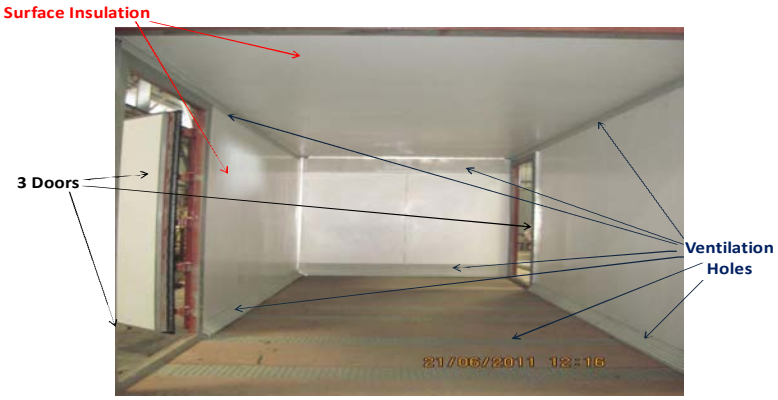
d. Technical Specifications for mechanised sorting & grading system for potatoes, onion and apples have been firmed up and introduced under its schemes,

e. Technical design features and cost norms for conveyor belts for handling have been introduced for mezzanine type traditional cold storages.

f. Financial incentive available under ongoing plan schemes have been extended to hi-tech, commercial vegetable production related projects which include components of post harvest infrastructure,

g. NHB along with CONCOR has taken initiative to introduce insulated & ventilated freight containers for the purpose of long distance transport of perishables, results of which are yet to be seen.

Inner side View- Insulation, Ventilation and Doors



6. 20 Insulated & Ventilated Freight Container for F & V Transport

h. A new scheme of Horticulture Park / Common Facility Centre has been introduced which facilitates higher amount of investment in Common Facilities for post harvest management of horticulture produce,

i. Applied research initiatives have been undertaken to develop / validate protocols for post harvest management, packaging, long distance transport in scientific manner keeping in view not only technical viability but also economic viability of prescriptions. In this process, experiments have been carried out for transport of Dashehari Mangoes in refrigerated transport from Rahamankheda, Lucknow to Dubai, packaging and transport of litchi in refrigerated containers from Muzaffarpur (Bihar) to New Delhi and so on.

j. National Centre for Cold Chain Development (NCCD) has been promoted by NHB jointly with stake-holders for promotion of quality regime in cold chain infrastructure development and management,

Mid-term Appraisal of 11th Plan – It is mentioned in mid-term appraisal document of Planning Commission of India that adequate attention to post harvest management and market development and processing of horticulture produce is yet to pick up.

***Recommended Course of Action for Supply Chain Management* during XII*th* *Plan Period* -**

Continuation of ongoing schemes of PHM-It is proposed to continue with ongoing schemes relating to Post Harvest Management of horticulture produce. As the cost norms and subsidy norms have been revised recently, same level of assistance may be continued. However, ceiling of 5000 MT put on cold storage capacity need to be relaxed in case of infrastructure under National Green Grid and Terminal and Wholesale Markets.

Development & Transfer of Technology / Technology Solutions- In order to make recommendations of post harvest management, packaging and storages relevant and acceptable to stake-holders it is necessary to develop appropriate technology and validate available technology in our conditions in following respect. Ongoing scheme of Development & Transfer of Technology / Technology under NHB may be continued to address to following needs; -

a. Introduction of Production Technology for increasing percentage of *quality fruits* in a production lot,

b. Development of *appropriate design of packaging* for horticulture produce, for relevant conditions in which transportation is to be made,

c. Validation of *critical storage conditions* for Indian cultivars and in our agro-climatic conditions

d. Validation of *PHM protocols for* Indian cultivars and in our agro-climatic conditions

e. Development and Introduction of economically viable *Long Distance Bulk Transport Solutions* for fresh horticulture produce,

Strengthening of NCCD- National Centre for Cold Chain Development which had been promoted by NHB during XIth Plan Period under its plan scheme need to be strengthened and its ambit may be expanded so as to develop protocols for above mentioned aspects of *Development & Transfer of Technology / Technology Solutions*.

Introduction of Scheme for Multi-Modal Transport System as Long Distance Bulk Transport Solutions for fresh horticulture produce- a scheme component of promotion of multi-modal transport system for long distance transportation of fresh fruits & vegetables, linking production centres with major markets need to be introduced on assistance pattern of ongoing scheme of Horticulture Park / Common Facility Centre.

Introduction of Scheme for Common Facility of perishable cargo handling at Inland Container Deports, Railway Yards, Dry Ports, Sea Ports, Air Cargo centres, Land Custom Stations etc- this new component too may be operated on assistance pattern of Horticulture Park / Common Facility Centre.

Need for Putting Policy- Framework in Place- Following policy framework need to be put in place for effective supply chain management of fresh horticulture produce.

i. *Introduction of Project Mode of Scheme Implementation*- It is proposed that during XIIth plan period, financial assistance for PHM component should be given in integration with new are-a expansion project or in integration with existing orchards in project mode. Thus, components for assistance will be decided keeping in view the system of production, aggregation of farm produce, its transportation to market and trading system in vogue. This policy decision may clash with XIth plan trend of proliferation of Mission Mode programmes for individual components like NMMI, Farm Machinery Mission, Seeds & Planting Material Mission and may be Cold Chain Mission etc. Following items may be given due importance while preparing such a project-

a. Plastic crates / bins and handling system among producer farmers and registered 'Adhatiyas / brokers in APMC markets,

b. Fruit ripening Chambers for banana, mangoes, papaya etc.

c. Mechanised sorting, grading and handling systems,

d. Cold storages with appropriate technical standards and storage conditions

e. Development of Infrastructure suitable for storing & grading and handling fresh horticulture produce at market centres, Inland Container Deports and Ports including sea ports, air cargo centres, Land Port Stations.

ii. *Free Movement of fresh horticulture produce across the Country*- At present perishables does not get free passage against city-area entry rules, on check posts etc. There is a need to introduce a system of free passage for fresh horticulture produce. This aspect has been dealt with in details while dealing with issue of Marketing of fresh horticulture produce.

iii. *Rationalisation of Cold Storage Licensing System*- At present, cold storage licensing is handled by State Government officials from horticulture / marketing directorates. The procedure and provisions regarding licensing revolve around administrative powers and penalty for defaulters but do not prescribe technical conditions which are necessary for securing licenses. There is a need to introduce a

uniform protocol and procedure in this regard and, possibly, entrust this task to NCCD.

iv. Development of Export Support Infrastructure within Country as Mandate under Scheme of Horticulture Division of DAC- At present, there is no clarity about role of various agencies in development of suitable export promotion infrastructure within country. As such, pack houses, quality control laboratories, cold chain infrastructures, perishable cargo centres at sea ports and air-ports etc are being supported under schemes of horticulture division of DAC as well as by APEDA. Ministry of Home Affairs too has schemes for development of Land Custom Stations at major inland ports. A policy decision in this respect may be taken that inland infrastructure of this nature will be developed under schemes of horticulture Division of DAC as central sector scheme fully funded by central government.

v. Removal of scheme overlap – Ministry of Food Processing Industries had introduced a scheme of Integrated Cold Chain during Xth and XIth plan period which does not essentially require that such cold chain infrastructure must have organic linkage with processing activities / units. A policy decision needs to be taken to remove such scheme overlaps.

Estimation of Requirement for Infrastructure Development- It is proposed to estimate requirement of pack houses, cold storages and fruit ripening chambers etc in spite of low level of their prevalence so far. It is targeted to provide sorting & grading / conveyor belt / rope-way facility for about 25% of estimated production of fruits and vegetables. Most of the crops require sorting & grading and packing in about a month's period and facility is generally is used for mono-crop. Taking working of pack-house in two shifts of 8 hours each, one may get about 500 hours of operation. Thus an installed capacity of one lakh TPH may be required. Taking cost norm of about Rs. 10000 per TPH the budgetary requirement at assistance level of 40% of capital cost will come out to be Rs. 400 crores. Similarly, requirement of additional capacity of cold storage for fruits & vegetables not requiring pre-cooling is taken as 10 Million MT @ assistance level of Rs. 2400 / MT, cold storage for crops requiring pre-cooling as 2 million MT @ assistance level of Rs. 3200 / MT and CA storage as 0.5 Million MT @ assistance level of Rs. 28800 / MT, onion storage as 5 million MT @ assistance level of Rs. 1500 / MT and introduction of 5000 refrigerated vans @ assistance level of Rs. ten lakh / van and 10 rakes / fleets of about 1000 MT capacity per cycle for long distance transport solutions is taken. Lump-sum provision of Rs. 100 crore each is proposed for primary processing and packaging solutions including plastic crates / bins. Similarly, for creating scientific ripening capacity of 5 million MT for 4 day ripening cycle in 250 working days, ripening chambers of total ripening capacity of 80000 MT is required to be created. Taking cost norm of Rs. one lakh /MT the estimated

budgetary requirement comes out to be Rs. 800 crores. A budget provision of Rs. 25 Crores is proposed for *NCCD* for carrying out its function of certification of PHM and cold chain infrastructures, HRD and applied R & D function.

Projection of Budgetary Requirement for 12th Plan Period- Detailed calculation in this regard is given below.

Table 6.1
Indicating Budgetary Requirements during 12th Plan Period

S. No.	PHM Intervention Type	Target Crop	Production in 2009-10 in million MT	Capacity creation during 12th Plan	Budgetary Requirement (Rs. in Crores)
1	Pack house, Ropeways, Conveyor belts etc	Potato	36.7	50 Million MT in about 2 shift totalling to 500 working hours and cost norm of Rs, one lakh / TPH and level of assistance @ 40% of capital investment.	400
2		Onion	12.1		
3		Apple	1.7		
4		Citrus	9.6		
5		Sapota	1.3		
6		Pomegranate	0.8		
7		Other crops	160.9		
		Total	223.1		
8	Cold storage with mezzanine floors		@ Rs 2400/ MT	10 Million MT	2400
9	Advance Cold storages		@ Rs. 3200 / MT	2 Million MT	640
10	CA Storages		@ Rs. 28800 / MT	0.5 Million MT	1440
11	Onion storage		@ Rs. 1500/ Mt	5 Million MT	750
12	Refrigerated vans		@ Rs. 10 lakh / unit	5000 No.	500
13	Multi-modal transport system for horticulture produce		@Rs. 10 crore per rake	10 fleet	100
14	Primary Processing		Lump sum amount		100
15	Fruit Ripening Chambers **(For banana, mangoes and papaya)**		Ripening chambers of 80000 MT	5 M. MT, in 250 days (4 days ripening cycle)	800
16	Miscellaneous measures including crates, bins etc				100
17	*Grant in Aid to NCCD*				25
Total					**7255 crores Say 7300 crores**

@ rate of assistance / unit

Chapter 7: Horticulture Marketing

Background Facts- The purpose of regulation of agricultural markets was to protect farmers from the exploitation of intermediaries and traders and also to ensure better prices and timely payment for his produce. With this in view, only State Governments were permitted under provisions of APMC Act to set up markets and it was made mandatory to carry out sales-purchase of agriculture produce within the area of operation of regulated markets only inside the markets premise. Management of APMC's does not carry out auction-functions directly instead, gives licenses to brokers/ commission agents known as "Adhatiyas" for carrying out auction of produce brought to the market. "Adhatiyas" are responsible to pay the price of the produce to the seller and has to recover purchase price from the buyers. As most of the trade of perishable is on credit, the "Adhatiyas" tend to manipulate sales of farm produce to traders known to them and who have better track record in making payments. This more often than not, results into lack of transparency in auction of agriculture produce, absence of real-time, truthful market information regarding price and arrivals of produce etc. The licensed brokers in the regulated markets have developed monopoly and political clout who do not allow easy entry of new persons, stifling the very spirit of competitive functioning.

Apart from the issue of lack of transparency in auction system, even the business process adopted by the market committees is generally insensitive to perishable nature of fresh horticulture produce. As per ruling business process adopted by regulated markets, on one hand, farmers have to bring their produce to the market yard where they do not get any value-added services and on the other, buyers like exporters, processors and retail chain operators who may not get desired quality and quantity of produce for their business; cannot buy the produce at the farm or at the processing plant or warehouse; the produce is required to be transported from the farm to the market yard and then only it can be purchased. In this process it becomes difficult to maintain traceability of the produce which is becoming one of the important requirements in export-markets.

On front of development of infrastructure, it may be observed that very few agriculture produce markets are specially designed for dealing with fresh horticulture produce that are highly perishable in nature and require proper handling, efficient sales, proper storage and further transport. The regulated markets were expected to plough back their revenue earnings into development of crop specific infrastructure; however, to the contrary, these markets have, over a period of time, acquired the status of restrictive and monopolistic markets and have not developed crop specific infrastructure and business process.

In this background, Market Sector Reforms were conceived and a Model Agriculture Produce Marketing (Development & Regulation) Act known as *Model Act* was introduced in the year 2003.

Structural Limitations in Effecting Market Sector Reforms- Two main existing legislative instruments with the central and state governments, viz, the Agricultural

Produce Marketing (Regulation) Act and Essential Commodities Act, 1955 respectively are used to monitor the activities of market functionaries; however, provisions of the two Acts do not deal with the identified gap in agriculture / horticulture marketing system. Therefore, need for putting in place a new legislative frame-work providing for agriculture / horticulture produce marketing was felt. As per arrangement under the Constitution of India, agricultural marketing is a state subject; therefore, market reforms for agriculture / horticulture produce which has been a long felt need, can be brought about only by respective State Governments. Therefore, the Central Government had decided to effect market sector reforms by putting in place a Model Agriculture Produce Marketing (Development & Regulation) Act and has been encouraging States to adopt the same by various means such as making the adoption of Model Act as a pre-condition for States being eligible for getting benefits of Central Schemes relating to infrastructure development for agriculture produce markets. This has operated as incentives for State Government to adopt Model APMC Act which in turn had been expected to trigger the process of market sector reforms and promote private sector investment in setting up modern agriculture markets with proper PHM infrastructures, transparent auction system etc which may reduce "inefficiency" of value chain management.

Salient Features of Model APMC Act-

a. the Preamble of the Model Act sets out the objective to provide for development of efficient marketing system, promotion of agri-processing and agricultural exports and to lay down procedures and systems for putting in place an effective infrastructure for the marketing of agricultural produce.

b. Under the existing law, markets are setup at the initiative of State Governments alone. To the contrary, the Model Act provides that legal persons, growers and local authorities are permitted to apply for the establishment of new markets for agricultural produce in any area. Consequently, in a market area, more than one market can be established by private persons, farmers and consumers.

c. It also prescribes that there will be no compulsion on the growers to sell their produce through existing markets administered by the Agricultural Produce Market Committee (APMC); however, agriculturist who does not bring his produce to the market area for sale will not be eligible for election to the APMC. Separate provision is made for notification of 'Special Markets' or *'Special Commodities Markets'* in any market area for specified agricultural commodities to be operated in addition to existing markets.

d. Even the APMC have been made specifically responsible for: ensuring complete transparency in pricing system and transactions taking place in market area; providing market-led extension services to farmers; ensuring payment for agricultural produce sold by farmers on the same day; promoting agricultural processing including activities for value addition in agricultural produce; and

publicizing data on arrivals and rates of agricultural produce brought into the market area for sale.

e. A new Chapter on 'Contract Farming' has been added to provide for compulsory registration of all contract farming sponsors, recording of contract farming agreements, resolution of disputes, if any, arising out of such agreement, exemption from levy of market fee on produce covered by contract farming agreements and to provide for indemnity to producers' title/ possession over his land from any claim arising out of the agreement. Provision has also been made for direct sale of farm produce to contract farming sponsor from farmers' field without the necessity of routing it through notified markets.

f. In addition, accepting the principle of *"State as One Market"*, provision has been made for imposition of *single point levy of market fee* on the sale of notified agricultural commodities in any market area and discretion provided to the State Government to fix graded levy of market fee on different types of sales.

g. Under the provisions of Model Act, licensing of market functionaries is dispensed with and a time bound procedure for registration has been laid down; registration for market functionaries has been provided to operate in one or more than one market areas; commission agency in any transaction relating to notified agricultural produce involving an agriculturist is prohibited and there will be no deduction towards commission from the sale proceeds payable to agriculturist seller.

h. Provision has also been made for the purchase of agricultural produce through private yards or directly from agriculturists in one or more than one market area.

i. Provision is also made for the establishment of consumers'/ farmers' market to facilitate direct sale of agricultural produce to consumers, and for resolving of disputes, if any, arising between private market/ consumer market and Market Committee.

j. State Governments have been conferred power to exempt any agricultural produce brought for sale in market area, from payment of market fee.

k. Market Committees have been permitted to use its funds among others to create facilities like grading, standardization and quality certification; to create infrastructure on its own or through public private partnership for post harvest handling of agricultural produce and development of modern marketing system.

Status of Adoption of Model APMC Act- In pursuance of above mentioned effort, the States / U.Ts of Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Goa, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Nagaland, Orissa, Rajasthan, Sikkim and Tripura have notified the reforms in their APMC, Act in the key areas *viz* Direct Marketing; Contract Farming and Establishment of Markets in

Private/ Co-operative Sectors as suggested in the Model Act circulated by Department of Agriculture and Cooperation. The APMC Act implemented by State Government of Tamil Nadu already provides for the reforms as suggested in the model Act circulated by Department of Agriculture and Cooperation. There is no APMC Act in the States/ UTs of Kerala, Manipur, Andaman & Nicobar Islands, Dadra & Nagar Haveli, Daman & Diu, and Lakshadweep. The Government of Bihar has repealed the APMC Act in the State. Only the State Governments/UT of Haryana, Punjab, NCT of Delhi and Chandigarh have undertaken reforms partially by amending APMC Act and the States of Mizoram, Meghalaya, Haryana, J&K, Uttrakhand, West Bengal, Puducherry, NCT of Delhi and Uttar Pradesh have just initiated administrative action for the reforms.

Table-7.1
Status of Agri-Market reforms

Sl. No.	Stage of Reforms	Name of States/ Union Territories
1.	States/ UTs where reforms to APMC Act has been done for Direct Marketing; Contract Farming and Markets in Private/ Coop Sectors	Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Goa, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Mizoram, Nagaland, Odisha, Rajasthan, Sikkim, Uttarakhand and Tripura.
2.	States/ UTs where reforms to APMC Act has been done partially	a) Direct Marketing: NCT of Delhi, Madhya Pradesh b) Contract Farming: Madhya Pradesh, Haryana, Punjab and Chandigarh c) Private market : Punjab and Chandigarh
3.	States/ UTs where there is no APMC Act and hence not requiring reforms	Bihar*, Kerala, Manipur, Andaman & Nicobar Islands, Dadra & Nagar Haveli, Daman & Diu, and Lakshadweep.
4.	States/ UTs where APMC Act already provides for the reforms	Tamil Nadu
5.	States/ UTs where further action is required for the reforms	Meghalaya, Haryana, J&K, West Bengal, Puducherry, NCT of Delhi and Uttar Pradesh.

***Bihar has repealed APMC Act**

Impact of Market Sector Reforms as per Model Act- From above chart it may be seen that the level of adoption of Model Act is varying, but it is noteworthy that mere adoption of Model Act has neither resulted into enhanced investment of private sector in value chain management for fresh horticulture produce nor in a better price discovery under process of direct procurement of agriculture produce under contact farming system. The Working Group has critically examined following case studies for this purpose-

a. *Status of F & V Marketing in Bihar after abolition of APMC Act*- after the APMC Act has been repealed in the State of Bihar, w.e.f. September, 2006; market infrastructures created earlier by the Bihar State Agricultural Marketing Board in the State are presently in use by the trader who were earlier operating from their shops allotted to them on rent; Sub Divisional Magistrate of the area

functions as the Nodal Officer and he is in-charge of the unregulated markets and no market fee are charged from the farmers. However, other charges towards loading/unloading/ *Hamal* charges are in vogue. But this reform has not resulted into enhanced private investment for development of market infrastructures for agriculture produce in the State; as such the State of Bihar has gone back to primitive stage of market infrastructure in respect of agriculture produce.

b. *Organized retail chain outlets for fresh fruits & vegetables by corporate Sector*- Earlier the public sector organisations like *NDDB and* the Horticultural Producers' Co-operative Marketing and Processing Society Ltd. *(HOPCOMS)* had taken initiatives to organize marketing of horticulture produce and set up retail outlets in cities in early eighties, however, these experiments had recorded only limited success in terms of establishing backward linkage with producer farmers and promoting formation of common facility centres in producers' clusters. After the Market Sector Reforms in agriculture / horticulture, a number of corporate houses have set up organized retail chain outlets in big cities but they too, generally function as wholesale buyers of horticulture produce and lack backward organic linkage; they do not provide any price discovery mechanism to producers which are better than APMC system. Even in terms of commodity price and quality these outlets do not make any material difference either for producers or for consumers.

c. *Terminal Markets*- Terminal Markets Complex (TMC) introduced as a new item under NHM is conceived to be set up in a Public Private Partnership (PPP) mode. It is designed to be set up in the form of hub and spoke model. It has provision of equity participation by Producers Association up to 26% of the total equity in the TMC. Approval has already been accorded for establishment of TMC at Patna (Bihar) and *Perundurai* (Tamil Nadu) and in-principle approval has been accorded for bidding for TMC at *Babangaon* (Maharashtra), Nagpur (Maharashtra), Madurai (Tamil Nadu), *Kancheepuram* (Tamil Nadu) and *Sambalpur* (Odisha). So far, the mega- scheme of Wholesale Market and Terminal Markets under National Horticulture Mission has not picked up during 11th plan period in spite of viability gap funding to the extent of 50% of project cost extending to Rs. fifty crores.

Recommendations of a Committee of State Ministers In-charge Agricultural Marketing-

In order to expedite the pace of market reforms the Ministry of Agriculture has set up a Committee of State Ministers In-charge Agricultural Marketing on 2nd March, 2010, with members from the state of Maharashtra, Gujarat, Haryana, Uttarakhand, Bihar, Assam, Orissa, Andhra Pradesh, Karnataka and Madhya Pradesh. The report called for *"speedy reforms"* of Agricultural Produce Market Committees Act across different states along with "time-bound development" of agri-marketing infrastructure. Calling for a 10-year perspective plan to improve agri-infrastructure of backward and forward

linkages for agriculture production and marketing, the report suggested providing *"priority sector lending to agri-marketing activities"*.

As the initiative taken for Market Sector Reforms have not yielded desired results, perhaps that is why *Approach Paper to the Twelfth Five Year Plan (2012-17)* has echoed *the need for excluding horticulture produce and perishables entirely from the ambit of APMC, as a viable solution.*

Approach Paper to the Twelfth Five Year Plan (2012-17) – The Approach Paper to the 12th plan states that - *"Consideration should be given to extending infrastructure status to a wider range of agricultural market facilities in the same manner as for warehouses. States must modify the Essential Commodities Act (ECA) and the APMC Act (perhaps exclude horticulture and perishables entirely from the ambit of APMC), rebuild the extension system, increase the involvement of private sector in marketing, and also facilitate leasing in/out of land by farmers. …."*.

Critical Analysis of Suggested remedy in Approach Paper to the Twelfth Five Year Plan- The Working Group has critically examined the implications of the suggested remedy in Approach Paper to the XIIth Plan as mentioned above. Taking horticulture produce out of ambit of APMC would mean that it may not be mandatory to trade them in any market premise, be it public or private, therefore; it could not be comprehended as to how private sector investment would materialise in marketing infrastructures if horticulture produce is taken out of ambit of APMC. In this context the case of flower markets may be taken into account which is not the scheduled commodity under APMC Act and to that extent excluded from ambit of APMC. In spite of this, the flower- markets are in no different shape than markets of any other horticulture produce. By taking horticulture produce out of ambit of APMC may have three implications; firstly, this would result into Bihar like situation which prevails after abolition of APMC Act or situation of flower market of Mumbai which takes place below *Dadar* flyover or Delhi flower market which takes place near Hanuman Temple in Connaught Place. Secondly, it would mean, direct procurement from farmers' field by operators of organised retail chain outlets / processors and exports which alone will not be able to introduce a price discovery and transparency regime in trade of horticulture produce and may not be able to deal with huge volume of horticulture produce in our country. Moreover, from the other important recommendation made in the Approach Paper to XIIth plan regarding *leasing in / out of land by farmers* may ultimately mean promoting corporate farming model which would have far reaching socio-economic implications that cannot be ignored after having experience of land acquisition for corporate through the instrument of Land Acquisition Act. Permitting *Corporate Farming* and relaxation of ceiling laws may not even remotely really address the issue of Market sector reforms but may have serious taxation related implications too. In order to ascertain the extent to which private sector participation and deregulation of markets can impact introduction of a better marketing regime in respect of horticulture produce, following case-studies have been examined by the Working Group-

a. *State of Unregulated Rural Primary Markets/ Haats / Shandies/ Painths*- At present, horticulture produce along with other farm output is traded through a network of about 27738 Wholesale and Rural Primary Markets out of which only 7157 are Regulated Markets. Other Rural Primary Markets include *Haats*, *Shandies*, *Painths* and fairs which are estimated to be more than 20,000 across country which are owned and managed by the private individuals, *Panchayats* and municipalities who are interested in collection of ground rent /fee /cess. As such, generally revenue realization from market is hardly applied for the development of infrastructure in Rural Primary Markets. About 90 per cent of the total marketable surplus in the remote areas is sold through these markets. It is assessed that the efficiency of rural markets is poor due to high degree of congestion at market yards, less number of traders and non-availability of supporting facilities and services and private sector investment is not coming for Primary Rural Markets.

b. *State of Affairs at unregulated standalone wholesale markets*- Like Primary Rural Markets majority of standalone wholesale markets handle mix of commodities including, horticulture produce. Infrastructure facilities available in these markets at present are far from satisfactory and do not cater to special needs of perishables. In addition, there are some special types of unregulated markets as given below-

i. *Unregulated Wholesale Markets in Kerala Managed by Public Authorities*- As such there is no market regulation in Kerala, there are 6 Agricultural Wholesale Markets in Kerala under the control of State Agricultural Department, out of which 3 are Urban Whole Sale Markets and 3 are Rural Wholesale Markets. The Agricultural Urban Wholesale Market in *Maradu*, is one of the main wholesale market in Ernakulum district. The market authorities charge rent for the stalls from the traders. The traders buy produce from farmers and also bring from other states. Farmers bring their produce to the market once in a week and the traders buy directly from them. At present this Market is not charging anything from the farmers or traders for this service, to that extent, this model is subsidised my Government for its operating expenses.

ii. *Unregulated Wholesale Markets in Kolkata Managed by Private Sector*- Kolkata city has unregulated private wholesale markets which are called as *Koley Market* for vegetables, *Machua Market* for Fruits or *Mallighat* Flower market which are managed by private persons who run the same in the most primitive manner and charge market fee based on weight of produce. From the following photographs, glimpse of the state of affairs at these privately managed wholesale market of Kolkata can be seen-

'Machua Market' - A Private Wholesale Fruit Market in Kolkatta City

iii. *Case of APPTA Market in Nagercoil (TN)-* another type of unregulated market had been set up and run by *Agricultural Products Producers and Traders Association (APPTA) in Tamilnadu which is also known as APPTA Market***.** APPTA Market is a Modern Fruit and Vegetables Market constructed at *Nagercoil* near *Kanyakumari* in Tamil Nadu. It is the important major assembling centre for fruit and vegetable in a radius of 50 km. The infrastructure facilities provided in the markets are wholesale shops (131), retail shops (504), covered auction hall, open auction platforms, storage godowns, pre-cooling / ripening chambers and drying yard. Input shops for fertilizer, seed, pesticides and grocery shops are also constructed in the market complex. Provision is made for other public utilities like drinking water, drainage, toilets, post office, bank, internet kiosk, police out post, bus stop, famers guest house, tea shops, hotel and restaurant. Appropriate handling capacity of the market is 3,000 MT of Fruit and Vegetables per day. The arrivals are reported from within the district and neighbouring *Tirunelveli* and *Tuticorin* districts in Tamil Nadu. Dispatches are mainly to Kerala markets and some quantity to the northern districts of Tamil Nadu, Chennai and *Bangaluru.* The revenue for the market is from entrance fee, rent and maintenance charges. The unexpected risk factors are huge investment but lesser return, higher land cost, high interest burden, less amount of subsidy and very important lack of government support. Due to these reasons the market is financially weak and they are unable to repay the bank loan.

c. *Modern Wholesale Markets with Sorting Grading & Electronic Auction Facilities-* Wholesale market has been set up by NDDB in Bangaluru city with technical assistance from the FAO. It is based on the European model of wholesale trade. The facility comprises state of the art auction halls with computerized bidding, specially designed cold stores for different produces, shops and other related commercial and administration facilities. The superstructure is entirely in steel with a cladding of PUF panels. NDDB has taken initiative to organise producer farmers as SAFAL-Groups which could have addressed to the issue of consistency in quality and traceability of produce for the purpose of processing and exports. Management of these markets own function of market management, facilitate business model which ensures price discovery, protection to sellers regarding realization of sales proceeds and facilitates to buyers the quality of produce. However, capacity utilisation of this market is sub optimal due to non-participation of traders, processors, exporters etc and its

business is generally limited to local retailers who source their commodities from retail counter of this market.

Flower Auction House at G. NOIDA

d. *Modern Flower Auction Houses set up under Assistance from APEDA*- four modern flower auction centres have been set up by respective State governments under financial assistance from APEDA as per design and business model recommended by consultants of international repute. These auction centres not only provide sorting & grading facilities, cold storages, electronic auction system but also banking facilities, offices to producers and traders and value addition facilities. Management of these markets own function of market management, facilitate business model which ensures price discovery, protection to sellers regarding realization of sales proceeds and provides quality assurance of produce to the buyers. However, the infrastructure of Modern Flower Auction House at Bangaluru is reported to be highly underutilized and Flower Auction Houses at Mumbai, Kolkatta and G. NOIDA (UP) have not started functioning for pasy several years due to non-participation of traders and exporters.

SAFAL's F & V Wholesale Market at Bangaluru

e. *E-Trading in Fruits & Vegetables*- SAFAL National Exchange of India Limited (SNX) was an initiative of National Dairy Development Board on collaboration with Multi Commodity Exchange of India (MCX) and Financial Technologies (India) Limited (FTIL). The FTIL-MCX combine owned the majority 51% stake, with NDDB holding the rest. SNX was an electronic spot market which was set up to offer transparency and guarantees payment and delivery with quality for the benefit of sellers and the large number of buyers across the country,

pursuing a vision of *"One India One Market"*. The exchange started operations in December 2007 and offered sale-purchase contracts in mango, onion, potato, tomato, grapes and banana which were being traded. The exchange connected to individual farmers through its members which were 250 in number by end of year 2008-09, including 150 Self Help Groups and Farmers' Associations. The exchange aimed at creating an opportunity for farmers, even the small ones to get access to national markets; but it closed down on March 31, 2009 for want of adequate business.

Inference regarding present strategy of market sector reforms- From the above analysis, it may be inferred that –

a. Rural Primary Markets may not attract sizable private sector investment in its infrastructure and public sector investment will be required. There are schemes of Gramin Bhandaran Yojana, Development / Strengthening of Agriculture Marketing Infrastructure, Grading and Standardisation implemented by Directorate of Agriculture Marketing and Inspection, DAC, scheme-component under NHB of giving Assistance for setting up sales outlet for horticulture produce and scheme of assistance for setting up Rural Primary Market under NHM and MM-II of HMNEH which need to be continued during XIIth plan period.

b. Even in cases of wholesale market segment, investment in market infrastructure in respect of a large range of horticulture produce may not generate handsome returns and therefore, expecting private sector investment in development of majority of wholesale markets may either not materialise or may not be of the standards which is targeted by such initiatives for market reforms. The reasons behind poor take off of schemes of Wholesale Market and Terminal Markets offered by NHM in spite of sizable viability-gap funding appears to be linked with absence of *Standard Operating Procedure* (SOP) for traditional Horticulture Wholesale Markets which means absence of level-playing ground for the investors in modern marketing infrastructures with SOP. This is reinforced by the experience of yet another model of Public Sector Investment in infrastructure combined with professional management by stake-holders which are exemplified by NDDB's Wholesale F & V Market at Bangaluru and Modern Flower Auction Houses set up with assistance of APEDA.

c. To conclude, Market Sector Reforms without having Common *Standard Operating Procedure* (SOP) for all the markets may not result into major private sector investment in setting up modern marketing infrastructure and finding a short-cut solution by taking horticulture produce out of ambit of APMC Act altogether and permitting leasing / out of agriculture land to corporate may make the situation more complicated.

What is meant by Standard Operating Procedure (SOP)? - As per present practice, APMC gives licenses to brokers / *Adhatiyas* who are allotted space in APMC premises. These *Adhatiyas* carry out function of auctioning the produce brought to APMC by

sellers and have responsibility towards seller and APMC. More often, the brokers do sell the produce to wholesale traders on credit; though the wholesale traders are licensed by APMC, APMC does not secure payment from wholesale traders to the "adhatiyas". This is often cited as one of the most important reasons for lack of transparency in auction system. On the other hand, the management of modern wholesale markets and auction centres own direct responsibility of quality classification / grading of farm produce and its auctioning, recovery of sales proceeds from the buyers and payment to the sellers through bank. This inter alia, requires registration of sellers and buyers both and buyers have to offer security in terms of Bank Cash Credit limits etc. All transactions in such markets are recorded on real-time basis, in a transparent manner which not only ensures price discovery, promotion of investment in infrastructure but also generates real time market information. All the transactions in the modern markets get recorded truthfully on real time basis. This is termed in this report as *Standard Operating Procedure (SOP*).

Why are traders/ wholesale buyers / exporters / processors generally reluctant to avail services of modern markets which follow SOP ?- As SOP has been the basis of operation of modern markets it results into bringing the entire business details as well as income of traders in records of market which has implication relating to business secrets and bringing transactions fully under market cess and income-tax domain; therefore, the traders/ exporters and other wholesale buyers, in all probability, are reluctant to avail the services of such modern markets set up by public sector or private sector investment.

How to Break the Barrier ?- For breaking the barrier of reluctance on part of traders/ wholesale buyers / exporters / processors to participate in business of modern markets it is necessary to introduce the *Standard Operating Procedure* (SOP) for modern markets being set up as well as for regulated markets set up under APMC Act, as part of Marketing Reforms. The present model of Market Sector Reforms which provides for creating a new set of modern markets in co-existence with the regulated markets under APMC Act with ongoing business procedure is not going to yield desired results. Therefore, it is proposed that the management of regulated markets too should be made to assume new role on line with modern marketing models, say, that of Dutch Flower Auction Houses or any other model marketing model. Under the reformed system, regulated markets will also have to undertake auction-function themselves and register the buyers who shall be given a credit limit. Seller too will be required to get himself registered with a Market in which he wants to sell his farm produce so that his payment may be made through bank. After auction of produce, the seller may collect payment towards price of goods sold from the Market Committee. It will be for the management of market to collect payments from the wholesale buyers. This will definitely improve the functioning of existing regulated markets which will be compelled by business requirements to make investment in packing & grading, modern ware houses and electronic auction system. Introduction of Standard Operating Procedure (SOP) will pave the way for investment in Private Markets too.

Strategy for Addressing other Important Issues of Marketing and Prices of Horticulture Produce?

a. *Bridging wide gap between wholesale and retail prices of horticulture produce in urban areas- Producers' Market in Towns / Cities*- Existence of a multi-layered middle-men in value chain management of perishables and higher post harvest losses have been cited as the main cause of wide gap between wholesale and retail prices of fresh horticulture produce and case of introduction of organised retail chain outlets has been advocated to improve the efficiency of value chain. However, in practice, the existence of NDDB's SAFAL outlets and retail chain outlets operated by players of corporate sector have not been able to present any better model in cities like Delhi, Bangaluru, Mumbai etc. On the other hand, direct farmers' market have been in existence in many towns and cities; for example- *Pool Gate Market of Pune Cantonment, Vasantkunj market of New Delhi and Anta Ghaat* Market in Patna town are some of the examples of age-old, existing farmer's markets. These were phased out by regulated markets under concerns of town planning, traffic regulation and economic viability of market management. In recent past, the direct farmers' market for perishable got reintroduced through a few innovations carried out for facilitating direct marketing of agriculture produce including horticulture produce by the producer farmers. Some of these innovations are named as *Uzhavar Sandhai* introduced by Tamil Nadu in 1999-2000 for direct selling of fruits and vegetables by farmers to consumers at a fair price, *Rythu Bazaars* in Andhra Pradesh to provide direct link between farmers and consumers in the marketing of fruits, vegetables and essential food items, *Apni Mandi* in Punjab, to establish direct contact between the farmers and ultimate consumers for sale of the produce and *Krushak Baazars* have been established by State Government of Odisha and are managed by APMCs. Farmers generally trade paddy, maize and cotton and fruits and vegetables in *Krushak Baazars*. This leads us to infer that modern town planning and traffic regulation should take into account the relevance of direct farmers' markets in respect of perishables which may go a long way in reducing the gap between wholesale price and retail price. However, this may address to the issue of marketing needs of only a section of consumers which is more sensitive to price of the produce and is willing to go to such markets operating at certain distance from their residential areas.

b. *Very Wide Price Fluctuations*- Wide fluctuations in prices of essential commodities like potato, onion, tomatoes causes consumer discontent of higher order. This not only needs market intelligence but also requires weather proofing of production system and long distance transport solutions for perishables connecting production system with consumption centres. This aspect has been covered under chapter on Post Harvest Management.

c. *Marketing of Fruits which may be produced from new orchards set up under NHM and HMNEHA?-* Though, information regarding new production clusters of fruits which have come up under area expansion programmes under schemes of NHM and HMNEHA and which need advance planning for marketing is not

available, it is noticed that the area expansion has mostly taken place around existing production clusters such as mangoes in Chittor- Kolar- Krishnagiri belt (KN & TN); Vijnaur- Amroha and Lucknow of UP, Malda-Murshibad (WB), Vaishali- Muzzarfarpur- Bhagalpur of Bihar, Sindhudurg- Ratnagiri (MH); banana in Jalgaon- Nanded- Parbhani (Maharashtra) and Navsari- Bharuch belt (Gujrat) and Katihar belt in Bihar; tomato in Pune-Nadik (Maharashtra), Solan- Simla (HP), Haldivari (WB), Kolar (KN); Litchi in Muzaffarpur – Samastipur- Vaishali (Bihar), Murshidabad (WB) and Muzaffarnagar (Uttarakhand) etc. Marketing needs of these clusters can be met by introducing multi-modal transport system linking production clusters with major markets in consumption clusters supplemented by scaling up of initiatives for Product Promotion and Market Development through events like Horti-fair *Sangam* introduced by NHB during XIth plan period as its scheme sub-component.

Market Information System and Market Intelligence- At present, Market Information in respect of agriculture including horticulture produce is collected by Directorate of Agriculture Marketing, DAC, the Government of India through AGMARKNET Project. Under this project, market price and arrival is collected by *mandi* staff and uplinked on AGMARKNET portal. 'AGMARKNET' is a unique live portal on agricultural commodities, technically supported by a high capacity Central server and the programming capabilities of the NIC and the data is fed into the system and later disseminated to farmers in a decentralized mode through the voluntary cooperation of *mandi* staff. In addition, NHB too collects information regarding market price and arrivals from selected markets and uplinks the same on its own website. The NHB also releases monthly and annual market bulletins. In addition, NHB publishes annual horticulture database too by way of marketing related information. The efforts of DMI and NHB may be coordinated by making later responsible for validation of data. Even, the newly introduced system of Direct Procurement of horticulture produce by Managers of Organised Retail Chain Outlets, Processors and Exporters has not resulted into better price discovery and a better market information system. In the present scenario it is not possible to get real-time, truthful data regarding commodity arrival and price for agriculture / horticulture produce and generation of Market Intelligence remains a distant reality. Introduction of SOP can facilitate generation of real-time, truthful market information and market intelligence for horticulture produce.

Market Related HRD- Horticulture Market Management is highly skilled job and therefore, it requires specially trained persons who not only know rules & regulations of markets but also understand perishable nature of fresh horticulture produce. NIAM provides HRD support in this regard. In addition, Directorate of Agriculture Marketing, BHO Nagpur offers courses like Diploma in Agricultural Marketing, Market Intelligence & News Service and Market Extension Service. Organised retail chain outlets set up by corporate sector is mostly seen to be sourcing trained manpower from existing players like SAFAL of NDDB, HOPCOMS etc. Therefore, there is need to give special thrust to Market Related HRD component during 12th Plan period through public sector initiative.

Recommendations for 12th Plan Period- Based on above analysis, it is recommended to make following interventions during 12th plan period-

Policy Interventions- Working Group is of the view that excluding horticulture produce and perishables entirely from ambit of APMC may benefit only those interested in business of operating organized retail chain outlets or sourcing the raw material for processing but it will prove to be counterproductive in terms of development of market infrastructures. In such circumstances, expecting any kind of private investment in market infrastructure free from conflict of interest will be a dream as no investor will make investment in market infrastructure if he is not sure of business inside market premise. Therefore, the Working Group has made following recommendations which are more in consonance with the ides of properly designed Market Sector Reforms.

a. *Redefining Role for Management of Regulated Markets and Introduction of Standard Operating Procedure (SOP)* – it is proposed that the management of regulated markets should also be compelled to follow standard Operating Procedure (SOP). This will not only improve the functioning of existing regulated markets which will be compelled by business requirements to make investment in packing & grading, modern ware houses and electronic auction system but introduction of Standard Operating Procedure (SOP) will pave the way for investment in Private Markets too.

b. *Rationale Policy of Registration of Wholesale Buyers*-As per present practice, in a regulated market, the wholesale buyer is licensed by Market Committee. Once a system of registration of wholesale buyer under SOP is introduced, such buyers will be able to participate in auctions to the extent of bank credit limit furnished by them to the market. Therefore, introduction of new wholesale buyers should be encouraged and a rational procedure in this regard needs to be introduced.

c. *Permitting setting up Private Markets in Area of Operation of APMCs*- It is proposed to permit setting up of private markets in area of jurisdiction of AMPCs so that there is a healthy competition for providing better services. Market Regulator should ensure that those involved in management of Private Markets do not have conflict of interest. Private Markets and APMC should be subject to same Standard Operating Procedure (SOP).

d. *Enactment of "Inter-State Agriculture Produce Trade and Commerce Regulation Act"* – Central Government may, using powers vested in it under entry 42 of Union List, enact "Inter-State Agriculture Produce Trade and Commerce Regulation Act" providing for Country as one market for fresh horticulture produce and removal of inter-state barriers for Unified National Market.

e. *Removal of inter-state barriers for Unified National Market-Free Flow of Horticulture Produce in sealed containerized cargo* - It is a matter of concern that horticulture produce cannot move freely across the Country. Apart from constraints of road / rail network for long distance movement of perishables, waiting at Octroi and Toll Nakas and Check Posts, restrictions on entry of HMV in city areas affect the quality of produce. It is proposed that, pending

enactment of "Inter-State Agriculture Produce Trade and Commerce Regulation Act", movement of perishables in containerized cargo which is sealed by registered producers group / trader registered by APMC or regulated market at place of origin may be allowed free passage. Movement of horticulture produce over a long distance from production centre to consumption centre generally takes place through jurisdiction of more than one APMC. If the consignment has supporting documents issued by originating APMC the commodity is allowed passage up to destination APMC without payment of cess at subsequent APMCs however, the consignment is required to be physically brought to such APMCs and at times opened up. This procedural requirement may be curtailed in case the consignment is in sealed containers.

f. *Single Point Levy of Market Cess*—In a number of cases trade in goods takes place during the period the commodity is in transition from originating APMC to APMC at destination for which the same has been initially booked for. As per present procedure adopted by APMCs the cargo on arrival in the area of destination AMPC, is required to be taken to the APMC premises for levy of cess and issue of documents permitting further movement of the products as per transaction carried out during transit. Levying the produce in transit with full rate of market Cess has cascading effect on commodity prices without respective regulated market having offered any substantial services facilitating the trade. There is, therefore, need for introduction of a system of *single point levy of Market Cess on perishables goods* which may be levied at the first point of trading. Service charges commensurate with services provided may be levied by regulated markets en-route while goods are in transit, however, this may be done without requiring the goods to be physically brought to the market premises. This facility may be extended to *registered traders.*

g. *Extending Status of Ware House to Cold Storages / CA Storages* and extending coverage of scheme of ware house slip to Horticulture Produce fit for long duration storage such as potato, onion, apples etc.

h. *Introduction of Quality Standards in Sales through organized Retail Chain Outlets-* Existing national grade standards should be harmonized with international grade standards; and should be made mandatory for fresh horticulture produce sold from organized retail chain outlets in packaged form. This will trigger the process of development of appropriate and efficient value chain without affecting the street vendors. Once the consumer awareness about quality standards increase and buyers' preference goes in favour of graded and quality produce, the trade related reforms will come in auto mode.

i. *Incentive linked with Reforms-* There is a need to continue with the policy of extending financial assistance to existing markets subject to their giving effect to market sector reforms.

j. *Direct Market Access by Growers' Association*- Organization of the farmers into growers' groups/commodity groups/ cooperatives/self help groups/producer

companies to ensure the participation of diversely located small and marginal farmers and their linkage with the markets.

k. *Scaling up NHBs scheme component of Product Promotion & Market Development through events like Horti-fair Sangam*- NHB had introduced a new scheme component of Product Promotion & Market Development through events like Horti- fair *Sangam* which also targets at Technology Transfer for PH, packaging, Transport, Storage, labelling etc. It is proposed to scale up this initiative during XIIth plan period.

l. *Market Information and Market Intelligence*- Current agri-marketing Information system like AGMARKNET and NHB depend on information received from the office of APMC's which is more often based on information furnished by brokers. This information is not real time and doubts are raised about the correctness of information for obvious reason of conflict of interest. Introduction of Standard Operating Procedures *(SOP)* for regulated markets will facilitate having access to correct and real time market information which may be disseminated by modern electronic technology.

m. *Documentation issues*: - At present, there is a need to obtain documentation clearances (Anugya Patra, Gate Pass, 9R/6R etc) for every dispatch from the respective APMC where produce is sourced from farmers directly. Processors and Retail Chain outlets operators complain that it leads to logistics issues and higher costs. The procedure in this regard needs simplification.

Plan Schemes of Horticulture Division of DAC Relating to Infrastructure and System Development-

a. *Continuation of On Going Schemes for Market Development and Market Information System*- From this point of view, all the schemes of infrastructure development relating to horticulture markets and Market Information System operated by DAC need to be continued during 12th plan period.

b. *Infrastructure Development of Rural Primary Markets*- It is targeted to develop infrastructure of 12 Terminal Markets, 12 Wholesale Markets, about 2500 Rural Primary Markets/Rural Periodic Markets/Rural Haats (out of 21000); 2500 Retail Market Outlets etc as listed in Table 2 below. Keeping in view the advantages of *Farmers' Markets in Towns and Cities it is proposed to e*ncourage setting up of such *Farmers Markets*.

c. *Introduction of containerized rail transport system for fresh horticulture produce* – It is proposed that CONCOR, CWC and other license holders should be assisted to operate containerized transport system for horticulture produce linking production centres and market situated at long distance from each other. CONCOR and NHB have carried out successful trial run for such a system comprising of Insulated & Ventilated freight containers specially designed with help of CIPHET Ludhiana. This may facilitate pack house to ware house transport solution to long distance as well as short distance transport solution for fresh

horticulture produce and may also be clubbed with refrigerated transport as per need.

d. *Market Related HRD* – It is proposed to give special impetus to Market related HRD programmes during 12th Plan Period. Ongoing HRD programmes may be required to be reoriented to train not only managers and other functionaries of Markets but the producers and traders as well.

e. *Introduction of vending carts*- During 12th plan period, modern vending carts and fruits & vegetable stacking units are proposed to be introduced at retail points.

Projection for Budgetary Requirement for 12th Plan*-Based on this the budgetary requirements are projected as follows-*

Table 7.2
Projected Budgetary Requirement for 12th Plan Period

S. No.	Type of Market	No.	Rate of Assistance	Cost
1	Terminal Markets	12	Rs. 50 crore / project	Rs. 600 Crores
2	Wholesale Markets	12	Up to Rs. 33 crore / project @ 33.3% % of cost	Rs. 400 Crores
3	Rural Market / Apni Mandi / Direct Market	5000	Up to Rs. 8 lakh / unit @ 40% cost	Rs. 400 Crores
4	Retail Market Outlets	2500	Rs. 4 lakh / unit @ 40% of cost	Rs. 100 Crores
5	Vending Carts	15000	Rs. 15000 @ 50% of cost	RS. 22.5 crores
6	Functional Infrastructure like pack house	7000	Rs. 6 lakh / unit @ 40% of cost	Rs. 420 crores
7	Quality Analysis labs	5	Rs. 200 lakh	Rs. 10.00crores
8	Market-related extension Services	500	Rs. 3 lakh / event	Rs. 15.00 Crores
9	Product Promotion & Market Development		Need Based	Rs. 30 crores
Total			**Rs. 1967.5 crores say Rs. 2000 crores**	

Chapter 8: Fruit and Vegetable Processing

i. **Background Facts**- major part of fruits grown in India are consumed as table fruits and therefore, table varieties of fruits get preference in horticulture development programmes. Similarly, fresh vegetables are generally cooked in Indian kitchens each time before the meals in preference to pre-cooked vegetables. That is why; a very small quantity of fresh horticulture produce goes for processing for consumption in the form of processed food. However, processing of fruits and vegetables is assuming significance in planning process for horticulture development as due to change in family profile and increasing urbanisation, more and more household have started preferring ready-to eat, easy to cook type fruits & vegetables. As a result of value-addition the producer farmers get price premium for their horticulture produce. In addition, processing may provide viable solution to the problem of glut in the market due to over-production and also to the problem of transport of fresh horticulture produce from remote production clusters to markets. For example- a number of production clusters of fresh fruits and vegetables in NE and Hilly reasons of the Country are situated in geographically remote areas from where the transport of these perishables to consumption centres results in to huge post harvest losses and their processing has been seen to be a viable solution and therefore, Mission Mode programme for horticulture development in such areas namely, HM-NEHA has a special component Mini-Mission-IV and the scheme sub-component of primary processing figures into NHM and NHB Schemes of horticulture development. Apart from the table varieties of fruits which may be available for processing in above mentioned contingencies, there are a number of other fruits and fruit-varieties which are produced for processing such as pineapples, passion fruits, processing varieties of mangoes, walnut, almond, cashew nut, coconut, cocoa, areca nut, 'Makhana (Fox Nut)', white onion. Though, reliable statistics regarding F & V processing units set up in the Country with and without assistance under Government schemes is not available, it is generally observed that following F & V are commonly processed:

   i. Green peas
   ii. Tomato for puree, ketch-up, sauces, snacks-dressing etc
   iii. Selected varieties of potatoes for flakes, french fries etc
   iv. White onion for dehydration
   v. A range of vegetables for cut vegetables, frozen vegetables and pickling
   vi. Certain mango varieties for slices, pulp and pickle making
   vii. Pineapples for slices, tit-bits and juice making
   viii. Grapes varieties for raisin making

ix. Certain Banana and Jack- fruit varieties for flakes making

x. Citrus, strawberry, pineapple, apples, plum, peaches and mixed fruits for jam, jelly and orange marmalade

xi. Guava and Custard apple for ice-cream

xii. Apple, Nectarine, Guava, Passion fruits nectarine etc for RTS drinks

xiii. Apricot as dry fruit, peach for peach-halves in sugar syrup; walnut, almond, cashew as dry fruits and value added products

xiv. Spices like Chilly, Ginger, Turmeric, Pepper, Coriander, Cummins, Isabgol, Saffron, Vanilla

xv. Aromatic and Herbal plants

8.2 Overview of the XIth Plan Schemes relating to Processing of F & V:

There are two general schemes implemented by the Ministry of Food Processing Industries for infrastructure development of food processing industries as given below which includes F & V processing. In addition there is a scheme of *Mini Mission-IV under Horticulture Mission for NR and hilly areas Technology* which applies exclusively for F & V processing. Similarly, scheme of cold chain targets providing backward linkage for F & V processing. Salient features of these schemes are discussed below-

a. *Scheme for Technology Up-gradation/Setting up/Modernization/Expansion of Food Processing Industries for small and medium food processing units-* Under the scheme for Technology Up-gradation / Setting up / Modernization/Expansion of Food Processing Industries, grant assistance to the tune of 25% of the cost of plant & machinery and technical civil works subject to a maximum of Rs.50 lakhs in general areas and 33% up to Rs.75 lakh in difficult areas (Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, North- Eastern States, Andaman & Nicobar Islands, Lakshadweep and Integrated Tribal Development Project (ITDP) areas) is provided. Only new Plant & Machinery shall be eligible. Technical civil works include civil works for functional purposes and shall exclude boundary wall, office buildings, guest house, canteen and roads. As a very limited data pertaining to this scheme implementation during 11th Plan Period, in the form of year wise allocation has been available, it has not been possible to get idea about releases and expenditure for projects relating to F & V Sectors. The Working Group was generally informed that during the first four years of 11th Plan Period financial assistance of Rs. 94.11 Crore has been extended to over 300 F & V processing units.

Table 8.1

Allocation for the Scheme during 11th Plan Period

Year	Budgetary Allocation (Rs Crores)	Remarks
2007-08	119.30	15% of allocation is reserved for oilseeds products, rice milling, flour milling and pulse processing units
2008-09	96.87	
2009-10	82.49	
2010-11	105.67	
2011-12	98.00	

ii. Though the scheme deals with "Technology Up-gradation/Setting up/ Modernization /Expansion of Food Processing Industries", no bench-marking of existing technology level has been done. Similarly, the technology level proposed to be introduced / brought about is also not enunciated from time to time, leaving the industry at the mercy of consultants. It is also noticed that a modern fruit & vegetable processing units may require various components such as pre-cooling / IQF, aseptic packing / tetra packing; deep freezing / blast freezing etc in addition to sorting & grading line, cutter, pulper etc. depending on business plan. Accordingly, the minimum viable size of project would vary for F & V to be processed and other aspect of business details. For effective implementation of the existing scheme, it would have been handy to work out minimum viable size of processing unit in terms of TPH for say, two shifts of working of processing unit for about 240 working days in a year. This would work as a ready-reckoner for investors. In absence of any such study, it is felt that the assistance available under the scheme is not adequate to promote capital investment in setting up of a modern fruit & vegetable processing unit with facility to store raw materials and semi finished and finished products.

b. *Scheme for Mega Food Parks*- The scheme envisages a onetime capital grant of 50% of the project cost (excluding land cost) subject to a maximum of Rs. 50 crores in general areas and 75% of the project cost (excluding land cost) subject to a ceiling of Rs. 50 crores in difficult and hilly areas i.e. North East Region including Sikkim, J&K, Himachal Pradesh, Uttarakhand and ITDP notified areas of the States. The scheme aims to facilitate the establishment of a strong food processing industry backed by an efficient supply chain, which would include collection centres, primary processing centers and cold chain infrastructure. The food processing units, under the scheme, would be located at a Central Processing Centre (CPC) with need based common infrastructure required for processing, packaging, environmental protection systems, quality control labs, trade facilitation centres, etc.

The Working Group has examined the reasons for poor off-take of this scheme too. On structural side, firstly the success of the scheme depends on right selection

of project site and accordingly making investment decision. It is felt that a credit linked, back-ended subsidy scheme would have been a better model compared to the present one. In addition, the success of the scheme depends on scheme "Technology Up-gradation/Setting up/ Modernization /Expansion of Food Processing Industries" which has not been suitably modified on above mentioned lines in order to meet the investors' needs. Thirdly, the concept of the scheme puts existing clusters of processing units at a disadvantaged position.

c. *Scheme of Mini Mission IV under Horticulture Mission for NR and hilly areas*- Under this scheme, financial assistance @ 50% of fixed capital up to Rs. Two crores is extended as subsidy for F & V processing units. Subsidy is routed through SFAC and MoFPI. The working group has noted that assistance at higher scale under the component of MM IV under HMNEHA compared to that available under the Scheme of "Technology Up-gradation/Setting up/Modernization/Expansion of Food Processing Industries" makes the later redundant and superfluous in hilly and NE regions. There is, therefore, a need for convergence of the two schemes.

d. *Scheme for Cold Chain, Value addition and Preservation Infrastructure*- The Integrated Cold Chain infrastructure scheme of 11th Plan consolidates the Scheme for Integrated Cold Chain, Value added Centers, Packaging Center and irradiation Facilities of the Tenth Five Year Plan, based on extensive feedback and consultations with stakeholders. The present proposal is to revise the scale and quantum of financial assistance besides inducting flexibility to cover components like pre-cooling, mobile cooling, reefer vans etc. to cover the whole range of food items including horticulture crops. The objective of the scheme is to provide integrated and complete cold chain and preservation infrastructure facilities without any break, from the farm gate to the consumer. Pre-cooling facilities at production sites, reefer vans, and mobile cooling units also need to be assisted under the Integrated Cold Chain projects. Integrated cold chain and preservation infrastructure can be set up by individuals or groups of entrepreneurs with business interest in cold chain solutions and also by those who manage supply chain. They will enable linking groups of producers to the processors and market through well equipped supply chain and cold chain. Financial assistance (grant-in-aid) of 50% the total cost of plant and machinery and technical civil works in General areas and 75% for NE region and difficult areas (North East including Sikkim and J&K, Himachal Pradesh and Uttarakhand) subject to a maximum of Rs 10 Crore. The Working Group is of the view that Projects sanctioned under scheme for Cold Chain, Value addition and Preservation Infrastructure, more often than not, have no organic linkage with processing of perishable F & V and it generally ends up in providing ordinary cold chain and fruit ripening solutions for consumption of fresh F & V.; therefore, it may be restructured during XIIth Plan period.

8.3 Issues To be Addressed During 12th Plan Period- In spite of various incentives offered to the industry by the Central and State govt. agencies, the growth of fruits and vegetables processing industry in the country has been sluggish because of several

seasons. Some of the issues affecting the development of fruit and vegetable processing sector in the country are outlined below:

a. Issues relating to supply chain / availability of F & V as raw material:-

APMC Act: Some of the key areas of concern regarding the APMC act are; Market Sector Reforms, Abolition of APMC Act, Permitting Contract Farming and transactions outside the regulated *mandis,* Private Sector Investment in Marketing Infrastructures, Setting Up of Modern Markets like Safal's Wholesale Market in Bangaluru, Safal Exchange for F & V, Modern Flower Auction Houses in Metros etc have not been able to provide a viable solution to sourcing of quality raw materials for processing, especially for fresh F & V.

iii. Other Operational Issues Affecting Processing of F &V-

iv. Contract farming for processing varieties and volatility of market of processed item- issues of aggregation and traceability of a number of processing varieties of F & V can be resolved by adoption of contract farming. But, it is also noted that the processors too are not always keen to enter into contract production due to high volatility of market of processed product. For example- case of white onion.

v. Working capital for storage of raw material- In a number of cases, the raw material supply is seasonal and is required to be procured in a short time frame. Working capital requirement in such cases is quite high, which is generally not available at a reasonable cost of capital.

vi. Credit Market and Sales Return- Market of process food items is, by and large, a credit market on sales return basis. Even the institutional buyers like five star hotels, air lines etc do purchase these items on credit. Due to demand constraints the manufacturers do not get dealers for sole dealership and one dealer stocks products of more than one manufacturer which ultimately results into sales return for a number of manufacturers. This puts additional financial burden of working capital on manufacturers of processed food items.

vii. *Cost of transaction and advertisement*- it is noteworthy that transaction cost in case of processed food items is too high and in several instances 40% to 50% of MRP goes in commission to be paid to distributor- dealer network leaving very thin margin for the manufacturer. In addition, small and medium players find it difficult due to tough competition with multinational companies whose advertisement budget is many times larger than turnover of domestic companies.

viii. Other Policy Issues Influencing Fruits & Vegetable Processing-

ix. PVR and import of processing varieties- There are a number of open pollinated processing varieties of fruits & vegetables such as in potato which can be sourced

from other Countries. However, in absence of PVR related regulation in place in our Country in respect of F & V, breeders are not keen to share the seeds and planting materials with us.

1. *Quality Control and Consumer's Confidence in Processed Food*- Consumer confidence about quality of processed food items is must for increased consumption of these items. On one hand, quality control in respect of processed food through government machinery falls short in winning consumers' confidence, on the other the industry association has also not taken concrete measure in this regard in terms of self certification as has happened in case of European retail chain outlets for fresh horticulture produce Eurep GAP.

C. Recommendations for 12th Plan Period

Suggested Interventions for Fruits and Vegetables and Consumer Industries

There is a need to prepare a multi-pronged strategy to address all the concerns and challenges identified in the previous section and the following interventions are suggested:

a. *Cataloguing of process-able F & V and validated processing technologies*- A number of F & V processing projects are not viable ab initio but shown to be viable based on unrealistic presumptions. For example- a project based on processing of such F & V as raw materials which may not be available for processing in estimated quantity due to price premium for table purpose use except during periods of over-production or; a project based on such F & V which may not be process worthy or for processing of which appropriate technology is not within the reach of the entrepreneur. Therefore, rather than promoting investment on projects relating to processing of entire range of F & V produced in a particular area, focus fruits and vegetables with potential for processing, marketable surplus available, and consumer demand in the domestic as well as export markets should be identified. Thus, there is a need that catalogues of F & V which are process-worthy and which is generally available at economically viable price range for processing. Such list of F & V may be termed as "Focus Crops for Processing during 12th Plan Period. Similarly, cataloguing of validated processing technologies may prove to be handy for the entrepreneurs and the same may be named as *"Validated Technologies".*

b. *Bench-marking of Technology level*- It will go handy if the present level of technology adopted by processing units for F & V is bench-marked and targeted technology level for 12th plan may also be enunciated. This will help in assisting the right kind of projects.

d. *Estimation of economically viable minimum size of processing units and cost norms* – Based on several factors like scale of operations, fixed and variable cost and minimum size of plant and machineries available a basic minimum size of

economically viable project of processing of F & V may be determined. The dimensioning of minimum viable size of processing units may vary based on packaging system such as canning & bottling or tetra-packing or storage of semi-finished products such as frozen storage for semi finished products or storage in aseptic packing; it may also be influenced by sizes of various components of P & M required to be set up in integration.

e. *Identification of new processing varieties*- this may enhance performance of processing units and the same be notified for introduction in production system or imports. For example introduction of grape varieties for wine making, potato variety with higher dry matter and low starch for French-fries etc, fig and apricot with higher TSS etc may be required to be introduced.

f. Site Selection and other critical business decisions- Site selection and other critical business decisions need to be left to the judgment of investor. However, in order to secure stakes for entrepreneur, schemes relating to fixed capital investment subsidies need to be made credit linked and should be strictly operated as back-ended subsidy without any advance subsidy. Term loan component from FIs with minimum 20% above eligible project cost may be made mandatory and a suitable locking in period may be as per project appraisal may be enforced.

g. *Redesigning the Scheme of Technology Up-gradation / Setting up / Modernization / Expansion of Food Processing Industries-* In view of above, the scheme in respect of F & V and consumer industries needs to be redesigned taking into account the following-

i. Technology level for processing and P & M

ii. Infrastructure needs at back-end for PHM, transport, integrated cold chain and raw material storage

iii. Minimum and optimum size of economically viable processing unit taking into account various factor involved

iv. Storage requirement of semi-finished and finished products

v. Packaging type

vi. Capital investment required for in-house transport arrangement for raw materials and or finished products, if any.

Accordingly, the cost norm for scheme for processing of F & V needs to be modified and upward revision up to Rs. five crores and may be allowed along with technical specifications and cost norms for various sub components. Similarly, the existing scheme of MM-IV under HM-NEH may be discontinued. Scale of

admissible capital investment subsidy in NE and HA may be enhanced to 50% of project cost and in rest of the areas the same may continue to be 40% of project cost to bring it at par with the assistance available under schemes relating to *primary processing* implemented by Horticulture Division of DAC.

h. *Restructuring of Scheme of Cold Chain-* Present scheme of Cold Chain with subsidy @ 50% of eligible project cost with upper ceiling of Rs. 10 crores may be modified and cold chain required for handling and storage of raw material for processing, treatments like irradiation if recommended, aseptic or frozen storage with IQF or blast freezing for storage of raw materials or finished / semi finished products as per requirement of processing units and setting up of tetra-packing facility may be covered when set up for captive use or as common facility for existing F & V processing units with organic linkage with them.

Chapter 9: Exports and Enhancing Export Competitiveness

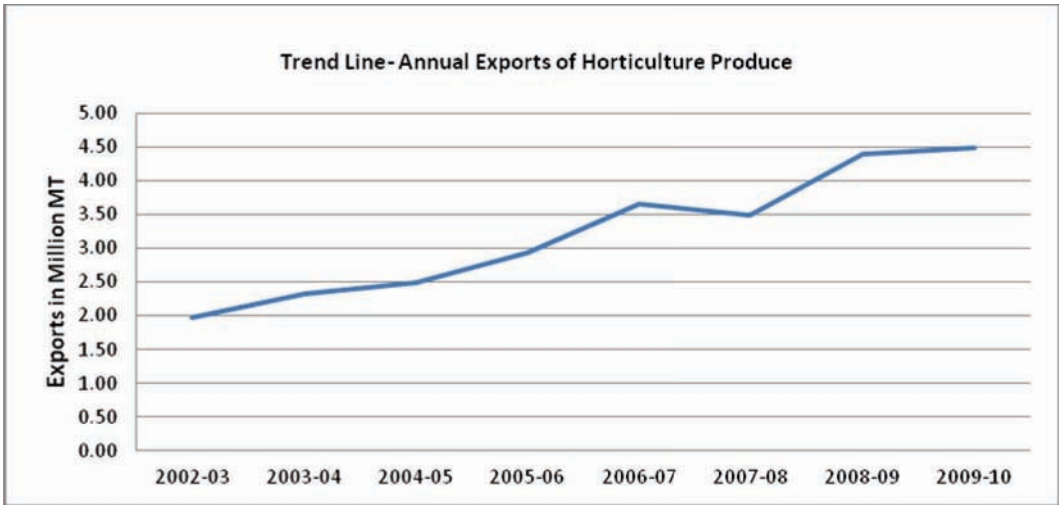
Overall Export-Trend for Horticulture Produce- India may have a negligible share in world's total exports of horticulture produce; however, export of major horticulture produce from India during 10th plan period and the first three years of 11th plan period have recorded a rising trend. Quoting latest report of APEDA, Country's exports performance data is as follows-

Table 9.1

Export of Major Horticulture Produce during 10th and 11th Plan Period

Product	Year 2002-03	Year 2003-04	Year 2004-05	Year 2005-06	Year 2006-07	Year 2007-08	Year 2008-09	Year 2009-10
	Qty MT	Qty MT	Qty MT	Qty MT	Qty MT	Qty MT	Qty MT	Qty MT
Fresh Onions	588450	859939	870217	960507	1378373	1008606	1670186	1664922
Other Processed Fruits & Vegetables	54688	129123	156622	272530	318324	311756	387126	398012
Mango Pulp	96095	89515	95857	134613	156836	166752	173014	186198
Other Fresh Vegetables	182755	188321	190689	217378	276825	350235	505284	419241
Fresh Grapes	25667	26784	39339	54050	85898	96964	124628	131154
Dried And Preserved Vegetables	84249	70374	72827	133801	119322	125726	147869	124614
Other Fresh Fruits	90320	149294	136954	173816	177638	207701	256768	260675
Floriculture	26688	30665	27774	35464	42565	36254	30808	26815
Fresh Mangoes	38002	60551	53480	69607	79061	54351	83703	74461
Walnuts	7619	6418	5851	5257	5063	6716	5696	9073
Fruits & Vegetables Seeds	10658	5173	6727	7562	8104	10157	8536	8884
Tea	182861	184270	183401	162856	185627	198548	207272	208549
Cashew	129416	100297	118110	125102	122776	111275	126147	122168
Spices	277009	246946	364531	400245	482781	619612	504161	680607
Coffee	184796	180436	167663	177685	213650	178239	174238	177528
Total for Major Horticulture Produce	**1979272**	**2328105**	**2490042**	**2930471**	**3652842**	**3482894**	**4405435**	**4492901**

Chart 9.1



Commodity wise Analysis of Export trend- Even though, overall exports of fresh horticulture produce has recorded sustained rising trend over past several years, export-trend in respect of floriculture, fruits & vegetable seeds, dried & processed vegetables, mangoes, cashew and coffee has recorded marked fluctuations. The export of cut flowers and seeds for fruits and vegetables increased during the period from 1996-97 to 2006-07 subsequent to increase in export oriented production in some identified clusters such as Pune-Nasik, areas around Bangalore and Hyderabad. Side by side, domestic market has also picked up for consumption of new varieties of cut flowers and seeds for landscaping etc. due to which exports have become a less attractive proposition for many growers and exporters. Issue relating to quick change in consumer preference of varieties in export market is yet another factor to which Indian producers find it difficult to keep pace with specially in a growing domestic market which is capable to pay prices equal to or better than what is possible to realize in the export markets.

Chart 9.2

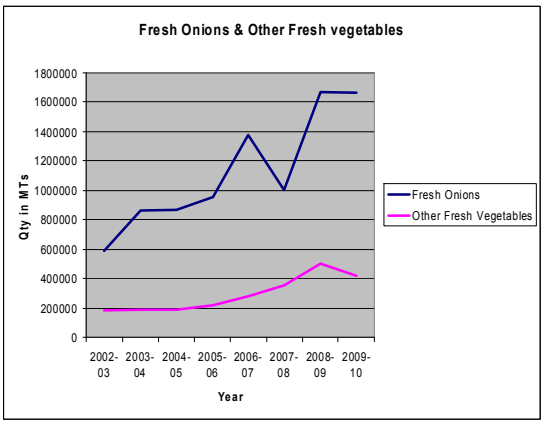


Chart 9.3

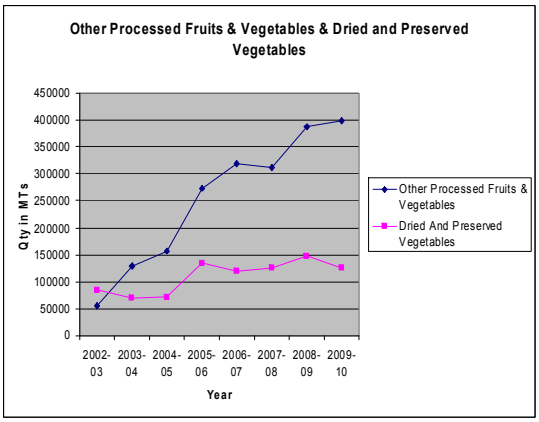


Chart 8.4

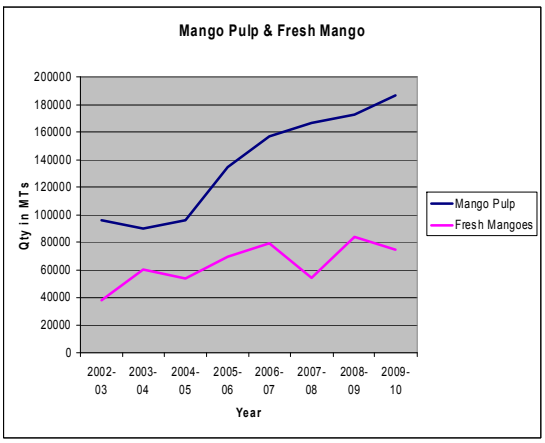


Chart 8.5

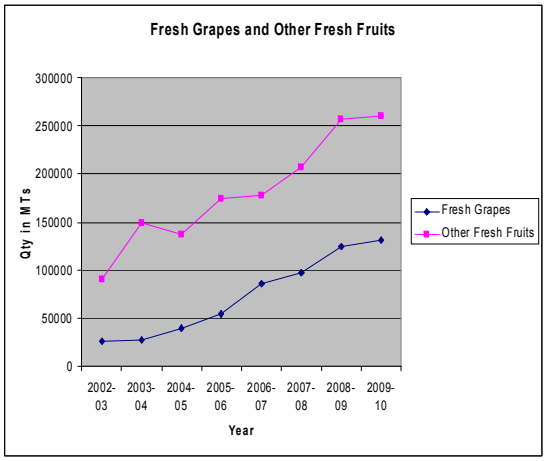


Chart 9.6

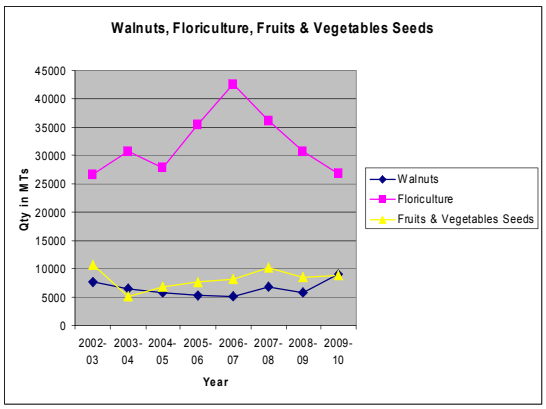
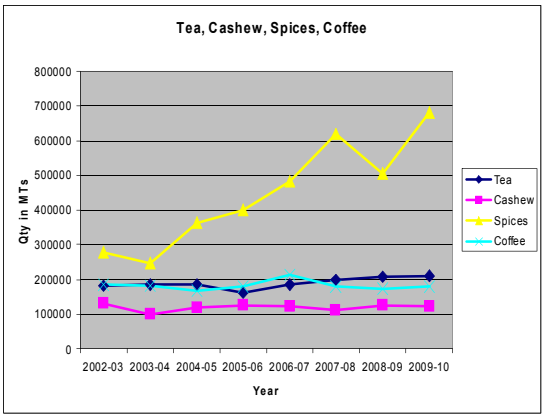


Chart 9.7



Commodity wise Share in Exports of Fresh Horticulture Produce from India - Chart 6.8 below shows the commodity wise share in country's exports of horticulture produce during year 2009-10; likewise the Chart 6.9 below depicts volume wise share in exports of horticulture produce for the corresponding period. From the two charts, it is clear that onion occupies major share in Country's exports of fresh horticulture produce both in terms of value and volume followed by other fresh vegetables and other fresh fruits respectively.

Chart 9.8

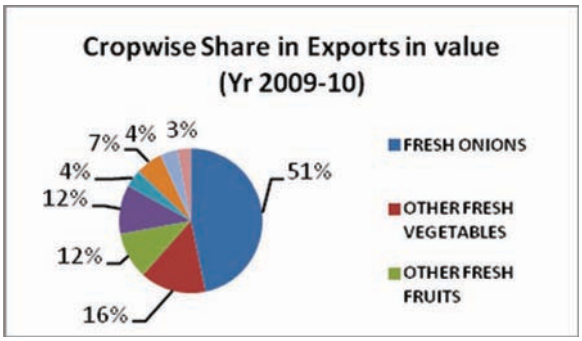
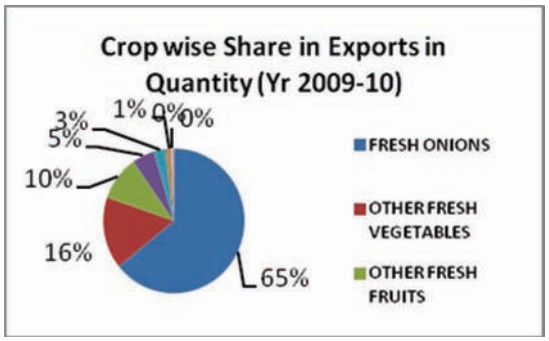


Chart 9.9



Country wise Exports of Horticulture Produce and Opportunity Ahead- country wise exports figures for major horticulture produce in terms of volume and price realization for the year 2009-10 have been depicted in Chart No. 9.10 to Chart No. 9.21. This may give us fairly good inference regarding existing export opportunity.

a. *Case of Onion*-From exports data of onion for the year 2009-10, it can be easily made out that Bangladesh, Malaysia, UAE, Sri Lanka, Pakistan and Nepal are major importers of onion from India in which case export prices are to the about Rs. 15000 / MT.

Chart 9.10

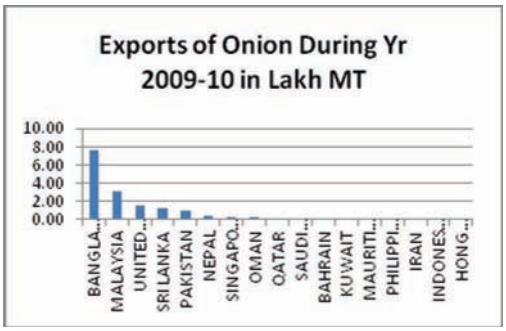
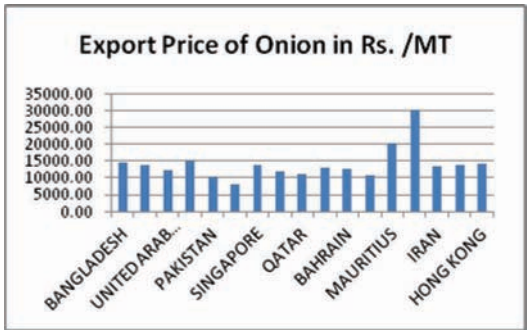


Chart 9.11



b. *Case of Mangoes*- Bangladesh, UAE, Nepal, Saudi Arabia and UK are main importers of mangoes from India. India has better price realization and therefore better export potential in UAE, Saudi Arabia and UK but larger volume will continue to go to Bangladesh at lower price.

Chart 9.12

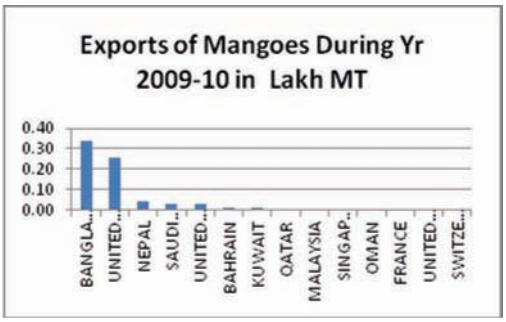
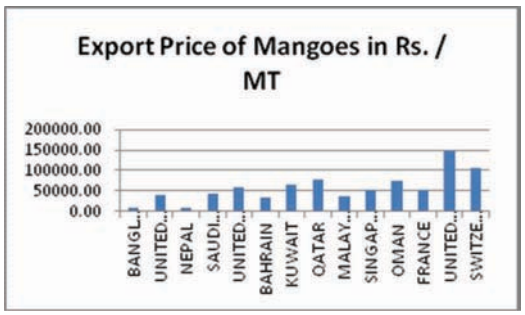


Chart 9.13



c. *Case of Other Fresh vegetables*- there seems to be a better export avenue for other fresh vegetables in Bangladesh, Nepal, Middle East and EU Countries. It includes tomato, green chili, drum sticks, curry leaves, other leafy vegetables and Okra.

Chart 9.14

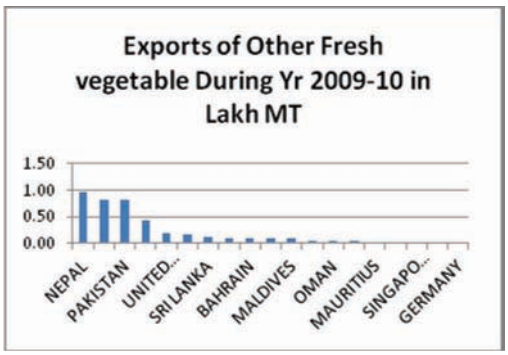
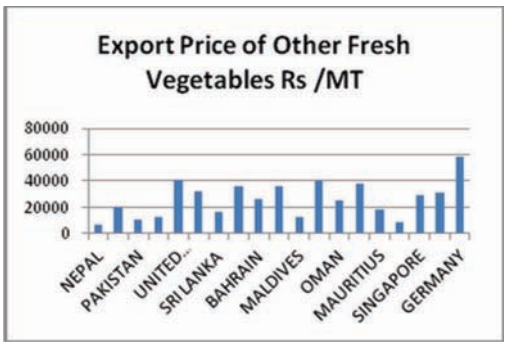


Chart 9.15



d. *Case of Grapes*- though, a large volume of table grapes goes to Bangladesh but EU Countries make attractive export destinations.

Chart 9.16

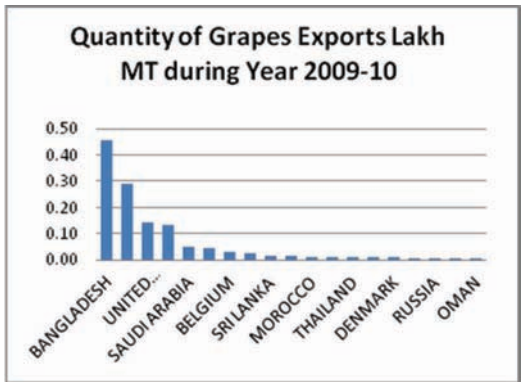
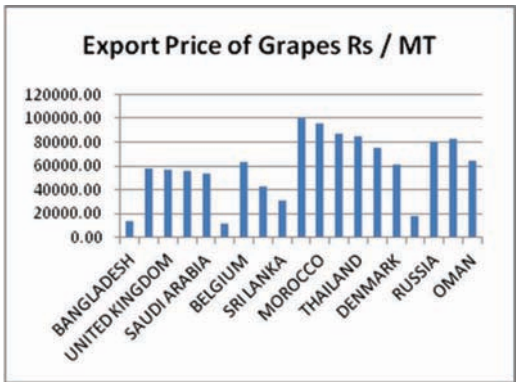


Chart 9.17



e. *Case of other Fresh fruits*- UAE, Bangladesh, Nepal, Saudi Arabia, Kuwait, Netherland are some of the promising export destinations for other fresh vegetables

Chart 9.18

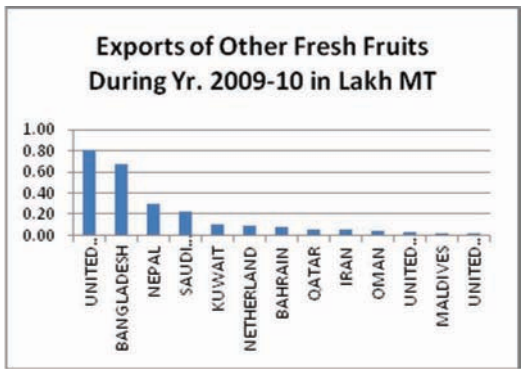
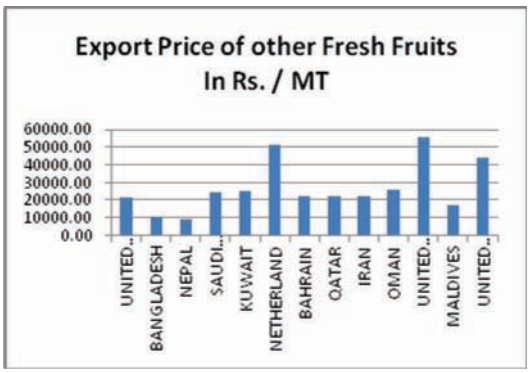


Chart 9.19



f. *Floriculture*- USA, EU Countries, UAE, Japan and Canada are some of the promising export destinations for floriculture. However, exports of floriculture items from India are facing tough competition from the produce from some of the African countries. In addition, there is also an issue relating to quick change in consumer preference of varieties in export market. The producers in India find it difficult to keep pace with such dynamism in a market particularly when domestic market is growing and is capable to pay prices equal to or better than what is possible to realize in the export markets. During 12th plan we must gear up to face this challenge and also develop new markets.

Chart 9.20

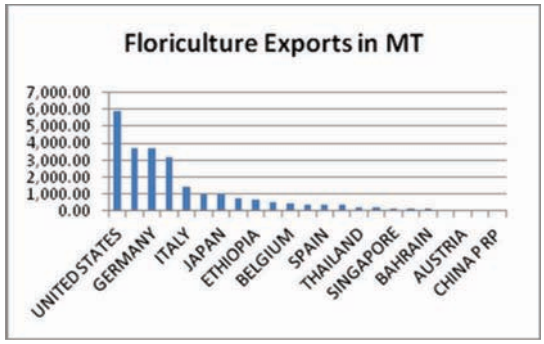
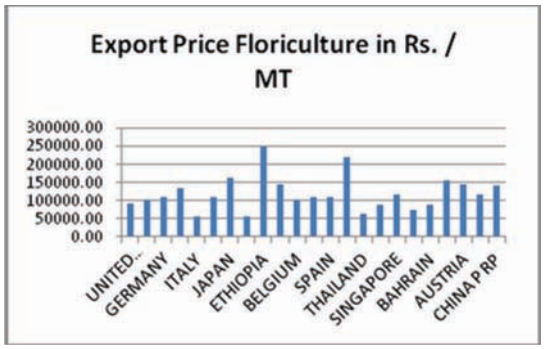


Chart 9.21



Success Stories and Positive Development on Domestic Front-

a. *Success Stories of exports of Pomegranate, Banana and Gherkins* - Success stories of exports of table grapes, mangoes and floriculture items have got replicated in cases of pomegranate, banana and gherkins. In these cases, production of critical quantity of export-quality horticulture produce has facilitated their exports. Case to case details for individual produce may be different but the success has been possible due to concerted effort by farmers' organizations, public and private sector initiatives. Challenges faced during the process serves as good guide for developing and strengthening more such clusters for niche products.

b. *Agri-entrepreneurs in farming* - a new class of agri-entrepreneurs has got into agriculture by either farming themselves or achieved large scale of produce by means of contract farming. The success of contract farming in various areas in the country is listed below:

i. Gherkins in Karnataka, Tamil Nadu and pockets of Andhra Pradesh (by all leading exporters)

ii. Dehydrated onion and garlic in Jalgaon, Maharashtra (by Jain Irrigation) and Bhavnagar district in Gujarat (by over 60 MSME entrepreneurs but not under proper contract farming)

iii. Banana in Gujarat (by Desai fruit and Vegetables etc. under contract farming)

iv. Fresh Vegetables in Bangalore (by Namdhari Seeds)

v. Strawberry in Himachal Pradesh (by Devbhumi by open market procurement)

c. *Corporate houses in Agri Business*- Corporate houses also have taken to merchandizing of agriculture produce in a big way, which has resulted in commercialization of agriculture/horticulture in extensive tracts. A number of them have made varietal introduction and passing on production and post harvest management related technology to producer farmers. All of these groups may not be in exports of horticulture produce, but their participation marks a positive development. Some examples are listed below:

- Pepsi in West Bengal & Punjab
- ITC e-Chaupal, Madhya Pradesh
- Mahindra Shubhlabh, Maharashtra
- TATA Khet se, Punjab
- McAins, Gujarat
- Adani, Himachal Pradesh

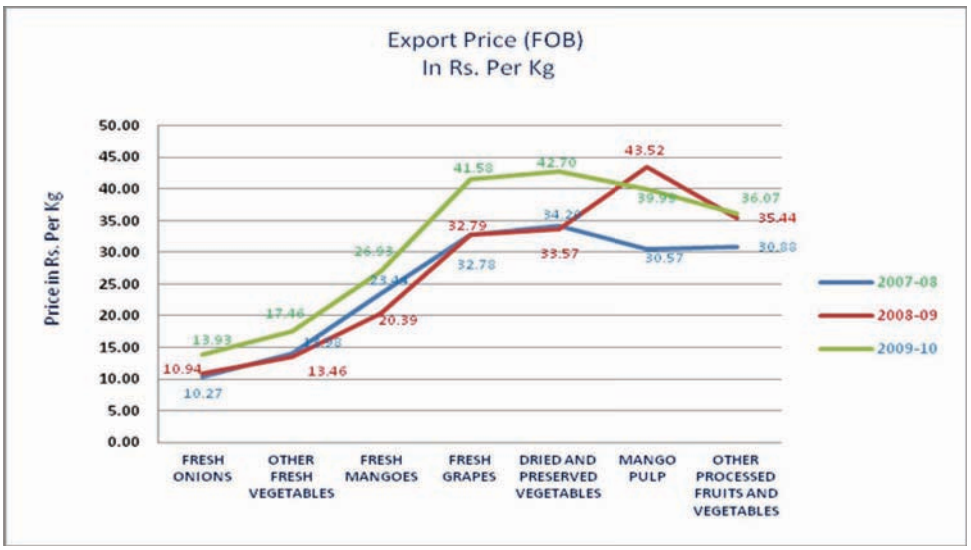
d. *Horticulture Development Programmes of Government*- This is not to deny that schemes like NHM, RKVY and the progressive steps taken by State governments including the efforts of APEDA and NHB, substantial extension and creation, pre and post harvest infrastructure has come up, but the Govt.

intervention has relatively been more successful in generating surplus in areas where a large swathe of farmers have shown commercial instincts. This is relatively been new phenomena.

International Developments on WTO Platform-

a. Evaluation of the reduction in export subsidies and domestic support by the developed countries as per Uruguay Round commitments has revealed that these commitments have not been implemented in full. Accordingly, commodity prices in global market continue to be artificially lowered due to the continued support by the developed countries to their farmers and exporters. The effect of this can be seen in *Chart 9.22* which shows export price of major horticulture produce from India over a period extending from year 2007-08 to 2009-10.

Chart 9.22



Source- APEDA

b. As per revised Draft Modalities for Agriculture, *Negotiating Groups* have been constituted in the WTO on each aspect of the negotiations. In the agriculture negotiations, the draft modalities include formulae and other methods to be used to reduce tariffs and agricultural subsidies. The Chair of the Negotiating Group on Agriculture brought out *Draft Modalities on Agriculture* on 17 July 2007; and based on the multilateral discussions, brought out further revised draft versions on 8 February, 19 May and 10 July 2008. The revised draft text of 10 July 2008 formed the basis of discussion during the *Mini-Ministerial Meeting* of the WTO in Geneva in July 2008. A fourth revised draft version was issued on 6 December 2008. In WTO Negotiations, *Annexure G* of the December 2008 modalities circulated by the Chair referred to Tropical Products. India's interest would be in ensuring that items of its export interest feature in the tropical products, list in *Annexure G* for faster and deeper cuts in duties. Annexure G has a total of 134 products at six digit HS level. APEDA has analyzed the products and found 12 horticulture products of our interest as given below-

Table 9.2

HS 96	Description
060310	Cut flowers and flower buds for bouquets, etc. fresh
060390	Cut flowers and flower buds for bouquets , etc. dried
060499	Foliage, branches, for bouquets, etc.-except fresh
070310	Onions and shallots
070990	Vegetables, fresh or chilled nes
071190	Other vegetables; mixtures of vegetables
071490	Arrowroot, salep, etc. fresh or dried and sago pith
080111	Desiccated coconuts
080300	Bananas, including plantains, fresh or dried
080430	Pineapples, fresh or dried
080450	Guavas, mangoes and mangosteens, fresh or dried
081290	Fruit and nuts, provisionally preserved

However, based on experience, any significant breakthrough in this regard is not considered for the purpose of planning for the 12th Plan Period.

c. There has been a recent trend of an increased reliance on use of private standards at individual firm level and collective national/regional level. These standards are besides International Standards from standards formulating bodies' viz. Codex and International Plant Protection Convention and the National Standards set by the Governments of member states of WTO. Adoption of one such standard in the form of EurepGAP (now GlobalGAP) standards by farmers for cultivation of grapes and other horticulture crops such as pomegranate has led to increased market acceptance and higher volumes of export as well as higher price realization. However, introduction of private standards in domestic production system involves not only extension work and capacity building at various levels but also has cost implications. At times, introduction of private standards at a very short notice may amount to unreasonable Non Tariff Barrier such as application of private standards on exports consignments of Indian table grapes to EU Countries during the year 2010-11 when Private Standards had been introduced by overseas buyers / retail chain outlets / super markets at a very short notice. But the fact remains that the direction of exports in the years to come would depend on adoption of international standards of quality safety and hygiene. The stringent standards prescribed by developed countries for contaminants and *maximum residue limits* (MRLs) for pesticides are a challenge for the producers and processors. Markets are likely to insist upon introduction of monitoring plans similar to Grape Net, implemented by APEDA, in case of export of grapes to EU, for export of other crops as well.

d. *Competition from producers in African countries-* For last several decades, countries in African continent have been supplying a variety of agriculture produce to the markets in West Europe. Many of the African countries have been European colonies for a long time. Therefore, a significant investment by European investors has been there supporting agriculture production in these countries for serving the European trade and consumers. These African countries also enjoy benefit of zero import duty for most agriculture produce exported to Europe. A comparative study carried out for exports of major horticulture product categories viz. floriculture, fruits & vegetables from India with two leading suppliers from South Africa to the markets in EU and Singapore & Malaysia in South East Asia during 2009 is given below-.

Table 9.3
Floriculture/ Fruit and Vegetable seeds

Val: US$ Mill.

	EU	Singapore	Malaysia
Kenya	74.35	0	0
Zimbabwe	1.07	0	0
India	32.92	0	0

Table 9.4 Fruits

Val: US$ Mill.

	EU	Singapore	Malaysia
Kenya	31.62	0.0001	0.05
Zimbabwe	16.35	0	0
India	146.32	8.7	6.2

Table 9.5 Vegetables

Val: US$ Mill.

	EU	Singapore	Malaysia
Kenya	229.36	0.18	0
Zimbabwe	6.55	0	0
India	25.6	9	80

e. It may be seen from the data above that the exports of horticulture products from South Africa to EU markets is much higher as compared to India. However, the presence in South East Asia is not significant. In view of the good potential of exports of horticulture produce from Africa, some of the investors from India have also chosen to establish ventures in the countries in Africa for production and export of horticulture products.

***Import Scenario*-** Horticulture produce in fresh as well as processed forms are imported in the Country. Attempt has been made to analysis import trends as follows-

a. *Import of Apples*- There is a new trend of increasing imports of apples; the major suppliers are USA, China, Chili, New Zealand and Australia. Imports of apples during the years 2008-09 and 2009-10 have been of the order of 70,000 MT and 100,000 MT respectively. Though, section of traders have pointed out certain procedural issues relating to price determination of imported apples for applying import duty as one of the important factors resulting into higher imports from Chennai port, generally, high marketing margins and import tariff (50% ad valorem) may account for about half of the consumer price of imported apples. As per trade feedback, high prices of imported apples, compared with Indian apples and other fruits, are likely to limit growth in import. The import of apples in last few years, however, has increased consumer appeal and sensitized various stakeholders in the trade channels including Government agencies regarding importance of post harvest management infrastructure including CA cold storages at various stages of supply Chain.

b. *Import of raw Cashew nuts*- India imports a significant quantity of raw cashew which are processed and re-exported. India ranks No. 1 in the world import of cashew nuts, importing 90% of total world production. African countries are the major suppliers of raw cashew nut to India. Increasing mechanisation of cutting and pealing operations involved in cashew processing may address to the issue of shortage of labour in processing clusters in India.

c. *Import of Walnut*- **As** per DGCIS, the information on import of walnut is as follows:

Table 9.6

Commodity: 080232 SHELLED WALNUTS FRSH OR DRIED

S.No.	Country	Values in Rs. Lacs		Quantity MT	
		2008-2009	2009-2010	2008-2009	2009-2010
1	TAIWAN	0.61	0.32	0.20	0.20
2	GERMANY	1.75	2.34	0.55	0.68
	Total	**2.35**	**2.66**	0.75	0.88

It is reported that walnut processors had to import raw walnut for capacity utilisation of their processing unit. In case a case, effort needs to be made for increase in production of walnut which has potential in view of climate change scenario.

d. *Import of Palm Oil*- Import of palm oil is permitted freely except that these imports are not permitted through any port in Kerala. Annual imports of crude palm oil range between 4 to 5 million MTs; major suppliers being Indonesia, Malaysia and Thailand. As per DGCIS, the data relating to quantity and value of imports of crude palm oils and its fractions in last two years is:

Table 9.7
Import of Plam Oil

Commodity: 15111000 CRUDE PALM OIL & ITS FRACTNS

S.No.	Country	Value in Rs. Lac	Value in Rs. Lac	Qty in MT	Qty in MT
		2008-2009	2009-2010	2008-2009	2009-2010
1	Indonesia	743,032	1,268,905	3,585,776	4,099,478
2	Malaysia	146,476	204,840	668,762	655,576
3	Thailand	15,125	10,554	78,295	29,321
4	Other	3,707	3,573	15,229	12,949
	Total	**908,340**	**1,487,871**	4,348,063	4,797,323

Issues Concerning Enhancing Export Competitiveness- In spite of being low cost producer of crops; Indian horticulture produce is not finally competitive in global markets primarily due to non-availability of critical volumes of good quality product from a compact area resulting into higher delivery costs. An analysis of the reasons behind this state of affairs may be summarized as follows-

a. *Bulk of Export to SAARC and ASEAN Nations*-- As is seen in above analysis, a large volume of exports from our country is to SAARC and ASEAN Nations and countries in Gulf; buyers from these countries are generally not very quality conscious and export price in such countries in not only highly volatile but also may not necessarily be attractive enough at all points of time. In such cases, the merchant exporters prefer to source horticulture produce for such exports from wholesale markets or from farms, as and when there is a good business opportunity. A number of overseas buyers from neighbouring countries like Bangladesh and Nepal also enter into contract of purchasing harvest from orchards / farms at some intermediate stage of crop growth and also extend advance payments. Though, this type of export provides market for domestic produce, it does not enhance our global export competitiveness. As this business model for exports applies to a large volume of exports from our Country, export quality production as a concept has not been wide spread in majority of production area, especially in eastern and NE States.

b. *Quality Regime in Domestic Market*- quality standards put in place for fresh horticulture produce by AGMARK and CODEX are voluntary in spite of the fact that there is a segment of consumers who are prepared to pay higher price for quality products sold from organized retail chain outlets. In case, the quality standards are enforced on horticulture produce sold for consumption in packaged form, it may not only trigger the process of setting up of PHM infrastructures but also build export competitiveness among those managing supply chains for hi-end domestic market.

c. *Export to Developed Countries*- Export Competitiveness of our exporters is mainly gained from our limited exports experience of EU and other developed Countries. For exports of horticulture produce like grapes, gherkins, chives and exportable cut flowers etc to quality conscious developed countries where there is regular

and established export market for the commodities, generally contract farming is resorted to by exporters / overseas buyers. In such cases, seed and planting materials, critical farm inputs and production & plant protection technology may be provided by the overseas buyer through the exporter and PHM protocols, specifications for packaging materials and labelling, supply schedule etc too may be prescribed by them. Domestic producers benefit from such exports not only in terms of better price realization but also in overcoming barriers caused by technology gaps, input gap and gap of market intelligence.

d. *Need for New Scheme for Enhancing Export Competitiveness-* From above analysis it may be inferred that for enhancing our export competitiveness, it is necessary to not only encourage export quality production for domestic consumption in high-end markets but also target export destination with careful analysis of markets and set out export competitiveness initiatives in mission mode under *central sector scheme of horticulture development*.

Recommendations for 12th plan Period- During XIth Plan period and before, export promotion has not been considered as direct responsibility of horticulture division of DAC and as such, there has been no scheme component which facilitates capacity building for production of export quality fruits & vegetables, promotes quality parameters of CODEX etc. and promotes development of infrastructure of international standards for facilitating exports. This role has been left to APEDA which has limited contact with producer farmers and their groups. Therefore, the Working Group recommends a concerted and planned effort in project mode for enhancing our share in export of horticulture produce during XIIth Plan Period. Proposed interventions in this regard are listed below-

i. *Identification of Focus Crops and Estimating Export Opportunity* **-** The Working Group recommends that there is a need to strengthen export oriented production of *focus crops* in *selected production clusters* in a *project mode*. The selection of *focus crops* may be made on the basis of critical analysis of the export potential of crops for identified potential export destinations. This needs to be followed by collecting information about market's preference for quality standards for produce in terms of size, shape, weight, colour, flavour, texture etc which shall then be required to be converted into extension message for production and PHM protocols. Market intelligence in terms of nature of competition and expected price realization to needs to be gathered and made available to producers and exporters so that the producers may undertake production accordingly and logistic support too can be ensured by concerned players.

ii. *Varietal Introduction, Quality Planting Materials, Farm Chemicals and Farm Mechanisation* - In a number of cases, suitable variety of crops has to be introduced to promote exports, a number of which may require import of planting materials. Import of planting materials need to be undertaken by public sector initiative too. In addition, there is a need to link area expansion

programme with availability of quality planting materials. Import of farm chemicals and farm machineries too may be required to produce export quality horticulture produce.

iii. *Technology Development and Transfer for Export Competitiveness*- There is a need to increase farm level productivity and quality of produce in terms of size, colour, texture, physical appearance, TSS, TSS: acid ratio, fruit pressure, insect damage etc. The grades of various horticulture commodities have been notified by the Dept. of Agriculture and Cooperation (AGMARK) keeping in pace with Codex Standards. During 12th Plan Period, production technology for export quality production and PHM protocols for ensuring quality preservation of fresh horticulture produce for meeting quality standards of consignment in export destination needs to be developed and transferred to various players in *project mode*. For this, there is a need to raise man-power who does not speak about technology in great academic details concerning only one or few aspects of production but who can carry out transfer of technology as a total solution for export-quality production in selected clusters.

iv. *Validation of Prescriptions for Post Harvest Management Practices*- There are gaps in general prescriptions regarding pre-harvest and post-harvest management protocols for fresh horticulture produce and its applicability in our agro-climatic conditions and varieties in economically viable manner . Therefore, PHM protocols have to be firmed up after due validation. In a number of cases, protocol for transport of horticulture produce by sea route needs to be prescribed in order to cut down on transport cost by air cargo.

v. *Development of IPM protocols*- Similarly, IPM protocols for horticulture produce have to be prescribed in clear terms. This needs to be followed by putting in place a system of pesticide residue monitoring.

vi. *Quality Regime for Horticulture Produce*- There is a need to put Quality Regime in horticulture produce for domestic marketing too which will enhance capacity of stakeholders to undertake export quality production, packaging, transport and storage. Maturity standards for harvesting the produce and grades set by regulation bodies such as AGMARK / CODEX may be enforced for domestic marketing of horticulture produce in packaged form. This will enable India to impose quality standards on imported items too, in conformity with provisions of Agreement on Agriculture (AoA).

vii. *Investment in Capital Intensive, hi-tech infrastructure*- Infrastructure creation to fill up the deficiency in the supply chain, which may include pack house, ripening chambers, collection centres, reefer transport, irradiation and VHT facilities etc. Implementation of these could be linked with compulsory O&M by private sector by determination of pre-determined PPP contract terms & conditions. Modernization and up gradation of old processing plant in the clusters, if given priority, may also increase the production capacity and bring down the cost of production. Construction of high quality laboratories in

private sector should be encouraged by locating them in the clusters and not in the metros as is the current practice.

viii. *Market Sector Reforms and Contract Farming*- Several States in the country have made amendments in their respective Agriculture Produce Marketing Act to facilitate contract farming. In most of the crop covered by contract farming in different parts of the country, the produce is targeted for markets abroad. The contract farming with improved regulations, to cover the interest of both the farmers and the exporters, could actually be used as a tool to promote investment in agriculture. This would also help in promoting the exports of agro products by achieving better quality produce meeting the global standards. In contract farming arrangements, the differences between the two partners, the exporter and farmer arise mainly in the areas of price settlement and default by farmers in fulfilling the supply commitments. In spite of written contracts, the mechanism for resolution of disputes is weak because of cultural issues in the Indian farming environment. The best arrangement would be such which is firmed up and operationalized considering social and cultural issues. The exporter/processor has to assume higher responsibilities in terms of taking a long term view of the arrangement and evolve an environment of inter dependence between the two sides for mutual benefit.

ix. *Export Support Infrastructures*- During 12th plan period, scheme components for development of export support infrastructure at ports (sea ports, air ports, inland ports) may be given due attention under schemes of horticulture development. At times, long queues of trucks carrying cargo of perishables for export to neighbouring countries through inland ports result in delay and corresponding deterioration of quality of export produce. Presently, developing infrastructures for exports of perishable through sea-ports and land custom stations has not been given due attention under Horticulture Development Programmes. There is also a need to review the procedure adopted by custom authorities and shipping lines in dealing with perishables. It is recommended to pay due attention to these aspects during 12th plan period.

x. *Manpower Development*- Capacity building exercise, which may include training, workshops for the farmers, service providers, entrepreneurs etc. in areas of cultivation, preservation, logistics, exports etc. continues to be area of importance during 12th plan period. Special training courses for potential exporters and farmers organizations regarding export procedure and opportunity needs to be designed and introduced.

xi. *Sustained Support to Existing Export Oriented Clusters for processed item***s**- During 12th plan, support to existing export- oriented clusters need to be continued under schemes of the Ministry of Food Processing Industries. Schemes should be framed not only for capacity addition but also for up-gradation and modernization.

Table 9.8
Product Cluster – Turnover

S.NO.	Products	Clusters	Manufacturing Units	Total Turnover	Approximate cluster turnover *
1.	Mango Pulp	Chitoor (Andhra Pradesh) Krishnagiri (Tamil nadu)	85	Rs. 744.60 crores	Rs. 600 crores
2.	Gherkins	In and around Bangalore (Karnataka)	37	Rs. 742.71 crores	Rs. 700 crores
3	Dehydrated Onion and Garlic	Mahua (Bhavnagar, Gujarat)	34	Rs. 736 crores	Rs. 675 crores
4	Dried flowers	Tuticorin (Tamil Nadu)	8	Rs 194 crores	Rs. 145.50 crores

** Obtained from Trade*

Projected Budgetary Requirement- It is proposed that schemes relating to enhancing our export competitiveness should be introduced in the form of Central sector Schemes of horticulture Division of DAC; this inter alia may include schemes promoting investment in export oriented infrastructure within Country such as pack houses, development of appropriate handling and warehousing facilities for perishables at sea-ports, land custom stations, dry docks, air cargo centres etc. It may also have capacity building components for producers and exporters. A budget provision of Rs. 370 Crores may be made for this during 12th plan period for the components as detailed below which are otherwise covered by ongoing schemes of NHB and NHM but may be specially categorised as *"Enhancement of Export Competitiveness"*.

Table 9.9
Budgetary Requirement for 12th Plan Period
(New Component of Enhancing Export Competitiveness)

S. No.	Scheme	Existing scheme, if any	Budgetary Allocation in Rs. Crores
1	**Export Quality Production** a. Varietal Introduction, Quality Planting Materials, Farm Chemicals and Farm Mechanization b. Technology Development and Transfer for Export Competitiveness c. Validation of Prescriptions for Post Harvest Management Practices d. Development of IPM protocols e. Quality Regime for Horticulture Produce	Ongoing Scheme of Technology Development & Transfer for Horticulture Development @ 100% Central Grant	30
2	Investment in Capital Intensive, hi-tech infrastructure-e.g. Residue Testing Lab, Irradiation Facility, VHT Treatment	@ 50% subsidy under CFC	100
3	Export Support Infrastructures- Integrated Pack-House, Auction Centers, Perishable Cargo Centers at Air Port, Sea Port, LCS etc	@ 50% subsidy under CFC and @ 40% subsidy for individual projects	100
4	Manpower Development	Ongoing Scheme of Technology Development & Transfer for Horticulture Development ; @ 100% grant	20
Total Budgetary Requirement			**250**

CHAPTER 10: Horticulture Extension Services and Human Resource Development Programme

a. ***Back ground***- horticulture extension has been integral part of agriculture extension services. After all, a producer farmer grows different crops including horticulture crops on his farm and has to know the production, plant protection and PHM technologies in respect of all of them. Going to the history of formation of horticulture division in DAC, initially, Crop Division in DAC used to look after the subject of horticulture development. With increase in emphasis on horticulture development, there had been a felt need to have a separate horticulture division at Centre to perform planning and monitoring & control functions for horticulture development programmes. Horticulture Division was finally carved out from Crop Division of DAC at the Centre in the year 1981. Centrally sponsored scheme of TMNE was launched for NE States including Sikkim in the year 2001-02 followed by extension of the scheme for three hilly States of J & K, Himachal Pradesh and Uttaranchal in the year 200-04. Scheme of NHM was launched in selected 281 districts in the year 2005 which has been expanded later on to 373 districts. National Mission for Micro Irrigation (NMMI) and National Bamboo Missions (NBM) were launched during the year 2006.

b. Some of the States which had taken up horticulture development initiatives on their own had already set up separate Directorate of Horticulture at earlier stages. With launch of centrally sponsored schemes of NHM, NMMI, HMNEH and NBM the flow of plan grants from government of India to State Governments increased drastically, making it imperative for the States to have a separate Directorate of Horticulture to perform planning, monitoring & control functions. Setting up of a separate State Directorates of Horticulture had given rise to a new dimension of hierarchical control and management related issues and resultantly, process of developing a separate field level organization structure for State Horticulture Directorate has been triggered. Increasing Trend of Plan grant allocation from DAC for horticulture sector is shown in *Table 10.1* below. In addition, States do get plan grants for horticulture sector under State Plan schemes too, including RKVY.

Table 10.1
Trend of Plan Grant Allocation for Horticulture Sector
(Department of Agriculture & Cooperation)

Plan	Amount (Rs. in crore)
7th	24.2
8th	789.0
9th	1453.6
10th	5025.0
11th	16235.0

c. Availability of technical staff in State Directorates of Horticulture, in respect of which data could be collected, is shown in *Table 10.2***.** A number of States now expect plan grant assistance from Government of India to raise adequate size staffing pattern to implement horticulture development schemes of NHM, HMNEH, NBM and IMMI.

Table 10.2
State wise Details of Staff Strength in Some State Horticulture Departments

S.No.	Name of State	No. of post Sanctioned	No. of post filled up	No. of post Vacant	Remark(% Vacancy)
1	Andhra Pradesh	465	236	229	49%
2	Arunachal Pradesh	415	411	4	1%
4	Bihar	901	506	395	44%
8	Gujarat	375	175	200	53%
9	Haryana	208	144	64	31%
11	Jharkhand	559	136	423	76%
13	Karnataka	5390	3678	1712	32%
14	Kerala	118	111	7	6%
15	Madhya Pradesh	1556	1018	538	35%
18	Meghalaya	323	282	41	13%
20	Nagaland	138	138	0	0%
21	Odisha	2219	1543	676	30%
22	Punjab	202	108	94	47%
24	Rajasthan	417	307	110	26%
25	Tamil Nadu	2596	2185	411	16%
27	Uttar Pradesh	1521	985	536	35%
29	West Bengal	652	162	490	75%
31	Pondicherry	25	24	1	4%
	Total	17872	12005	5867	33%

d. To the contrary, NHB, CDB, Directorate of Cashew nut & Cocoa Development and Directorate of Areca nut & Spices Development, Tea Board, Coffee board and rubber Board have their own field offices for implementation of their schemes. However, position about schemes of Medicinal Plant Board is varying which mostly depends on State Govt for implementation of its programmes.

1.1 Need for Human Resource Development for carrying out horticulture extension has been fully recognised and specific components relating to HRD have been incorporated in schemes of horticulture development during Xth and XIth plan periods. On perusal of scheme components it may be evident that mainly class room training, participation in workshops and seminars, foreign visits, visits to hi-tech commercial projects and exhibitions have been used as common tools for human resource development for extension workers engaged in horticulture

development. On analysis of number of extension workers trained and expenditure made on HRD programmes, it may be said that HRD programmes for horticulture extension need special attention during XIIth Plan Period.

HRD Concern for XIIth Plan Period- Common shortcomings in the ongoing HRD programmes may be exemplified by following list which may not be exhaustive-

Lack of Technology Solutions in Project Mode- Institutional / class room training courses are generally targeted at familiarising the extension workers with variety of technologies in compartmentalised manner but very little capacity is built among them to provide technology-solutions in project-mode. For example- extension workers may be in a position to impart technology regarding canopy management, soil testing, nutrient management, IPM etc but he/ she is generally not equipped to speak in terms of giving a complete technology-solution for a targeted production-cluster in terms of targeted increase in productivity and increase in percentage of quality fruits meeting prescribed quality standards etc.

Lacking Economic viability of prescribed technology solutions- HRD programmes for extension workers impart knowledge about technology without much concern for economic viability of prescribed technology- intervention,

Lack of coordination between experts from Life-Sciences and Engineering and Technology stream in designing technology solutions and extension messages- HRD programmes are highly compartmentalised and lack coordination between experts of life-sciences and faculty from engineering technology streams which adversely affects HRD programmes in respect of PHM, storage, cold chain and transport solutions,

Lack of Applied Research and Validation of Technology Solutions before incorporating them in Extension Messages- Lack of applied research in respect of Critical Storage Conditions of fresh horticulture produce, prescribing technical standards for PHM and cold chain infrastructures, in respect of packaging and transport solutions, automation of value addition processes and farm mechanisation etc makes the related HRD programmes too much dependent on inputs from International Organisations and bookish knowledge. Even, during XIIth Plan period, dependence on technology inputs from organisations like World Food logistics Organisation (WFLO), Global Cold Chain Alliance (GCCA), American Society of Heating, Refrigeration, Air Conditioning Engineers, Euro-vent, EurepGap etc will continue to be there. In absence of applied R & D and validation of such prescriptions in Indian conditions and for our cultivars, the extension workers find themselves inadequate in carrying out extension functions in these fields.

Distortions in Implementation of HRD Programmes in Participatory Mode- Distortions are noticed in programme implementations for HRD and horticulture extension through tools of Workshops/ Seminars and Exhibitions too. A large number of Workshops / Seminars organised with financial assistance under schemes of DAC for Horticulture Development serve very little purpose of HRD and horticulture extension. For example- workshops and seminars of International / National levels organised by R & D Institutions with financial assistance from schemes of DAC for Horticulture Development which mostly devote more time on presentation of research papers and felicitation of scientists do not serve any HRD or extension purpose. Similarly, Workshops and Seminars organised by industries associations with financial assistance under schemes of horticulture development but, which are essentially in the nature of periodic meetings of members of industries association or of their interface with top level planners for posting demands of the industry do not serve purpose of HRD / horticulture extension. At times, these workshops are classified and given nomenclature of International / National event just to tap higher amount of financial assistance. Further there has been mushroom growth of event- managers who organise multi-disciplinary exhibitions with objective of tapping financial assistance from multiple government agencies and schemes like NHM, HMNEHA, NHB, Extension division of DAC, APEDA, MoFPI etc. Many of such events do not allow free entry to entrepreneurs and farmers.

Need for raising cadre of skilled-manpower for carrying out extension services essentially in self-employment mode- The Working Group has also analysed the need for introduction of HRD programme for diploma and certificate courses in agriculture/ horticulture. Thus, an army of man power possessing specialised skills as mentioned above can be created which may provide requisite services to horticulture sector and earn livelihood in self-employment mode.

Cadre Management- Large scale vacancies in extension cadres of State Extension Departments and Utilisation of Extension Force for Administrative and Purchase Functions- The Working Group shares the concern of State Departments that effective strength of extension functionaries is very low due to large scale vacancies in sanctioned posts. However, the demand of State Governments for providing establishment grants does not seem to have merit. Rather States may consider having unified extension services for agriculture & horticulture at cutting edge levels and decide not to undertake input supply / purchase functions under development schemes.

Need for Multi-Faceted HRD Work Plan- During XIIth Plan Period, HRD programmes for various disciplines and target groups need to be put in place some of which is listed below-

a. HRD Programmes for extension functionaries in State Directorates of Horticulture and Master-Trainers

b. HRD Programmes for Managers of Horticulture Market, Quality Grading System for Fruits & Vegetables under CODEX and AGMARK, Traders in Horticulture Produce etc.

c. HRD Programmes for Mechanical & Refrigeration Engineers in Planning and Designing Cold Chain Infrastructures for fresh Horticulture Produce

d. HRD Programmes for Nursery Management as per Good Nursery Management Practices

e. HRD Programmes for Cold Storage Operators and Operators of Reefer Vans

f. HRD Programmes for managers / functionaries of Common Facility Centres such as dedicated multi-modal transport solutions for fresh horticulture produce, pack houses, sophisticated laboratories etc.

g. HRD Programmes for urban horticulture Initiatives such as edible horticulture, ornamental horticulture and kitchen / nutrition garden Initiatives

Horticulture Extension Services- The Working Group endorses the view that agriculture / horticulture extension is not only dependent on strength and high academic qualification of manpower appointed as extension workers but it also depends on quality & relevance of extension messages, capacity of extension workers in understanding technology needs of the target-stakeholders and selecting most appropriate technology solution to the problem and finally, in conveying the same to agriculture / horticulture farmers and operators of system of PHM and Cold Chain. Felt deterioration of quality of agriculture extension services in general and horticulture extension services in particular is witnessed with a phenomena of experts and extension workers finding themselves lacking in capacity to recommend technology solutions to the producers and managers of PHM infrastructures. In case of hi-tech commercial horticulture projects experts and extension workers, more often than not, find the production & PHM technology adopted by concerned under technical advice of private sector input suppliers and extension workers to be more advanced. This in turn, means that

there is a need to strengthen our technology support system during XIIth plan period by having the following-

a. At apex level, having a *Unified Technology Support System* comprising of technically qualified personnel led by a senior horticulture experts which carries out function of identification of Technology Needs, prescribing Appropriate Technology Solutions and formulation of Appropriate Extension Messages.

b. At cutting edge level, to have motivated extension workers with required level of technical knowledge who can communicate with the target-group and thereby transfer technology

On the contrary, in our present typical extension system, packages of ready-made technology solutions prepared by experts based generally on academic knowledge and their research findings; with or without validation in given field condition, are made available to extension workers during classroom training. So far as assigning responsibility for extension work is concerned it is more often than not, over-delegated; even under Mission Mode Programmes of HMNEHA and NHM the Mission Directorates and Technology Support Groups under them have, for all practical purposes, delegated both the above functions to lowers level extension workers. In contrast to this, most of the private companies dealing in farm inputs manage to promote their products, effect marketing and transfer of relevant technology through a small number of extension workers because of a well planned approach towards transfer of technology and extension.

Existing Modes of Technology Transfer and Concerns for XIIth Plan-

a. Technology Transfer by Mission Directorates- Each of the Mission Directorate has an ad hoc Technology Support Group **(TSG)** which consists of outsourced experts most of whom are retired senior functionaries from ICAR, SAU or DAC. The members of TSG mainly assist Mission Directors in carrying out scrutiny of annual action plans and fund utilisation certificates submitted by State Mission Directors. They also carry out field visits of projects periodically. In case of HMNH, the technical inspection of projects is left to SFAC which performs the same with the help of State SFACs which eventually may itself be the implementing agency. However, the Mission Directorates do not own any express responsibility to make assessment of Technology Needs and accordingly, to provide technology support to State Mission Directors in scheme implementation.

b. Extension Work by State Directorates of Horticulture- in the State Directorates of Horticulture, administrative functions are generally assumed by the extension functionaries positioned at higher levels along the hierarchy line and extension work is left to the lower level / lowest functionaries. Most of these functionaries have academic qualification of agriculture / horticulture but do not have direct exposure to

farming as a result; they lack confidence in addressing to field level problems faced by farmers. Due to above mentioned reasons, the field level functionaries of State Directorates rope in experts from ICAR Institutions / SAUs/ KVKs to provide the technology input or extension messages or direct the entrepreneurs to access them to find technology solutions.

c. Extension Services by ICAR Institutions, SAU, KVKs and ATMA**-** ICAR Institutions and SAUs basically concentrate on research and extension education; very limited priority is attached to agriculture extension work. The senior scientists and experts, more often than not, prefer to operate in respective fields of specialisation only and not by taking a production system in project mode. Similarly, fresh graduates and post graduates from these institutions lack sufficient exposure to field level problems and as such they are not good enough as effective extension workers. KVKs had shown positive signs in improving quality of technology transfer and in performing extension functions initially but due to indiscriminate numerical growth of KVKs the system has resulted into compromise of quality of services rendered by them. These KVKs are perennially dependent on Government grants and their experts generally feel inadequacy in addressing to issues relating to horticulture crops. ATMA (Agriculture Technology Management Agency) was launched as an experiment under National Agriculture Technology Programme (NATP) of the ICAR supported by the World Bank in seven States and 24 Districts in year 2001. In the year ATMA has been extended to 252 districts. However, District Collector and District Agriculture Officer of a district have not been able to formulate a meaningful extension programme or provide marketing related support; as a result ATMA Societies have not been able to secure involvement of producer farmers.

d. Extension Services by Panchayatraj Institutions (PRIs)- Potential of PRIs has not been fully utilised for horticulture extension work. Village panchayat functionary of Gram Sevaks which used to provide this service earlier is, at present, mostly engaged in programme implementation of programmes of poverty alleviation, employment generation and rural infrastructure development.

***e. Extension Services by Growers Associations* –** During Xth and XIth plan periods, NHB had promoted 19 Growers Associations by nominating leading growers as their office-bearers; provided them with seed money and grants for meeting initial administrative expenses but the associations lacked any field extension work, remained perennially dependent on NHB grants for their day-to-day functioning and therefore, could not develop membership base. On the other hand, a number of Growers Associations which do not depend on government grants for managing their day to day affairs and provide value added services to their members are able to carry out extension services; however, such associations are successful in crops which have high commercial value.

Grape and pomegranate Growers from Maharashtra and Karnataka, Mango Growers from TN and AP are some successful examples of growers associations in this regard.

f. Extension Services by Input Suppliers- A number of private seed companies, pesticide and insecticide companies provide extension services and transfer production and post harvest management technologies to producer farmers. It is this group which has been able to promote private sector research hybrid seeds of vegetables and fruits like papaya and planting materials of crops like strawberry, cut-flowers, gherkins etc and transfer production and plant protection technology. Input suppliers, at times, avail services of dealers and retailers too who do not have technical knowledge of products which may result in indiscriminate use of farm chemicals.

g. Extension Services by Contract Buyers- buyers who enter into contract production programme of horticulture crops for exports, processing or domestic marketing do supply seed & planting materials, other farm inputs and relevant technologies. They also may provide cold chain and packaging solutions for long distance transport of produce. This group is a very effective in transfer of technology in respect of certain specific horticulture crops like cut flowers, export quality grapes, wine variety of grapes, green peas, exportable mangoes, gherkins etc.

h. Role of Self-Employed Extension Workers- There are a number of hi-tech operations in respect of hi-tech commercial horticulture projects which require certain amount of expertise like pruning, grafting, poly-house operations, maintenance of fertigation system etc. Self employed agriculture graduates, diploma holders and certificate holders are generally engaged in rendering this kind of extension services on service-charge basis in respect of high-value commercial crops.

i. Role of Radio, TV, press and mobile phones- Extension needs of farming community have been recognised by media including radio and TV also who offer meaningful programmes on pre-determined schedule basis. However, radio, TV and newspapers depend heavily on inputs from public-sector extension workers. A number of initiatives have been taken for putting SMS facility though mobile phones to use of agriculture / horticulture extension services. This may emerge as one of the most potent tools for this purpose during XIIth plan period.

j Workshops / Seminars- Enabling entrepreneurs to attend relevant workshops and seminars is yet another tool for technology transfer, but it is noticed that most of the workshops / seminars funded under schemes of Horticulture Development are either meant for furthering purpose of Industries Associations or Crop Specific Societies promoted by agriculture scientists for presenting their scientific papers and annual get together. This is defeating the very purpose of the scheme for furthering cause of horticulture extension.

k. ***Exhibitions / Field Visits-*** Field visits is yet another tool of transfer of technology. However, ultimate success depends on selection process for beneficiaries for such

visits and relevance of field locations to be visited. Now, a number of event managers have started organising exhibitions as a business propositions which is proving to be futile in furthering cause of horticulture extension.

Recommendations of the Working Group for 12th Plan-

a. ***Putting in Place a Unified Technology Support Group*** - It is proposed that central schemes of horticulture development; namely, schemes of NHB, NHM, HMNEH, NMMI and NBM may be integrated. For effective transfer of technology, there is a need to have a *Unified Technology Support Group* for the *Integrated National Horticulture Programme* which will be responsible for ensuring proper identification and transfer of technology solutions to field level issues relating to horticulture projects. This Group will work in close coordination with ICAR Institutions and SAUs on one side and private sector R & D and International Technical Collaboration Programmes on the other and ensure consolidation of appropriate extension messages and preparation of technology intervention plans. Similarly, Director (Agriculture / Horticulture) should lead Technology Support Group at level of State Mission Directorates and ensure consolidation of appropriate extension messages and preparation of technology intervention plans and transfer of the same to extension workers in selected system of extension for finally passing on the same to the producer farmers.

b. ***De-fragmentation of Agriculture Extension System-*** Vertical bifurcation of agriculture extension system in to two- agriculture and horticulture has been affected in most of the States with stated objectives of developing clear-cut line of command under two separate directorates of agriculture and horticulture and promoting development of sectoral expertise. This has not only resulted into thinning of the two streams of extension but also does not actually serve purpose of effective extension and conflicts with the ground reality that a farmer needs integrated advise for all the crops grown by him. It is proposed that States may consider introducing single-window extension system for agriculture, horticulture, soil & water-conservation etc.

c. ***SAMETI and ATMA Society Based Extension Strategy***- ATMA Society may be taken as a main plate-form for convergence of all extension messages of agriculture and allied sectors as well as other support Ministries and Departments and provide project support. It was also considered that in the district, the major farming situation and farming systems may be selected and commodity groups formed. Thus areas with dominant horticulture production groups may be formed around the particular crop, say orange or grape and project formulated for a grape-based farming system or orange-based farming system. Such Commodity Associations may play main role in horticulture extension in those districts which do not have ATMA Societies. Effort of ATMA Societies may be complemented / supplemented

by KVKs and Growers associations under overall technical guidance and support of Technical Support Groups. In case of ware housing and processing Cold Storage Owners' Associations, Transporters associations etc may be involved for extension work. SAMETIs should be developed as nodal agencies which may function in close coordination and liaison with Unified Technology Support System at DAC and State levels.

d. ***Cluster based extension for targeted deliverables*****-** There is also a need to move away from mode of extending component-wise assistance to *project-mode* of extension and accordingly, extension message for every target cluster may be worked out in details; the same may be transferred to the producer farmers in the selected cluster. For this purpose, it is also necessary to set out deliverables of technology interventions such as increased productivity, increase in percentage of quality fruits, IPM, organic farming, GAP certification, PHM practices etc and extension messages should be designed accordingly with practical tips. Beneficiaries for new projects should be imparted training during project implementation. The entire exercise may be carried out with the help of organizations selected carefully on the basis of their capacity and interest.

e. ***Innovative Methods of Extension- Horti-Fair Sangam-*** NHB has introduced 'Horti-fair Sangam' for effecting hands-on training for adoption of recommended production and post-harvest management technologies and product promotion and market development. The exercise is also used for field trials and validation of technologies. NHB scheme has already incorporated the concept of Horticulture Fairs based on the experience of 'Horti-fair Sangam'. This initiative needs to be scaled up during 12th plan period.

f. ***HRD for Extension Functionaries*****-** The departmental staff need to be provided refresher training once in two years and should be exposed to advanced training in horticulture periodically. It is estimated that apart from regular extension functionaries, over 10000 cold storage operators, over 5000 reefer van operators and operators of CFC, more than 10000 nursery workers need to be trained during XIIth plan period. However, their HRD programmes should be need based and market oriented so as to bridge the gap of requirement of skilled man-power and its availability in self employment mode.

g. ***Introduction of Diploma and Certificate Courses in horticulture*** - There is a need to introduce regular courses of Diploma in Horticulture and Certificate Courses in horticulture so that there is availability of skilled manpower willing to work at grass-root level as extension worker. Such specially trained man-power may have good employment opportunity in hi-tech commercial horticulture projects, nursery operations and management, cold storage operation and management, refrigerated van operation etc.

h. ***Field Demonstration of Technology, Field trials of new Inputs***-It is yet another innovative method of transfer of technology; under this ICAR Institutions, SAUs, other R&D institutions and Industry Associations are called upon to jointly identify the farm inputs, farm equipment/machineries, PHM, transport and storage technology etc for carrying out field demonstration and field trials on farmers' field/State farms, as the case may be. On a number of occasions, imported inputs and technologies too, are undertaken for field trials and demonstration. This method of transfer of technology may be resorted to in a big way.

i. ***Electronic media, internet, SMS services of mobile phones etc should also be used for extension work.*** Development of ICT materials like multi-media, portals, videos, self learning modules for effective dissemination of horticultural technologies.

j. ***Limiting Role of Extension Functionaries in Purchase Functions-*** In a number of States extension workers are engaged in input purchase functions under which they fix rate-contract agencies for inputs like seeds and planting materials, micro irrigation system, poly houses etc. Their valuable time is wasted in releasing subsidy amount directly to the input suppliers. This needs to be discouraged.

k. ***Private Sector Participation in Horticulture HRD Programmes and Extension Programmes-*** Private sector institutions may play effective role in introducing diploma and certificate courses in horticulture. The trained man-power so created will be able to carry perform skilled farm operations relating to horticulture production, PHM, transport and storage in self-employment mode. NCCD which has been formed for this purpose may provide suitable platform for private sector participation in HRD in respect of PHM and Cold Chain Infrastructure. KVKs and Growers Associations / Farmers' Self Help groups are also modes of private sector participation in horticulture extension services through public funding. In addition, it is expected that contract buyers and farm input suppliers will continue to carry out extension services from corporate sector.

Budgetary Requirement- For HRD functions for a very large group of extension functionaries ranging from departmental extension functionaries to nursery-men, engineers, cold storage operators, CFC operators, lead farmers etc it is necessary to get training modules prepared and programmes carried out. Number of trainees may be decided keeping in view that gap in availability of trained and skilled man-power in critical areas in bridged. For example at least one operator from over 5000 cold storages in the country may be trained and at least 250 graduate engineers interested in providing or already engaged in rendering consultancy services for cold storage planning & design may be equipped with advance skill.

A budget provision of Rs. 250 Crores may be made for this purpose.

CHAPTER 11 : Horticulture Database

Background Facts- The term "Horticulture Database" connotes several types of data such as data relating to area estimates under various horticulture crops and their productivity, market arrival & price of horticulture commodities, available storage facility, PHM infrastructure and exports etc. Directorate General of Commercial Intelligence & Statistics, Ministry of Commerce, Kolkata is the pioneer official organization for collection, compilation and dissemination of India's Trade Statistics and Commercial Information. Similarly, Directorate of Marketing and Intelligence, DAC, Ministry of Agriculture is responsible for agriculture market information, agriculture market research and planning & development of agriculture ware houses including cold storages. As the market information pertaining to horticulture crops require a different deal, the same may be achieved through coordination between DMI and Commodity Boards. Thus data relating to area-estimates under various horticulture crops and their productivity are two aspects of horticulture data- base which has been dealt by the Working Group in the present context.

Complexities in collection of horticulture area and production data- Horticulture sector covers wide range of crop-segments viz. fruits, vegetables, spices, floriculture, aromatic and medicinal plants, etc. and each segment covers a number of crops. There are a number of issues which make collection of data a complex exercise such as listed below-

Fruit:

i) As against seasonal nature of field crops, fruits may be perennial crops.

ii) Fruit trees, besides being grown on regular orchards, are also extensively grown on canal banks, field bunds, road sides, back yard of houses and even as a stray trees.

iii) Different fruits are frequently grown in the same orchard.

iv) Fruit trees take quite a few years before they start bearing fruit.

v) Harvesting of fruit trees is done in a number of pickings extending over several weeks.

vi) Several fruits like citrus guava, etc. have two harvesting seasons in a year.

Vegetable:

i) The vegetables are short duration crops and their duration varies considerably from one vegetable to the other.

ii) Harvesting of vegetables involves a number of pickings

iii) Vegetable cultivation is more or less a continuous process with various operations like sowing, harvesting, etc. Being done simultaneously in different fields of a village

iv) Vegetables are highly sensitive crops and is normally adds to the variability in the yield rates of the crops.

In order to set up a system of collection of area and productivity statistics of fruits, vegetables and spices considering above uniqueness, a pilot scheme named as Crop Estimation Survey (Fruits & Vegetables) popularly known as- CES (F &V) was launched in the year 1983-84 which continues till date as a plan scheme implemented by Directorate of Economics & Statistics in DAC, Ministry of Agriculture.

Brief Description of scheme of CES-F&V –

Implementing Agency- Directorate of Economics & Statistics (DES), Ministry of Agriculture (MoA), Government of India operates a Centrally Sponsored Scheme *"Crop Estimation Survey on Fruits and Vegetables (CES-F&V)"* for estimating area and production of horticulture crops. This scheme is in operation as pilot project since the year 1983-84.

State Level Implementation by State Agriculture Statistics Authorities (SASA)- At State level, the scheme of *CES-F&V* is implemented by *Department of Horticulture / Agriculture*, *Department of Land Records / Board of Revenue* and *Department of Economics & Statistics.* One of them in each State has been designated as *State Agriculture Statistics Authorities (SASA).* In all, there are 278 sanctioned posts under the scheme of *CES-F&V*. Moreover, the systems of *Timely Reporting System (TRS)* combined with *Improvement in Crop Statistics (ICS)* and *Establishment of an Agency for Reporting Agriculture Statistics (EARAS)* which are basically for agriculture crops, assist in area estimation of horticulture crops too in a limited and varying manner.

TABLE-11.1
State Agriculture Statistics Authorities (SASA)

SASA	States
Horticulture	UP, Haryana, Punjab
State DES	Orissa, KN, TN, AP,
Agriculture	Maharashtra, Gujrat
Land Records	Himachal Pradesh
Board of Revenue	Rajsthan

Sampling System- Under *CES-F&V,* a statistically designed sampling system is adopted for data collection in respect of production. The scheme covers only seven fruit crops, five vegetables crops and two spice crops and data for area and production is collected under the scheme from eleven States only.

Annual Budget under CES (F &V) - Annual budget estimates for these schemes during last two years is shown in **Table-11.2**.

TABLE-11.2

Showing Budget estimates and Staff strength for CES-F &V, TRS, EARAS and ICS

	Yr. 2009-10 (Rs. Lakh)	Yr. 2010-11 (Rs Lakh)	Staff Strength
CES-F&V	565.00	585.00	278
TRS	1323.60	1490.00	718
EARAS	4145.00	4050.00	2748
ICS	1007.00	1070.00	462

Coverage of fruit crops under CES-F&V-**T**he scheme of *CES-F &V* aims at sampling and collection of area and production statistics from major producing States. The sampling States for seven fruit crops covered by sampling is shown in **Table-11.3.**

TABLE- 11.3

Showing sampling States under CES-F &V for selected Fruit Crops

Fruit Crops	Sampling States
Mango	AP, UP, Karnataka, Gujrat, Maharashtra, TN, Orissa, Punjab, Haryana
Banana	Maharashtra, Karnataka, AP, Gujrat, Orissa, TN
Citrus	Maharashtra, Karnataka, AP, Punjab, Rajsthan, HP, TN
Guava	UP, Haryana, Gujrat, Karnataka, TN
Grapes	Maharashtra, Karnataka, TN, Haryana
Apple	HP
Pineapple	TN

Coverage of vegetable crops under CES-F&V- **N**ow, let us have a look at sampling plan for selected vegetable and spice crops. The sampling States for selected vegetable and spice crops are tabulated in **Table- 11.4**.

TABLE-11.4

Showing sampling States for Vegetables and Spice Crops

Vegetable Crops	Sampling States
Potato	HP, UP, Punjab, Haryana, Orissa, TN, Karnataka
Onion	Maharashtra, Karnataka, Gujrat, AP, Orissa, TN, Haryana
Tomato	Orissa, Karnataka, Maharashtra, Punjab, Haryana, TN,
Cauliflower	Orissa
Cabbage	Orissa, TN
Turmeric	AP, Karnataka, Rajsthan, TN
Ginger	HP, Rajsthan

Evaluation of outcome of CES (F &V) - it seems that periodic evaluation of CES (F &V) has not been carried out. Even the data generated by it are generally not referred to in firming up annual horticulture database.

Recommendations of National Statistical Commission for Horticulture Statistics-- *National Statistical Commission* set up in the year 2000 under the Chairmanship of Dr. C.

Rangarajan, an eminent economist in its report submitted in the year 2001 had made 623 recommendations out of which 73 pertained to Ministry of Agriculture all of which except two made by the Commission, basically relate to agriculture statistics in general, addressing to the issues like "Girdawari", Crop cutting experiments under General Crop Estimation Survey (GCES), reconciliation of data regarding area under irrigation finalized by field agencies of agriculture and irrigation / water resources departments, agriculture census, prices of agriculture commodities, land-use statistics, input survey, use of data available from schemes like *Improvement of Crop Statistics (ICS)* for apportionment of areas of constituent crops of major crop mixtures etc. The two recommendations made, which were specific to horticulture segment, flagged the need for review of the scheme of *CES-F&V* in terms of *methodology for estimating production of horticulture crops* covered by the scheme and also the *need for inclusion of crops like mushroom, herbs and floriculture with specially designed methodology* for their production estimates. The Commission further recommended that a team of experts comprising of representatives from Indian Agricultural Statistics Research Institute *(IASRI),* Directorate of Economics & Statistics *(DES)* of Ministry of Agriculture *(MoA),* Field Operation Division *(FOD)* of National Sample Survey Organization *(NSS)* and from one or two major States growing the horticulture crops should undertake such studies required to design alternative methodology and its feasibility. In addition, the importance of information flowing from other sources like market arrivals, exports has been recognized. Accordingly, IASRI has, in the year 2007, come out with findings of a pilot study to develop an alternative methodology for estimation of area and production estimation of horticulture crops. The pilot study essentially covers alternative sampling methodology for estimation of acreages under each major fruit and vegetable crop as well as estimation of yield rates and total production of major fruits and vegetable crops grown in the sampling State. However, *IASRI* is likely to recommend further testing of the new methodology and may, in all probability, take more time to come out with its final recommendations about the new methodology.

Present System of Compilation of Horticulture database by the National Horticulture Board (NHB)- In absence of any other better system, **N**ational Horticulture Board has been compiling and publishing annual database for horticulture sector by using secondary sources of data received from the State Directorates of Agriculture / Horticulture (*Fruits, Vegetables, Flowers, Nuts, Mushroom and Aromatic & Medicinal plants)*, Directorate of Economics and Statistics *(DES)* of Ministry of Agriculture, Government of India for *Plantation Crops*, Directorate of Areca nut and Spices Development (DASD) for spices, National Bee Board for Honey and various Spices Board under Ministry of Commerce for Cardamom and, *APEDA* for exports / imports and website of FAO *for the World Statistics* for area, production and productivity estimates pertaining to leading horticulture producers of the World. In this system followed by NHB, 11 fruits crops namely- Apple, Banana, Citrus, Grape, Guava, Litchi, Mango, Papaya, Pineapple, Pomegranate, Sapota have been termed as main crops and all other residuary crops are classified as "Others". Keeping in accordance with the international norms, crops of watermelon and musk melon are reported under vegetable category. Similarly, ten vegetable crops namely-

Brinjal, Cabbage, Cauliflower, Okra, Peas, Tomato, Onion, Potato, Sweet Potato, Tapioca are categorized as main vegetables and all other residuary crops as "Other Vegetables". However, secondary data is taken for compilation in respect of area & production estimates. In addition, crop statistics regarding Cut Flowers and Loose Flowers; p*lantation crops of* Coconut, Cashew nut, Areca nut and Cocoa; s*pices viz,.* Black Pepper, Cardamom (small/large), Cinnamon, Clove, Coriander, Cumin, Fennel, Fenugreek, Ginger, Garlic, Nutmeg, Tamarind, Turmeric, Vanilla, Chilly (Red/Green); n*uts namely,* Almond and Walnut and Mushroom *and* Honey are also collected. Price and Arrival statistics is generated by the National Horticulture Board under its scheme, *"Market Information Service Scheme***".** Under this scheme, NHB has established 35 field offices in the major capital / terminal markets, which collect the wholesale prices and arrival of major horticultural crops on daily basis. The said information as compiled by NHB is made part of the publication- *"Indian Horticulture Database".*

Present System of firming up Area & Production Statistics and Horticulture database- A committee headed by the Principal Adviser, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India with following members approves the area & production estimates as collected and compiled by NHB and other agencies and thereafter, approves the contents of Horticulture Database compiled by NHB for publication.

a. Economic and Statistical Adviser, DAC, MoA, Government of India
b. Joint Secretary (Horticulture), DAC, MoA, Government of India
c. Horticulture Commissioner, DAC, MoA, Government of India
d. Managing Director, National Horticulture Board
e. Managing Director, NAFED
f. Managing Director, NHRDF, Nasik
g. Advisor (Hort. Statistics), DAC, MoA, Government of India

Recommendations of the Working Group on Horticulture, Plantation Crops and Organic Farming for the XI Five Year Plan- The said working group has considered the experience of implementing the scheme of CES (F &V) and recommendations of National Commission on Agriculture Statistics and made recommendation of setting up extensive network of proper horticulture data establishments on Horticulture Information Systems (HIS) in all the districts and State level with apex unit at the Centre in the Ministry of Agriculture to coordinate, organise, consolidate, analyze data obtained from the States and disseminate the same for user organisations. The said Working Group has, perhaps, based its recommendations under belief that shortcomings of CES (F &V) are due to absence of administrative network extending to all the districts in all the States.

Gap Analysis- from above discussions, it is noticed that during pilot phase of implementation of CES (F &V) a methodology for assessment of productivity of fruits & vegetables by selection of sample farmers and carrying out crop-cutting experiments is established. However, there are two gaps in the present system; only a few crops and production clusters are covered by CES (F &V) and area under horticulture crops is generally not captured by " Girdawari" carried out by village revenue officer, as such, the same is reported by State Directorates of Horticulture by making general assessment. Therefore, first of all, there is a need to have fresh look on sample-crops and producer States / production clusters to be covered for assessment of productivity. Secondly, there is a need to make area assessment of horticulture crops along with agriculture crops by getting suitable administrative orders passed by State Governments.

It is noteworthy that senior officers in DES of DAC are visualising merit in delinking the task of area assessment and crop cutting experiment for agriculture crops from entries in village revenue record made by "Patwari" and are of strong view that by raising a separate team of personnel from statistics wing they may gain access to more accurate crop statistics. However, they also agree that the personnel from statistics wing on their own may not be able to make area assessment and carry out crop cutting experiments on fields of farmers without securing involvement and cooperation of "Patwari". Notwithstanding selection of agency for carrying out area estimates for agriculture crops, there is a merit in having unified system for agriculture crops and horticulture crops covered by schemes of DAC.

Recommendations for XIIth Five year Plan Period- Indian Horticulture Sector needs a reliable database without further delay. It is the high time that the scheme of **CES-F&V** is restructured during XIIth plan period making rectification for the glaring *lacunae in its sampling system* and enhancing its efficacy by *broad-basing the scheme*, instead of waiting for outcome of *complicated statistical exercises* in respect of *stratification for sampling and sample size* etc and *proposals for having independent system of horticulture census for benchmarking* to materialize. Any improvement in statistical procedure of stratification for sampling and benchmarking etc can be applied as and when revised methodologies in this regard are available and accordingly the manpower resources can be redeployed to make better qualitative coverage under the scheme. Following recommendations are being made by the Working Group for compilation of horticulture statistics during XIIth plan period.

Mode of Continuation of scheme of CE – F & V-

"Horticulture Crops" should be construed to include all the crops dealt by Horticulture Division of the DAC in Ministry of Agriculture. Crops falling under purview of Ministry of Commerce and AYUSH may also be taken care by this proposed scheme and may be

implemented through commodity boards in respective Ministries. Therefore, institutional arrangement made by respective Commodity Boards in respect of rubber, tea, coffee; spices and medicinal & aromatic plants may be relied and depended upon for compilation of related database.

Comparative merit of having unified organisation or multiple organisations for compilation of agriculture and horticulture statistics including coconut, cashew nut, cocoa and areca nut has been examined by the Working Group. The Working Group, in consultation with senior officers from DES of DAC recommends that notwithstanding selection of organisational structure for area assessment of agriculture crops, for efficient resource utilisation, a *unified system* of Area Assessment of agriculture and horticulture crops would be a better option.

Advance Crop Estimates and crop cutting experiments would be extended to expanded list of sample crops which are considered relevant by State concerned in consultation with DAC. Services of out sourced man-power would be availed for carrying out crop-cutting experiments. Commodity Boards such as CDB, NMPB, Spices Board and NHB may be made responsible to provide necessary administrative support and supervision in this regard under technical advice from Advisor (Horticulture) in horticulture division of DAC.

So far as nodal agency at DAC level is concerned, there seems a merit in allowing the Directorate of Economics & Statistics (DES), Ministry of Agriculture (MoA), Government of India to continue to be nodal agency for compilation of horticulture database during XIIth plan period which can function through Advisor (Horticulture Statistics) for horticulture crops who may be directly assisted by autonomous bodies / Commodity Boards under DAC or otherwise. As an alternative, a separate administrative set up under Advisor (Statistics) may be set up for horticulture crops with permanent office staff at State and district levels which may require creation of a few thousand posts of various ranks.

Present system of collection and compilation of horticulture statistics regarding market information, import & exports, world statistics etc may continue as such.

The Principal Advisor, Department of Agriculture & Cooperation had earlier recommended introduction of following timetable in respect of compilation of horticulture area and production statistics as shown in Table-11.5. The new Time Table is an improvement over the earlier one and requires issue of detailed guidelines for the *SASA***,** in absence of which the States will not be able to respond to the new timetable.

TABLE-11.5

Prescribed Time Table

Schedule of Estimates	Time Limit
1st advance estimates of the current year and final estimates of previous year	31st December
2nd advance estimates of current year	15th May
3rd advance estimates of current year	31st August

Projection about Budgetary Requirements- a detailed modified scheme of CES (F & V) would be prepared and got duly approved for XIIth Plan Period. Keeping in view estimated level of expenditure of about Rs. 25-30 crores for CES (F & V) in its present form, and financial implication of proposed modification in CES (F &V) a tentative budgetary requirement for XIIth plan period has been estimated by officers of DES to be to the tune of **Rs. 175 crores**.

CHAPTER 12 : Urban Horticulture

Context: **W**ith rapid spread of urban areas on one hand and rapid urbanization of rural areas on the other, the concept of limiting farming only to rural areas is no longer valid. As per recent trend, gap between urban and rural landscape will continue to narrow. Extending farming to urban areas in national horticulture planning can no longer be delayed in the long term interest of economic growth, nutritional security and social order. Considering the important role of Horticulture in high population (18%), changing life style and food habits of urban dwellers and also to address the issues arising out of fast urbanization, climate change, domestic waste accumulation and acute water shortage, the Working Group on Horticulture and Plantation Crops for XIIth Five-Year Plan had decided to incorporate the issue of Urban Horticulture in its *Terms of References* and had constituted a Sub-Group to deal with it.

Advantages Urban Horticulture: urban horticulture can address to the following problems being faced by urban population.

a. *Restoration of land area under farm-production-* Generally, urbanisation results into reduction of land area under cultivation. Green cover over area under non agriculture use is getting restored due to promotion of social forestry and concept of landscaping. The concept of urban horticulture extends to bringing open urban land spaces not only under green cover but also under horticulture without compromising aesthetic value. Even though large contiguous areas on the lines of rural areas are not available, area available for farming in totality is large enough to make a significant contribution to horticulture production.

b. *Generation of employment and providing livelihood security.* There is tremendous potential of generating jobs in the urban areas in both production and marketing such as fruit juice stalls and bars which would require provision of stalls to these people on a massive scale with the added advantage of promoting demand for horticulture produce and improving the health and nutritional security. If possible, the job generation may be monetised suitably. In this manner, urban Horticulture will result into generating jobs both in production and marketing.

c. *Health and nutritional security.* Urban horticulture will help bring about large increase in total fruits & vegetable production due to higher levels of investment and intensive farming by individuals and institutions. With increasing income levels demand for high value fruits, vegetables and herbs are increasing rapidly. Money value of urban farm products will, therefore, be high which will add to total agriculture income. Household food and nutritional security will achieved by promoting courtyard farming, kitchen gardening, etc which are parts of urban horticulture.

d. *Environmental security.* There has been lot of emphasis on and awareness about afforestation and greening. The same has not been done in the case of horticulture which is greening plus as it provides both greening and edible output in terms of fruits and vegetables. The concept of edible greening and edible landscaping needs to be developed and put into practice. There is also evidence that increasing the proportion of fruit trees, fauna and flora and by undertaking vegetable production on areas currently not under cultivation improves the green mass. There is enormous potential for the concept of edible greening and edible landscaping.

e. *Entertainment and Life Style-* Urban Horticulture includes urban landscaping, terrace farming, development of parks, golf courses, indoor decoration with ornamental plants etc which has entertainment value and combines well with urban life style and thereby, generate opportunity for employment for semi skilled workforce.

Contributors in Urban Horticulture and Role they can play-

A. Individual households:

i. Planting of trees, shrubs etc in compound of each and every house besides development of kitchen garden wherever there is a space rather than converting the open area in to concrete flooring.

ii. Creation of poly houses, Green houses, hydro phonics, aero-phonics etc on terraces to grow vegetables, medicinal plants, spices etc in a vertical fashion.

iii. Harvesting of rain water / roof water and recycling the same for developing and maintaining homestead gardens.

iv. Converting the day-to-day generated household solid waste into vermin-compost / compost by employing proper technology and reusing the same for home gardening.

B. Community based activities:

i. De-silting and reviving of available tanks within the city limits, planting number of trees all around the tank bunds, planting avenue trees or aesthetic trees etc to beautify the city shall be started, which will also helps in bring down the carbon di-oxide concentration.

ii. Creation of arboretums, green patches sacred gardens etc in a vacant places rather than converting them into concrete jungles shall be made mandatory and maintaining these garden areas shall be entrusted to local bodies.

C. Action for public / social organizations:

i. Each and every institution / organizations (schools, colleges, hospitals) etc should be provided with place for gardens and each student should be made to plant and maintain, a tree so that the campus become green with flowering / fruit species.

ii. Each and every hospital should have to maintain definite garden area with good number of flowering plants and herbs, ever green trees etc.

iii. In each city, there are temples and it should be made mandatory to plant important medicinal plants and religious trees like Bilwa, Shami, Ashawath, Terminalice etc., besides developing concept gardens in all the temple premises,

iv. Big malls are becoming more popular in major cities of the state and country and it should be made mandatory for these malls to maintain certain garden area with horticulture plants.

v. While laying new roads, circular ring roads etc. The central portion (which is left as divider) and also on both side of the roads should be planted with important horticulture / avenue species to beautify the area. While selecting trees for such purpose, the high carbon sequestering trees could be considered to reduce carbon dioxide concentration.

vi. Similarly, every city has long railway lines and on both sides of these lines, large number of obnoxious weeds / plants like Eupatorium, Parthenium Castor, Acasia etc., are widely grown. The corporation / Railway Department must raise a strip of trees along these railway lines for better utilization rather than allowing them for weeds growth.

D. Providing horticulture support for peri-urban areas:

i. The areas laying adjacent to urban areas which supply the day-to-day requirements like milk, vegetables, fruits to the urban dwellers. However there is no separate mechanism to support these peri-urban families. Hence it is suggested to provide them assistance for developing nursery of vegetables, flowering plants etc, to ensure regular supply of plants, vegetables, fruits, flowers *etc.*

ii. Most of these peri-urban people use sewage water for irrigation which is contaminated with toxic heavy metals. Hence it is imperative to provide them

good water for cultivation; otherwise there will be residual toxicity of heavy metals like cobalt, arsenic, iron, manganese etc. in these crops.

iii. The modern system of green house cultivation, protected cultivation, hydro-phonics etc shall be popularized through these peri-urban families with special financial assistance.

Supporting Activities / Programmes:

i. To support development of horticulture and other related activities a small organization of local people for every definite number of household could be organized in each city and shall be named as Environment Protection Club / Brigade and the responsibility shall be given to this body for overseeing the implementing and monitoring the programme.

ii. To provide seed / planting material; technical information; crop protection support etc, a garden service unit can be established with a good nursery and other required facilities for each extension area in the city. To provide technical know-how and also other support services, a consultancy team of trained personnel also could be made available in these cities as part of this service centre.

iii. In the recent past, the urban horticulture or environmental horticulture is emerging as an important activity for providing better living conditions. Better knowledge base about ornamental horticulture part of urban horticulture is available with private sector players who deal with golf courses, land escaping etc. On the other hand knowledge regarding edible horticulture is available with National Agriculture Research System. Therefore, there is a need to generate sufficient technical know-how and create awareness on do-how approaches as a supportive mechanism by joint effort of public and private sectors in PPP mode. Thus, the skilled man power with required know-how can be generated, besides developing and disseminating the required technologies / Knowledge. An expert landscape designers / landscape engineers may be thus made available to develop suitable landscape designs, selection of spices, development plant architecture etc to meet the requirement of urban households and public organizations. Similarly each city shall have an aesthetic garden, medicinal or herbal plant garden and concept vanas like 'Nakshtra Vana', 'Rashi Vana' 'Navagraha Vana', Secret gardens etc.

iv. Awareness and Education Programmes: Regular awareness programmes, short duration trainings, workshops, seminars etc could be organized for the benefit of the urban people to create enough awareness to keep their cities clean, safe and healthy through respective corporations.

v. Central Government or local governments could draw an exclusive taxation policy for the urban dwellers either in the form of tax exemption (holiday) to those who have created required facilities as suggested or additional taxes to those who have failed to create the facilities required for improving the environment of their houses, streets and finally the localities through horticulture and vegetation development. This programme will help to mitigate the problems of temperature increase, carbon dioxide concentration and also several other associated health hazards.

Pre-requisites to Urban Horticulture-

1. *Management of Waste Water and Solid Waste* – Urban horticulture will require recycling of water. Recycling of water for horticulture production shall make the recycling economically viable.

2. *Training and HRD*- Urban Horticulture is going to be high-skilled, high investment horticulture with higher economic rate of return. Therefore, there will be a need for special effort for skill development through suitable HRD programmes which may be run on self-financing mode.

3. *Community Participation*- The task of making urban horticulture a community based movement cannot be accomplished by individual or single organization. The joint efforts of the urban dwellers, peri-urban population, the local corporations or civic organizations, universities and colleges of agriculture / horticulture and other concerned organizations in respective areas need to work in coherence.

Recommendation for XIIth plan-

a. It is recommended to introduce curriculum of Urban Horticulture in Human Resource Development Programmes for making skilled man-power available for planning and execution of urban horticulture projects under regular projects of landscaping in urban areas.

b. Including water needs of farming in water planning for urban areas as in case of rural areas and take initiatives for water recycling

c. Making suitable changes in Building Control Rules

d. Introduce concept of linking urban horticulture with nutrition needs of population

e. Promote recycling of urban water by urban local bodies for use in urban horticulture initiatives.

f. Promoting urban horticulture in manner so as to address to the issue of nutrition security, employment generation, skill development and tackle the issue of toxicity caused by indiscriminate use of farm chemicals.

Chapter 13: Inclusive Growth and Risk Mitigation in Horticulture Sector

***Background*-** It is necessary to make schemes of horticulture development inclusive for weaker sections of Society and for people living in remote, backward, difficult and disturbed areas. Similarly, as the projects of horticulture development are capital intensive, may have long gestation period, income security during gestation period of the project and mitigation of risk against natural calamity or vagaries of nature and price fluctuation seem to be necessary.

Recommendations for Inclusion of weaker sections of Society-

Delinking Credit Requirement for Small & Marginal Farmers- Prior to launch of Mission Mode schemes of horticulture development, the ongoing central sector scheme was implemented by National Horticulture Board which mainly targeted at promoting hi-tech commercial horticulture projects. The assistance available under schemes of NHB is mainly in the form of credit-linked back-ended subsidy. Therefore, mostly the affluent section of producer farmers could reap the direct benefits of NHB schemes. However, due to formation of clusters of hi-tech commercial horticulture projects benefits of transfer of technology and Marketing Avenue has definitely reached small and marginal farmer-producers. On the other hand, mission mode schemes are not necessarily implemented in project mode, these schemes do not insist on projects to be credit linked and do provide assistance for single component of projects therefore; weaker section of the beneficiaries who cannot have access to bank credit may also get covered by mission mode schemes. Even the scale of financial assistance as percentage of project cost in respect of area development projects etc has been generally kept higher in Mission Mode Schemes. However, in absence of data regarding socio-economic profile of beneficiaries of Mission Mode Schemes seems it is difficult to draw any conclusion regarding the extent of inclusion of disadvantaged groups. In order to ensure benefits of schemes of horticulture development to small and marginal farmers, it is proposed that during XIIth plan period area expansion projects up to 2 Ha of land in open field and 1000SQ M in protected cultivation may continue to be assisted at present scale of assistance without insisting on credit link for the project. In addition, the Working Group recommends that the small & marginal farmers may be given benefit of supply of seeds & planting materials of vegetable crops on pattern of *kitchen garden / nutrition garden scheme* being promoted in various States.

Inclusion of existing orchards for enhancement of productivity and quality of fruits through development of critical infrastructure - as per present practice, only the new projects of area expansion are assisted for development of critical infrastructures such as crop protection, development of irrigation source, farm machinery etc. The Working Group

recognises the fact that for the sustained growth of horticulture sector it is imperative to promote investment in critical infrastructure in existing orchards. Therefore, it has been proposed to extend assistance for components required for enhancement of productivity and quality of produce in existing orchard.

Inclusion of producers of seasonal crops like vegetables- at present, capital investment in infrastructure for open-field cultivation of short duration is not assisted under any of the schemes of horticulture crops. However, capital investment for crop protection, land development, irrigation and micro-irrigation infrastructure, PHM infrastructure, farm mechanisation, marketing and transport related infrastructure etc may be necessary for increasing productivity of seasonal crop grown in open field conditions. With this in view, it is proposed that capital investment in production, PHM, Farm Mechanisation, cold chain etc for such crops too may be assisted during XIIth plan period.

Continuation of ongoing schemes for NE and Hilly States- Keeping in view special needs of NE and hilly States, the scheme components of ongoing HMNEHA are proposed to be continued during XIIth plan with 100% central assistance, though under banner of Integrated National Horticulture Development Programme.

Hilly areas, Scheduled Area and tribal sub-plan districts- It has been proposed to continue higher level of assistance available for projects in hilly and scheduled areas available under ongoing schemes. Keeping in view the fact that districts under tribal sub-plan too need special assistance it has been proposed that the projects situated in tribal sub-plan areas may be extended the same scale of assistance as those available for projects in hilly and scheduled areas.

Remote areas of Andaman & Nicobar Islands, Lakshadweep etc- The Working Group has also considered the viability gap for projects situated in *Andaman* & Nicobar Islands, Lakshadweep. Therefore, it has been proposed to extend assistance for A & N Islands and Lakshadweep Island on line with hilly States.

Corporate Farming- model of corporate farming is frequently advocated for production of fruits & vegetables with justification of better resource management in production system and mobilising investment in development of efficient supply chain and value addition. However, case study of tea estates owned and managed by corporate sector does not support the presumption that the corporate sector manages the natural resources better and invests in modernisation and applied R & D for development of the entire production and value addition system. The prevailing state of re-plantation and modernization of processing units in tea-estates owned and managed by corporate sectors is far from being satisfactory. On the other hand, the counter view that the introduction of corporate farming will not only dispossess the poor land holders from their farm land but may result into indiscriminate exploitation of natural resources cannot be out rightly dismissed. The

Working Group has, therefore, not recommended land-leasing in favour of corporate - farming.

Schemes relating to protection of producer farmers against abrupt Price Fluctuation- Marketing Division of DAC implements a scheme of market Intervention for certain horticulture crops which protects producer farmers against sudden dipping gown of price or over production reflected by sudden excessive arrivals in the markets. It is felt that existing scheme may suffice and there is, therefore, no need to propose any additional intervention on this count.

Schemes Relating to Risk Mitigation against nature's vagaries- Horticulture related schemes are capital intensive and therefore, need to be provided with insurance cover. During XIth plan period, Coconut Palm Insurance Scheme (CPIS) is being implemented by Coconut Development Board (CDB). Similarly, The Tea Board of India is implementing a Weather (Rainfall) Insurance Scheme for tea growers during the 11th Plan. Keeping in success of weather based crop insurance schemes for plantation crops the working group has proposed to extend the scheme to several other plantation crops in clusters. On consultation with concerned it has come to the notice of the Working Group that introduction of weather-based crop insurance scheme may require setting up and maintenance of large number of weather stations in production clusters which may be physically maintained by State Directorates of agriculture / horticulture and automatically flowing data may be compiled and published by local centres of Indian Metrological Department. It is learnt that each such weather station may involve capital cost of Rs. 6 to7 lakh provided the land for setting up weather stations is made available by State Government of local bodies. Thus, a reliable weather data base can be created for implementation of weather-based crop insurance scheme. As the Marketing Division of DAC is implementing the schemes of crop insurance including Weather-Based Crop Insurance, no separate budget provision has been asked for the said scheme per se. However, after ascertaining that no other source of fund is available for meeting capital expenditure requirements for setting up additional number of automatic weather stations in production clusters of horticulture crops the Working Group has proposed budgetary provision for setting up automatic weather stations in large number during XIIth plan.

Thus the Working Group recommends following steps to be taken during XIIth Plan Period for crop insurance scheme-

i. Introduction of Regular Scheme of Crop Insurance on line with Modified Agriculture Insurance Scheme (MAIS) and Weather Based Crop Insurance Scheme (WBCIS) by the concerned Division of DAC. However, this may be done on pilot basis.

ii. Orchards of other perennial crops like Mangoes, Dates, Apples etc may be covered by Insurance scheme on line with Coconut Palm Insurance Scheme CPIS), or Weather Insurance Schemes for Tea and Coffee.

iii. For facilitating operationalisation of Weather-Based Crop Insurance Scheme, It is proposed to set up weather stations and weather based crop insurance scheme during XIIth Plan Period. The weather stations may be set up with responsibility on respective State Governments to provide land for the same and maintenance. Metrological Department may maintain weather data collected by them which can be used for implantation of Weather based insurance scheme.

iv. For successful introduction of weather-based crop insurance scheme for crops like mangoes, Dates, apples etc, it is necessary that ICAR scientists develop scientific protocol for loss assessment on the basis of weather data like temperature, humidity, wind speed, rain fall etc.

v. Hi-tech, capital intensive infrastructure like poly-houses, net houses etc may be covered by a suitable Insurance Scheme for which cost of premium may be shared between beneficiary, State and Central Govt on the ratio of MAIS or WBCIS.

A budgetary provision of Rs. 250 crores may be provided for setting automatic weather stations.

CHAPTER 14: SCHEMES OF DAC FOR HORTICULTURE DEVELOPMENT

Role of Central Government in Horticulture Development- As per arrangement under the Constitution of India, agricultural / horticulture development is a state subject. It may be noticed that State Governments have been spending about 5% -15% of annual RKVY grants for horticulture development during the XIth Plan Period; in addition, they do maintaining establishment of staff in department of horticulture using plan / non plan grants. In comparison, Central Government has been making sizable plan grants available to the States under various centrally sponsored schemes of Horticulture Development. In addition, central organizations like NHB, CDB and Directorate of Cashew nut & Cocoa Development and Directorate of Areca nut & Spices Development too spend central grants for development of their mandate-horticulture crops within territories of States and UTs. The schemes of DAC for horticulture development may be listed as below.

Overview of Schemes of Horticulture Division of DAC- Horticulture Division of DAC has following Schemes for Horticulture Development-

A. **Mission Mode Plan Schemes (Centrally Sponsored Schemes / Central Sector Scheme)**

a) Horticulture Mission for North East and Himalayan States (HMNEH)- Central Sector Scheme

b) National Horticulture Mission (NHM)- Centrally Sponsored Scheme

c) National Mission on Micro Irrigation (NMMI)- Centrally Sponsored Scheme

d) National Bamboo Mission (NBM)- Centrally Sponsored Scheme

B. Plan Schemes of Autonomous Bodies (Central Sector Schemes)

a. National Horticulture Board (NHB)

b. Coconut Development Board (CDB)

C. Non Plan Schemes of Crop Directorates

a. Directorate of Cashew nut & Cocoa Development (DCCD)

b. Directorate of Areca nut & Spices Development (SASD)

D. Organizations Created on ad hoc basis within DAC without own budgetary provisions-

a. National Bee Board (NBB)

b. National Committee on Plasticulture Applications in Horticulture (NCPAH)

Table 14.1
Budgetary Releases during XIth Plan Period
(Amount in Rs. crores)

Year	NHM	NMMI	HM-NEHA	NBM	NHB	CDB	total
2007-08	917.33	411.25	321.76	114.39	122.47	52.46	1939.66
2008-09	1010.5	470	291.4	84.66	124	66.28	2046.84
2009-10	800	480	325.72	50.89	145	75.4	1877.01
2010-11	970.86	997.25	399.98	89.66	151.83	88.24	2697.82
2011-12(allocation)	1200	1150	500	100	150	86	3186
Total	4898.69	3508.5	1838.86	439.6	693.3	368.38	11747.33

Funding Pattern in Centrally Sponsored Schemes-

Table 14.2

S. No.	Scheme	Funding Pattern (Centre : State)	Implementing Agency
1	**NHM**	85:15	State Mission Directorates and National Level Agencies
2	**NMMI**	90:10 for small & Marginal farmers	State Directorates of Horticulture
		80:20 for farmers of other category	

Area of Coverage of Mission Mode Schemes, Scheme Components and Mission Directorates-

1. **Horticulture Mission for NE and Hilly Areas**-

i. *Coverage*- North Eastern Region and the States of Himachal Pradesh, Jammu & Kashmir and Uttaranchal the horticulture roughly have share of 2.5% in horticulture production and 27.2% area in the country. Accordingly, to stimulate horticulture led transformation in the region; a Centrally Sponsored Scheme on Technology Mission for Integrated Development of Horticulture in North Eastern region including Sikkim was launched during the Ninth Five Year (2001-02) Plan period in the eight NE States and thereafter extended to the States of J&K, Himachal Pradesh and Uttaranchal during 2003-04. The Scheme was revised as Horticulture Mission for North East and Himalayan States (HMNEH) during the Eleventh Plan, effective from 2010-11.

ii. *Scheme Components*- the HMNEH comprises of four Mini Missions for addressing all the aspects of Horticulture development with an end-to-end approach. Mini Mission-I, involving research, is implemented by the Indian Council of Agricultural Research (ICAR). Mini Mission-II, covering production and productivity improvement activities, is implemented by the Agriculture/Horticulture Departments of the States. Mini Mission-III of HMNEH has two sub components; subcomponent of post harvest management is implemented by the National Horticulture Board (NHB) and the other subcomponent f Marketing & exports is

implanted by concerned State Government. Mini Mission-IV involving processing is implemented by SFAC in close through the Ministry of Food Processing Industries (MFPI).

iii. *Mission Directorate*- Horticulture Commissioner, DAC is ex-officio Mission Director who mainly deals with annual action plan of States, release of fund and general review of the scheme implementation. SFAC provides administrative support to the Mission Director for making release of grants to implementing agencies, carrying out technical inspection of the projects, collection and scrutiny of utilisation certificates for the grants released and compilation and printing of Annual Report of the scheme. SFAC also provides administrative and secretarial support to the Mission Director. State level small Farmers Agri Business Consortiums (SFACs) constituted in most of the implementing States, carry out implementation of the programme at the grass root level.

iv. *Programme Monitoring Functions*- HMNEH has ad hoc organisational structure for its Mission Directorate. As such, Mission Directorates function of programme monitoring and control has either been left to implementing agencies itself as is the case with Mini Mission - I and PHM component of Mini Mission –III; or has for all practical purposes, been delegated to SFAC which has not been quipped to discharge the responsibility.

v. *Central Assistance under HMNEH* – HMNEH being a Central Sector Scheme, it provides 100% central assistance to the States covered under the programme. During the XI Plan a sum of Rs.1338.86 crore was released to the States till 2010-11 and the allocation for 2011-12 is Rs.500.00 crore *(Table 14.3)*:

Table 14.3
Details of Release under HMNEH Scheme

Year	Amount (Rs. in crore)
2007-08	321.76
2008-09	291.40
2009-10	325.72
2010-11	399.98
2011-12 (Allocation)	500.00
Total	**1838.86**

B. Centrally Sponsored Scheme on National Horticulture Mission

i. Coverage- The National Horticulture Mission (NHM) was initially launched during the year 2005-06 for 259 districts in 18 States however, its operation has now been extended to 373 districts in 18 States and 3 UTs with the objective to promote holistic growth of the horticulture sector in all the mainland States & UTs by adopting an end to end cluster approach duly ensuring backward and forward

linkages. With effect from the XI Plan, the pattern of assistance to the State Governments through Central Government under the Scheme is 85:15 i.e. 15% contribution to the programme is from the State. An amount of Rs.3698.69 crore was released till 2010-11 and the allocation for 2011-12 is Rs.1200.00 crore. The details of amount released to the SHM are given in **Table 14.4**.

Table 14.4
Details of funds released under NHM

Year	Release (Rs. in crore)
2007-08	917.33
2008-09	1010.50
2009-10	800.00
2010-11	970.86
2011-12 (Allocation)	1200.00
Total	**4898.69**

ii. *Mission Directorate of NHM*: - A Joint Secretary rank officer if horticulture division has been designated as Mission Director (NHM). Like HMNEH, the scheme of NHM too has ad hoc organisation as Mission Directorate which is manned by a few regular staff from horticulture division and a battery of outsourced experts majority of which are retired personnel from ICAR or organizations under DAC. Technology Support Group and administrative support to the Mission Directorate is provided by NHB. A few National Level Agencies have been listed who are entrusted with responsibility of implementation of some of the scheme components selected from time to time.

iii. *Overall Direction and Control at Centre*- For overseeing the implementation of the Mission a three tier structure has been set up. At the National level, there is a General Council (GC) and an Executive Committee (EC). While the GC under the Chairmanship of Agriculture Minister provides overall direction to the Mission, the Executive Committee (EC) headed by the Secretary (Agriculture & Cooperation) oversees the activities of the Mission and approves the Annual Action Plans (AAPs) of the States and National level organizations.

iv. *State Level Organizational set up*- At State level, scheme of NHM is implemented through State Horticulture Mission which is headed by an officer of the rank of State Director of Horticulture/ agriculture. In some States, a separate Mission Director is also appointed who functions with the help of State Director of Horticulture only. An Executive Committee under the Chairmanship of the Agricultural Production Commissioner, or Secretary Horticulture/Agriculture oversees the implementation of the programmes. At the District level, the District Mission Committee (DMC) under the Chairmanship of Chief Executive Officer (CEO) of Zila Parishad / CEO of District Rural Development Agency (DRDA) is responsible for plan formulation and monitoring.

C. National Mission on Micro Irrigation

i. *Coverage*- Based on the recommendations of the Task Force on Micro Irrigation, a Centrally Sponsored Scheme on Micro Irrigation was launched during the year 2005-06 for promoting efficient methods of irrigation like drip and sprinkler irrigation. The Scheme has since been modified as National Mission on Micro Irrigation (NMMI) during the Eleventh Plan, with effect from 2010-11. The Mission envisages 40% subsidy for general farmers and 50% subsidy for small and marginal farmers. The pattern of assistance to the State Government is 90:10 in the case of Small & marginal farmers and 80:20 in the case of other category farmers. The small and marginal farmers are eligible for a subsidy of 60% of the cost while other category farmers are eligible for a subsidy of 50% of the cost of the micro irrigation system. However, there is flexibility to States to enhance State contribution in the scheme.

ii. *Mission Directorate*- JS (NHM) in Horticulture Division is Mission Director for the scheme and the scheme is implemented through State Governments.

iii. *Budgetary Outlays during XIth Plan Period*- An amount of Rs.2358.50 crore was released till 2010-11 and the allocation for 2011-12 is Rs.1150.00 crore. The year wise details of amount released to the States are given in **Table 14.5**.

Table 14.5
Details of funds released under NMMI

Year	Release (Rs. in crore)
2007-08	411.25
2008-09	470.00
2009-10	480.00
2010-11	997.25
2011-12 (Allocation)	1150.00
Total	**3508.50**

D. National Bamboo Mission

i. *Coverage*- With a view to harness the potential of bamboo crop in the country the Ministry of Agriculture launched a Centrally Sponsored Scheme on National Bamboo Mission (NBM) during 2006-07 to be implemented in 27 States in the country. Horticulture Commissioner in DAC is Mission Director for the NBM. Main focus is on the North Eastern States, where bamboo is found extensively.

ii. *Mission Directorate*- In case of NBM the Horticulture Commissioner in Horticulture Division is designated as Mission Director and functions through administrative support of NHB and technical support from a battery of outsourced technical personnel who are retired Govt officers / ICAR Scientists.

iii. *Budgetary Provision during XIth Plan Period*- An amount of Rs. 339.6 crore was released to the States till 2010-11. The outlay earmarked for the Scheme during 2011-12 is Rs. 100.00 crore. The year wise details of funds released to the States are given in **Table 14.6**.

Table 14.6
Details of fund released under NBM

Year	Release (Rs. in crore)
2007-08	114.39
2008-09	84.66
2009-10	50.89
2010-11	89.66
2011-12 (allocation)	100.00
Total	**439.60**

Organizations Created on ad hoc basis within DAC

a. **National Committee on Plasticulture Applications in Horticulture-** The National Committee Plasticulture Application in Horticulture (NCPAH) has been functioning in the Ministry of Agriculture since 1993 to promote use of plasticulture and precision farming technologies. NCPAH, besides overseeing the implementation of NMMI, is coordinating the programmes of 22 Precision Farming Development Centres (PFDC), which have been established in major State Agricultural Universities and ICAR Institutes in the country. The NCPAH is also functioning as a NLA under NHM for promoting R & D on precision farming through the PFDCs. *There is no budgetary provision for NCPAH by the DAC.* However, it receives contingency funds for monitoring the PFDC and NMMI programmes. During the period 2007-08 to 2010-11, funds to the tune of Rs. 18.70 Crore was released to NCPAH under NHM for PFDCs.

b. **National Bee Board -**The National Bee Board (NBB) is a Public Private Partnership (PPP) initiative in which the Board, a Registered Society has been functioning under the Chairmanship of Secretary (A&C) since the year 2000 for taking up programmes relating to the beekeeping sector. *Formation of NBB is yet to get Government of India's approval therefore; it does not have its budgetary provision and a duly approved staffing pattern.* The NBB is presently functioning on the basis of staff drafted from other wings of DAC and sources of fund for its activities under the scheme of NHM, which is taking up various promotional and HRD activities for promoting cross pollination of crops for enhancing crop productivity. During the period 2007-08 to 2010-11, funds to the tune of Rs. 3.21 Crore was released to NBB under NHM.

Scheme of Autonomous Organisations (Central Sector Schemes)

A. National Horticulture Board

i. *Formation of NHB*- The National Horticulture Board (NHB) was set up in 1984 as an autonomous society under the Societies Registration Act, 1860 with a mandate to promote integrated development of horticulture, to help in coordinating, stimulating and sustaining the production and processing of fruits and vegetables and to establish a sound infrastructure in the field of production, processing and marketing with a focus on post-harvest management to reduce losses.

ii. *Schemes of NHB*- The Board's Schemes being implemented during the Eleventh Plan include the following:

a. Credit linked back ended capital investment subsidy scheme for construction/expansion/ modernisation of cold storages and storages for horticulture produce.

b. Credit linked back ended subsidy under development of commercial horticulture through production and post-harvest management.

c. Technology development and transfer for promotion of horticulture.

d. Market information service for horticultural crops.

e. Horticulture promotion service.

iii. *Organisation of NHB*- NHB has a network of 33 regional offices and market information centres located in almost all the States in the country with exception that in NE region it has its offices in Guwahaty and Gangtok only. The initiative of the Board has helped in developing infrastructure for horticultural development. The Board has been instrumental in bring out the Standards for cold storages. The Board is also working towards operationalisation of National Cold Chain Development Center (NCCDC) promoted by it and operationalisation of F &V dedicated transport system jointly with the Container Corporation (CONCOR).

iv. *Budgetary Outlay*- An outlay of Rs. 632.00 crore was provided for NHB Schemes during XI Plan. Outlay for 2011-12 is Rs. 150.00 crore. The year wise details of funds released to NHB are given in **Table 14.7**.

Table 14.7
Details of fund released under NHB

Year	Expenditure (Rs. in crore)
2007-08	122.47
2008-09	124.00
2009-10	145.00
2010-11	151.83
2011-12 (allocation)	150.00
Total	**693.30**

v. *Restructuring of NHB Schemes during XIth Plan* – Schemes of NHB have been continued during XIth Plan Period with restructuring which has following salient features-

a. *Removal of Scheme Overlaps with Mission Mode scheme of NHM and HMNEH*- As per this decision, NHB shall undertake projects of area expansion in open field for projects having project area more than 10 acres and in protected condition only if the project area is more than 1000 SQ M. Thus there remain no overlap with Mission Mode Schemes in area expansion Programmes. Even for Cold storages, fruit ripening chambers are on higher technical specifications than those in Mission mode schemes.

b. *Synergies with Mission Mode Schemes*- this has been achieved by introduction of following two sub components in scheme of NHB.

I. Mother Plant Nurseries

II. Accreditation & Rating of Horticulture Nurseries

c. *Horticulture Parks / Common Facility Centres*- This is a new scheme component which permits undertaking Common Facilities like CFC at sea- ports, air ports, Inland ports, Inland Container Deports etc and introduction of specialized rail for horticulture produce.

d. *Market Intelligence*- this newly component may help farmers get not only market information but market intelligence too.

e. *National Centre for Cold Chain Development (NCCD)* – NCCD has been set up by NHB in association with other stake-holders. This is going to promote quality regime in cold chain infrastructure and meet HRD needs of the sector.

B. Coconut Development Board- Coconut-

i. *Formation of CDB*- Development Board (CDB) was established in the year 1981 as a statutory body under the Coconut Development Board Act, 1979 enacted by the Parliament, for the integrated development of coconut production and utilization in the country with focus on productivity increase and product diversification. with its Headquarters at Kochi in Kerala has three Regional Offices and six State Centres Besides, the Board has established 9 Demonstration cum Seed Production (DSP) Farms in different locations of the country. A Market Development cum Information Centre has established in Delhi. The Board has also set up a Technology Development Centre at Vazhakulam near Aluva in Kerala.

ii. *A scheme of CDB- the CDB is* implementing various programmes including Technology Mission on Coconut for the holistic development of the coconut industry. The schemes are relating to

a. Production and Distribution of Planting Material – subsidy & 25% of seedling limited to Rs. 2 lakh per nursery

b. Expansion of area under Coconut- assistance @ Rs. 8000 per Ha.

c. Integrated Farming for Productivity Improvement- financial assistance @ Rs. 35000/ Ha for cluster based production of 25030 Ha;

d. Technology Demonstration;

e. Market Promotion and Statistics including assistance @ 25% of capital cost of modern processing unit limiting to Rs. 10000 per project;

f. Information and Information Technology which includes extension material, conducting seminars / workshops, participation in fairs & exhibitions etc;

g. Human Resource Development;

h. Technology Mission on Coconut- financial assistance @ 25% of capital cost limiting to Rs. 50 lakh for coconut processing unit or its modernisation and @ 50% limiting to Rs 10 lakh for individuals and Rs. 25 lakhs for cooperative Societies for product promotion, participation in exhibitions, introduction of new packaging etc

i. Rejuvenation and replanting of senile coconut orchards in 3 districts of Kerala and Andaman & Nicobar Islands on pilot basis in which financial assistance @ Rs. 13000 / Ha for cutting and removal of senile / diseased palm and Rs. 20 per seedling for re-plantation; in alternative @ Rs. 15000 for rejuvenation of coconut farm in two years by good management practice

j. Palm Insurance Scheme- covers risks against natural calamities, pest and disease attack of wide spread nature causing irreparable, severe drought and consequential total loss.

Budgetary Outlay during XIth Plan Period- During 2007-08 to 2010-11, an amount of Rs 282.38 crore was released to CDB and an allocation of Rs 86 crore has been made during 2011-12. The year wise details of funds released to CDB are given in **Table 14.8**

Table 14.8
Details of fund released under CDB

Year	Release (Rs. in crore)
2007-08	52.46
2008-09	66.28
2009-10	75.40
2010-11	88.24
2011-12 (allocation)	86.00
Total	**368.38**

Non Plan Schemes of Two Directorates under Horticulture Division of DAC-

A. Directorate of Cashew nut & Cocoa Development- the Directorate of Cashew & Cocoa Development (DCCD) was established in 1966 stationed at Kochi (Kerala) as a subordinate office of the Ministry of Agriculture. The primary objective of the Directorate is development of cashew nut in the country. Responsibility of development of cocoa was transferred to this Directorate during 1998. This Directorate has been responsible for formulation and coordination of schemes /programmes for development of the mandated commodities in the country. The Directorate conducts comprehensive studies on various aspects of cashew nut & cocoa development including production, marketing, prices and other related problems. It has been instrumental in dissemination of technical information and research findings of practical value through technical bulletins/leaflets. The establishment of this Directorate has helped in promotion of cashew & cocoa development by adoption of improved technology for production and making available quality planting material. Presently, the Directorate is functioning as a National Level Agency (NLA) under the NHM for implementing the programmes relating to cashew and cocoa development through the State Agricultural Universities and Cashew Development Corporations of different States. During the period 2007-08 to 2010-11, funds to the tune of Rs. 27.41 crore were released to DCCD under NHM.

B. Directorate of Areca nut & Spices Development

The Directorate of Areca nut & Spices Development (DASD) was also established in 1966 stationed at Calicut, Kerala as a subordinate office of the Ministry of Agriculture It has the mandate to formulate appropriate development schemes on spices, medicinal & aromatic plants and areca nut at the national level. These schemes are implemented through State Governments, Agricultural Universities, ICAR Institutes as well as through Regional Research Laboratories under CSIR and monitored by the Directorate. This Directorate also collects, compiles and publishes data on area, production, price trends, export and import of areca nut and spices in addition to keeping liaison with research and development agencies both at the State and Central levels. DASD is presently involved as a NLA under NHM for the development of spices and aromatic plants. During the period 2007-08 to 2010-11, funds to the tune of Rs. 20.36 crore were released to DASD under NHM.

C. Central Institute of Horticulture Development, Nagaland- Recognizing the importance of institutional support for development of horticulture in NE Region,

Government of India sanctioned a Central Sector Scheme for setting up of Central Institute of Horticulture in Nagaland in the year 2006. The Institute is set up for the holistic development of horticulture sectors of the NER, initially with a financial outlay Rs.20 crores. The institute was inaugurated by Shri Sharad Pawar, Hon'ble union minister of Agriculture, Govt. of India on 27th March 2006. The Institute is established at Medziphema, Nagaland in an area of 43.50 ha, which is situated at 35 kms from Dimapur and 45 kms from Kohima city on National Highway 39. It has an elevation ranging from 250 to 300 metres having temperature between 12 to 35 degree centigrade and average rainfall of 2500 mm. The area has low hilly terrain with good soil suitable for growing most of the sub tropical horticultural crops. The objectives and the identified programmes of the Institute are as follows:

Objectives of the Institute

- Capacity building / training of trainers & farmers/ beneficiaries
- Transfer, Assessment and Refinement of Technologies through demonstrations and field trials.
- Follow-on extension support in the field of horticulture.
- Promotion of organic cultivation of horticultural crops.
- Establishing convergence and synergy among programmes in the field of horticulture
- Monitoring of Centrally Sponsored Programmes in the area of Horticulture.

Programmes of the Institute

a. Training of Trainers
b. Farmers Training
c. Refinement & demonstration of improved technologies
d. Production and Supply of Quality Planting Materials
e. Promotion of Organic Farming
f. Post harvest Management, Marketing and Agribusiness Promotion
g. Monitoring of the activities under TMNE and other Centrally Sponsored Schemes in the region.
h. Coordination with other Departments, Organizations and Institutes

Management & Man Power

The Institute is headed by the Director and it has Board of Management and a Technical Advisory Committee for policy decisions and technical supervision. The Institute also has provision for having consultancy services .The Institution has 17

sanction posts (list enclosed for reference) to be recruited on deputation , out of which only the Director is on deputation and the rest are on contractual basis . The office as well as the farm is managed through outsourced labours.

Horticulture Development under Rashtriya Krishi Vikas Yojana (RKVY)

Convergence of NHM, NMMI with horticulture development plan prepared under RKVY has been highly desirable. Comprehensive District Agriculture Plan is prepared by States for overall development of agriculture and allied sector which includes horticulture sector. Though it may be noticed from the figures given in Table 12.9 that the State Governments are utilising a part of grants under RKVY Scheme to supplement horticulture related activities, however, it is also noticed that most of the States are utilising RKVY fund for following three purposes-

i. Taking up horticulture development programmes in non NHM districts on pattern of NHM

ii. Providing top-up subsidy over and above subsidy admissible under scheme of NHM and NMMI etc.

iii. Taking up infrastructure related projects developed as per local needs at the District level, which most of the time do not figure in perspective plan for the development of horticulture in the State.

Table 14.9

Details of Fund allocation under RKVY Scheme during year 2007-08

(Rs in crore)

Sl. N	SECTOR	2007-08	2008-09	2009-10	2010-11	Total	% share
1	AGRICULTURE MECHANISATION	57.13	486.83	218.98	609.70	1372.64	7.0
2	ANIMAL HUSBANDRY	79.73	833.76	471.70	861.53	2246.72	11.4
3	COOPERATIVES/COOPERATION		27.22	33.55	137.36	198.13	1.0
4	CROP DEVELOPMENT	48.10	90.15	137.43	2109.73	2385.41	12.1
5	DAIRY DEVELOPMENT	25.60	222.22	172.83	153.13	573.78	2.9
6	EXTENSION	51.51	137.99	116.28	469.47	775.25	3.9
7	FERTILISERS AND INM	30.12	140.64	484.69	284.83	940.29	4.8
8	FISHERIES	32.80	175.74	95.85	272.37	576.76	2.9
9	**HORTICULTURE**	**71.29**	**303.72**	**176.81**	**638.04**	**1189.86**	**6.0**
10	INFORMATION TECHNOLOGY	5.32	18.76	1.00	8.51	33.59	0.2
11	INNOVATIVE PROGRAMMES / OTHERS	96.15	554.78	208.22	431.77	1290.92	6.5
12	INTEGRATED PEST MANAGEMENT	11.49	55.21	21.51	96.72	184.94	0.9
13	MARKETING AND POST HARVEST MANAGEMENT	116.54	207.60	147.02	473.19	944.36	4.8
14	**MICRO/MINOR IRRIGATION**	**211.26**	**1192.70**	**235.37**	**1452.65**	**3091.97**	**15.7**
15	NATURAL RESOURCE MANAGEMENT	123.49	179.17	311.08	324.36	938.09	4.8
16	NON FARM ACTIVITIES	6.13	13.54	30.82	72.80	123.29	0.6
17	ORGANIC FARMING / BIO FERTILISER	22.06	113.43	140.63	168.19	444.32	2.3
18	RESEARCH(AGRI/HORTI/ANIMAL HUSBANDRY etc)	50.07	99.68	99.14	152.35	401.24	2.0
19	SEED	120.88	533.62	561.75	730.63	1946.89	9.9
20	SERICULTURE	0.52	16.34	12.04	27.69	56.58	0.3
	TOTAL	**1160.19**	**5403.12**	**3676.71**	**9475.01**	**19715.02**	**100.0**

Out of 20 sectors, funds to the tune of 6% of the total allocation are flowing for horticulture development programmes under RKVY and 15.7% for Micro / Minor irrigation. Thus, it can be inferred that proper convergence of NHM, NMMI and RKVY is still not in place.

National Vegetable Initiative

A new programme on Vegetable Initiative for Urban Clusters (VIUC) was launched during year 2011-12 with an outlay of Rs.300.00 crore, within the overall aegis of RKVY. The Scheme is being implemented in urban clusters having a population of one million and above covering 29 States, except seven States in the North East (Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura) and Goa, in which case urban clusters of less than one million ha are included. The Scheme covers various aspects relating to formation of farmers' association/groups, training/capacity building of farmers, linking farmers group with aggregators/markets, vegetable production and supply to urban centers starting from planting material to marketing to retail level. Funds for implementation of scheme are channelized through RKVY. The existing cost norms and pattern of assistance for individual components under the National Horticulture Mission (NHM)/ Horticulture Mission in North East and Himalayan States (HNNEH) have generally been adopted.

State Governments' Contributions-

i. **Organisation of Horticulture Department / Mission Directorates / State SFAcs**- Most of the State Governments have been taking initiatives on their own for capitalizing the potential for horticulture. State of Maharashtra had introduced a scheme of horticulture through Employment Guarantee Scheme (EGS) which has perhaps been the basis of area expansion programme under NHM and TMNE-HA. Similarly, State of AP took lead in promotion of micro-irrigation. By now, almost all the States, except Assam, Bihar, Chhattisgarh, Goa and Kerala have established a separate Horticulture Department to oversee development of horticulture in the State. Besides, all the States Governments covered under the NHM Scheme have created a separate State Horticulture Mission Society, Registered under the Societies Registration Act. Similarly, States under HM-NEH have set up State SFAC or State Nodal Agency for implementation of HMNEH.

ii. State Plan Allocations for Horticulture- the Planning Commission approves allocations as per the State Plans, which includes programmes on horticulture development. Summary details of the Allocations approved for the horticulture sector during the period 2007-08 to 2010-11 are given in Table: 14.10.

Table 14.10
Details of Allocations for Horticulture under State Plans

Year	Release (Rs. in crore)
2007-08	394.20
2008-09	638.81
2009-10	941.57
2010-11	1270.04
Total	**3244.62**

Between 2007-08 and 2010-11, there has been significant improvement in the allocation for horticulture development in the State Plan, which has increased by about 222%. During 2010-12, substantial allocation over 100.00 crore has been made by the States of Andhra Pradesh, Karnataka, Madhya Pradesh and Maharashtra.

Critical Analysis of the Schemes of Horticulture Development-

The Working Group observes with serious concern that new schemes in Mission Mode or otherwise are launched without taking comprehensive view with similar ongoing schemes. Most of the new schemes deal with one or another component in a horticulture project making project-mode implementation extremely difficult. Thereafter, as an afterthought, issue of overlap among schemes is taken up and the process of taking corrective measure begins.

Comparison between scheme components of NHM and HM-NEH are at ***Appendix-14.1***. R & D outcome of Mini Mission I is given at **Annexure-3**. It may be inferred from perusal of the two appendixes /annexure and above analysis that following aspects of horticulture development schemes of DAC need immediate attention-

i. There are too many concurrent programmes including mission mode programmes which result into confusion, delay, disintegration of integrated projects and loss of convergence of schemes. For example integrating benefits of NMMI and NHB schemes requires a complicated procedure.

ii. Multiple programmes for horticulture development appear to be competing with each other in increasing financial assistance for projects in order to spend available grants.

iii. Scheme components dealing with increase in productivity of existing orchards and quality of produce in project mode is almost absent in all the ongoing schemes.

iv. There has been absence of any scheme promoting capital investment in essential infrastructure like irrigation, fencing, land development, PHM infrastructures, farm machineries etc in open field seasonal crops like vegetables.

v. Crops like spices, aromatic & medicinal plants, coconut do not get full coverage under schemes of respective Commodity Boards which is otherwise available under schemes of Horticulture Division of DAC.

vi. Status of preparation of Base-line Survey is far from satisfactory and most of the time the same is elusive. Similarly, scheme of NHM and HMNEHA do not get converged well with C-DAP prepared under RKVY.

vii. Major chunk of grants under Mission mode schemes is getting spent on area expansion programmes is not fully backed by availability of quality seed and planting materials.

viii. Area expansion projects under Mission Mode schemes are in component mode and not in project mode which results into disintegrated support to a project.

ix. Mission Mode Schemes launched have incorporated most of the components of other ongoing schemes but with higher cost norm and subsidy norms resulting in overlapping and duplication of schemes,

x. Implementing agency assuming *input purchase functions* resulting into wastage of scarce manpower and loss of quality of programme implementation such as avoidable increase in cost and subsidy norms and resorting to top up subsidy as a substitute to credit link for project funding, area expansion without ensuring availability of quality planting materials and programme implementation in input supply mode rather than project mode.

xi. Schemes of NHB and CDB too have concentrated more on capital investment in production system and PHM infrastructures and less on Development & Transfer of Technology.

xii. Area expansion programmes in Mission mode schemes are not backed by demand driven production strategy,

xiii. Ad hoc organisation of Mission Directorates resulting into loss of quality of programme implementation, programme monitoring and financial control.

xiv. Ad hoc organisation of *Technical Support Group* for Mission Mode Programmes results in to lack of technology input of higher order. Even programmes under Horticulture Mission for NE and Hilly Areas are expected to get technical support / supervision from non- technical staff of SFAC.

xv. Merging of function of JS (Hort) and Horticulture Commissioner with Mission Directors in Mission Mode schemes in not a fair arrangement as it has ingrained into it role conflict in respect of programme evaluation and monitoring and fair deal to other ongoing schemes of horticulture development.

xvi. Last but not the least, the flow of fund to State Mission Directors directly may have serious implications in terms of loss of financial control of respective State Governments. In case, the present practice is considered to be inevitable for the purpose of flow of fund to implementing agency them consolidated Annual Account of Mission Mode Programmes may be prepared at Central Mission Directorate and the same should be audited by GAG.

Recommendations for 12th Plan –

Regarding Restructuring of Centrals Schemes-

a. Integration of schemes is the first and foremost requirement for maximizing benefits to any beneficiary. Therefore, proposed convergence of central schemes of horticulture development; namely, schemes of NHB, NHM, HMNH, NMM, CDBI and NBM and the same may be named as "*Integrated National Horticulture Programme*" under which different cost norm and subsidy norms for hilly and scheduled areas and States in NE region of the Country may continue. It is further recommended that after this convergence, no new mission mode or other separate scheme should be launched which creates duplication / overlap and destroys integrated nature or project mode schemes such as Mission on Farm Mechanisation, Mission on Seed & Planting Material, National Vegetable Initiative or Mission on Cold Chain Development, etc.

b. Secondly, it will be desirable to have a proper *Mission Directorate* for mission mode schemes of restructured "*Integrated National Horticulture Development Programme"* which should be a duly constituted statutory body which may be part of *Central Agriculture Infrastructure and Establishment Scheme* **(CAIES-Horticulture)**. Present practice of retaining function of Mission Director within the Secretariat amounts to role conflict and may adversely affect monitoring of the scheme at Ministry / Department level. There may be two sub-divisions into it; one for mandate crops of fruits, vegetables, flowers and medicinal, aromatic plants, bamboo, mushroom, bamboo and bee-keeping with HQ in NCR and another for mandate crops of coconut, areca nut, cashew nut, spices and cocoa (plantation and spice crops).

c. For effective transfer of technology, there is a need to have a *Unified Technology Support Group* for the *Integrated National Horticulture Development Programme* which will be responsible for ensuring proper identification and transfer of technology solutions to field level issues relating to horticulture projects.

d. Fourth, the schemes of *Integrated National Horticulture Development Programme* may be redesigned and it should have two components; namely*, Central Sector Components (100% central grant)* and *centrally Sponsored Components (Centre: State grant sharing pattern)*. Item having catalytic effect on horticulture

development, those relating to creation of infrastructures of national importance, projects benefitting more than one State, projects and schemes pertaining to exports promotion and involving higher level of technology may be kept as *Central Sector Components* and others may be classified as C*entrally Sponsored Components. I*mplementation of C*entrally Sponsored Components* may be made on the pattern of RKVY which will secure integration of horticulture development programmes with Comprehensive Area Development Plan (C-DAP). As Mission Mode Programmes are meant for certain time period, provision may be made to ensure that the *Central Sector Components do* not get discontinued automatically on *Mission Mode Programme components* coming to an end.

e. Present office premise and other infrastructure available at NHB HQ may be converted as HQ of *Integrated National Horticulture Development Programme* and man-power available on establishment of NHB may be used for programme implementation.

f. Mandate of CDB may be expanded to act as an umbrella Organisation for Development of all plantation crops like coconut, cashew nut, areca nut, cocoa and spices. Schemes of CDB may be restructured on line with scheme of *Integrated National Horticulture Development Programme.*

Recommendations regarding Programme Implementation

a. The Seeds Bill, 2004 provides for registration of nurseries under clause 23 and 24. Till the Bill is approved, a suitable certification system needs to be put in place under NHM and HMNEH, may be through one of their National Level Agencies. Area expansion programme for fruits crops under NHM and HMNEH is presently not linked with availability of quality planting materials from accredited nurseries. Ad hock system of listing of supplier nurseries by functionaries of State Directorate who themselves procure the planting materials, is in common practice for sourcing planting material. In such cases, payment for supply of planting materials to supplier nurseries and is also centrally handled by Mission Directorates. *This system needs to be modified and area expansion programme during 12th plan period may be restricted to availability of quality planting materials.*

b. The State Governments have not been able to deploy the manpower commensurate with the enhanced allocation for horticulture. Although the State Governments have created a staff pool for implementing various Schemes, many of the posts are lying vacant. Horticulture being a priority sector, the staff structure up to the grass root level should be sound and efficient. All the vacant posts in the Horticulture/ Agriculture Department involved in the implementation of Horticulture Programmes should, therefore, be got filled-in on an urgent basis. As an incentive for better manpower deployment GoI schemes should be linked

with the availability of trained manpower and the Government's commitment to fill the vacant posts within a stipulated period of time say there to six months. Deployment of staff and human resource development should go hand in hand. Therefore, there is also a need to move away from mode of extending component wise assistance to project mode. Area expansion and other programmes may be made credit linked back ended subsidy mode which will necessarily reduce the work burden on State Mission Directorates / Implementing Agency.

c. The departmental staff need to be provided refresher training once in two years and should be exposed to advanced training in horticulture periodically. Besides, unemployed youth with 12th pass should be trained as Para Professionals for horticulture sector.

d. ***Project Documentation and Book Keeping***- Schemes of NHM are not necessarily credit linked therefore; there is, therefore, a need to implement schemes in project-mode for which proper system of project preparation & approval, documentation and book keeping needs to be prescribed. In absence of it, monitoring of the scheme gets even more difficult.

e. **Interface of implementing agency with input suppliers**- Operational procedure followed in programme implementation, in most of the States, ends up in direct interface between input suppliers and implementing agency / State Directorate of Horticulture; which is not a very healthy scenario for ensuring efficient use of grants; apart from other operational difficulties caused by it. Under such arrangement, the beneficiary has to source assets under the schemes from suppliers / vendors empanelled by State Mission Directorates on rate contract basis and payment to the supplier for supplies made to beneficiaries is handled centrally by implementing agency. This system needs to be critically examined and corrective measures need to be prescribed for improving quality of scheme implementation during 12th Plan period.

f. ***Mode of application of credit linked, Back-ended subsidy*** **–** there are scheme components which provide for credit linked back-ended subsidy. However, in practice, minimum percentage of credit element is not prescribed and subsidy is allowed to be treated as means of finance which means that the same is allowed to be applied in front-ended mode. This adversely affects the quality of appraisal of projects and efficiency of utilisation of available grants.

g. ***Rejuvenation of Old & Senile Orchards***- Rejuvenation is one of the main components in the NHM and HMNEH schemes for enhancing the production and productivity of senile plantations/orchards. However, this work is hindered in many States on account of restrictions on transit of pruned branches from the field. Hence, it will be necessary for the Ministry of Environment and Forests (MoEF) to take up with the State Government to amend the Transit and Felling

rules to permit the cutting & pruning of branches of common horticulture crops like Mango, Litchi, Aonla Cashew, etc.(which are not forest species). MoEF has been requested in this regard by MoA.

h. ***National Mission on Micro Irrigation-*** Micro irrigation has been an integral component in most of the schemes of horticulture division. Putting up a separate scheme on micro irrigation with higher subsidy norms has jeopardized the integral nature of schemes being implemented in project modes. This goes against the principle of convergence of schemes. It is recommended that assistance for micro irrigation component on pattern of NMMI may be made available under ongoing area expansion schemes and also for existing orchards.

i. ***MM-III (PHM component) under HMNEH–*** At present, **t**here is a complete duplication between NHB (NE) and MM-III (relating to PHM). It is recommended that the MM-III sub component relating to PHM may be modified to suit special needs of the NE and Hilly regions like those facilitating evacuation of horticulture produce from far flung production clusters, introduction of ropeways, introduction of multi modal transport system for fresh horticulture produce etc.

j. ***MM-I under HMNEH****:* - projects sanctioned under MM-I are listed as **Annexure - 3.** There is a need to critically review the benefits that have accrued to HMNEH from the outcome of such R & D projects in increasing production and productivity of crops in NE Area or otherwise. It is also pertinent to see that such R & D projects could have been taken up under regular programmes of ICAR centres in NE and Hilly regions.

k. ***Status of NCCD, CDB, NHB, CIH, NBB and NCPAH-***

i. CDB- It is recommended that the mandate of CDB may be expanded to act as an umbrella Organisation for Development of all plantation crops like coconut, cashew nut, areca nut, cocoa and spices. Functions of the two Directorates namely, the Directorate of Cashew nut & Cocoa Development and the Directorate of Areca nut and Spice Development may be merged with CDB. Schemes of CDB may be restructured on line with scheme of *Integrated National Horticulture Development Programme.*

ii. NHB- NHB is a plan scheme started in the year 1984 as a result of recommendations of a committee headed by Dr. M. S. Swaminathan. Prior to recommendation of Expenditure Reforms Commission regarding restructuring Horticulture Division of DAC, NHB had received treatment of main instrumentality of Horticulture Division. It is recommended by the Working Group that it is in the interest of programme implementation that NHB may be entrusted with responsibility of implementation of Integrated National Horticulture Development Programme during XIIth period as an

Umbrella Organisation. However, Centrally Sponsored Scheme Components and their equivalents for NE region, Hilly and Scheduled Areas may be implemented through State Directorates of Horticulture; Central Sector Component may be implemented by NHB through its State Centres. DAC may even merge functions of SFAC relating to horticulture sector with NHB. For this purpose, NHB may be constituted under Parliament Act on line with CDB.

iii. NCCD- NCCD has been created during the year 2010-11 as a Society registered under Societies Registration Act 1860. It is mandated to function in participatory mode with stake holders of PHM and cold chain sector. It is recommended by the Working Group to entrust NCCD with R & D and Applied HRD functions in addition to its role in Standard setting and certification of infrastructures relating to Cold Chain and PHM. This will pave the way for fetching benefits of schemes of Ware Housing Slips for scheduled F & V stored in cold storages. A budget provision of Rs. 25 crores has been made for one time grant to be given to NCCD as per commitment made during XIth Plan, in case the same remains unfulfilled.

iv. CIH Dimapur – it is recommended that keeping in view the significance of role played by CIH in promoting technology transfer relating to production, PHM and Market Links, the same may be continued in its present form during XIIth plan period. However, its Governing Body may be headed by senior officer than Horticulture Commissioner, DAC.

v. National Bee Board (NBB) and National Committee on Plasticulture Applications in Horticulture (NCPAH) – it is proposed that NBB and NCPAH may be discontinued during XIIth plan period.

I. *Convergence with Schemes of Other Departments / Ministries*

i. *Convergence and dovetailing with various development programmes of Ministry of Rural development*- Convergence of programmes of horticulture programmes with schemes like MNREGS implemented by Ministry of Rural Development may help in developing irrigation tanks on individual farmer's field and community irrigation facilities, in providing connectivity of production clusters and rural markets through rural roads etc.

ii. *Convergence and dovetailing with schemes of Ministry of Food Processing Industries*- So far as schemes of Ministry of Food Processing Industries (MFPI) are concerned, it has been noticed that there is overlap of schemes relating to cold chain by way of backward linkage and area of primary processing. It is being been suggested that MFPI may

concentrate on projects relating backward linkage when there is organic linkage of the project with processing units. Similarly, it has been proposed that horticulture development programmes may take up projects of primary processing when the same is an integral part of area expansion project or existing orchards. It is also proposed that as MFPI does not have its State level offices, the present office set up of NHB may be entrusted with task of implementing schemes of MFPI relating to processing of F & V.

iii. *Convergence and dovetailing with schemes of APEDA*- It has been proposed that a new *Central Sector* scheme component of *Enhancing Export Competitiveness* be introduced under *Integrated National Horticulture Development Programme*. This will facilitate taking up under horticulture development programmes such projects inside the country which may enhance our export competitiveness. With this, APEDA may be able to concentrate more on strategic aspects of export promotion through initiatives in potential export destinations.

iv. *Convergence and dovetailing with schemes of Ministry of AYUSH-* National Medicinal Plant Board (NMPB) has been set up by Department of AYUSH to coordinate development of medicinal plants. However, NMPB does not have its State level offices and as such it depends on State Directorates of Horticulture for programme implementation. Therefore, it is proposed that projects relating to scheduled medicinal and aromatic plants notified by NMPB from time to time may not be taken up under schemes of Horticulture Division of DAC.

vi. *Convergence with Programmes of the Spices Board*- Spice Board is mandated to deal exclusively with cardamom and other 51 spices. It is recommended that during XIIth plan period, horticulture division of DAC may continue to implement production related schemes of all the spices such as seeds and planting materials, productivity and plant protection etc. As far as possible, the schemes relating to export of spices may be implemented through Spice Board.

vii. *Convergence with schemes of KVIB regarding Bee Keeping*- There is a need for convergence of scheme components of bee-keeping under schemes of horticulture division of DAC and schemes for promoting production, processing and marketing of honey implemented by Khadi & Village Industries Boards. This can be done by having a joint monitoring committee with Khadi and Village Industries Commission and Horticulture Division of DAC.

viii. *Convergence with scheme of DS&T relating to application of Bamboo*- Similarly, convergence between scheme components of *National Bamboo Mission* and *National Mission on Bamboo Application which is implemented by Department of Science & technology is required.*

ix. *Coordination and BIS, BEE, CBRI, IIPM, CSIR, CONCOR, Indian Railways, FHEL etc*- It is recommended that horticulture division of DAC and organisations under it may avail the services of organisations like Bureau of Indian standards, Bureau of Energy Efficiency, Central Building Research Institute, Indian Institute of Packaging, Council for Scientific & Industrial Research, Container Corporation of India, Indian Railways, Fresh & Healthy Enterprises Ltd etc for better synergies. For example-Ministry of Railways and CONCOR may assist in development of long distance transport solutions for perishables through multi-modal transport system and also provide suitable infrastructures at dry docks, Inland Container Depots, Rail Yards etc Proposed Unified Mission Directorate for all Mission mode Programmes of Horticulture Division of DAC may help achieve this desired convergence of programmes.

x. *Quality of convergence with scheme of RKVY*- Convergence is generally achieved with Comprehensive District Development Plan (C-DAP) prepared under RKVY, in the following manner-

i. Increasing expanse of NHM like scheme to areas which have been consciously excluded from coverage of NHM

ii. Providing additional subsidy to components eligible for subsidy under NHM

iii. Funding large infrastructure projects not figuring into CDAP

There is a need to review this as a general policy to be adopted by several States and necessary guidelines may be issued in this regard.

m. Introduction of RKVY model for Centrally Sponsored components of Horticulture Development Programme- The Working Group has also examined the aspect of operating Centrally Sponsored Scheme Components of restructured scheme of Horticulture development in RKVY pattern with the objective of having better convergence with Comprehensive District Development Plans.

n. Structure of Integrated *National Horticulture Development Programme* Recommended for 12th Plan Period- The scheme components and other details are at **Appendix 14.2**. Under this, in addition to several other points, giving of grant in aid to newly formed National Centre for Cold Chain Development (NCCD) has been recommended. In addition, it is recommended that National Horticulture Board may be recognised as Umbrella Organisation and as such it may be given

responsibility of implementing Central Sector Scheme Components under *Integrated National Horticulture Development Programme.* Similarly, schemes related to coconut Development of coconut, cashew nut, cocoa, areca nut and spices may be entrusted to CDB as an umbrella organisation for the purpose. For this purpose a budget provision of Rs. 1000 crores has been proposed.

o. *Estimated Budgetary Requirement for Horticulture Development Programmes of Horticulture Division of DAC*-

Table - 14. 11

Estimated Budgetary Requirement for 12th Plan		
S. No.	**Restructured Programmes**	**Rs. in Crores**
1	Area Expansion Programmes in Integrated Project Mode including protected cultivation	10000
2	For Productivity Enhancement of Existing Orchards / Production Clusters in Project Mode including pollination support	10000
3	Additional Provision for NE region, Hilly areas and scheduled areas and small & marginal Farmers etc for above two schemes	3000
4	Infrastructure development for Input production	250
5	Supply Chain Management, Post Harvest Management	7300
6	Marketing Infrastructure, HRD, & Market information	2000
7	Enhancing Export Competitiveness	250
8	Human Resource Development	250
9	Horticulture Database	175
10	Crop Insurance and Setting up Weather Stations	250
11	Schemes of Coconut Development Board	1000
12	Schemes Components of Bamboo Development	500
13	Horticulture Promotion Services- NCCD	25
Total		**35000**

Appendix 14.1

Comparative Chart for HM-NEH and NHM Scheme Components for XIth Plan Period				
HMNEH			**NHM**	
MINI MISSION- I			**RESEARCH**	
Seed and Planting material – Production and supply of parental lines, quality seeds, rootstocks, motherstocks (scion blocks)	Rs.15 lakh/project	Project based – 100% and only for public sector.		
Technology standardization / refinement and dissemination	Rs.20 lakh/project	Project based – 100% and only for public sector.	Central Government Institutes under ICAR, CSIR and others will take up research & development works out of their existing budget for which a Research Advisory Committee will identify the thrust areas	
Acquisition of technologies including import of planting material from other countries for evaluation and mass multiplication in order to increase production & productivity of horticulture crops	Rs.10 lakh/project	Project based – 100% and only for public sector.		
Imparting training through on farm trials / front line demonstrations	Rs.5 lakh/project	Project based – 100% and only for public sector.		
MINI MISSION – II			**PLANTATION INFRASTRUCTURE DEVELOPMENT**	
Production of planting material			**Production of planting material**	
Model nursery / Big Nursery (2-4 ha)	Rs.6.25 lakh/ha	100 % of cost for Public sector and 50% for private sector having production capacity of 50,000 plants per ha per year. Assistance would be availed upto Rs. 25.00 lakh by public sector and Rs. 12.50 lakh by private sector for area of 4 ha.	Rs. 6.25 lakh/ ha	100% to public sector limited to Rs 25.00lakh/unit and in case of private sector, credit linked back-ended subsidy @ 50% of cost, subject to a maximum of Rs. 12.50 lakh/unit, for a maximum of 4 ha. as project based activity.
Small nursery (1ha)	Rs.6.25 lakh	100 % of cost for Public sector and 50% for private sector having production capacity of 50,000 plants per ha per year for 1 ha.	Rs. 6.25 lakh/ ha	100% to public sector and in case of private sector, credit linked back-ended subsidy @ 50% of cost, subject to a maximum of Rs. 3.125 lakh/unit, as project based activity.
Setting up of Tissue Culture Units	Rs.100 lakh/unit	100 % of cost to Public sector and 50% of cost to private sector units having production capacity of 15 lakh plants of mandated crops for which protocols are available for commercial use.	Rs. 100 lakh/unit	100% of total cost to public sector and in case of private sector, credit linked back ended subsidy @ 50% of cost. Each TC unit will produce a minimum of 15 lakh plants of mandated crops for which protocols are available for commercial use.
Rehabilitation of existing Tissue Culture (TC) units.	Rs. 15 lakh per unit-as Project based activity	100% of cost to public sector and 50% of cost for private sector.	Rs. 15 lakh / unit, as project based activity	100% of cost to public sector and in case of private sector, credit linked back ended subsidy @ 50% of cost.
True Potato Seed Center	Rs. 25 lakh per center	100% of cost to public sector and 50% of the cost to private sector.		
Progeny and Herbal Gardens	Rs. 5 lakh/unit	100% of cost to public sector and 50% of the cost to private sector.		
Seed production for vegetables and Rhizomatic spices				
Open pollinated crops	Rs. 30,000/ha	For public sector 100% for private sector, 75% of the cost, limited to 5 ha. Output target of seed for each crop will be fixed by individual state for each beneficiary, before releasing funds.	Rs.50,000 per ha	100% of total cost to Public sector and for Private sector, @ 50% of the total cost as credit linked back ended subsidy limited to 5 ha per beneficiary. Indenting organizations for breeder seed required for producing foundation seed will be eligible for 25% assistance on the cost of procurement of breeder seed from ICAR/SAU.

Hybrid seeds	Rs. 1,33,000/ha	For public sector, 100% and for private sector, 75% of the cost limited to 2 ha. Output targets of seed for each crop will be fixed by individual State for each beneficiary, before releasing funds.		
Import of planting material for trial and demonstration purpose (By State Government, Growers' Associations recognized by NHB/MOA, PSU)	Rs. 10 lakh	100% of the cost for state Govt.		
Seed infrastructure for handling, processing, packing, storage etc. of seeds of horticulture crops.	Rs. 200 lakh	100% of the cost for public sector and 75% of cost for private sector.	Rs. 200 lakh/ project	100% of cost to public sector and in case of private sector, credit linked back ended subsidy @ 50% of cost of project.
Area expansion under Hort. Crops			**Establishment of new gardens (Area expansion)**	
Cost Intensive Fruits (for a maximum area of 4 ha per beneficiary)			(a) **Cost intensive crops** (For a maximum area of 4 ha per beneficiary)	
Cost Intensive Fruit crops like Grapes, Strawberry, Kiwi, Passion fruit, etc.	Rs. 1,00,000 per ha	75% of cost i.e.Rs. 75000/ha including expenditure on planting material and cost of material for INM/IPM, in 3 installments of 60:20:20 subject to survival rate of 75% in 2nd year and 90% in 3rd year.	Rs.1,00,000/ ha	Maximum of Rs. 50,000/- per ha. (50% of cost for meeting the expenditure on planting material and cost of material for INM/IPM etc, in 3 installments of 60:20:20 subject to survival rate of 75% in 2 nd year and 90% in 3rd year)
Fruit crops like TC Banana and Pineapple	Rs. 1,00,000/ha	75% of cost i.e.Rs. 75000/ha including expenditure on planting material and cost of material for INM/IPM, in 2 installments of 75:25	Rs.1,00,000/ha M	Maximum of Rs. 50,000/- per ha. (50 % of cost for meeting the expenditure on planting material and cost of material for INM/IPM etc, in 2 installments of 75:25 subject to survival rate of 90% in second year)
Fruit crops like Banana sucker and Papaya	Rs. 70,000/ha	75% of the cost i.e.Rs. 52500/ha including expenditure on planting material and cost of material for INM/IPM, in 2 installments of 75:25	Rs.70,000/ ha	Maximum of 35,000/- per ha. (50% of cost for meeting the expenditure on planting material and cost of material for INM/IPM etc, in 2 installments 75:25 subject to survival rate of 90% in second year)
High density planting (apple, pear, peach, mango, guava, litchi, ber, etc.)	Rs. 80,000/ha	75% of cost i.e. Rs. 60000/ha including the expenditure on planting material and cost of material for INM/IPM, in 3 installments of 60:20:20 subject to survival rate of 75% in 2nd year and 90% in 3rd year.	Rs. 80,000 /ha	Maximum of Rs. 40,000/- per ha. (50% of cost for meeting the expenditure on planting material and cost of material for INM/IPM etc, in 3 installments of 60:20:20 subject to survival rate of 75% in 2nd year and 90% in 3rd year)
Fruit crops other than cost intensive crops using normal spacing	Rs. 40,000/ha	75% of the cost i.e.Rs. 30000/ha including expenditure on planting material and cost of material for INM/IPM,in 3 installments of 60:20:20 subject to survival rate of 75% in 2nd year & 90% in 3rd year.	Rs. 40,000/ ha	Maximum of Rs.30, 000/- per ha. (75% of cost for meeting the expenditure on planting material and cost of INM/IPM etc in 3 installments of 60:20:20 subject to survival rate of 75% in 2nd year & 90% in 3rd year for perennial crops and for non perennial crops in 2 installments of 75:25 subject to survival rate of 90% in second year)
Vegetable (for maximum area of 2 ha per beneficiary)				
Open pollinated	Rs. 30,000/ha	75% of cost i.e. Rs. 22500/ha.		
Hybrid	Rs. 45,000/ha	75% of cost i.e. Rs. 33750/ha.		
Mushroom			**Mushrooms**	
Integrated mushroom unit consisting of composting, spawn production unit and training	Rs. 50 lakh/unit	100% of project cost for public sector 50% for Private sector.	Rs.50 lakh/unit	100% of the cost to public sector and 50% of cost for private sector, for meeting the expenditure on infrastructure, as credit linked back ended subsidy.
Spawn making unit	Rs. 15 lakh/unit	100% of cost to public sector and 50% of the cost to private sector.	Rs. 15 lakh/ unit	100% of the cost to public sector and in case of private sector, 50% of cost, as credit linked 45 back ended subsidy.
Compost making unit	Rs.20 lakh/unit.	100% of cost to public sector 50% of the cost to private sector.	Rs. 20 lakh/ unit	100% of the cost to public sector and in case of private sector, 50% of cost, as credit linked back ended subsidy
Flowers (for a maximum area of 2 ha per beneficiary)			**Flowers** (For a maximum of 2 ha per beneficiary)	

Cut flowers	Rs. 70,000/ha	75% of the cost i.e. Rs. 52500/ha including expenditure on planting material and cost of material for INM/IPM.	Rs.70,000/ ha	50 % of the cost to Small and Marginal(S&M) farmers and 33% to other category farmers, subject to a maximum of Rs.35,000/- per ha for S&M farmers and Rs. 23,100/- per ha for other category farmers
Bulbous flowers	Rs. 90,000/ha	75% of cost i.e. Rs. 67500/ha including expenditure on planting material and cost of material for INM/IPM.	Rs. 90,000/ ha	50 % of the cost to Small and Marginal farmers and 33% to other category farmers, subject to a maximum of Rs.45,000/- per ha for S&M farmers and Rs. 29,700/- per ha for other category farmers
Loose Flowers	Rs. 24,000/ha	75% of cost i.e. Rs. 18000/ha including expenditure on planting material and cost of material for INM/IPM.	Rs. 24,000/ ha	50 % of the cost to Small and Marginal farmers and 33% to other category farmers, subject to a maximum of Rs.12,000/- per ha for S&M farmer and Rs.7,920/- per ha for other category farmers.
Model Floriculture Centre	Rs. 100 lakh per centre	100% of cost to public sector.		
Spices (for a maximum area of 4 ha per beneficiary)			**Spices** (For a maximum area of 4 ha per beneficiary)	
Seed spices and Rhizomatic spices	Rs. 25,000/ha	75% of cost i.e. Rs. 18750/ha including expenditure on planting material and cost of material for INM/IPM.	Rs. 25,000 / ha	Maximum of Rs. 12,500/- per ha. (50% of cost for meeting the expenditure on planting material and cost of material for INM/IPM etc).
Perennial spices (black pepper, cinnamon, clove and nutmeg)	Rs. 40,000/ha	75% of cost i.e. Rs. 30000/ha including expenditure on planting material and cost of material for INM/IPM.	Rs. 40,000ha	Maximum of Rs. 20,000/- per ha (50% of cost for meeting the expenditure on planting material and cost of material for INM/IPM etc).
Cost intensive spices viz. Saffron	Rs. 80,000/ha	75% of cost i.e. Rs. 60000/ha including expenditure on planting material and cost of material for INM/IPM.		
Aromatic Plants (for a maximum area of 4 ha per beneficiary)			**Aromatic Plants** (For a maximum area of 4 ha per beneficiary)	
Cost intensive aromatic plants (patchouli, geranium rosemary, etc.)	Rs. 75,000/ha	75% of cost i.e. Rs.56250/ha, including expenditure on planting material and cost of material for INM/IPM.	Rs. 75,000/ ha	50% of cost, subject to a maximum of Rs.37,500/- per ha, for meeting the expenditure on planting material and cost of material for INM/IPM etc.
Other Aromatic Plants	Rs. 25,000/ha	75% of cost i.e. Rs. 18750/ha, including expenditure on planting material and cost of material for INM/IPM.	Rs. 25,000/ ha	50% of cost, subject to a maximum of Rs.12,500/- per ha, for meeting the expenditure on planting material and cost of material for INM/IPM etc.
Rejuvenation / Replacement of senile plantations	Rs. 30000/ha	50% of cost subject to a maximum of Rs. 15000/ha limited to 2 ha per beneficiary.	Rs.30,000/ ha (average)	50% of the total cost subject to a maximum of Rs. 15,000/ha limited to 2 ha per beneficiary.
Creation of water sources			**Creation of Water resources** (to be implemented in conjunction with NREGS)	
Community tank/on farm pond / on farm water reservoirs with use of plastic / RCC lining	Rs. 17.25 lakh/unit	100% of cost for 10 ha of command area, with size of 100m x 100m x 3m or any other size depending upon pro rata basis, owned & managed by a community / farmer group. Cost for non-lined ponds/ tanks only in black cotton soils will be 33% less. Assistance under the mission will be restricted to the cost of plastic / RCC lining. However, for non MGNREGS beneficiaries, assistance on entire cost including construction of pond as well as lining can be availed under the Mission	Rs. 15 lakh /unit in plain areas, Rs.17.25 lakh/unit in hilly areas.	100% of cost for 10 ha of command area, with pond size of 100m x 100m x 3 m or any other smaller size on pro rata basis depending upon the command area, owned & managed by a community/farmer group. Cost for nonlined ponds/tanks (only in black cotton soils) will be 33% less. Assistance under NHM will be restricted to the cost of plastic / RCC lining. However, for non MNREGS beneficiaries, assistance on entire cost including construction of pond/tank as well as lining can be availed under NHM
Water harvesting system for individuals- for storage of water in 20mx20mx3m pond / tube wells / dug wells	Rs. 1.38 lakh per unit.	75% of cost i.e. Rs.1.03 lakh per beneficiary assistance may be given for smaller size on pro rata basis. Maintenance to be ensured by beneficiary.	Rs. 1.20 lakh /unit in plain areas, Rs.1.38 lakh/unit in hilly areas for maximum command area at 2 ha	50% of cost including lining. For smaller size of the ponds /dug wells, cost will be admissible on pro rata basis. Maintenance to be ensured by the beneficiary
Protected Cultivation			**Protected cultivation**	

Green House Structure			**Green House structure**	
(Includes cost of material, installation and irrigation system)				
Fan and pad system	Rs. 1465/ Sq.m	50% of cost limited to 1000 Sq.m per beneficiary	Rs. 1465/ Sq.m 5	50% of the cost limited to 1000 Sq.m per beneficiary
Naturally ventilated system			**Naturally ventilated system**	
Tubular Structure	Rs. 935/ Sq.m	50% of cost limited to 1000 Sq.m per beneficiary	Rs. 935/ Sq.m	50% of the cost limited to 1000 Sq.m per beneficiary
Wooden Structure	Rs. 515/ Sq.m	50% of cost limited to 1000 Sq.m per beneficiary	Rs. 515/ Sq.m	50% of the cost limited to 2 units (each unit not to exceed 500 Sq.m per beneficiary
Bamboo Structure	Rs. 375/ Sq.m	50% of cost limited to 1000 Sq.m per beneficiary	Rs. 375/ Sq.m	50% of the cost limited to 5 units (each unit not to exceed 200 Sq.m) per beneficiary
Plastic Mulching	Rs. 20,000 per ha	50% of cost limited to 2 ha per beneficiary	Rs. 20,000/ ha	50% of the total cost limited to 2 ha per beneficiary
Shade Net House			**Shade Net House**	
Tubular Structure	Rs. 600/sq.m	50% of cost limited to 1000 Sq.m per beneficiary	Rs. 600/ Sq.m	50% of cost limited to 1000 Sq.m per beneficiary
Wooden Structure	Rs. 410/sq.m	50% of cost limited to 1000 Sq.m per beneficiary	Rs. 410/ Sq.m	
Bamboo Structure	Rs. 300/Sq.m	50% of cost limited to 1000 Sq.m per beneficiary	Rs. 300/ Sq.m	
Plastic Tunnels	Rs. 30/sq.m	50% of cost limited to 5000 sq.m per beneficiary	Rs.30/ Sq.m	50% of cost limited to 5 units (each unit not to exceed 200 Sq.m) per beneficiary
Anti Bird / Anti Hail Nets	Rs. 20/Sq.m	50% of cost limited to 5000 sq.m per beneficiary	Rs.20/ Sq.m	50% of cost limited to 5 units (each unit not to exceed 200 sqmt) per beneficiary.
Cost of planting material of high value vegetables grown in poly house	Rs. 105/ sq.m	50% of cost limited to 500 sq.m per beneficiary	Rs.105/ Sq.m	50% of cost limited 1000 sqmt per beneficiary
Cost of planting material of high value flowers for poly house	Rs.500/sq.m	50% of cost limited to 500 sq.m per beneficiary	Rs.500/ Sq.m	50% of cost limited to 5000 Sq.m per beneficiary.
Precision Farming development and extension through Precision Farming Development Centers (PFDCs)	Project based	100% of cost to PFDCs	Project based	50% of cost limited to 500 Sq.m per beneficiary.
Promotion of INM/IPM			**Promotion of Integrated Nutrient Management(INM)/ Integrated Pest Management (IPM)**	
Sanitary and Phytosanitary Infrastructure (Public Sector)	Rs.500 lakh/unit	100% of the cost.	Rs.500 lakh/unit	100% of cost
Promotion of INM/IPM	Rs. 2000/ha	50% of cost subject to a maximum of Rs. 1000/ha limited to 4 ha/beneficiary.	Rs. 2000/ha	50% of cost subject to a maximum of Rs. 1000/ha limited to 4 ha per beneficiary.
Disease forecasting unit (public sector)	Rs. 4 lakh/unit	100% of cost	Rs. 4 lakh/unit	Maximum up to Rs. 4 lakh/unit
Bio Control Lab	Rs. 80lakh/unit	100% of cost to public sector and 50% of the cost to private sector	Rs. 80lakh/unit	Maximum up to Rs. 80 lakh/unit for Public Sector and Rs.40 lakh as credit linked back ended subsidy to Private Sector
Plant Health Clinics	Rs. 20 lakh/unit	100% of cost to public sector and 50% of the cost to private sector	Rs. 20 lakh/unit	Maximum up to Rs. 20 lakh/unit for Public Sector and Rs.10 lakh as credit linked back ended subsidy to Private Sector
Leaf / Tissue analysis labs.	Rs. 20 lakh/unit	100% of cost to public sector and 50% of the cost to private sector	Rs. 20 lakh/unit	Maximum up to Rs. 20 lakh/unit for Public Sector and Rs.10 lakh as credit linked back ended subsidy to Private Sector.
Organic Farming			**Organic Farming**	
Adoption of organic farming	Rs. 20,000/ha	50% of cost limited to Rs. 10000/ha for a maximum area of 4 ha per beneficiary, spread over a period of 3 years involving assistance of Rs. 4000/- in first year and Rs. 3000/- each in second & third year, subject to programme being linked to certification.	Rs. 20,000/ha	50% of cost limited to Rs.10000/ha for a maximum area of 4 ha. per beneficiary, spread over a period of 3 years involving an assistance of Rs.4000/- in first year and Rs. 3000/- each in second & third year. The programme to be linked with certification
Organic Certification	Project based	Rs. 5 lakh for a cluster of 50 ha which will include Rs. 1.50 lakh in first year, Rs. 1.50 lakh in second year and Rs. 2.00 lakh in third year	Project based	Rs. 5 lakh for a cluster of 50 ha which will include Rs.1.50 lakh in first year, Rs. 1.50 lakh in second year and Rs. 2.00 lakh in third year

Vermi-compost unit	Rs. 60,000/unit for permanent structure and Rs. 10,000/unit for HDPE Vermibed	50% of cost conforming to the size of the unit of 30'x8'x2.5' dimension of permanent structure to be administered on pro-rata basis. For HDPE Vermibed, 50% of cost conforming to size of 96 cft (12'x4'x2') to be administered on pro-rata basis.	Rs. 60,000/unit for permanent structure and Rs. 10,000/unit for HDPE Vermibed	50% of cost conforming to the size of the unit of 30'x8'x2.5' dimension of permanent structure to be administered on pro-rata basis. For HDPE Vermibed, 50% of cost conforming to size of 96 cft (12'x4'x2') to be administered on pro-rata basis.
Certification for GAP, including infrastructure	Rs. 10,000 per ha	50% of cost	Rs. 10,000 per ha	50% of the cost.
Center of Excellence for Horticulture	Rs. 500 lakh/centre	100% of cost.		
Precision Farming development and extension through Precision Farming Development Centers (PFDCs)			Project based	100% of cost to PFDCs
Pollination Support through Bee Keeping			**Pollination support through beekeeping**	
Production of nucleus stock (Public Sector)	Rs. 10 lakh	100% of cost.	Rs. 10 lakh	100% of cost.
Production of bee colonies by bee breeder	Rs. 6 lakh	50% of cost for producing minimum of 2000 colonies / year	Rs. 6 lakh	50% of cost for producing minimum of 2000 colonies / year
Honey bee colony	Rs. 1400 per colony of 4 frames	50% of cost limited to 50 colonies / beneficiary	Rs. 1400 per colony of 4 frames	50% of cost limited to 50 colonies / beneficiary
Hives	Rs. 1600 per hive	50% of cost limited to 50 hives / beneficiary	Rs. 1600 per hive	50% of cost limited to 50 hives / beneficiary
Equipment including honey extractor (4 frame), food grade containers container (30 kg), net etc.	Rs. 14,000 per set	50% of the cost limited to one set per beneficiary for a group of 100 bee keepers.	Rs. 14,000 per set	50% of the cost limited to one set per beneficiary
Horticulture Mechanization			**Horticulture Mechanization**	
Power operated machines / tools including Power Saw and Plant Protection equipments etc.	Rs. 35,000/set	50% of cost limited to one set per beneficiary.	Rs. 35,000/set	50% of cost limited to one set per beneficiary.
Power Machines (upto 20BHP) with rotavator / equipment	Rs. 1.20 lakh/set	50% of cost limited to one set per beneficiary.	Rs. 1.20 lakh/set	50% of cost limited to one set per beneficiary.
Power machines (20 HP and above) including accessories / equipments	Rs. 3 lakh/set	50% of cost limited to one set per beneficiary.	Rs. 3 lakh/set	50% of cost limited to one set per beneficiary.
Import of new machines and Tools for horticulture for demonstration purpose (Public sector)	Rs. 50 lakh/machine	100% of total cost	Rs. 50 lakh/machine	100% of total cost
Human Resource development (HRD)			**Human Resource Development (HRD)**	
Training of Farmers including women			**Training of farmers**	
within the district	Rs. 400/day per farmer excluding transport.	100% of cost	Rs. 400/day per farmer excluding transport.	100% of cost
Within the State	Rs. 750/day per farmer excluding transport	100% of cost	Rs. 750/day per farmer excluding transport	100% of cost
Outside the State	Rs. 1000/day per farmer excluding transport	100% of cost	Rs. 1000/day per farmer excluding transport	100% of cost
Exposure visit of farmers including women			**Exposure visit of farmers**	
Within the district	Rs. 250/day per farmer excluding transport	100% of cost	Rs. 250/day per farmer excluding transport	100% of cost
Within the State	Rs. 300/day per farmer excluding transport	100% of cost.	Rs. 300/day per farmer excluding transport	100% of cost.

Outside the State	Rs. 600/day per farmer excluding transport.	100% of cost	Rs. 600/day per farmer excluding transport.	100% of cost
Outside India	Rs. 3 lakh/participant	Project based. 100% of air /rail travel cost	Rs. 3 lakh/participant	Project based. 100% of air /rail travel cost
Training / study tour of Technical officers / field functionaries involved in implementation of the scheme at central / state level including women			**Training / study tour of technical staff/ field functionaries**	
within the State	Rs.200/day per participant plus TA/DA, as admissible.	100% of cost.	Rs.200/day per participant plus TA/DA, as admissible.	100% of cost.
Study tour /training in progressive states / units (group of minimum 5 participants) including women	Rs.650/day per participant plus TA/DA, as admissible	100% of cost	Rs.650/day per participant plus TA/DA, as admissible	100% of cost
Outside India	Rs. 5 lakh/participant	100% of cost on actual basis.	Rs. 5 lakh/participant	100% of cost on actual basis.
Information dissemination through publicity, printed literature etc and local advertisements	Rs. 0.40 lakh per block	100% of total cost		
Development of technology packages in electronic form to be shared through IT network	Rs. 1.00 lakh per district	100% of total cost		
Special Interventions				
Special interventions: such as land development, transportation on case to case basis (from farm-gate to processing units / market places and transportation centers) projects of need based.	Rs. 200 lakh	Project based and restricted to 10% of outlay for the State proposal under the scheme.		
Tackling of emergent/unforeseen requirements of State Government/ implementing agencies	Rs. 10 lakh	100% of the total cost.	Rs. 10 lakh	50% of the cost based on project proposal.
Crop Insurance and weather Station (New component)				As per norms of MAIS / WBIS
Mini-Mission-III				
Post Harvest Management			**INTEGRATED POST HARVEST MANAGEMENT**	
On farm collection and sorting unit (pack house)	Rs. 3 lakh/unit with size of 9Mx6M	50% of capital cost	Rs. 3 lakh/unit with size of 9Mx6M	50% of capital cost
Pre-cooling unit	Rs. 15 lakh for 6MT capacity	Credit linked back-ended subsidy @ 50% of cost of project.	Rs. 15 lakh for 6MT capacity	Credit linked back-ended subsidy @ 50% of cost of project.
Mobile pre cooling unit	Rs. 24 lakh/unit for 5 MT capacity	Credit linked back-ended subsidy @ 50% of cost of project.	Rs. 24 lakh/unit for 5 MT capacity	Credit linked back-ended subsidy @ 50% of cost of project.
Cold storage units (construction / expansion / Modernization) with insulation, humidity control, fin foil cooling system with multi chamber	Rs. 6000/MT for 5000 MT capacity	Credit linked back-ended subsidy @ 50% of the cost of project in respect of only those units which adopt new technologies which are energy efficient with provision of insulation, humidity control and fin coil cooling system with provision of multi chambers. Technical standards, parameters and protocol issued by the Department to be adopted.	Rs. 6000/MT for 5000 MT capacity	Credit linked back-ended subsidy @ 50% of the cost of project in respect of only those units which adopt new technologies which are energy efficient with provision of insulation, humidity control and fin coil cooling system with provision of multi chambers. Technical standards, parameters and protocol issued by the Department to be adopted.
Integrated CA chamber with facilities like pre cooling, cleaning, sorting and grading etc.	Rs. 70,000/MT for maximum up to 5000 MT capacity	-do-		

C.A.. Storage units	Rs. 32,000/MT for maximum 5000 MT	do	Rs. 32,000/MT for maximum 5000	do
Reefer vans / containers	Rs. 24 lakh/unit for 6 MT capacity	-do-	Rs. 24 lakh/unit for 6 MT capacity	do
Primary/ Mobile/ Minimal processing unit	Rs. 24 lakh/unit.	-do-	Rs. 24 lakh/unit.	do
Ripening chamber	Rs. 6000/MT for 5000 MT capacity	Credit linked back- ended subsidy @ 50% of cost of the project.	Rs. 6000/MT for 5000 MT capacity	Credit linked back- ended subsidy @ 50% of cost of the project.
Evaporative / low energy cool chamber (8 MT)	Rs. 4.00 lakh per unit	50% of total cost.	Rs. 4.00 lakh per unit	50% of total cost.
Preservation unit (low cost)	Rs. 2.00 lakh/unit for new unit and Rs. 1.00 lakh/unit for up gradation	50% of total cost.	Rs. 2.00 lakh/unit for new unit and Rs. 1.00 lakh/unit for up gradation	50% of total cost.
Low cost onion storage structure (25 MT)	Rs. 1.00 lakh per unit	50% of total cost.	Rs. 1.00 lakh per unit	50% of total cost.
Pusa Zero energy cool chamber (100 kg)	Rs. 4000 per unit	50% of total cost	Rs. 4000 per unit	50% of total cost
Integrated project on production and post harvest management of horticultural crops.	Rs.50.00 lakh	50% of project cost		
Establishment of Marketing Infrastructure for horticultural produce in Govt./ Private / Cooperative sector			**ESTABLISHMENT OF MARKETING INFRASTRUCTURE FOR HORTICULTURAL PRODUCE**	
Terminal Markets	Rs. 150 crore/project	25% to 40% (limited to Rs.50.00 crore) as Public-Private Partnership mode through competitive bidding, in accordance with operational guidelines issued separately.	Rs. 150 crore/project	25% to 40% (limited to Rs.50.00 crore) as Public-Private Partnership mode through competitive bidding, in accordance with operational guidelines issued separately.
Wholesale Markets	Rs. 100 crore	Credit linked back-ended subsidy @ 33.33% of the capital cost of the project.	Rs. 100 crore	Credit linked back-ended subsidy @ 25% of the capital cost of project in general areas and 33.33% in case of Hilly & Scheduled areas for individual entrepreneurs
Rural Markets / Apni mandies/Direct markets	Rs. 20.00 lakh/unit	50% of capital cost.	Rs. 20.00 lakh/unit	Credit linked back-ended subsidy @ 40% of the capital cost of project in general areas and 55% in case of Hilly & Scheduled areas for individual entrepreneurs
Retail Markets / Outlets (environmentally controlled)	Rs. 10.00 lakh per unit	50% of capital cost.	Rs. 10.00 lakh per unit	Credit linked back-ended subsidy @ 40% of the capital cost of project in general areas and 55% in case of Hilly & Scheduled areas for individual entrepreneurs
Static / Mobile Vending Cart / platform with cool chamber.	30,000/unit	50% of total cost.	30,000/unit	50% of the total cost
Functional Infrastructure:				
For collection, grading, etc.	Rs. 15 lakh	50% of total cost.	Rs. 15 lakh	50% of total cost.
Quality control/analysis lab	Rs. 200 lakh	100% of total cost to public sector and 50% of cost to private sector.	Rs. 200 lakh	100% of total cost to public sector and 50% of cost to private sector.
Market extension, quality awareness and market led extension activities for fresh products	Rs. 3 lakh/event	100% assistance to State Government /SHM/ Public Sector Agencies	Rs. 3 lakh/event	100% assistance to State Government /SHM/ Public Sector Agencies
Mini Mission - IV				
Processing & Value Addition				
Setting up of new processing units	Rs.800 lakh	Credit linked back ended capital investment assistance of 50% of cost.		
Up-gradation and modernization of existing processing units	Rs.200 lakh	Credit linked back ended capital investment assistance of 50% of cost.		
Promotional activities	Project based	As per MFPI pattern		
Mission Management			**Mission Management**	

State Level			**State Level**				
State & Districts Mission Offices and implementing agencies for administrative expenses, field consultants, project, preparation, computerization, contingency etc.	4.5% of total annual expenditure against the approved action plan on the basis of appraised needs to the implementing agencies.	100% assistance to implementing agencies.	5% of total annual expenditure against the approved action plan on the basis of appraised needs to the implementing agencies.	100% assistance to implementing agencies.			
Institutional Strengthening – hiring of vehicles, purchase of hardware/software etc	Project based	100% assistance	Project based	100% assistance			
Seminars, conferences, workshops, exhibitions, Kisan Mela, horticulture shows, honey festivals etc.							
State level	Rs. 3 lakh/event	100% assistance subject to a maximum of Rs. 3.00 lakh per event of two days.	Rs. 3 lakh/event	100% assistance subject to a maximum of Rs. 3.00 lakh per event of two days.			
District level	Rs. 2 lakh/event	100% assistance subject to a maximum of Rs. 2.00 lakh per event of two days.	Rs. 2 lakh/event	100% assistance subject to a maximum of Rs. 2.00 lakh per event of two days.			
Technical Support Group (TSG) at State level for hiring experts/staff, studies, monitoring & evaluation, mass media, publicity, video conference etc.	Project based subject to a ceiling of Rs. 50 lakh per annum/state	100% of cost.	Project based subject to a ceiling of Rs. 50 lakh per annum/state	100% of cost.			
National Level			**National Level**				
Technical Support Group (TSG) at national Level for hiring experts / consultants, studies, Seminar / Conference / Workshops, training, contingencies, monitoring & evaluation, mass media, publicity, video conference etc.	Rs. 500 lakh	100% of cost	Rs. 500 lakh	100% of cost			
Technical Collaboration with International agencies like FAO, World Bank, ADB, Bilateral cooperation, International exposure visits / training of officials etc.	Project based, on actual cost	100% assistance.	Project based, on actual cost	100% assistance.			

Appendix - 14.2

Restructured Schemes of Horticulture Development for 12th Plan Period			
Seed and Planting Material Security			
Setting up of nucleus blocks / mother plant and root stock nursery	Central Sector	Rs. 75 Lakh / Ha including virus indexing, tissue culture lab etc	Public Sector
Acquisition of technologies including import of planting material from other countries for evaluation and mass multiplication in order to increase production & productivity of horticulture crops	Central Sector	up to Rs.10 lakh/project	Project based – 100% and only for public sector.
Large Commercial Horticulture Nursery for Vegetatively Propagated Fruit Plants (2-4 ha)	Central Sector	up to Rs. 50 lakh per project	Credit linked back ended subsidy @ 40% of normative cost
Small Commercial Horticulture Nursery for Vegetatively Propagated Fruit Plants (1 to < 2 ha)	Central Sector	up to Rs. 25 lakh per project	Credit linked back ended subsidy @ 40% of normative cost
Setting up of Tissue Culture Units	Central Sector	up to Rs. 50 lakh per project	Credit linked back ended subsidy @ 40% of normative cost
Rehabilitation of existing Tissue Culture (TC) units.	Central Sector	up to Rs. 25 lakh per project	Credit linked back ended subsidy @ 40% of normative cost
Seed Processing and TPS production and processing unit	Central Sector	up to Rs. 25 lakh per project	Credit linked back ended subsidy @ 40% of normative cost
Progeny and Herbal Gardens	Central Sector	Rs. 5 lakh/unit	100% of cost to public sector
Area expansion under Hort. Crops and Promotion of Capital Investment in Essential Infrastructure in Existing Orchards			
Integrated, Hi-tech, Commercial Horticulture Project in Open Field for Area over 2 Ha	Central Sector	Rs. 30 Lakh	Credit linked back ended subsidy @ 30% of normative cost of project (@ 35% for NE and Hily and scheduled Areas)
Integrated, Hi-tech, Commercial Horticulture Project in Protected Condition including Mushroom Cultivation for Area above 1000 Sq M	Central Sector	Rs. 75 Lakh	Credit linked back ended subsidy @ 35% of normative cost of project (@ 40% for NE and Hilly and scheduled Areas)
Integrated, Hi-tech, Commercial Horticulture Project in Open Field for Area up to 2 Ha	Centrally sponsored scheme	Rs. 5 Lakh	Project based subsidy @ 50% of normative cost of project (@ 75% for NE and Hily and scheduled Areas) on 75:15:10 basis in three years
Integrated, Hi-tech, Commercial Horticulture Project in Protected Condition including Mushroom Cultivation for Area up to 1000 Sq M	Centrally sponsored scheme	Rs. 75 Lakh	Project based subsidy @ 40% of normative cost of project (@ 50% for NE and Hily and scheduled Areas) on 75:15:10 basis in three years
Rejuvenation / Replacement of senile plantations	Centrally sponsored scheme	Rs. 30000/ha	50% of cost subject to a maximum of Rs. 15000/ha limited to 2 ha per beneficiary.
Promotion of INM/IPM			
Sanitary and Phytosanitary Infrastructure (Public Sector)	Centrally sponsored scheme	Rs.500 lakh/unit	100% of the cost.
Promotion of INM/IPM	Centrally sponsored scheme	Rs. 2000/ha	50% of cost subject to a maximum of Rs. 1000/ha limited to 4 ha/beneficiary.

Disease forecasting unit (public sector)	Central Sector	Rs. 4 lakh/unit	100% of cost in public sector
Bio Control Lab	Centrally sponsored scheme	Rs. 80lakh/unit	100% of cost to public sector and 50% of the cost to private sector in Credit linked back ended subsidy mode
Plant Health Clinics	Centrally sponsored scheme	Rs. 20 lakh/unit	100% of cost to public sector and 50% of the cost to private sector in Credit linked back ended subsidy mode
Leaf / Tissue analysis labs.	Central Sector	Rs. 20 lakh/unit	100% of cost to public sector and 50% of the cost to private sector in Credit linked back ended subsidy mode
Organic Farming, GAP Certification, Precision Farming			
Adoption of organic farming	Centrally sponsored scheme	Rs. 20,000/ha	50% of cost limited to Rs. 10000/ha for a maximum area of 4 ha per beneficiary, spread over a period of 3 years involving assistance of Rs. 4000/- in first year and Rs. 3000/- each in second & third year, subject to programme being linked to certification.
Organic Certification	Centrally sponsored scheme	Project based	Rs. 5 lakh for a cluster of 50 ha which will include Rs. 1.50 lakh in first year, Rs. 1.50 lakh in second year and Rs. 2.00 lakh in third year
Vermi-compost unit	Centrally sponsored scheme	Rs. 60,000/unit for permanent structure and Rs. 10,000/unit for HDPE Vermibed	50% of cost conforming to the size of the unit of 30'x8'x2.5' dimension of permanent structure to be administered on pro-rata basis. For HDPE Vermibed, 50% of cost conforming to size of 96 cft (12'x4'x2') to be administered on pro-rata basis.
Certification for GAP, including infrastructure	Centrally sponsored scheme	Rs. 10,000 per ha	50% of cost
Precision Farming development and extension through Precision Farming Development Centers (PFDCs)	Centrally sponsored scheme	Project based	100% of cost to PFDCs
Pollination Support through Bee Keeping			
Production of nucleus stock (Public Sector)	Centrally sponsored scheme	Rs. 10 lakh	100% of cost.
Production of bee colonies by bee breeder	Centrally sponsored scheme	Rs. 6 lakh	50% of cost for producing minimum of 2000 colonies / year in Credit linked back ended subsidy mode
Honey bee colony	Centrally sponsored scheme	Rs. 1400 per colony of 4 frames	50% of cost limited to 50 colonies / beneficiary
Hives	Centrally sponsored scheme	Rs. 1600 per hive	50% of cost limited to 50 hives / beneficiary
Equipment including honey extractor (4 frame), food grade containers container (30 kg), net etc.	Centrally sponsored scheme	Rs. 14,000 per set	50% of the cost limited to one set per beneficiary for a group of 100 bee keepers.

Horticulture Mechanization			
Power operated machines / tools including Power Saw and Plant Protection equipments etc.	Centrally sponsored scheme	Rs. 35,000/set	50% of cost limited to one set per beneficiary
Power Machines (upto 20BHP) with rotavator / equipment	Centrally sponsored scheme	Rs. 1.20 lakh/set	50% of cost limited to one set per beneficiary in Credit linked back ended subsidy mode
Power machines (20 HP and above) including accessories / equipments	Centrally sponsored scheme	Rs. 3 lakh/set	50% of cost limited to one set per beneficiary in Credit linked back ended subsidy mode
Import of new machines and Tools for horticulture for demonstration purpose (Public sector)	Central Sector	Rs. 50 lakh/machine	100% of total cost in public sector
Post Harvest Management			
On farm collection and sorting unit (pack house)	Centrally sponsored scheme	Rs. 3 lakh/unit with size of 9Mx6M	50% of capital cost (50% in NE, Hilly Areas and scheduled areas)in Credit linked back ended subsidy mode
Pre-cooling unit	Central Sector	Rs. 15 lakh for 6MT capacity	Credit linked back-ended subsidy @ 50% of cost of project (50% in NE, Hilly Areas and scheduled areas)
Mobile pre cooling unit	Central Sector	Rs. 24 lakh/unit for 5 MT capacity	Credit linked back-ended subsidy @ 50% of cost of project.
Cold storage units (construction / expansion / Modernization) with insulation, humidity control, fin foil cooling system with multi chamber	Central Sector	Rs. 6000/MT for to Rs 8000/MT on existing scheme of NHB for 5000 MT capacity	Credit linked back-ended subsidy @ 40% of the cost of project (50% in NE, Hilly Areas and scheduled areas) in respect of only those units which adopt new technologies which are energy efficient with provision of insulation, humidity control and fin coil cooling system with provision of multi chambers. Technical standards, parameters and protocol issued by the Department to be adopted.
Integrated CA chamber with facilities like pre cooling, cleaning, sorting and grading etc.	Central Sector	Rs. 70,000/MT	-do-
C.A. Storage units	Central Sector	Rs. 32,000/MT for maximum 5000 MT	do
Reefer vans / containers	Central Sector	Rs. 24 lakh/unit for 6 MT capacity	-do-
Primary/ Mobile/ Minimal processing unit	Central Sector	As per normative cost	-do-
Ripening chamber	Central Sector	Rs. 6000/MT for 5000 MT capacity	Credit linked back- ended subsidy @ 40% of cost of the project.
Evaporative / low energy cool chamber (8 MT)	Centrally sponsored scheme	Rs. 4.00 lakh per unit	40% of total cost (50% in NE, Hilly Areas and scheduled areas)
Preservation unit (low cost)	Centrally sponsored scheme	Rs. 2.00 lakh/unit for new unit and Rs. 1.00 lakh/unit for upgradation	40% of total cost (50% in NE, Hilly Areas and scheduled areas)
Low cost onion storage structure (25 MT)	Centrally sponsored scheme	Rs. 1.00 lakh per unit	40% of total cost (50% in NE, Hilly Areas and scheduled areas)
Common Facility Centre / Horticulture Parks	Central Sector	Rs. 4 crores	50% of project cost in Credit linked back ended subsidy mode

Pusa Zero energy cool chamber (100 kg)	Centrally sponsored scheme	Rs. 4000 per unit	40% of total cost (50% in NE, Hilly Areas and scheduled areas)
Establishment of Marketing Infrastructure for horticultural produce in Govt./ Private / Cooperative sector			
Terminal Markets	Central Sector	Rs. 150 crore/project	25% to 40% (limited to Rs.50.00 crore) as Public-Private Partnership mode through competitive bidding, in accordance with operational guidelines issued separately.
Wholesale Markets	Central Sector	Rs. 100 crore	Credit linked back-ended subsidy @ 33.33% of the capital cost of the project.
Rural Markets / Apni mandies/Direct markets	Centrally sponsored scheme	Rs. 20.00 lakh/unit	40% of capital cost (50% in NE, Hilly Areas and scheduled areas)in Credit linked back ended subsidy mode
Retail Markets / Outlets (environmentally controlled)	Centrally sponsored scheme	Rs. 10.00 lakh per unit	40% of capital cost (50% in NE, Hilly Areas and scheduled areas)in Credit linked back ended subsidy mode
Market extension, quality awareness and market led extension activities for fresh products	Centrally sponsored scheme	Rs. 3 lakh/event	100% assistance to State Government /SHM/ Public Sector Agencies
Market Information Services including Market Intelligence	Central Sector	Project based, on actual cost	by Central Nodal Agency
Static / Mobile Vending Cart / platform with cool chamber.	Centrally sponsored scheme	30,000/unit	50% of total cost (55% in NE, Hilly Areas and scheduled areas)in Credit linked back ended subsidy mode
Product Promotion and Market Development Services- Horti-fairs	Central Sector	Project based	100% of sponsored projects
Enhancing Export Competitiveness			
Export Quality Production	Central Sector	100% Grant	At par with Ongoing Scheme of Technology Development & Transfer for Horticulture Development @ 100% Central Grant
Investment in Capital Intensive, hi-tech infrastructure- e.g. Residue Testing Lab, Irradiation Facility, VHT Treatment	Central Sector	50% subsidy	@ 50% subsidy under CFC
Export Support Infrastructures- Integrated Pack-House, Auction Centers, Perishable Cargo Centers at Air Port, Sea Port, LCS etc	Central Sector	50% subsidy	@ 50% subsidy under CFC and @ 40% subsidy for individual projects
Man power development	Central Sector	100% to through public sector	At par with ongoing Scheme of Technology Development & Transfer for Horticulture Development ; @ 100% grant
Functional Infrastructure:			
Long Distance Transport Solution (New Scheme)	Central Sector	Rs. 10 crores per project	50% of project cost,
Quality control/analysis lab	Central Sector	Rs. 200 lakh	100% of total cost to public sector and 50% of cost to private sector.
Horticulture Database			
Horticulture Statistics CES (F &V)	Central Sector	Project based, on actual cost	by Central Nodal Agency
Extension and Technology Transfer			
Horticulture Promotion Services / Expert Services	Central Sector	Project based, on actual cost	by Central Nodal Agency
Development & Transfer of Technology	Central Sector	Project based, on actual cost	by Central Nodal Agency

NCCD	Central Sector	Project based	100% of sponsored projects
Technical Collaboration with International agencies like FAO, World Bank, ADB, Bilateral cooperation, International exposure visits / training of officials etc.	Central Sector	Project based, on actual cost	100% assistance, by Central Nodal Agency
Human Resource development (HRD)			
Training of Farmers including women			
within the district	Centrally sponsored scheme	Rs. 400/day per farmer excluding transport.	100% of cost
Within the State	Centrally sponsored scheme	Rs. 750/day per farmer excluding transport	100% of cost
Outside the State	Central Sector	Rs. 1000/day per farmer excluding transport	100% of cost
Exposure visit of farmers including women			
Within the district	Centrally sponsored scheme	Rs. 250/day per farmer excluding transport	100% of cost
Within the State	Centrally sponsored scheme	Rs. 300/day per farmer excluding transport	100% of cost.
Outside the State	Central Sector	Rs. 600/day per farmer excluding transport.	100% of cost
Outside India	Central Sector	Rs. 3 lakh/participant	Project based. 100% of air /rail travel cost
Training / study tour of Technical officers / field functionaries involved in implementation of the scheme at central / state level including women			
within the State	Centrally sponsored scheme	Rs.200/day per participant plus TA/DA, as admissible.	100% of cost.
Study tour /training in progressive states / units (group of minimum 5 participants) including women	Centrally sponsored scheme	Rs.650/day per participant plus TA/DA, as admissible	100% of cost
Outside India	Central Sector	Rs. 5 lakh/participant	100% of cost on actual basis.
Information dissemination			
Information dissemination through publicity, printed literature etc and local advertisements	Centrally sponsored scheme	Rs. 0.40 lakh per block	100% of total cost
Development of technology packages in electronic form to be shared through IT network	Centrally sponsored scheme	Rs. 1.00 lakh per district	100% of total cost
Special Interventions			
Tackling of emergent/unforeseen requirements of State Government/ implementing agencies	Central Sector	Rs. 10 lakh	100% of the total cost.

Chapter 15: Schemes for Development of Tea, Coffee, Rubber, Spices and Medicinal & Aromatic Plants

Ministry of Commerce implements schemes through its commodity Boards namely, Tea Board of India, Coffee Board of India, the Rubber Board and Spices Board India.

A. Tea Board of India: Tea Board, Kolkata, was constituted under the Tea Act, 1953. The Tea Board functions as a statutory autonomous organization under the aegis of the Department of Commerce, Ministry of Commerce & Industry. The functions of Tea Board, inter alia, include regulation and development of the Tea Industry.

A.1 XI Plan Programmes (ongoing schemes with the results)

A.1.a Objectives for the 11th Plan and Outlay – The XIth Plan schemes of the Tea Board are aimed at increasing production, productivity & quality of tea, factory modernization, export promotion, e-auction, strengthening of Research and Development (R&D), Human Resource Development (HRD), etc., through various schemes/programmes like Special Purpose Tea Fund(SPTF), Quality Up-gradation and Product Diversification Scheme **(**QUPDS), Market Promotion, R&D etc. for the overall development of the Tea Industry. The outlay for the schemes of the Tea Board has been increased by 128% from Rs. 350 crores during Xth Plan to Rs. 800 crores during 11th Plan. The scheme-wise allocation is as under:-

Table 15.1

Sl. No.	Name of the Scheme	Outlay (Rs. In Crores)
1	Tea Plantation Development Scheme including SPTF	316
2	Quality Up gradation & Product Diversification Scheme	230
3	Market Promotion Scheme	119
4	Human Resource Development Scheme	50
5	R&D Scheme	85
	TOTAL	**800**

In addition, in the Union Budget for 2008-09, a sum of Rs. 20 Crore was approved as Centenary Grant towards Tocklai Experimental Station of TRA.

A.1.b Major Outcomes during the XI Plan:

i. **Tea Plantation Development Scheme** (Outlay Rs.316 crore including Rs.261 crore for SPTF which was conceived in 2007)

ii. **Special Purpose Tea Fund (SPTF):** The Government, on 17th January, 2007, approved setting up of the SPTF under the aegis of Tea Board, Kolkata for funding re-plantation and rejuvenation activities aimed at improving the age profile of tea plantations. The Scheme has been approved for implementation till the end of 11th

Plan with an estimated outlay of Rs.567.10 crore (subsidy of Rs. 333.27 crore, spill over of subsidy of Rs. 142.83 crore to the first three years of the 12th Plan and Rs.91.00 crore towards capital contribution) to be provided by the Government. Under the Scheme, borrower's contribution would be only 25% and remaining 75% will be arranged by the Government in the form of subsidy (25%) and loan (50%) from the SPTF. During the first four years of the Plan, 20901 ha and 5740 ha have been replanted and rejuvenated respectively. Other components of the Tea plantation Development Scheme include improvement in drainage and creation of irrigation facilities, new plantations, formation of self-help groups to raise the productivity levels. During the first four years of the Plan, new planting has been done in 2977 hectares and irrigation and drainage has been provided in 9522 hectares. 167 Self Help Groups have been formed.

iii. **Tea Quality Up-gradation and Product Diversification Scheme (Outlay Rs. 230 crores)-**

iv. The Scheme provides financial assistance for product diversification, modernisation of factories, installation of orthodox tea manufacturing, certification and training to small growers etc. In QUPDS subsidy ranging from 25% to 40% is provided for modernization of tea factories. It also provides subsidy for orthodox tea production. 854 units have been modernised and 155 factories have availed assistance for Quality Certification. Subsidy has been availed for production of 303 million kg of orthodox tea.

v. **Market Promotion Scheme (Outlay Rs.119 crores)-**The scheme with an outlay of Rs. 119 crores provides assistance to the producers/exporters for increasing domestic consumption and boosting exports through generic and brand promotion by way of participation in fairs and exhibitions and providing transport subsidy. The Board has participated in 151 fairs and provided transport subsidy for about 102.26 million kg. Electronic auction system has been introduced at all 6 auction centres, viz., Kolkata, Guwahati, Siliguri, Coimbatore, Cochin and Coonoor at a cost of Rs. 9.5 crores and 5 Centres except Siliguri are fully functional.

vi. **HRD Scheme (Outlay Rs.50 crores)-**The scheme with an outlay of Rs. 50 crores, aims to improve labour productivity, skill improvement and welfare of the labour relating to health, education etc. Assistance has been given to 42,000 wards of workers for education.

vii. **R&D Scheme (Outlay Rs.85 crores) -**The Scheme with an outlay of Rs. 85 crores aims to assist research projects by the Tea Research Institute, TRA and UPASI, for quality upgradation, value addition, product diversification, setting of quality control labs, opening of new development offices etc.

viii. The details of physical achievements under the aforesaid Plan schemes of the Tea Board during the first four years of XIth Plan are at **Appendix 15.1.** It is noticed that the major shortfall in achievement of targets has been in the area of new planting and value addition.

A.1. c. Review of XI Plan Schemes/Programmes:- The review of the XIth Plan schemes of the Tea Board has been done by the Department of Commerce and the Planning Commission from time to time. The major problem areas identified are:

a) Slow pace of re-plantation and rejuvenation on account of long gestation period, good prices, lower subsidy and loss of income during gestation period, etc.

b) Increase in the input cost on re-plantation/rejuvenation.

c) Shortage of quality planting material.

d) Scattered nature of small growers.

e) Ownership of land by the small growers- many of the small tea growers are not in possession of patta and are not eligible for any subsidy under various schemes implemented by the Tea Board.

f) Shortage of labour.

g) Individual training instead of Group Training.

h) Development of high-yielding weather-resistant clones.

i) Restriction on felling of shade trees.

j) Leasing of lands under tea to large professional companies in Himachal Pradesh.

k) Pesticides and MRL issues.

A.2. Perspectives for XII Plan – Taking into account the lessons learnt from the implementation of the various schemes during the XIth Plan, the perspectives for the XIIth Plan are as under:

(a) **Planting material requirement**: The modest increase in productivity was due to low yield from old aged bushes. Nearly 40% of the total tea area is having tea bushes which have crossed the economic threshold age limit of 50 years. There is, therefore, an urgent need for renovation of the field assets either by way of replanting/replacement planting or rejuvenation and consolidation. For accelerated renovation programme during the XIIth plan period, there is huge demand for planting materials. Accordingly, the replanting and rejuvenation schemes with enhanced level of subsidy are required to be implemented in a big way.

(b) **Technologies to be developed:** The technologies that need to be developed during the XIIth plan would include the following: (a) Development of high yielding clones with more cuppage and acceptable quality, (b) standardization of nutrient management techniques in a more scientific and professional manner, (c) Mini Tea Factories for Small

Tea Growers, (d) development of cost efficient and effective mechanical harvesters; (e) techniques for processing of Specialty and Ready to Drink Tea, (f) Studies on comparative evaluation of volatile and flavoury compounds on regional basis ; (g) usage of Remote Sensing and GIS in Research and Development decisions. Hence adequate budget provision is required to be made for the purpose.

(c) **Sustainable production and organic cultivation:** The world market for Organic products is growing. India is one of the leading producers of organic tea in the world. The entire Indian production of organic tea is exported. However, in volume terms, the trading in organic tea is very insignificant at it is little over 1% of the total tea produced in India. The current area under organic tea cultivation is 10,503 hectares and the production level is around 10 million kgs. Given the growing demand for organic teas, special assistance needs to be provided to growers for bringing more area under organic tea cultivation during the 12th Plan period.

(d) **Secondary Agriculture:** As there is greater demand for orthodox teas/green teas in the global markets, there is a need for changing the product mix, and focus on value addition. The approach during the ensuing plan period as far as export of tea is concerned, is proposed to be more of value realisation rather than chasing volume. This would be possible only by better value addition and product diversification.

(e) **Marketing:** Although India is the largest consumer of tea in the world, the per capita consumption is much lower at around 800 grams per head when compared to more than 1000 grams in neighbouring countries such as Pakistan, Sri Lanka etc. If the growth rate for consumption remain low surplus of production over consumption demand is likely to affect the prices and in turn the health of the industry. The focus should therefore be on domestic marketing. This will also pave for creating good infrastructure for blending & packaging conforming to the international standards. There is also need to set up tea boutiques in India and overseas. Further, brand promotion of Indian tea in identified markets with adequate fund provision needs to be taken up during the 12th Plan. Such developments will help in the marketing of Indian teas in the export market as well.

(f) **Export**: *Export of tea is essential to maintain supply-demand balance and fetching prices at a sustainable level.* However, for increasing value of exports, exporters need to be encouraged to export more quality teas in value added form for which special incentives are to be provided including the following:

- Duty free imports of packing material and machinery.
- Reduction of freight for tea because high freight cost is a major deterrent.
- Provide special incentives of one time grant, for setting up packaging and blending units for catering to the overseas markets.

(g) **Transfer of Technology:** The output of the small sector had gone up many folds over the last 10 years from 97 million kg in 2000 to 257 million kg in 2011. The number of holdings has significantly increased. It is estimated that there are about 1.57 lakh holdings covering about 1.60 lakh hectares. Having scattered and fragmented small size holdings, the small growers are highly unorganized. For want of technical knowhow, the productivity of these holdings is much lower than the organised sector and because of supply of indifferent quality of green leaf to the factories, the latter end up in producing low quality tea. Thus the tea of this tiny sector is bracketed as low quality low value teas. It is proposed to make this sector produce low cost high value teas during the ensuring plan period. This would call for closer interface with the small growers for collectivisation and providing extension services for proper upkeep of the planted areas and producing good quality teas. Thus the focus would be on:

(1) Extending technical support to the growers on young tea management and

(2) Facilitating the growers to organize themselves into Tea Producers' Society / Federation for sustainability to deliver good quality leaf to the processing factories.

(3) Extending Technical support to owners of the Bought Leaf Factories on the manufacturing aspects and also monitor their performance and disposal of tea waste (Regulatory measures).

(h) **Database development and statistics:** There is greater need for latest data as to the area, production, prices etc. for taking informed decisions by the major stakeholders and policy makers. A baseline survey of tea plantations needs to be done through Field Officers of the Tea Board for which adequate funds are required to be provided during the XIIth Plan.

(i) **Human Resource Development needs**: Tea is highly labour intensive crop. Induction of professionalism in plantation management, skills improvement at all levels from workers to managers would be the focus during the XII^{h} Plan.

(j) **E-Auction**: The Tea Board has developed customized software for e-auction of Tea providing, inter alia, online trading facilities to the buyers and ensuring procedural transparency. This platform needs to be further strengthened during the XIIth Plan.

(k) **Social Cost:** As per the Plantation Labour Act, 1951, garden owners have to provide certain welfare measures for workers of gardens in tune with the provisions of the Act. This has resulted in increased cost of production and makes the Indian Tea uncompetitive in the international market. In the background of Indo-ASEAN Trade in Goods Agreement, with a view to finding out the structural infirmities in tea sector a study was entrusted to the Indian Institute of Plantation Management (IIPM), Bangalore. The recommendations contained in the Report submitted by the Institute, inter alia, include sharing of social cost between the Centre and the Industry. The recommendation may be suitably considered by the Govt. while preparing the schemes for the XIIth Plan so as to

ease the burden of social cost on the industry and reduce the cost of production of tea. This may also be considered under RKVY.

(l) **Crop Insurance for Tea:-** Coffee Board is implementing a Weather (Rainfall) Insurance Scheme for coffee growers during the 11th Plan. The scheme has mixed response from the growers. Since the tea plantation is vagaries of nature as well as pest, it is proposed that an insurance scheme for tea sector may be evolved during the XIIth Plan on the lines of coffee vis-a-vis the peculiar nature of tea plantations.

(m) **Continuation of Assistance for Orthodox Tea Production:** Govt. has been promoting production of Orthodox tea by providing subsidy for actual production of leaf grades and dust grades and additional incentives on the incremental volume over previous year. As almost all the Orthodox Tea produced in the country is exported, there is need to continue the assistance for orthodox tea production during XIIth Plan with higher rate.

(n) **Lost glory of Kangra Tea** – Kangra Tea has its own importance in the world market. However, it has lost its glory in the past few years. During the 12th Plan, a concerted effort may be made to revive the lost glory of Kangra Tea in consultation with the Tea Board, Government of HP, H.P. Krishi Vishwavidyalaya, etc.

(o) **Assistance for export of tea from other places like ICD, Amingaon**- Transport subsidy for the teas exported directly from ICD Amingaon (Assam) is provided @Rs.1.50/kg. Assistance for export of tea from other places is proposed to be explored during the XIIth Plan.

A.3. Proposed Targets for the XIIth Plan:

As the area under tea has been stagnating, to increase the area it is proposed to take up new plantation during 12th Plan. Further, steps would be taken to improve productivity which would result in increased production. It is targeted to achieve growth of about 3.5% in area during 12th Plan period with average annual increase of 0.7% .The targets for productivity and production are estimated at 2.2% and 5% per annum. Further, the aim is to meet the domestic demand in full and to increase exports by 1.5% per annum.

A.4. Recommendations for XIIth Five Year Plan: Keeping in view the major problem areas identified on review of implementation of the schemes during XIth Plan, consultations held with the stakeholders and the perspectives and the targets for the XIIth Plan, the recommendations are as follows:

i) As a sizeable area is having tea bushes which has crossed the economic threshold age limit of 50 years, replanting and rejuvenation schemes with enhanced level of subsidy are required to be implemented in a big way. For this purpose special efforts also need to be made through research and development for meeting the

huge demand for planting materials, farm mechanization to address the problem of labour shortage and development of suitable technologies for development of high yielding clones.

ii) Special assistance needs to be provided to growers for bringing more area under organic tea cultivation and assistance at increased rate may be provided for increasing Orthodox tea production and value addition.

iii) Marketing particularly domestic marketing of tea needs to be given special emphasis. For increasing exports, in addition to existing schemes, Brand promotion of Indian tea in identified markets with adequate fund provision needs to be taken up during the XIIth Plan.

iv) The exporters of tea may be encouraged to export more quality teas in value added form for which special incentives needs to be provided which may include duty free imports for packing material and machinery, reduction of freight for tea, special incentives for setting up packaging & blending units, transport subsidy etc.

v) The small tea growers need to be given more focus for technical support on tea management, manufacturing aspects of bought leaf factories, organizing themselves in the shape of societies/federations.

vi) The baseline survey of tea plantations needs to be taken up on priority.

vii) The e-auction platform of the Tea Board needs to be further strengthened during the XIIth Plan.

viii) Sharing the social costs by the Central Govt., State Govt. and the Industry may be considered so as to reduce the production cost of tea.

ix) As the tea plantation is subjected to vagaries of nature as well as pests, insurance cover for the tea sector needs to be considered during the XIIth Plan

A.5 Budgetary Requirement for Tea Board Schemes-

Table 15.2

Sl.No	Name of the Scheme	XIth Plan Outlay in Rs. Crores	Projected outlay for XIIth Plan (2012-17) (Rs. In crore)
1	Plantation Development Scheme including Special Purpose Tea Fund for Re-plantation & Rejuvenation	316	**650**
2	Quality Up-gradation and Product Diversification Scheme	230	**450**
3	Market Promotion Scheme	119	**250**
4	HRD Scheme	50	**100**
5	Research and Development Scheme	85	**150**
Total		**800**	**1600**

B. COFFEE- The Coffee Board: The Coffee Board, constituted by the Government of India through the Coffee Act of 1942 is a statutory organization under the Ministry of Commerce & Industry. It looks after the overall growth and development of the Indian Coffee Industry. The major thrust areas of the Board include research & development, extension, promotion, quality control and market information dissemination.

B.1- XI Plan Programmes (ongoing with the results)

B.1.a Objectives for the XI Plan & Outlay: The XI Plan schemes are aimed at achieving the objective of increasing production, productivity and quality of coffee, exports and domestic coffee consumption through various programmes under Research, Extension, Development, Market Development both domestic and international for the overall development of the coffee industry. The approved outlay of the XI Plan for Coffee is Rs.600.00 crores against the 10th Plan outlay of Rs.298.93 crores and the scheme wise outlay is as follows:

Table 15.3

SL. NO.	SCHEME	Approved Outlay (Rs. in Crores)
1	R & D for Sustainable Coffee Production	90.00
2	Development Support	310.00
3	Market Development	30.00
4	Risk Management to Coffee Growers	80.00
5	Export Promotion	45.00
6	Support for Coffee Processing	45.00
	TOTAL Total	**600.00**

B.1.b Major Outcomes during XI Plan:

i. **Coffee Production**: Though, the Board had set ambitious production targets at the time of the formulation of XIth Plan i.e 3.35 lakh tonnes by the terminal year of XIth Plan, the production targets could not be achieved on account of lower productivity as well as adverse weather conditions.

ii. **Coffee Exports**: The Board had projected an annual average growth rate of 5% in exports keeping in view of the high production targets originally envisaged. However, due to shortfall in production in the first four years of the XIth Plan, revised export targets had to be set based on production potential, on a year on year basis.

iii. **Domestic Coffee Consumption**: Due to supply constraints and increased demand for coffee in the overseas markets during the XIth Plan period, there was stagnation

in the domestic coffee consumption, which was placed at 50-55,000 tonnes per annum.

B.1.c. The scheme-wise achievements are as under:

(a) Research & Development for sustainable coffee production: The Research & Development for Sustainable Coffee Production scheme had components namely (1) Development of technologies for sustainable Coffee production, productivity & quality (2) Transfer of Technology through Extension centres (3) Infrastructure development for R & D and (4) Improvement of labour productivity through appropriate mechanization efforts. The progress on various research projects are:

(i) Evolving Improved Coffee Varieties with resistance major pests & diseases :

- A total of 28.42 MTs of seed material has been supplied to the growers during 4 years of XIth Plan period as against the plan target of 25 MTs.
- Released a new semi dwarf Arabica plant variety of coffee viz. Chandragiri in December, 2007.
- Characterization and cataloging of about 300 arabica germplasm collections established at CCRI has been completed.
- Development and evaluation of superior robusta lines with respect to yield, quality, early ripening behaviour and drought tolerance. Superior robusta lines with respect of yield, quality and drought tolerance has been identified.
- Studies on biochemical composition and their association for pest resistance & identification of root stock combination for drought and nematode tolerance.
- Biochemical approaches for disease, cold and heat tolerance.
- Evolving physiological strategies and methods for drought management.
- Identification of physiologically efficient genotypes.
- Studies on influence of fungicides and leaf extracts on growth and development and control of leaf rust.

(ii) **Improvement of labour productivity through mechanization**:

Development of various farm machinery and implements for reducing drudgery of workers in carrying out various farm operations in coffee plantations and also to reduce the cost of cultivation by way of mechanization.

- Evaluation of mechanical weed cutter verses manual weeding was worked out. The results reveal that weeding by mechanical weed cutter can save up to 50% of the

costs over the manual weeding. In terms of man days nearly 07 man days can be saved by mechanical weed cutters.

- Evaluated Pit diggers : More efficient compared to manual
- Evaluation of rotary mower verse brush weed cutter is in progress.
- Evaluation of prototype machines in coffee estates and evaluations of Harvesters

(b) Development support scheme for coffee: The scheme is aimed to provide support to coffee growers to increase production and to improve farm productivity. This Scheme has the following seven components:

(i) **Re-plantation**: The total area covered under the re-plantation subsidy for 4 years of XI Plan period works out to 12,588 ha against the target of 15,000 ha..

(ii) **Water Augmentation, Quality Up-gradation and Pollution Abatement**: The physical achievement under this component for 4 years (from 2007-08 to 2010-11) of XI Plan period works out to 16240 units against the target of 12340 units.

(iii) **Coffee Development in North Eastern Region:** The total area covered under expansion and consolidation of area during the 4 years is 1351 Ha. against the XI plan target of 1850 Ha. The progressive achievement in respect of quality up-gradation for 4 years is 1208 units against the Plan target of 820 units.

(iv) **Coffee Development in Non-Traditional Area:** As against the target of supporting 4750 units of pulper and drying yard for the Plan period, the physical achievement during the first 4 years is 5829 units which has exceeded the target of the XIth Plan.

(v) **Capacity building for all stakeholders:** Totally, 12030 persons have been covered under this component during 4 years, as against the XIth Plan target of 15,000.

(vi) **Welfare support to labourers and tiny coffee growers**: As against the target of 15000 beneficiaries for XIth Plan, the achievement during the first 4 years is 20961 beneficiaries, which has exceeded the XIth Plan target.

(vii) **Interest Subsidy to Growers on Working Capital Loans**: As against the physical target of 90000 growers/beneficiaries per year, the total achievement for 4 years of XIth Plan is only 27343 growers.

(c) Market Development: The objective of this Scheme is development of domestic coffee market and Market Intelligence/Research. As part of domestic promotion activities, the Board participated in 143 domestic events and 432 Nos. of publicity through print media during 4 years of XIth Plan (2007-2011).

(d) Risk Management to coffee Growers – Implementation of the Weather (Rainfall) Insurance Scheme for coffee Growers has shown that it is an effective risk management tool to the coffee growers against the vagaries of weather pattern especially nature of rainfall

distribution over last few years as the payouts (about Rs. 15 crores) are high compared to the premiums (Rs. 7 crores).

(e) Export Promotion of Coffee: As part of export promotion activities, participated in 53 international events and organized 13 BSMs during the 4 years of XIth Plan period. Export incentive for export of value added coffee @ Rs. 2 per Kg has been extended to 22482 MTs of value added coffee during 4 years of XIth Plan up to 2010-11.

(f) Support for coffee Processing: Support has been extended for 55 units during 3 years of XIth Plan (2008-2011) and the progressive financial achievement up to 2010-11 under the scheme is Rs. 1.89 crores.

(g) Support for Mechanisation of coffee estates operations: The scheme is aimed to provide support to coffee growers to encourage the use of farm machineries to improve productivity and efficiency in carrying out crucial farm operations for coffee in time particularly in the context of farm labour. The scheme was implemented by the Coffee Board during February-March 2011. The physical achievement during 2010-11 is 1564 units and the financial achievement is Rs. 1.98 crores.

Physical and Financial targets achieved during the first four years of XIth Plan are given in **Appendix 15.2.**

B.2 Perspectives for XII Plan – Priorities, Programmes and Strategies for Coffee Sector-

On the basis of implementation of the programmes during 11th Plan, consultations held with the stakeholders, following priorities/ thrust areas, programmes and strategies have been identified for the growth and sustenance of Indian coffee sector in the XII Plan period:

a. **R&D for evolving improved planting material with disease/ pest tolerance and developing eco-friendly, cost effective technologies for sustainable coffee production**- During the XIIth Plan period, emphasis will be given for integration of molecular and biotechnological approaches with conventional breeding programmes for evolving elite plant varieties; commercialization of rapid multiplication especially in case of cross pollinated Robusta for supplying elite material for planting/replanting programmes; improving health of soil, plant and environment and modifications to planting designs to suit mechanization.

b. **Support for replanting of coffee, Water augmentation and Quality up-gradation for improving production, productivity and quality-** During the XIIth Plan since decline in productivity due to aged/senile plantations is a major concern, it is proposed to continue the replanting scheme with modifications to reflect the unit cost based on current rates and enhanced level of subsidy. There is a need to extend the benefits to corporate and Co-operatives as a substantial area of 25% is left out. Further, new planting is proposed to be taken up in non-traditional areas.

c. **Improving labour productivity through Mechanization of farm operations in coffee estates**- In recent years, there is a serious shortage of workers in plantation areas due to migration to urban areas. Even the labour wages have also gone up sharply during the last 5 years. In order to address the problem of labour shortage, the Research Department of the Board evaluated and identified few types of machinery like weed cutters, pit diggers, coffee harvesting machines, and sprayers etc., which help in ensuring saving in labour / costs. This new scheme has been sanctioned only towards the end of XIth plan and it is proposed to continue the scheme during XIIth Plan period also with a provision to include more types of machinery/ equipment, so as to facilitate large scale adoption of mechanization in coffee estates to address the problem of labour shortage & make our coffee more competitiveness

d. **Risk management tool to coffee growers (weather based insurance against crop losses)-** Inconsistencies in weather pattern due to climate change have become a frequent phenomenon in coffee tracts. Under the Coffee Rainfall Insurance scheme, Coffee Board/GoI is extending premium subsidy up to 50% of premium for small growers (up to 10 ha) subject to a ceiling of Rs.2,500/ha for Arabica and Rs. 2,000/ha for Robusta. In view of the importance of risk mitigation against vagaries of weather, there is a need to continue with CRIS scheme during XIIth Plan.

e. **Creation of data base on coffee area holding pattern**- The Census of coffee estates was done some three decades ago. It is proposed to undertake elaborate Census of coffee holdings in different states to update data base on coffee area, holding pattern, infrastructure facilities, water resources etc. complemented with area estimation using remote sensing application.

f. **Expansion and consolidation of coffee holdings in Tribal areas of the NTA and NER**- The scheme aimed at expansion and consolidation will be continued during XIIth Plan also. Besides, support will also be extended towards the activities like quality improvement, marketing, capacity building among the tribal growers in the NTA and NER.

g. **Transfer of technology**- The extension activities are focused on improving the knowledge and skill involved in various cultivation aspects for improving production, productivity and quality of coffee at farm level and are required to be continued during the XII Plan.

h. **Promotion of Indian coffee in domestic and export markets**- The Coffee promotion scheme needs to be continued during the XIIth Plan with emphasis on value addition and differentiation in the export promotion and through capacity building and support for coffee processing in domestic market.

i. **Capacity building among various stakeholders of coffee sector**- There is an imperative need to continue the capacity building efforts across all stake holders of the coffee sector for the sustained growth of the industry. To achieve this, competent national and international institutions will be involved to develop suitable curriculum which would help in uplifting the skills and technical requirement of all stakeholders.

j. **Welfare measures to farm workers/ tiny growers**- The benefits of welfare schemes like educational stipends, support for higher education and profession courses are very much essential towards socio-economic-educational improvement of families of workers and tiny growers. This scheme needs to be continued with focus on education in agriculture and plantation specific areas.

B.3 Proposed Targets for the XIIth Plan: To increase the area under Coffee, it is proposed to take up new plantation during 12th Plan in non-traditional areas and the NE States. Further, steps would be taken to achieve increased growth in production, productivity, exports and domestic consumption. Accordingly, the estimated annual increase targeted during 12th Plan in area, production, productivity, export and domestic consumption in respect of coffee is 1.10%, 3.50%, 2.50%, 4.30% and 4.60% respectively.

B.4 Recommendation for the XIIth Five Year Plan: Keeping in view the areas identified on review of implementation of the schemes during XIth Plan, consultations held with the stakeholders, the perspectives and the proposed targets for the XIIth Plan, the recommendations are as follows:

i) Research and Development schemes may be implemented for evolving improved planting material with disease/pest tolerance, developing eco-friendly, cost effective technologies for sustainable coffee production and should include establishment of weather stations in coffee growing regions.

ii) As decline in productivity due to aged/senile plantations is a major concern, the existing replanting scheme needs to be continued with modifications to reflect the unit cost based on current rates and enhanced level of subsidy. The benefits need to be extended to corporate and co-operatives as substantial area of 25% is left out.

iii) The scheme approved for mechanization of farm operations in coffee estates towards end of the XIth Plan needs to be continued during XIIth Plan with provisions to include more types of machinery/equipment so as to facilitate large scale adoption of mechanization in coffee estates to address the problem of labour shortage and make coffee more competitive.

iv) The risk management scheme, viz., weather based insurance against crop losses needs to be continued during XIIth Plan.

v) As census of coffee estates was done some three decades ago, elaborate census of coffee holdings in different States to update data base using remote sensing applications needs to be carried out.

vi) As 99% coffee growers are small growers, increased support for growers collectives should be considered during XIIth Plan.

vii) The existing schemes for consolidation of coffee holding in tribal areas, extension activities for improving the knowledge and skill involved in various cultivation aspects, promotion of coffee in domestic and export markets, capacity building and welfare measures for farm workers need to be continued during XIIth Plan.

B.5 Budgetary Requirement for Coffee Board-

Table 15.4

Sl. No.	Name of the 12th Plan Schemes	XIth Plan Outlay in Rs. Crores	XII Plan (2012-17) Proposed Outlay (Rs. crore)
I	R&D for Sustainable Coffee Production	90	**180**
II	Development Support Scheme	310	**620**
III	Risk Management to Growers	80	**160**
IV	Market Development	30	**60**
V	Support for Coffee Processing	45	**90**
VI	Export Promotion	45	**90**
	Grand Total :	**600**	**1200**

C. NATURAL RUBBER-

The Rubber Board: The Indian Rubber Board was constituted under the Rubber (Production and Marketing) Act 1947. The mandate of the Board is to function as an apex body for the overall development of the Indian rubber industry. It renders necessary advice to the Government of India in formulation and implementation of appropriate policies and programmes with the aim to make production, processing and marketing of NR in the country globally competitive.

Co-operatives: Rubber Board encouraged smallholders to constitute Rubber Marketing Co-operatives by providing organizational assistance, share participation, working capital loans etc. About 40 co-operatives are now functioning successfully, with either districts or taluks as their areas of operation. Besides rubber marketing, these societies undertake marketing of various plantation inputs such as fertilizers, fungicides, acid for coagulation of latex, tapping aids etc.

Rubber Producers' Societies (RPSs) **:** Rubber Producers Societies were formed to function as extension arms of the Board. They facilitate practical dissemination of extension programmes and also render effective service to the one million small holders of the country.

C.1 Programmes (ongoing) with results during XIth Plan

C.1.a The thrust areas of the XIth Plan are as follows: -

- Increasing rubber production and productivity;
- Reducing cost of production and cost of processing;
- Optimum utilisation of available resources like land, water, human capital;
- Promoting group approach and strengthening farmer groups;
- Accelerating development programmes in North-East; and
- Intensifying research to evolve cost effective agro-technology to increase productivity.

On the basis of the thrust areas, six schemes are being implemented in the XIth Plan with a total outlay of Rs. 580.00 Crore. The Xth Plan outlay of the Rubber Board was Rs.385.00 crore.

C.1.b Schemes and Outlay under XIth Plan

Table 15.5

Scheme	Initially Approved Outlay (Rs. in crore)
1. Rubber Plantation Development	240.00
2. Rubber Research	60.00
3. Processing, Quality upgradation & Product development of rubber	44.00
4. Market development and export promotion	44.00
5. Human Resource Development	42.00
6. Rubber Development in North-Eastern region	150.00
Total	**580.00**

The main objectives and components of the six schemes are summarised below.

(a) Rubber Plantation Development (Outlay Rs.240 crore)-The objective of this scheme is to promote replanting of old and uneconomic plantations with high yielding varieties adopting latest agro-management practices. Expansion of rubber area through new planting especially in the non-traditional region and enhancing productivity from existing plantations. During 4 years of the Plan period, the financial achievement is Rs. 223.34 crores as against the target of Rs. 228.50 crore. In terms of physical achievements, an area of 18538 hectares has been covered under replanting as against the target of 24000 hectares. The area under new planting is 10863 hectares as against the target of 6000 hectares. The major components of the Scheme are as follows: -

(i) **For new planting and replanting in the traditional region**: Rs. 19,500 per ha for growers having area up to 5 ha with financial assistance limited to 2 ha only

(ii) **For new planting and replanting in the non-traditional region**: Rs. 22,000 per ha for growers having area up to 20 ha. Reimbursement of the cost of planting materials @ Rs. 8.00 per plant limited to 500 plants per ha. ie. Rs.4000 per ha and transportation grant of Rs. 4000 per ha for transporting plantation inputs to the site are also provided. The scheme includes a component for tribal settlement through rubber cultivation, implemented in collaboration with State Govts. and beneficiaries.

(iii) **Productivity enhancement:** This component of the scheme envisages procurement of critical inputs in bulk by the Board and distribution to the smallholders through Rubber Producers Societies (RPS). Another component is to promote conserving rain water falling in plantations by making silt pits, an environmentally good practice that helps in protecting top soil and enhances yield.

(iv)**Farmer group formation and empowerment**: Group activities are promoted among smallholders at the grassroots level by formation and strengthening of RPS and self-help-groups (SHGs) under them. The RPS and SHGs are supported through special projects aimed at socio-economic development of the resource poor farmers and their families.

(v) **Rubber Plantation Development - Non-Traditional Region Other than NE**: The Scheme covers new planting and replanting of rubber and other assistance programmes in non-traditional regions excluding North East.

(vi) **Staff skill up gradation and consultancy***:* This component is to enhance the skill and capability of extension officers, especially in areas like participatory extension management, community based development etc.

(b) Research Scheme (Outlay Rs.60 crore)- Rubber being a perennial tree crop with gestation period of about seven years having economic life spanning over 25 years, continuous and long term research efforts are essential for improvement in productivity, effective disease management and devising cost minimising and income augmenting agronomic practices. During 4 years of the Plan period**,** the financial achievement is Rs. 64.96 crores as against the target of Rs. 59 crores. **During the year 2010-11,** the Board has spent Rs. 19.45 crores as against the target of Rs. 21.00 crores.

(i) **Crop Management**: The Regional soil and tissue testing laboratories and the central laboratory undertake analysis of soil and leaf samples received from large estates and smallholdings and necessary fertilizer recommendations are offered in time.

(ii) **Crop Improvement**: This includes strengthening of research activities of Botany, Biotechnology, Germplasm divisions and Genome Analysis Lab.

(iii) **Crop protection**: Under this, focus is accorded to various studies related to disease and pest control, molecular aspects of pathogenesis, pollution control etc.

(iv) **Advanced Centre for Molecular Biology & Biotechnology**: The Biotechnology division and other divisions under crop improvement, crop physiology and crop

protection are engaged in molecular biology research on various aspects of abiotic and biotic stresses, yield component studies, genome mapping etc.

(c). Processing, Quality Up gradation and Product Development (Outlay Rs.44 crore)- It is necessary to reorient the Indian rubber production and processing sectors towards the global standards and equip them in attaining competitiveness in cost, quality, delivery schedules and packaging. Further, for attaining competitiveness in cost, it is necessary to exploit fully the potential available for value addition and ancillary income. In this context, the huge potential available in the commercial utilization of rubber wood has to be fully tapped by promoting and modernizing this sector. During the 4 years of the Plan, the financial achievement is Rs. 19.88 crores as against the target of Rs. 33 crores. In terms of physical achievements, quality up gradation and modernisation of 52 and 59 processing units has been done against the targets of 20 and 24 respectively. 10 processing, value addition & quality improvement units has been done against the target of 16 units.

(d) Market Development & Export Promotion of NR (Outlay Rs.44 crore)- The main objective of the Scheme is to assist the NR sector to attain international competitiveness in marketing practices. The sector comprising RPS, rubber processing and trading companies promoted by Rubber Board and Co-operatives is given special emphasis. During the 4 years of the Plan, the financial achievement is Rs. 27.64 crores as against the target of Rs. 31.50 crores. In terms of physical achievements, 5units of 100 MT godowns and 1 unit of 1000MT godown have been set up as against the targets of 20 units and 1 unit respectively. 64 units in the RPS sector have been strengthened in the marketing of rubber against the target of 44 units. 1,60,793 tonnes of NR has been exported as against the target of 200000 tonnes.

(i) **Market development**: Activities under this component aim at strengthening the RPS, rubber processing and trading companies promoted by Rubber Board and Co-operatives in improving marketing of NR. Small growers of rubber are encouraged to market their produce through such agencies. Working capital assistance, construction of godowns and infrastructure development are covered.

(ii) **Export promotion**: To equip the sector to enter into the international market, it is essential that the NR produced in the country meet international standards in quality, price, packaging and delivery schedules. It is also necessary to promote rubber wood in the national and international markets as an eco-friendly timber suited for furniture and interiors. Exposure to international market would enhance the quality standards of NR and provide an alternative marketing channel. Participation in international trade fairs related to NR and rubber wood to promote export and to publicise Indian NR and rubber wood in overseas markets is a main activity.

(e) Human Resource Development (Outlay Rs.42 crore)- Organizing training programmes for various segments of the rubber industry, welfare programmes for rubber plantation workers and infrastructure development are the three major components of this scheme. During the 4 years of the Plan**,** the financial achievement is Rs. 35.93 crores as against the target of Rs. 37.50 crores. In terms of physical achievements, assistance has been given to 95,174 workers under labour welfare programme and 47,649 beneficiaries have been trained under various training programmes.

(i) **Training:** The training component mainly covers programmes aiming at enhancing the technical and managerial competitiveness of the rubber growers, supervisory staff, rubber processors and rubber product manufactures.

(ii) **Labour welfare:** This component includes educational stipend and merit award for the children of plantation workers; medical attendance, housing subsidy and insurance-cum-deposit scheme for plantation workers.

(f) Rubber Development in NE Region (Outlay Rs.150 crore)-The NE region has predominantly sub-tropical climate with humid summers, severe monsoon and mild winters. The agro-climatic conditions render the region nearly suitable to produce a range of plantation crops including NR, spices, fruits, vegetables, flowers etc. Promotion of rubber cultivation in NE are settlement of shifting cultivators through assured permanent income and preservation of ecosystem by preventing "*jhuming*" practices. This special scheme exclusively for the NE region is implemented with a view to ensure that the region receives special attention in various rubber developmental programmes implemented during the Eleventh Plan. During the 4 years of the Plan**,** the financial achievement is Rs. 116.51 crores against the target of Rs. 102.50 crores. In terms of physical achievements, an area of 26,466 hectares has been brought under new planting as against the target of 18,000 hectares. In replanting, the physical achievement is zero as against the target of 1400 hectares.

C.2 Achievements during XIth Five Year Plan- The impact of the Plan Schemes of XIth Plan is obvious from the following facts:-

(i) Indian NR Sector recorded highest yield in terms of unit output irrespective of sub-optional agro-climatic conditions and low size of holding.

(ii) NR sector has become exemplary in promoting group approach in extension activities. There is an effective network of RPSs, co-operatives and Rubber Board promoted companies.

(iii) Supply of inputs helped in checking market prices.

(iv) Rubber growers in India get the highest farm-gate price.

(v) There is an efficient market intelligence collection and dissemination system in place.

(vi) Concerted research activities had lead to the development of indigenous clones and appropriate agronomic practices.

(vii) Successful extension of cultivation of NR to Northeast and other non-traditional regions is a big achievement.

(viii) Economic viability of rubber cultivation has been enhanced substantially through innovation and propagation of cost saving and yield/income augmenting culture practices.

Physical and Financial targets achieved during the first four years of XI Plan are given in **Appendix 15.3**.

C.3 Perspectives for XIIth Plan- Priorities, Programmes and strategies for Rubber Board -

Following priorities /thrust areas, programmes and strategies have been identified for the growth and sustenance of Rubber Sector in the XIIth Plan period:-

(i) **Crop Improvement and Management:** Most of the research schemes under various disciplines like Crop Improvement, Crop Management, Crop Protection etc. are of long term duration which will have to be essentially continued during XIIth plan also. However, short term projects have to be concluded in time and the results/findings should be transferred to the beneficiaries. Re-planting, new planting and rejuvenation activities need to be continued during XIIth plan period. There is a large gap between consumption and production as a large portion of the land is overdue for re-plantation. There is need to enhance the level of subsidy for re-plantation and expansion. Accordingly, the replanting and rejuvenation schemes with enhanced level of subsidy are required to be implemented in a big way during XIIth Plan.

(ii) **Research:** RRII has made tremendous progress in Hevea breeding research by evolving high yielding clones despite the long breeding cycle and absence of any specific early yield prediction parameters. More than 150 clones are in the pipeline for field testing. Adoption of molecular and physiological markers assisted breeding, use of Quantitative Trait Loci (QTL) maps for early selection etc. are areas of priority in crop breeding for the coming plan period. Use of these valuable genetic materials in breeding programmes is another area of priority.

iii) **Production of Genetically Modified Plants:** More production of Genetically Modified plants and field testing will be addressed in the XII plan period. Though RRII had made considerable progress in gene sequencing of Hevea genome, very little progress (6%) has been achieved in registering the genes in the Genbank when compared to other countries like China and Malaysia (46%). Hevea nuclear DNA sequencing is an area that deserves immediate attention.

iv) **Farm Mechanisation:** Farm mechanisation has attained importance due to severe shortage of farm workers and rising cost of skilled labour. More research has to be done for farm mechanisation in NR sector especially in planting operations, spraying etc. Prototypes of tapping machines have been developed and are under testing. Further research in mechanisation of tapping is a priority area. Fine tuning of the frequency tapping and standardizing yield stimulation procedures is again essential to address the labour shortage. Formation of Rubber Tapper Bank is one of the measure to address labour shortage. The concept of Rubber Tapper Banks is proposed to be formulated and made regular component of the scheme.

v) **Transfer of Technology to farmers:** The local communities are ignorant about NR cultivation and its economic benefits. In this region RRII would like to adopt a small village (a cluster of households) and establish technology demonstration plots which could act as slow catalysts for further expansion of NR cultivation by the local communities in the region. This will help to educate the rural population the economic potential of NR cultivation in their lands which will empower them against exploitation by outsiders and take up NR cultivation on their own.

vi) **Good Agriculture Practices:** Another area of immediate attention is the growing concern about use agricultural chemicals. Although NR plantations consume far less of these compared to most other crops, there is still a need to address these concerns. Evolving disease tolerant clones, GM rubber etc. are the strategies that require getting a boost in future. RRII in association with Bharath Petroleum has been testing bio-degradable spray oils. New proposals will be taken up to develop eco-friendly bio-formulations for control of diseases like ALF.

vii) **Need to Combat Climate Change:** Climate change will continue to pose major obstacles in our efforts to increase NR production in the country. A comprehensive modeling of the effects of climate change on NR plantations has not been done so far and this lacuna will be addressed at the earliest during XIIth Plan.

viii) **Need to evolve technology extension services:** Establishing a state-of-the-art tyre testing facility is a felt need in the industry. A need is felt that the Laboratories should have accreditation or ISO certification which would improve relations with the industry. This will help to bridge the wide gap that currently exists in technology extension service by Rubber Board, both in the tyre and non-tyre industry in the country.

ix) **Need to Introduce Crop Insurance scheme:** The plantation sector including rubber has suffered due to periodic booms and busts. In addition to volatility in prices, the farming activities have also been vulnerable to pest and climate related risks. Age profile of the plantations has severally affected the yields, quality, prices and overall competitiveness of the sector. With a view to address these problems, Price Stabilization Fund Scheme' was launched in April, 2003 with Corpus Funds of Rs. 500 Crores for a

period of ten years which, however, is not doing well due to poor response of the farmers towards the same. A need was, therefore, felt to introduce a better Scheme viz. Crop Insurance which is proposed to be implemented during XIIth Plan.

Proposed Targets for the XIIth Plan: There is tremendous increase in domestic consumption of Rubber. Hence, the coverage of area, production and productivity is to be increased. Hence, estimated annual growth rate of 2.8% in Area, 5.3% in production and 1.5% in productivity is targeted for the XIIth Plan. Further, the consumption is likely to increase by 4.5% on annual basis.

C.4 Recommendations for XIIth Five Year Plan: Keeping in view the problem areas identified on review of implementation of the schemes during XIth Plan, consultations held with the stakeholders, the perspectives and the targets for the XIIth Plan, the recommendations are as follows:

i) Replanting, new planting and rejuvenation activities taken up during 11th Plan need to be continued during XIIth Plan with enhanced level of subsidy.

ii) Rubber being a perennial tree crop having economic life spanning over 25 years, continuous and long term research efforts are essential for improvement in productivity, effective disease management and devising cost minimising & income augmenting agronomic practices. Hence, Research and development needs to be conducted in a big way during XIIth plan in the areas of evolving high yielding and disease tolerant clones, more production of genetically modified plants, concerns about use of agricultural chemicals, farm mechanization, effects of climate change on Natural Rubber plantations etc.

iii) There is growing shortage of labour especially tappers in rubber plantations. Measures need to be taken to attract/sustain tappers in rubber plantations during XIIth Plan. The measures may include certification of tappers to recognize their occupation skill and welfare measures like housing subsidy, medical facilities, educational assistance for children of tappers etc.

iv) Formation of Rubber Tapper Bank is one of the measures to address labour shortage. The concept of Rubber Tapper Banks may be formulated and made regular component of the scheme.

v) There is need to evolve technology extension services by establishing state-of-art tyre testing facility. The laboratories set up for this purpose should have accreditation or ISO certification.

vi) Like tea and spices, rubber sector has suffered due to periodic booms and busts. In addition to volatility in prices, the farming activities have also been vulnerable to pest and climate related risks To address such issues, there is need to introduce a scheme for crop insurance.

C.5 Budgetary Requirement for Rubber Board-

Table 15.6

Sl. No	Proposed Schemes	XIth Plan outlay in Rs. Crores	Proposed provisional outlay (Rs. Crore)
1.	Rubber Plantation Development	240	**500**
2.	Rubber Development in North East Region	150	**300**
3.	Strengthening of Rubber Research	60	**120**
4.	Processing Quality upgradation and Product Development of Rubber and Rubber Wood	44	**90**
5.	Market Development and Export Promotion	44	**90**
6.	Human Resources Development	42	**80**
Total		**580**	**1180**

D. Spices – Cardamom: Ministry of Commerce has been implementing the schemes through Spice Board which had been constituted under the Spices Board Act 1986 with the responsibility of export promotion of 52 spices shown in the schedule of the Act. The Board has been constituted by merging the erstwhile Cardamom Board and Spices Export Promotion Council. The Board is responsible for the overall development, marketing and export promotion of both small and large cardamom. The responsibility for the development of pepper in Idukki and Wayanad Districts of Kerala and in the North East has also been assigned to the Spices Board. It has also the responsibility for post harvest improvement as an export enhancing measure with respect to all other spices. Spices Board has 13 Marketing Offices, 7 Regional Offices, 13 Zonal Offices, 32 Field Offices located for development support. The main research station for spices is at Myladumpara and Regional research stations at Tadong (Sikkim), Saklespur and Thadiyankudisai. Production related aspects of spices, excluding cardamom (small & large) are looked after by the Union Agriculture Ministry and the concerned State Agriculture/Horticulture Departments. The Directorate of Areca nut & Spice Development, Calicut and Horticulture Mission operate Central Sector Schemes of the Ministry of Agriculture in this regard. *However, as per Ministry of Commerce, there is a demand from the spice growers as well as exporters that the responsibility of the production development of some of the key spices should be entrusted with the Spices Board*. There is also recommendation from the Parliamentary Committees and Centre for Development Studies (CDS), Thiruvananthapuram, etc. in this regard. The spices which are identified are pepper, chilli, ginger, turmeric, nutmeg, cinnamon, cumin seed, coriander, fennel and fenugreek. The Department of Commerce is considering taking up at least production development of pepper under its ambit**.**

D.1 Programmes on going with results during XIth Plan Schemes - Govt. has approved the following six schemes with total outlay of Rs.442.861 crores for XIth Plan:

1. Special purpose fund for replanting and rejuvenation of cardamom plantations
2. Export oriented production and post harvest improvement of spices

3. Export development & promotion of spices

4. Export oriented research

5. Quality improvement and strengthening of quality evaluation laboratory

6. Human resource development & capital works

In addition to these schemes, the Government has approved setting up of Plantation research unit in Centre for Development Studies, Thiruvananthapuram with a onetime grant of Rs.5.00 crores in 2008-09 and re-plantation and rejuvenation of pepper in Wynad district in Kerala and NE with an outlay of Rs.53.28 crores during October 2009 for implementation during the next five years. The details of scheme wise approved X and XI Plan outlays are as follows:

Table 15.7

Sl.No	Name of the scheme	Approved outlay in Rs. cr.	
		XI Plan	X Plan
1	Special purpose fund for replanting and rejuvenation of cardamom plantations	122.23	--
2	Export oriented production	82.94	76.36
3	Export development & promotion of spices	192.69	35.17
4	Export oriented research	20.00	14.03
5	Quality improvement	20.00	10.60
6	HRD & Capital works	5.00	1.04
	Total	**442.86**	**137.20**

D.1.a Major Outcomes of the XIth Plan: Spices Board has achieved targets in respect of most of the components of all the schemes. For some of the components, achievement is more than the target of the Five Year Plan as it has already been achieved in the fourth year itself.

i. **Export Oriented Production & Post Harvest Improvement (Rs. 82.94 crores):** The Scheme aims at improvement of productivity and production in cardamom and post harvest improvement of spices with export potential. During the 4 years of the Plan, the financial achievement is Rs. 73.70 crores as against the target of Rs.75.18 crores. In terms of physical achievements**,** in almost all the components, achievements are more than the targets or up to the targets. All the components of the Scheme are seasonal. The Board has timely initiated action to achieve the targets.

ii. **Rejuvenation & Re-plantation of Cardamom (Rs. 122.23 crores):** The scheme is aimed at improving the productivity and production of small & large cardamom by rejuvenating & replanting of old plants. During the 4 years of the Plan, the financial achievement is Rs. 43.55 crores as against the target of Rs.48 crores. In terms of physical achievements, an area of 8807 ha. has been brought under replanting of

small cardamom as against the target of 7265 ha. The area under rejuvenation (small cardamom) was 6472 ha as against the target of 4100 ha. For large cardamom, an area of 3346 ha. has been brought under replanting as against the target of 3800 ha. and the area under rejuvenation was 1610 ha, as against the target of 2860 ha. To increase re-plantation and rejuvenation, **t**he scheme is proposed to be continued with modification to reflect the unit cost based on current rates and enhanced level of subsidy

iii. **Export Development and Promotion of Spices (Rs. 192.69 crores):** The scheme aims at increasing spices exports from India. The market development activities focus on quality, value addition and technology up-gradation. During the first 4 years of the Plan, the financial achievement is Rs. 89.27 as against the target of Rs. 92.32 crores. In terms of physical achievements, in almost all the components, achievement is more than the targets or up to the targets. In terms of physical achievements, Board's achievement in respect of adoption of Hi-tech Technology and process up gradation and setting up in-house lab is up to the targets. In respect of other components Board has initiated action and received applications from the growers and is likely to achieve the targets.

iv. **Export Oriented Research (Outlay Rs.20 crore) :** Under the scheme assistance is provided for carrying out research programmes for quality plantations and other export oriented activities. During the 4 years of the Plan, the financial achievement is Rs. 20.95 crores as against the target of Rs.16 crore during the plan period.

v. **Quality Improvement (Outlay of Rs. 20 crores):** The scheme aims at providing analytical services and compulsory inspection of chilly and its products. During the 4 years of the Plan, the financial achievement is Rs. 15.81 crores against the target of Rs. 16 crore.

vi. **HRD and Capital Expenditure for Works (outlay of Rs. 5 crores):** The scheme aims at sharpening the knowledge of Spices Board personnel, labour welfare measures etc. During the 4 years of the Plan, the financial achievement is Rs. 3.48 crores against target of Rs. 4 crores.

vii. **Replantation and Rejuvenation of Pepper in Wayanad and North East Region:** Replanting/rejuvenation of the old and uneconomic plantations of pepper: A scheme of Rs.120.00 crores under NHM is being implemented in the whole of Idukki district of Kerala starting from 2009-10 by Spices Board. It received an amount of Rs.14.00 crores during 2009-10 for re-plantation and rejuvenation of pepper in this district. A separate scheme of Rs.53.28 crores under DOC for the replantation and rejuvenation of pepper in Waynad district of Kerala and NE states has been approved. During last year out of the total outlay of Rs.85.00 crores of the Board, a provisional amount of Rs.5.00 crores has been earmarked for this

programme and Board has utilized approx. Rs.4.77 crores. Physical achievements are 5292 ha as against the target of 1000 ha during 2010-11. Since 2010-11 was the initial year of implementation of the programme, preliminary arrangements like production and supply of planting material has been taking time. Physical and Financial targets achieved during the first four years of XIth Plan are given in **Annexure 15.4.**

C.2 Perspectives for XIIth Plan- Priorities, Programmes and Strategies for Spice Sector:

Keeping in view the performance of the schemes under implementation during the XIth Plan and consultations held with the stake holders for the XII Plan, the Board proposes during XIIth Plan the following schemes to further enhance/strengthen the post harvest development, export development and promotion, infrastructure development, export oriented production, research, quality spices production, re-plantation and rejuvenation of pepper, Skill development, HRD and social welfare schemes(Insurance).

i) **Spices Park**: It is a concept started in XIth Plan to set up common infrastructure facilities for cleaning, grading, processing, packaging etc**.** which has been fully accepted by the growers and exporters. Board proposes to set up a Spice Park in each spice growing State to reach out to spice growers and empower them to improve the quality of the spice produced by them through off farm quality improvement. This will help them to avoid spoilage of their produce through contamination, improper storage etc. and help them to have greater market accessibility. The programme will be implemented in PPP mode. State Govt. will make available 100-200 acres of land. Spices Board with the help of DONER Ministry, Ministry of Food processing, Commerce Ministry etc. will set up the project. Exporters will be assisted in setting up their processing and value addition units in areas leased to them within the park. Cost of equipments, technology, quality certification of the processing units (ISO – 2000/HACCP etc), trade promotion, brand development and its promotion will also be supported by the Spices Board under the proposed XIIth plan schemes.

ii) **Rejuvenation & Re-plantation of Cardamom:** This programme/scheme is aimed at improving the productivity and production of small & large cardamom by rejuvenating & replanting of old plants. To increase re-plantation and rejuvenation, the scheme is proposed to be continued with modification to reflect the unit cost based on current rates and enhanced level of subsidy

iii) **Quality Lab**: There is need to enhance the quality capabilities of spice industry and to ensure quality of spices exported from India, and to match the specified international standards. The Spices Board proposes to set up Regional Quality Evaluation Laboratories at major ports/spice parks in each major spice growing state and at major ports.

iv) **Establishment of Weather Forecasting Centre**: To continuously monitor the changing weather parameters, an automatic weather station is installed with the help of ISRO at ICRI Myladumpara. However, such automatic weather stations are to be established throughout the cardamom tract for providing localized weather predictions for the benefit of cardamom planters.

v) **Research and Development**: R & D on New products in the areas of Nutritional, Pharmaceutical, Health care products, cosmetics, wellness products, etc., has become the urgent need of the hour. To start with, it is proposed to establish a full-fledged R&D centre at Chennai.

vi) **Infrastructure facilities** for manufacturing high-end products like seasonings, sauce, etc. will be promoted.

vii) **Export Promotion of Spices**: Popularising the uses of spices and spice products through the Indian food festivals, mainly in Latin American countries will be accorded top priority.

viii) **Farm Mechanization**: There is a need to explore the possibility of mechanization of some of the cultivation and post harvest practices in cardamom as the plantation sector is facing severe shortage of skilled/unskilled labour. It is proposed to focus on pepper development in Karnataka, Tamil Nadu and North Eastern Region. Available/suitable machineries for farm operation, post harvesting will be evaluated and promoted providing 50% subsidy from the Spices Board.

ix) **Good Agriculture Practices:** There is a need to address issue of excessive use of pesticides in cardamom to counter pesticide residue problems in the final product as well as ecological problems. Concerted efforts are also required to make for soil and water conservation, afforestation, rainwater harvesting, promotion of organic farming etc.

x) **Establishment of Traceability**: The intrinsic and extrinsic quality of spices is proposed to be assured and traceability of the produce has to be ensured for encouraging export of quality Indian Spices.

xi) **Establishment of incubation centre at Cochin** – Spices Board proposes to set up an incubation centre at Cochin. This facility is proposed to provide sophisticated instrumentation back up for conducting research studies on product development by spice industry. The facility will be opened to technical experts from spice industry with a nominal user fee. The execution of the technical work will be done under the supervision of Board's staff. The work proposed in the centre includes development of unique spice blends, spices in pharmaceutical, neutraceutical, toiletry and wellness areas, derivation of fine chemicals from

spices, separation of biologically active compounds/natural molecules from spices etc.

xii) **Planting material requirement**: Lack of quality planting material is an important issue to be addressed in the XIIth Plan. Programmes for production and distribution of disease free quality planting material need to be incorporated in the XIIth Plan. It is proposed to continue the certified nursery programmes for the production of planting material for re-plantation of cardamom and pepper. It is proposed to elevate Board's nurseries and research farms to five-star accredited planting material production centres and strengthen the certified nursery programme linking it with the nucleus planting materials from Board's nurseries.

xiii) **Technologies to be developed** –There is need to develop Hi-tech technologies for processing and value addition of spices and to develop new products. Mechanization of farm activity is another area needs thrust in XIIth Plan. Harvesting of spices like pepper, cardamom, chilly etc., are labour intensive. However considering the nature of the crop, the scope for mechanization is limited. Irrigation management programmes for mitigating adverse effects of changing climate, afforestation and ecosystem sustainability would be targeted during the 12th plan period.

xiv) **Sustainable production and organic production**: Pesticide residue is major issue which needs to be addressed during the XIIth Plan. Programmes to promote Integrated Crop Management with IPM and IDM will be included in the XIIth plan. Spices Board has taken up promotion of Organic cultivation of spices in the 10th and 11th Plans. This programme is proposed to be continued in the XIIth Plan period also. In the stakeholders meeting, there was a demand to extend the assistance under the scheme at least by three years and assistance should be increased from Rs.25,000/- per individual farmer to at least Rs.100000/-. Supply of quality bio-agents from ICRI are to be strengthened during the XIIth Plan.

xv) **Secondary Agriculture (Pre, post harvest and value addition):** Support for Quality improvement and post harvest operation equipments such as polythene sheets, bamboo mat, dryers, polishers for turmeric, threshers for pepper and seed spices, weed cutter, curing device and multi-purpose aluminum ladders are proposed in the XIIth Five year plan.

xvi) **Marketing & Export:** Export development and promotion programmes are being implemented during the XIth Plan and are proposed to be continued in the XIIth Plan with increased financial assistance. Assistance for Infrastructure development, brand building, hi-tech processing and quality assurance programmes are proposed to be continued in the XIIth Plan.

xvii) **Transfer of Technology**: The extension advisory services of the Board will be strengthened. Each zonal office will be converted 'to knowledge centres by linking it with Research stations, trade information centres and farmers would be encouraged to use Field Offices as learning centres.

xviii) **Human Resource Development needs:** Most of the spice farmers are subsistence farmers and they are not aware / serious of the quality aspects of spices produced. It is proposed that the farmers may be educated on the quality aspects. Hence in the XIIth Plan farmers training programme is to be included as an important component.

xix) **Need to introduce Crop Insurance Scheme**: The Plantation Sector including spice has suffered due to periodic booms and busts. In addition to volatility in prices, the farming activities have also been vulnerable to pest and climate related risks. Age profile of the plantations has severely affected the yields, quality, prices and overall competitiveness of the sector. A need was therefore, felt to introduce a Crop Insurance Scheme which is under consideration of the Government and is proposed to be implemented during XIIth Plan.

C.3 Proposed Targets for the XIIth Plan: The production and other aspects of only Cardamom (Small and large) are with the Spices Board. Cardamom (Small) is a shade loving plant and cannot be planted without shade trees. Traditionally, Cardamom (Small) is cultivated in Cardamom Hill Reserve and cannot be expanded further in the forest area. Hence there is little scope for area expansion. The option, therefore, is to increase the production and productivity. Accordingly, the annual targeted increase during 12th Plan in area, production, productivity and exports is estimated at 1%, 5.50%, 4.60% and 5.50% respectively. The production of Cardamom (large) is mainly concentrated in Sikkim and Darjeeling district of West Bengal. Over the years, the area under Cardamom (large) in Sikkim has shown a decline, mainly because of the massive infrastructure development of roads, buildings etc. However, Spices Board has taken up initiative to bring more area under Cardamom (large) in Sikkim in XII Plan. It is proposed to replant 5000 hectares and rejuvenate 2500 hectares of Cardamom (Large) during the XII Plan period. The annual target increase during XII Plan in area, production, productivity and exports is estimated at 2%, 5%, 2% and 8%.

C.4 Recommendations for XIIth Five Year Plan: Keeping in view the problem areas identified on review of implementation of the schemes during XIth Plan, consultations held with the stakeholders, the perspectives and the targets for the XIIth Plan, the recommendations are as follows:

i) Production related aspects of spices, excluding Cardamom (small and large) are looked after by the Ministry of Agriculture and the concerned State Agriculture/Horticulture Departments. There has been a demand from the spice growers as well as exporters that the responsibility of the production and development of some of the key spices like pepper, chilli, ginger, turmeric, nutmeg, cinnamon, cumin seed, coriander, fennel and fenugreek should be entrusted to the Spices Board. Hence the Govt. May either entrust spices with CDB as nodal agency in DAC or assign them to the Spice Board.

ii) The concept of setting up common infrastructure facilities for cleaning, grading, processing, packaging etc. in the shape of the Spices Park, started in XI Plan, has been fully accepted by the growers and exporters. Hence a Spice Park needs to be set up in each spice growing State to reach out to growers and empower them to improve the quality of the spice produced by them through off farm quality improvement and this needs to be implemented in a PPP mode.

iii) To ensure quality of spices, Regional Quality Evaluation Laboratories at major ports/spice parks may be setup and automatic weather forecasting centres may be established throughout the cardamom tract for providing localized weather predictions to the planters.

iv) Research and development in the areas of nutritional, pharmaceutical, health care products, cosmetics, wellness products, etc. is crucial in the present context. Hence more R&D Centres need to be established.

v) The assistance being provided for cardamom plantation needs to be increased.

vi) Planting material requirement, infrastructure facilities for manufacturing high-end products, farm mechanization to meet the shortage of skilled/unskilled labour, good agriculture practices to address issue of excessive use of pesticides, development of hi-tech technologies for processing and value addition, organic production of spices, support for quality improvement and post harvest operation equipment, strengthening of extension advisory services, human resource development etc. needs to be given focused attention.

vii) For export promotion, popularizing the uses of spices and spice products in selected markets, brand building, quality assurance etc. may be taken up on a large scale with adequate funding provision during XIIth Plan.

viii) To protect the spices sector against the volatility in prices and pest & climate related risks, crop insurance needs to be considered.

ix) There is a need for modification in the existing replanting scheme of the Spices Board for Cardamom to reflect the unit cost based on current rates and enhanced level of subsidy.

C.5 Budgetary Requirement for XIIth Plan for Spice Board-

Table 15.8

Sl.No	Name of the scheme	Outlay during XIth Plan, Rs. in Crores	Proposed XIIth Plan outlay (Rs. in crore)
1	Rational production development (Replanting and rejuvenation of cardamom)	122.23	250.00
2	Export Oriented Production	82.94	200.00
3	Export development and Promotion of Spices	192.69	400.00
4	Export Oriented Research	20.00	30.00
5	Quality Improvement	20.00	10.00
6	HRD & Capital Works	5.00	10.00
	Total	**442.86**	**900.00**

E. Schemes Relating to Medicinal and Aromatic Plants- On going schemes of medicinal and Aromatic Plants covered under Integrated Horticulture Development Programme should, in coordination with schemes of NMPB under AYUSH should suffice.

F. Total Budgetary Requirement for Tea, Coffee, Rubber and Spices-

Table 15.9

S. No.	Crop	Estimated Budgetary Requirement in Rs. Crores
1	Schemes of Tea Board	1600
2	Schemes of Coffee Board	1200
3	Schemes of Rubber Board	1180
4	Schemes of Spice Board	900
	Total	**4880**

Appendix 15.1

Tea Board-Physical Achievements during 2007-2011

Sl. No.	Activity	XI Plan	2007-2011		% Achievement against	
			Targets	Achievements	2007-11 Targets	XI Plan Targets
1	New Planting : Hectare	7450	4250	2976.83	70.04	39.95
2	Replanting: Hectare	32560	21030	20900.71	99.38	64.00
3	Rejuvenation:Hectare	8432	6321	5740.28	90.81	68.07
4	Irrigation & Drainage: Hectare	7900	5700	9521.89	167.05	120.53
5	SHG of small growers (no. of SHGs)	212	145	167	114.48	78.30
6	Factory Modernization (number of Units)	349	350	854	244.00	244.69
7	Value Addition (Nos)	147	130	80	56.92	50.34
8	Quality certification(Nos)	100	95	155	90.53	86.00
9	Orthodox production (M.Kgs)	380	290	303	100.50	76.05
10	Fairs & Exhibitions (nos)	100	81	151	177.77	144.00

Appendix 15.2

Name of the Board : COFFEE BOARD											
Sl. No.	**Name of the Scheme/Component-wise (Units)**	**Target for the XI Plan period**		**Targets for first 4 years of the Plan**		**Achievements during last 4 years**		**Target for 2010-11**		**Achievement during 2010-11**	
		Phy.	**Fin.**	**Phy.**	**Fin.**	Phy.	**Fin.**	Phy.	**Fin.(P)**	**Phy.**	**Fin.**
I.	**RESEARCH & DEVELOPMENT FOR SUSTAINABLE COFFEE PRODUCTION**		**90.00**		**73.00**		**65.41**		**22.00**		**20.31**
	a) Crop Production (MT)	@335000		1220000		1112900					
	b) Production of Seed in MTs	25.0		20.0		28.42		5		**4.82**	
	c) No. of Estate visits	100000		80000		86920		20000		**22545**	
II	**DEVELOPMENT SUPPORT**		**310.00**		**182.70**		**149.96**		**48.20**		**46.37**
	a) Re-plantation (in ha.) *	40000		15000		12588		3000		**2338**	
	No. of beneficiaries	-				8495				**1697**	
	b) Water augmentation, Quality up-gradation & Pollution Abatement (in Units)*	10575		12340		16240		3570		**4979**	
	c) Coffee Development in N.E. Region(in ha)*										
	i) Expansion/Consolidation (in ha.)	1850		1350		1351		500		**303**	
	ii) Pulpers/Drying yard/trays (Nos.)	820		975		1208		500		**552**	
	d) Coffee Development in Non-Traditional Area & other tribal sector*										
	i) Expansion/phasing out of Cauvery(in Ha.)	22200		19200		19144		5000		**4709**	
	ii) Pulpers / Drying yards (Nos.)	4750		3750		5829		1250		**1329**	
	e) Welfare support to labourers and tiny coffee growers (Nos.)	15000		12000		20961		3000		**6550**	
	g) Interest subsidy to growers on working capital loans (No. of beneficiaries)	450000		28000		27343		2000		**4169**	
III	**MARKET DEVELOPMENT**		**30.00**		**20.00**		**13.31**		**6.00**		**3.97**
	Domestic consumption(in MT)	@120000		389000		394400					
IV	**RISK MANAGEMENT TO GROWERS**		**80.00**		**30.00**		**4.31**		**4.00**		**1.04**
	a) No. of small growers proposed to cover with <10 ha.	319000		85460		50287		15000		**19400**	
	b) Total area proposed to cover in ha.	522000		158600		83668		30000		**24400**	
V	**EXPORT PROMOTION**		**45.00**		**30.00**		**16.90**		**9.00**		**5.92**
	a) Export of Coffee (in MT)	@250000		855000		936999					
	b) Export of value added coffee as Indian brands (in MT)	37000		23000		22482		10000		**9887**	
	c) Export high value coffees to far off markets(in MT)	75000		15000		14268		8000		**7458**	
	d) Participation in Overseas trade fairs (nos.)	75		60		50		15		**14**	
	e) Buyer-Seller meet	14		11		14		3		**5**	
VI	**SUPPORT FOR PROCESSING**		**45.00**		**16.00**		**1.89**		**3.00**		**0.41**
	Setting up of Coffee processing units (Nos.)	180		100		55		50		**26**	
VII	**Support for Mechanisation of Coffee Estate Operations**				**1.00**		1.98				**1.98**
	No. of Machineries			1500		1564		1500	**1.00**	**1564**	
VIII	**6th CPC Pension**				**6.66**		**19.66**				
	Grand Total :		**600.00**		**359.36**		**273.42**		**93.20**		**80.00**
	***Includes Spill over cases of X plan**	**@Projected target for the terminal year of the XI plan.**									

Appendix 15.3

Rubber Board Schemes

Sl. No.	Name of the Schemes	Unit	Target for XI Plan Period		Target for first 4 years of XI Plan		Achievement during last 4 years	
			Phy	Fin	Phy	Fin	Phy	Fin
1	**Rubber Plantation Development Scheme**			240		228.5		223.34
	New planting - Permit issued area	ha	7500		6000		10863	
	Replanting - Permit issued area	ha	30000		24000		18538	
	Tribal Settlement - Permit issued area	ha	800		600		12	
	Productivity enhancement							
	a) Supply of inputs with price concession	ha	100000		80000		89415	
	b) Rubber Agro-management units	ha	15000		13500		7209	
	c) Soil protection& water conservation	ha	20000		17000		959	
	d) Generation of quality planting materials	lakh nos.	35		28		23.69	
	Farmer Group formation & Empowerment							
	a) Formation of new RPSS/SHGs	nos.	750		600		1026	
	b) Farmer education programmes & field training	no. of participants	50000		40000		803976	
	c) Group Processing centers	nos.	80		44		9	
	d) Infrastructure support to RPS/SHGs	nos.	100		80		827	
	e) Latex/sheets/scrap collection support to RPS/SHGs	nos.	100		80		1194	
	f) Apiculture	no. of growers	15000		12000		10749	
	RUBBER PLANTATION DEVELOPMENT (Non Traditional Region Other than NE)							
	a) New planting - Permit issued area	ha	2500		2000		5918	
	b) Replanting - Permit issued area	ha	1750		1400		152	
	c) Rubber plantation project for tribal development							
	Tribal development planting - Permit issued area	ha	500		400		78	
	d) Productivity Enhancement							
	(i) Rubber Agro-management units	ha	1000		800		115	
	(ii) Soil protection& water conservation	ha	1000		800		62	
	e) Irrigation	ha	500		400		118	
	f) Boundary protection	ha	750		600		151	
2	**RESEARCH SCHEMES**			60		59		64.96
	(A detailed note on research achievements is attached as Appendix. B)		No target fixed		No target fixed			
	a) Cross pollinations	nos.					31242	
	b) Production of hybrid seeds	nos.					3035	
	c) Hybrids under evaluation	nos.					9143	
	d) Testing of soil, leaf, latex, ethephon and rainguarding materials	nos.					314586	
	e) Ongoing laboratory and field trials	nos.					2244	
	f) Field visits & advisories given	nos.					46421	
	g) Supply of nucleus planting materials of new clones to farmers	nos.					323560	
	h) Scientific and popular publications	nos.					558	

Sl. No.	Name of the Schemes	Unit	Target for XI Plan Period		Target for first 4 years of XI Plan		Achievement during last 4 years	
			Phy	Fin	Phy	Fin	Phy	Fin
3	**PROCESSING QUALITY UPGRADATION & PRODUCT DEVELOPMENT**			44		33		19.88
	TECHNICALLY SPECIFIED RUBBER							
	a) Quality Upgradation	nos.	25		20		52	
	b) Modernisation	nos.	30		24		59	
	c) Environmental protection & waste utilisation	nos.	15		12		30	
	d) Strengthening RPS & Co-operative sectors	nos.	25		20		5	
	e) Interest subsidy to RPS sector	nos.	1		1		1	
	f) Quality control- P&QC laboratory*	nos.	1		1		1	
	g) Demonstration, training & technical support*	nos.	2		2		2	
	RUBBERWOOD							
	a) Processing, value addition & quality improvement	nos.	20		16		10	
	b) Waste utilisation & management	nos.	10		8		5	
	c) Quality control (Rubber-wood testing lab)*	nos.	1		1		1	
	d) Demonstration, training & technical support*	nos.	4		4		4	
4	**MARKET DEVELOPMENT & EXPORT PROMOTION**			44		31.5		27.64
	RUBBER							
	a) Godown- 100MT	nos.	25		20		5	
	b) Godown- 1000MT	nos.	1		1		1	
	c) Strengthening RPS sector in marketing of rubber (grant/loan)	nos.	55		44		64	
	d) Strengthening Co-operative sector in marketing of rubber (grant/loan)	nos.	125		100		79	
	e) Strengthening RPS sector in marketing of inputs (grant/loan)	nos.	10		8		25	
	f) Computers – RPS sector	nos.	60		48		5	
	RUBBER WOOD							
	a) Rubber-wood promotion- domestic	nos.	75		60		31	
	b) Assistance to processors (Godown, showrooms etc.)	nos.	10		8		0	
	EXPORT PROMOTION							
	a) Participation in international trade fairs - Rubber & Rubber wood	nos.	50		40		30	
	b) Grant to exporters to participate with Board in international exhibitions - Rubber& rubber-wood	nos.	40		32		33	
	c) Financial incentives to exporters & PSUs for publicity for participation in trade fairs	nos.	25		20		24	
	d) Global market study	nos.	2		2		-	
	e) Maintenance of website and setting up of trade information centre		-		-		-	
	f) Export finance to NR exporters (loan) modified as brand promotion/ Incentives schemes on logo implementation	nos.	75		60		-	
	Export of NR	Tonne	250000		200000		160793	

5	**HUMAN RESOURCE DEVELOPMENT**			42		37.5		35.93
	Training	no. of participants	17500		14000		21826	
	Labour Welfare	no. of beneficiaries	118600		92090		95174	
	Tappers' Training	no. of participants	32600		26080		25823	
	Sasthradarsan	no. of participants	2500		2000		448	
	Infrastructure development		not quantifiable					
6	**RUBBER DEVELOPMENT IN NORTH EASTERN REGION**			150		102.5		116.51
	Rubber Plantation Development Scheme							
	Newplanting - Permit issued area	ha	25000		18000		26466	
	Replanting - Permit issued area	ha	1750		1400		0	
	Integrated village level rubber development [Revitalisation, Restocking & Block planting]	ha	6825		2000		498	
	Prod. Enhancement - Supply of inputs with price concession	ha	25000		20000		22837	
	Quality planting material generation	lakh no.	25		20		18.48	
	Irrigation	ha	500		400		21	
	Boundary protection	ha	4200		3200		25801	
	Research		Not quantifiable					
	Processing and Quality Upgradation							
	Smoke house	nos.	200		160		136	
	Sheeting Rollers	nos.	500		400		392	
	Effluent treatment plant	nos.	250		200		24	
	Group processing centres	nos.	25		20		25	
	Human Resource Development							
	Tappers' training school	no. of participants	1250		1000		1284	
	SDITT	no. of participants	6000		4800		5487	
	Training in RRTC/DDC	no. of participants	2500		2000		3516	
	Meetings	no. of participants	60000		48000		97024	
	TOTAL			**580**		**492**		**488.26**

Appendix 15.4

SPICES BOARD

XI Plan targets and achievements (Financial in Rs. crores)											
Sl. No.	Name of the scheme	XI th Plan Targets		2010-11				Targets for first 4 years of the Plan		Achievement during last 4 years of the Plan	
				Targets		Achievements 2010-11					
		Fin.	Phy.	Fin.	Phy.	Fin	Phy	Fin	Phy	Fin	Phy
I	EXPORT ORIENTED PRODUCTION										
(A)	Small Cardamom										
i	Committed expenditure on Cardamom Replanting (ha)	0.305	987.75					0.300	987.75	0.305	980.25
ii	Irrigation & Land Development (area in ha)	4.471	4600	1.920	1800	1.821	1192.88	4.414	4500	4.543	3994
iii	Rain Water harvesting (Nos)	0.150	350	0.055	110	0.072	122	0.233	358	0.142	301
iv	Improved Cardamom Curing Devices (Nos)	1.215	250	0.700	140	0.799	155	1.580	310	1.744	351
	Sub -Total	**6.141**		**2.675**		**2.692**		6.527		6.734	
	Development Programmes for North East										
(B)	Large Cardamom - Sikkim										
i	Committed expenditure on Cardamom Replanting (ha)	0.172	673.1					0.170	673	0.172	672
ii	Curing house (Nos) - Modified Bhatti	0.365	450	0.03	40	0.014	17	0.240	326	0.246	289
iii	Rain Water harvesting (Nos)	0.075	200	0.019	50	0.002	13	0.051	124	0.034	103
	Sub -Total	**0.612**		**0.049**		**0.016**		0.461		0.452	
(C)	Other North Eastern States										
i (a)	Large Cardamom New Planting (ha)	3.000	1750	0.476	270	0.327	309.25	2.146	1261	2.329	1498
i (b)	Committed expenditure on Cardamom New planting (ha)	0.088	354					0.088	354	0.000	354
ii	Rain Water harvesting (Nos)	0.016	20	0.005	6	0.006	8	0.021	26	0.012	13
iii	Curing house (Nos) - Modified Bhatti	0.076	100	0.01	15	0.004	11	0.086	115	0.032	67
ii (a)	Pepper planting (ha) with committed expenditure for 150 ha	0.694	374					0.500	450	0.694	374
iii	Lakadong turmeric (ha) Organic	4.750	4000	1.145	915	1.128	812.55	4.233	3385	4.039	3268
iv	Organic ginger (ha)	4.600	3750	1.050	830	1.532	1498	3.688	2940	4.305	3750
v	Organic Naga chilli (ha)	0.015	10	0.005	10	0.004	10	0.033	30	0.019	20
vi	Training of officers (alternate years) (Nos)	0.150	18					0.205	36	0.065	9
vii	Training of farmers (alternate years) (Nos)	0.320	300	0.065	60	0.095	84	0.065	310	0.240	282
	Sub - Total	**13.709**		**2.756**		**3.097**		11.063		11.735	
(D)	Other Spices										
ii	Seed spices										
(a)	Threshers (Power) (Nos)	0.250	50	0.040	10	0.045	8	0.148	35	0.225	41
iii	Pepper										
(a)	Threshers (Nos)	0.715	1000	0.220	310	0.276	413	0.496	705	0.827	1026
(b)	Bamboomats (Nos)	0.330	26000	0.200	5000	0.138	5000	0.375	25000	0.346	21150
iv	Chilli										
(a)	IPM (ha)	5.800	29000	1.400	6650	1.324	6650	4.410	24150	4.365	22556
(b)	Polyhouse (Nos)	0.020	40					0.100	40	0.020	40
v	Turmeric										
(a)	Boilers (Nos)	0.180	17	0.150	12	0.162	18	0.240	44	0.242	25

(b)	Polishers (Nos)	0.016	10	0.008	5			0.074	45	0.000	1
	Sub - Total	**7.311**		**2.018**		**1.945**		5.843		6.024	
(E)	Post Harvest Improvement of Spices										
i	Drying Yard (in sq.m)	2.558	134000					1.087	55000	2.558	134028
ii	Polythene / Silpaulin Sheets (Nos)	4.971	55000	1.500	10000	1.407	11110	4.371	35500	3.425	41518
	Sub-Total	**7.529**		**1.500**		**1.407**		5.458		5.983	
(F)	Organic Farming										
i	Certification (Nos)							0.140			
(a)	Individual	0.512	60	0.085	12	0.114	14	0.335	47	0.461	51
(b)	Group		65		10			0.000	45	0.000	45
iii	Organic cultivation of spices (ha)	2.250	4500	0.470	950	0.479	866	2.120	4250	1.962	3895
iv	Vermicompost units (Nos)	1.600	8000	0.140	700	0.188	932	1.836	9050	1.436	7353
	Sub-Total	**4.362**		**0.695**		**0.78**		4.291		3.859	
(G)	Extension Advisory Service	42.316		10.007		11.943		41.237		38.314	
(H)	Outsourcing of technical personnel	0.960		0.300		0.336		0.300		0.598	
	Sub-Total	**43.276**		**10.307**		**12.280**		41.537		38.913	
	TOTAL	**82.940**		**20.000**		**22.218**		**75.180**		**73.700**	
II	SPECIAL PURPOSE FUND FOR REPLANTING AND REJUVENATION OF CARDAMOM PLANTATIONS										
(A)	Small Cardamom										
i	Replanting (Ha)	79.080	25000	9.677	2500	9.245	2354.34	32.349	7265	28.948	8807
ii	Rejuvenation (Ha)	21.040	15000	2.803	2100	1.601	1363.25	5.463	4100	8.187	6472
	Sub-Total	**100.120**		**12.480**		**10.846**		37.812		37.135	
(B)	Large cardamom										
i	Replanting (Ha)	15.510	10000	2.020	1050	1.967	863.4	8.528	3800	5.539	3346
ii	Rejuvenation (Ha)	6.600	10000	0.500	860	0.240	503.9	1.660	2860	0.875	1610
	Sub-Total	**22.110**		**2.520**		**2.206**		10.188		6.414	
	TOTAL	**122.230**		**15.000**		**13.053**		**48.000**		**43.549**	
III	EXPORT DEVELOPMENT & PROMOTION										
(A)	Infrastructure Improvement										
i	Adoption of Hitech (Nos)	11.000	15	1.500	4	1.816	2	7.150	14	9.111	26
ii	Technology and process upgradatioon (Nos)	6.000	40	2.500	15	2.518	20	8.300	56	6.601	36
iii	Setting up inhouse lab	2.500	50	0.250	10	0.228	4	4.550	40	1.473	34
iv	Quality certification (Nos)	0.250	20	0.050	5	0.005	1	0.412	28	0.104	10
	Sub-Total	**19.750**		**4.300**		**4.566**		20.412		17.289	
(B)	Trade promotion										
i	Sending business samples abroad (Nos)	0.400	90	0.113	30	0.088	20	0.263	90	0.277	64
ii	Printing brochures (Nos)	0.150	10	0.020	12	0.007	3	0.170	29	0.047	6
iii	Packaging development (Nos)	0.100	10	0.020		0.010	1	0.110	9	0.020	3
	Sub-Total	**0.650**		**0.153**		**0.105**		0.543		0.344	
(C)	Product Development & Research										
i	For Registered exporters/research Institutions	1.500	6	0.050	2	0.023	2	3.050	7	0.101	5
ii	Research for High end value addition of mint (Nos)	3.000	3					2.610	3		
	Sub-Total	**4.500**		**0.050**		**0.023**		5.660		0.101	
(D)	Spices Processing In N.E										
	Establishing export oriented processing units (Nos)	**2.584**	8	0.003	1			0.826	6	0.000	0

(E)	Market study abroad by the Board (Nos)	**1.500**	13	0.150	3	0.063		1.000	11	0.075	5
(F)	Promotion of Indian spice brand abroad (Nos)	**3.500**	6	0.400	2	0.329	1	1.400	4	1.129	3
(G)	Setting up of sterilization units (Nos)	**14.742**	3	5.000	2			6.500	5	0.474	2
(H)	Infrastructure for common cleaning, grading, packing, storing & processing facilities (Nos)	**107.215**	6	17.000	4	21.293		25.620	9	39.990	2
(I)	Participation in International Fairs/Meetings/Seminars (Nos)										
i	Participation by Spices Board	7.000	95	1.800	21	3.052		7.000	75	6.635	51
ii	Participation by Exporters	0.750	100	0.250	50	0.228	27	0.600	85	0.689	92
iii	Participation in Delegation/Meetings/Seminars (Nos)	0.500	10	0.250	5			0.427	22	0.197	5
	Sub-Total	**8.250**		**2.300**		**3.279**		8.027		7.521	
(J)	Publicity & public relations	**3.000**		0.550		0.708		2.050		2.528	
(K)	EDP service	**1.500**		0.250		0.478		0.900		1.497	
(L)	Trade information service	**0.500**		0.070		0.091		0.320		0.262	
(M)	Marketing services	**25.000**		5.774		5.052		19.062		18.057	
	TOTAL	**192.691**		**36.000**		**35.986**		**92.320**		**89.266**	
IV	EXPORT ORIENTED RESEARCH	**20.000**		4.000		5.068		**16.000**		**20.948**	
V	QUALITY IMPROVEMENT	**20.000**		**4.000**		**3.825**		**16.000**		**15.811**	
VI	HRD & CAPITAL EXPENDITURE FOR WORKS	**5.000**		**1.000**		**0.452**		**4.000**		**3.481**	
VII	SETTING UP OF PLANTATION RESEARCH UNIT IN CDS									5.000	
VIII	REPLANTATION AND REJUVENATION OF PEPPER IN WYNAD DIST AND NE STAES (Ha)			**5.000**	1000	**4.767**	5292				
	GRAND TOTAL	**442.861**		**85.000**		**85.369**		**256.500**		**256.523**	

Annexure-1

F.No.M-12043/2/2011-Agri
PLANNING COMMISSION
(AGRICULTURE DIVISION)
GOVERNMENT OF INDIA

Yojana Bhawan, Sansad Marg
New Delhi-110001
Dated : March 16, 2011

OFFICE MEMORANDUM

Subject: **Constitution of the Working Group on "Horticulture & Plantation Crops"for the Twelth Five Year Plan (2012-17)**

It has been decided, with the approval of competent authority to constitute Working Group on the subject cited above, with the following Composition and Terms of Reference.

1. **Composition**

1	Prof. . D.P. Ray, Vice-Chancellor, Orissa University of Agriculture & Technology, Bhubneshwar, 751003 Phone: 0674-2397700, Fax.2397780 Email:outmain@hotmail.com	Chairman
2.	Dr. H.P. Singh, Dy. Director General (Horticulture) Krishi Anusandhan Bhawan-II New Delhi-1101012 Email: hpsingh@icar.org.in	Member
3.	Shri Sanjeev Chopra, Joint Secretary & Mission Director, National Horticulture Mission(NHM) Department of Agriculture & Cooperation, Krishi Bhawan, New Delhi -110001 Email: chopra.sanjeev@nic.in	Member
4.	Dr. Gorakh Singh, Horticulture Commissioner DAC. Krishi Bhanwan, New Delhi-110001	Member
5..	Dr T.A. More, Vice Chancellor Mahatmaphule Krishi Vidya Peeth Member Rahuri-413722 Fax: 91(0)24643302 E-mail. kvmp@ren.nic.in	Member

6.	Dr S.D. Shikhamany, Vice-Chancellor, Andhra Horticulture University, DCC Bank Building, Tadepalligudem, Post Box-7, West Dodawari. Phone-8818-222191, Fax 222190	Member
7.	Dr R.K. Dhiman, Vice Chancellors, Dr. Y.S. Parmar Unvieristy of Horticulture & Forestry, Solan, Nauni, HP Phone. 01792 (252363 (O), M-9418203800 252242 ®	Member
8.	Shri Chandrika Prasad Tiwari Mission Director Directorate of Horticulture, Department of Horticulture & Fruit Processing, Govt. of UP, Udyan Bhawan-2 Sapru Marg, Lucknow-226001	Member
9.	Dr Pijush Kanti Parmanik, Director (Horticulture), Government of West Bengal, Department of Food Processing, Industries, Mayukh Bhawan, Salt Lake, Kolkata-700001	Member
10.	Shri A.L. Meena, Joint Secretary, Food Processing Industrires, Panchsheel Bhawan, Newlhi	Member
11.	Secretary, APMC Office Complex, MNI Azadpur, NFM Ph II, Sarai Pipal Thala, Delhi-110033. Phone: 27691748 Fax.27691799	Member
12.	Shri Mir Chand, Confederation of India Industry CII Headquarters Manthosh Sondhi Centre 23 Institutional Area Lodi Road, New Delhi	Member
13.	Director, Central Plantation Crops Research Institute, Kasaragod-671 124 Kerala	Member
14.	Director, Indian Institute of Spices Research Marikunna PO Calicut, Kerala-673012	Member
15.	Chief Executive Officer, SAFAL F-89/11, 1st Floor, Okhla Phase-1 New Delhi – 1100200 Phone. +91 11 40665555 Fax 40665503	Member

16.	Shri Sopan Kanchan, President, CIHs, Confederation of Indian Horticulture & Grape, Gultekdi, Pune (Maharashtra)	Member
17.	Shri Anil K. Gupta, Managing Director Container Corporation of India Ltd., CONCOR Bhawan, C-3, Mathura Road Opp. Apolo Hospital New Delhi-110 076 Phone: 91-11-41673093, 94, 95, 96 Fax : 91-11-41673112 Email.co.pro@concorindia.com	Member
18.	Ms. Ritu Kapoor , MD, Kashmir Apiaries Village- Malhipur, G.T. Road, Doraha-Ludhiana-141 421 Tel-(1628) 258 240 /258 640 Fax (1628) 661 699 / 661 698 Email.infor@kashmirhoney.com	Member
19.	Adviser (Agriculture), Planning Commission, New Delhi	Member
20	Dr. Amrik Singh Sandhu, Director, Indian Institute of Horticulture Reseearch9IIHR), Hessarghatta Lake Post, Bangalore-560089 E-mail-director@iihr.erneet.in	Member
21	Dr. Dandin, Vice Chancellor, University of Horticulture Sciences Sector No. 60, Navanagar, Bagalokot-587102 Karnataka.	Member
22	Dr N.K. Dadlani, B-3, IARI, Pusa Complex, New Delhi-011-25842781 nkdadlani@rediffmail.com	Member
23	Dr P.G. Adsule, Director, National Research Centre for Grapes, ICAR, PB No. 3, Manjri Farm Post Solapur Road, Pune-412308 (Maharashtra)	Member
24.	Dr M.M. Anwar, National Research Centre for Seed Spices, Tabiji Farm, Ajmer 305 206	Member
25	Shri Harsha Jyoti Barua, Ex-Director (Hort.), Assam Krishi Bhawan, Khanapara, Dispur, Guwahati.	Member

26.	Shri Bijay Kumar, MD, National Horticulture Board, Ministry of Agriculture, GOI. 85-Institutional Area, Sector-18, Gurgaon-122015 Phone (0124)- 2342992 Fax (0124)- 2342991 mdnhb@yahoo.com	Member Secretary

2. Terms of Reference (Specific)

2.1 To assess the extent achieved by the programmes/schemes in meeting their objectives during XI Plan and the extent contributed by the states in furthering the process of development of Horticulture in terms of financial allocation and deployment of qualified technical manpower.

2.2 Strengthening of delivery mechanism both at centers and states Government by closely involving existing organizations like ATMA, KVK, Growers Associations/SHG etc.

2.3 Review international and domestic scenario of horticulture sector. Identify area of constraints, suggest strategies for exploring opportunity in domestic & global horticulture market and suggest intervention.

2.4 To recommend an integrated approach for marketing of horticultural produce beginning form the service production to identification of procurement at reasonable price, assurance of connectivity to packaging and storage and processing till the disposal of the produce.

2.5 To review the status of plantation crops with specific reference to tea, coffee, spices, rubber etc and suggest intervention for increasing production and productivity and profitability.

2.6 To assess the role of the states in furthering the process of development of horticulture in terms of financial allocation and manpower.

2.7 To recommend modification for improvement in such of those schemes which have a potential of increasing horticulture production in the country , and also recommend doing away with those schemes which have made no significant impact so far.

2.8 To estimate figures on demand and supply of horticulture and plantation crops during the XII Plan and recommend schemes/interventions for increasing production along with financial implications.

2.9 To examine and recommend close coordination and active participation with the Ministry of Food Processing.

3. Terms of Reference (General)

3.1 The Chairman of Working Group may co-opt any other official/non official expert/ representative of any organization as a member(s), if required.

3.2 The working Group may also examine and address any other issues which are important but not specifically spelt out in the TORs. The Working Group may devise its own procedure for conducting its business/meetings.

3.3. The expenditure of the members on TA/DA in connection with the meeting of the Working Group or any work incidental to the functions of the Working Group/Sub-Group will be borne by their respective parent Department / Ministry / Organization for official members and by the Planning Commission for non-official members as per entitlement of Class-I Officer of Government of India.

3.4 The Working Group will submit its draft report to the Planning Commission by June,2011 and final one in September, 2011.

Dr. A. K. Tiwari , Deputy Adviser(Agriculture), Planning Commission, Yojana Bhavan, New Delhi 110001, Ph:011-23096710 Fax:011-23327703 E-mail tiwari.ak@nic.in will be the nodal officer of the Group and any further query/correspondence in this regards made with him.

(G. Rajeev)
Under Secretary to the Government of India

Distribution

Chairman and Members of the Working Group.

Copy to:

1. P.S. to Deputy Chairman, Planning Commission
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3. P.S. to Member (Science), Planning Commission
4. PS to Member Secretary, Planning Commission
5. Sr. Consultant (Agri.), Planning Commission
6. Adviser (Plan Coordination & Management Division), Planning Commission
7. Adviser (Agri)/Adviser (SS) / Joint Adviser (Agri.) / Director (Agri.) Dy. Advisers / SROs / ROs in the Agriculture Division
8. Pr. Advisers / Advisers of all Divisions
9. Account-I Section

(G. Rajeev)
Under Secretary to the Government of India

SPEED POST

F.No.M-12043/2/2011-Agri
Planning Commission
(Agriculture Division)

Yojana Bhawan, Sansad Marg
New Delhi-110001
Dated : April 27th, 2011

Office Memorandum

In continuation to notification vide OM of even number dated 16th March, 2011 ,with the inclusion of co-opted members, *the updated / extended list* of Working Group Members on 'Horticulture & Plantation Crops' is hereby circulated with the approval of competent authority.

2. The Ministry of Commerce shall be represented by Ms. Vijaya Laxmi Joshi, Joint Secretary (Trade/Plantation etc.) in place of Shri J.S. Deepak, Joint Secretary.

1	*Prof. . D.P. Ray, Vice-Chancellor, Orissa University of Agriculture &* Technology, Bhubneshwar, 751003 Phone: 0674-2397700, Fax.2397780 Mob.09437040057 Email:outmain@hotmail.com ***(Chairman)***
2.	Dr. H.P. Singh, Dy. Director General (Horticulture) Krishi Anusandhan Bhawan-II New Delhi-1101012 Email: hpsingh@icar.org.in
3.	Shri Sanjeev Chopra, Joint Secretary & Mission Director, National Horticulture Mission(NHM) Department of Agriculture & Cooperation, Krishi Bhawan, New Delhi -110001 Email: chopra.sanjeev@nic.in
4.	Dr. Gorakh Singh, Horticulture Commissioner DAC. Krishi Bhawan, New Delhi-110001
5..	*Dr T.A. More, Vice Chancellor* Mahatma Phule Krishi Vidyapeeth Rahuri-413722 Fax: 91(0)24643302 E-mail. kvmp@ren.nic.in

PS
27.5.11

6.	*Dr S.D. Shikhamany,* Vice-Chancellor, Andhra Horticulture University, DCC Bank Building, Tadepalligudem, Post Box-7, West Dodawari. Phone-8818-222191, Fax 222190
7.	*Dr R.K. Dhiman, Vice Chancellor,* Dr. Y.S. Parmar University of Horticulture & Forestry, Solan, Nauni, HP Phone. 01792 (252363 (O), M-9418203800 252242 ®
8.	Shri M.K. Singh, Secretary (Hort.)/Mission Director Directorate of Horticulture, Department of Horticulture & Fruit Processing, Govt. of UP, Udyan Bhawan-2 Sapru Marg, Lucknow-226001 Ph:0522-2235447 Mob:09793765111 Email: mks2973@yahoo.com Sac.uprd@gmail.com
9.	Dr Pijush Kanti Parmanik, Director (Horticulture), Government of West Bengal, Department of Food Processing, Industries, Mayukh Bhawan, Salt Lake, Kolkata-700001
10.	Shri A.L. Meena, Joint Secretary, Food Processing Industries, Panchsheel Bhawan, New Delhi
11.	Secretary, APMC, New Fruit Market, Sarai Pipal Thala, Azadpur, New Delhi -110033. Phone: 27691748 Fax.27691799
12.	*Shri Mir Chand,* Confederation of India Industry CII Headquarters Manthosh Sondhi Centre 23 Institutional Area Lodi Road, New Delhi
13.	Director, Central Plantation Crops Research Institute, Kasaragod-671 124 Kerala
14.	Director, Indian Institute of Spices Research Marikunna PO Calicut, Kerala-673012
15.	*Chief Executive Officer, SAFAL* F-89/11, 1st Floor, Okhla Phase-1 New Delhi – 1100200 Phone. +91 11 40665555 Fax 40665503
16.	*Shri Sopan Kanchan,* President, CIHs, Confederation of Indian Horticulture & Grape, Gultekdi, Pune (Maharashtra)

17.	Shri Anil K. Gupta, Managing Director Container Corporation of India Ltd., CONCOR Bhawan,C-3, Mathura Road Opp. Apolo Hospital, New Delhi-110 076 Phone: 91-11-41673093, 94, 95, 96 Fax : 91-11-41673112 Email.co.pro@concorindia.com
18.	*Ms. Ritu Kapoor* , MD, Kashmir Apiaries Village- Malhipur, G.T. Road, Doraha-Ludhiana-141 421 Tel-(1628) 258 240 /258 640 Fax (1628) 661 699 / 661 698 Email.infor@kashmirhoney.com
19.	Adviser (Agriculture), Planning Commission, New Delhi
20	Dr. Amrik Singh Sandhu, Director, Indian Institute of Horticulture Reseearch (IIHR), Hessarghatta Lake Post, Bangalore-560089 E-mail-director@iihr.erneet.in
21	*Dr. Dandin*, Vice Chancellor, University of Horticulture Sciences Sector No. 60, Navanagar, Bagalokot-587102 Karnataka.
22	Dr N.K. Dadlani, B-3, IARI, Pusa Complex, New Delhi-011-25842781 nkdadlani@rediffmail.com
23	Dr P.G. Adsule, Director, National Research Centre for Grapes, ICAR, PB No. 3, Manjri Farm Post Solapur Road, Pune-412308 (Maharashtra)
24.	Dr M.M. Anwar, National Research Centre for Seed Spices, Tabiji Farm, Ajmer 305 206
25	*Shri Harsha Jyoti Barua*, Ex-Director (Hort.), Assam Krishi Bhawan, Khanapara, Dispur, Guwahati.
26.	Shri Bijay Kumar, MD, National Horticulture Board, Ministry of Agriculture, GOI. 85-Institutional Area, Sector-18, Gurgaon-122015 Phone (0124)- 2342992 ***(Member Secretary)*** Fax (0124)- 2342991 mdnhb@yahoo.com

Co-opted Members

27.	*Dr. P. Rethinam,* Former Chairman, CDB, Cochi, Bhagireth, 18, Laxminagar, S.N. Palayam, Sugarcane Breeding Institute PO-Coimbatore-641007 (TN)
28.	Dr. K.V. Peter, Director, World, Noni Research Foundation, 12 Rajiv Gandhi Road, Sreenivasa Nagar, Perungudi, Chennai-600096.
29	*Dr P Das,* Former Director, Regional Plan Resource Centre, house No-C-122 (HIG), Baramunda Housing Board Colony, Bhubneshwar-3
30	Dr S. Edison, Former Director, CTCRI, Kerala Srindhi, House No. TC-13/350, Keshaba Das Puram, Pattom, PO Trivenduram-695004, Kerala.
31	*Dr R.L. Misra*, Former Project Coordinator, Horticulture, C-4, Brahma Apartments, Plot No.7, Sector-7, Dwarka, New Delhi-110075
32	Shri Asit Tripaty, Chairman, Agricultural & Processed Food Products Export DevelopmentAuthority (Ministry of Commerce & Industry, Govt. of India),NCUI Building 3, Siri Institutional Area, August Kranti Marg, New Delhi - 110 016, Fax : 91- 1226187 Email. chairman@apeda.gov.in
33	*Dr. D.S. Rathore*, Former Vice-Chancellor, HPKV, Palampur, Flat P, J-1/63, Khirki Extn. Malviya Nagar, New Delhi-110 017, Tel. 011-29543198
34	Ms Vijaya Laxmi Joshi, Joint Secretary, Ministry of Commerce, 248, B-wing,Udyog Bahwan, New Delhi Tel. 011-23061377 Email. vl.joshi@nic.in
35	Sudha Midha, Adviser (Hort.), Deptt. of Agri. & Coop., Ministry of Agriculture, Krishi Bhawan, New Delhi. Tel.011-23388658 Mob.9810524194 Email.sudha.midha@nic.in

(Dr. A.K. Tiwari)
Dy. Adviser (Monitoring Agri)
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To
Chairman and Member Secretary of Working Group on Horticulture & Plantation Crops.

Distribution :
All members of Working Group on Horticulture & Plantation Crops .
SRO / Branch Officer, Agriculture Division, Planning Commission

Planning Commission
Agriculture Division

Yojana Bhawan, Sansad Marg
New Delhi-110001
Dated : May 5, 2011

OFFICE MEMORANDUM

Subject: Working Group on "Horticulture & Plantation Crops" for the Twelfth Five Year Plan (2012-17)- Notification on co-opted members.

In continuation to earlier notification vide OM of even number dated the March 16th, 2011 for above cited Working Group, the names of the following as members of the Working Group have been co-opted with the approval of competent authority. ***A total of 37 members now represent the Working Group.***

1. Dr Krishna Pal Tomar
   A-122, Inderpuri, New Delhi-110012,
   Tel. No. 011-25835004, Mob.931318179

2. Shri Bhasker Reddy, Head, Agriculture, FICCI,
   Federation House, Tansen Marg, N Delhi.
   Tel. 23753124 Email. Fax. 23765333
   Mob. 9899599455 Email. baskar@ficci.com

(Dr. A.K. Tiwari)
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Distribution to all Members
Copy to :

1. Prof. D.P. Ray, Chairman *(12th Plan Working Group on Horticulture & Plantation Crops)*/Vice-Chancellor, OUA&T, Bhubneshwar – 751003-

2 Shri Bijay Kumar, Member Secretary, *(12th Plan Working Group on Horticulture & Plantation Crops)*/MD, National Horticulture Board, Ministry of Agriculture, GOI. 85-Institutional Area, Sector-18, Gurgaon.

F.No.M-12043/2/2011-Agri
Planning Commission
(Agriculture Division)

Yojana Bhawan, Sansad Marg
New Delhi-110001
Dated : June 13, 2011

Subject: 3rd Meeting of Working Group on Horticulture & Plantation Crops for Twelfth Five year Plan at Bangalore – Expenditure –reg.

For organization of 3rd Meeting of Working Group on Horticulture & Plantation Crops for Twelfth Five year Plan at Bangalore, the Director/Pr. Secretary (Horti.), Government of Karnataka was requested to host the event. Their response has not been positive so far and time left is very short, hence, the National Horticulture Board is requested to organize/host the above said meeting to facilitate the conduct of business smoothly. Necessary expanses towards logistics like boarding, lodging & transport etc. shall be reimbursed to the National Horticulture Board by the Planning Commission.

Followings may also be invited as co-opted member:

1. Shri Suresh Kumar, Chairperson Agriculture Extension, Working Group, Mob.09819830067 , Email: sureshkumar.goodgover@gmail .com.
2. Dr T.P. Rajendran, ADG (Plant Protection), ICAR, Room No. 215, krishi Bhawan, New Delhi-Tel.011-2338 4414 (o).

(Dr A.K. Tiwari)
Dy. Adviser (Agri)

Member Secretary,
12th Plan Working Group on Horti. & Plantation Crops, &
Managing Director
National Horticulture Board
Gurgaon (HR)

Annexure-2

The following sub-groups for the Working Group on "Horticulture & Plantation Crops" for 12th Five Year Plan were approved by the Working Group in its first meeting held at New Delhi on 18th April, 2011 having a Chairman and four members in each Group.

Sub-Groups	Area/Issues	Chairman
1.	Nature of Govt. of India's involvement in Schemes for Horticulture Development and Contribution of States	Shri Sanjeev Chopra, IAS, Joint Secretary and Mission Director, NHM, DAC
2.	Assessing Growth Rate of Horticulture Sector and Xllth Five Year Plan Outlay	Dr. H.P. Singh, DDG (Hort.), ICAR, New Delhi
3.	Issues relating to Critical Inputs, Production and PHM, Technology Gap etc.	Dr. Gorakh Singh, Horticulture, Commissioner, DAC, New Delhi
4.	Issues relating to PHM, Packaging, Transport and Storage and Value Addition of fresh Horticulture Produce	Shri Amrit Lal Meena, IAS, Joint Secretary, Ministry of Food Processing Industry, New Delhi
5.	WTO Regime and Global competitiveness	Shri Asit Tripathy, Chairman, APEDA
6.	Schemes of Horticulture Development	Dr. D.S. Rathore, Former Vice Chancellor, HPKV, Palampur, Plot No. P, J-1/63, Khiriki Extn., Malaviyanagar, New Delhi
7.	Issues relating to Plantation Crops	Dr P. Rethinam, Former Chairman, CDB, Cochi, Bhagirathi, 18-Laxminagar, Coimbtore (TN)
8.	Horticulture Statistics and Market Intelligence	Dr. K.V. Peter, Former Vice Chancellor, KAU & at present Director, World Noni Research Foundation, Perungudi, Chennai
9.	Environmental Horticulture, Urban Horticulture and Recycling of Urban Waste Water for Horticulture	Dr. P. Das, Former Director, Regional Plant Resource Centre, HIG-C-122, Baramunda Housing Board Colony, Bhuabaneswar-751003, Orissa

Annexure-3

A. Technologies developed under HMNEH (Mini Mission-I), Coordinated By National Research Centre for Orchids, Sikkim

1. ICAR RC NEH Region, Meghalaya

Sl. No.	Name of the Technology	Salient Feature of the Technology	Year
1.	**Effect of pruning severity and time on early/delayed flowering of peach**	Peach cv. TA-170 was pruned on 30th October, 15th November and 30th November (normal pruning time) with 50% and 75% severity. Earliest shoot emergence was recorded in 30th October pruned trees. Trees pruned on 30th October with 75% severity produce flower (100%) and fruits (last harvest) 12 days earlier than normal pruning date.	
2.	**Standardization of technology for off- season production of strawberry**	Strawberry cv. "Sweet Charlie" was planted at monthly intervals from July to February under low tunnels of plastic and shade net. The size of tunnels are 4.0m x 0.90m with central height of 75cm. July planting starts flowering on 20 October and fruiting in November under shade net (50%). Quality of off- season-produced fruits was at par with normal season fruit.	
3.	**Shelf life extension of strawberry**	Weight loss, decay loss and the chemical changes associated with shelf life were monitored during storage at ambient condition (temperature, 13 °C - 24 °C and RH- 70%). Shelf life of 6 days was recorded when the treated fruits with $CaCl_2$ (2%) was packed in HDPE.	
4.	**Organic cultivation of colocasia and sweet potato**	Different organic manures were tried to evaluate their performance in colocasia genotype ML-1. The highest yield of 107.50 q/ha was recorded when 16.25 t/ha of poultry manure was applied. In sweet potato variety H-62, the highest weight of tubers/plant (586.67 g) and highest tuber yield of 221.25 q/ha was recorded with 26 t/ha of FYM.	
5.	**Effect of organic manure on growth, yield and quality of tomato and capsicum**	FYM (12.5 t/ha) + Rabbit manure (7.5 t/ha) recorded the highest yield of 184.50 q/ha in tomato followed by application of Rabbit manure @ 15 t/ha. Among the eight treatments, significantly higher fruit yield of 128.5 q/ha in capsicum was recorded with Rabbit manure @ 15 t/ha	
6.	**Evaluation of tomato varieties under low- cost polyhouse during off season**	Six tomato varieties including two hybrids were grown during the month of November under low-cost polyhouse. The hybrid Rocky had the highest yield per plant (1.86kg) along with the highest average fruit weight (115.35g). Of the chemical parameters TSS and ascorbic acid were highest in the variety Megha Tomato–2 (9.0º B and 25.2 mg/100g respectively), while lycopene was found to be highest in the variety Selection–2 (37.76 mg/100g).	
7.	**Postharvest life of gladiolus as influenced by holding solutions**	Sucrose (4%) + 8- HQC (200ppm) as holding solution may be used for prolonging the postharvest life of gladiolus cv. Pusa Jyotsena up to 14 days	
8.	**Standardization protocol for preparation of tooty fruits from Chow-Chow**	Good quality product was obtained at sample size of 15 X 12 X 4 mm, 15 minutes blanching at boiling water, 2% calcium chloride dipping for two hours followed by 1 hour dipping in 40 % syrup solution at room temperature and 2 hours heating in 70% syrup at 90^{o}C.	
9.	**Integrated nutrient management in citrus**	Pig manure @ 60 kg/plant produced more number of fruits (654) with highest number of Extra special grade quality fruits (84.9) and special grade fruits (67.2) in 12 year old plantation of *Khasi* mandarin. Highest TSS (11.3 ^{0} B) was also recorded in the same treatment.	
10.	**Rejuvenation of old declined orchards of Khasi Mandarin**	After 8th year of dehorning more number (425) of fruits were obtained with 1.0 m top worked plants. Maximum fruit weight (146.7 g) and juice content (52 %) were also recorded in the same treatment.	
11.	**HDP in Dwarf Cavendish of Banana**	Dwarf Cavendish banana was planted with different spacing *viz.,*1.5 x 1.5, 2x2, 2.5x2.5 and 3x3 m. It was observed that 2.0 m x 2.0 m was optimum spacing for higher fruit yield (24.7 t/ ha), bunch weight (7.4 kg) and good quality fruits.	

12.	**Effect of high density planting on yield and quality of Pineapple**	Yield of pineapple was highest (101.9 t/ ha) in spacing T_6 (25x35x75 cm^3) with an average fruit weight of 1.40 kg. However, the spacing T_4 (25x35x90 cm^3) yielded fruits weighing on an average 1.48 kg each with highest TSS (16.43) and yield of 94.5 t/ha.	
13.	**Effect of Mulching and INM on the yield and quality of ratoon crop of pineapple**	The highest yield was recorded in black polymulch (63.42 t/ha) which was followed by grass mulch (52.67 t/ha) and non-mulched plot (46.87 t/ha). Similarly, higher yield was recorded in Azospirillum treated plots (57.98 t/ha) followed by FYM (55.26 t/ha) and Azotobactor (55.08 t/ha).	
14.	**Evaluation of Banana cultivars in Manipur condition**	The highest bunch weight was recorded in Dwarf Cavendish (24.1 kg) followed by Robusta (17.49 kg). The number of fingers was higher in Dwarf Cavendish (142.33) and lower in Robusta (98.75).	
15.	**Varietal evaluation of passion fruit**	Though highest number of fruits/plant was recorded in Manipur Local, the highest yield (127.89 t/ ha) was recorded in Kaveri due to its bigger size fruits and higher fruit weight. Further it was observed that more than 90% plants of all local purple varieties viz. Manipur Local, Sikkim Local, Meghalaya Local died due to wilt after third year of fruiting.	
16.	**Introduction, evaluation and standardization of production technology of kiwi**	Evaluation of five Kiwi varieties namely Allison, Bruno, Monty, Abbott and Hayward was taken up at four locations of Manipur. Allison at an altitude of 1150 -1300 m above msl (Ukhrul and Senapati districts) performed better than at lower elevations. Hardwood cuttings treated with a mixture of IBA (2500ppm) and NAA (2500ppm) solution for 30 seconds under intermittent mist for 2-3 minutes every 20 minutes interval in a day with sand, farm yard manure and soil as rooting media gave 70 percent success.	
17.	**Effect of NPK on growth, yield and quality of banana var. Giant Cavendish**	Eight different treatments were evaluated with different doses of NPK. The experimental findings revealed that the treatment T6 (NPK @ 300: 100 : 300 g/ plant) produced the highest yield with higher bunch weight of 15.33 kg and TSS of 26.5 %, respectively.	
18.	**Standardization of Propagation Techniques in Passion Fruit**	Propagation of passion fruit cv. purple (*Passiflora edulis* Sims) was undertaken by different methods *viz* seed, cutting, whip grafting and mound layering. Among the vegetative methods of propagation, whip grafting was found to be better over other methods of propagation.	
19.	**Performance of passion fruit cultivars under Nagaland condition**	Growth performance of Naga Local, Meghalaya Local and Kaveri (Yellow X Purple) was evaluated. Fruit yield per vine was recorded maximum (2.56 kg) in Kaveri, which was almost double the yield recorded in local cultivars (1.2 kg in Meghalaya Local and 1.39 kg in Naga Local).	
20.	**Evaluation of banana cultivars**	Ten banana cultivars namely, Jahaji, Robusta, Amrit Sagar, Manohar, Chinichampa, Jati Kol, Bor Jahaji, Red Banana, Sonda Kol and Krishna were evaluated. Jahaji produced the highest number of hands/ bunch with an average weight of 23.10 kg/bunch.	
21.	**Effect of bunch cover on maturity and fruit yield of banana**	Effect of bunch cover on maturity and fruit yield was studied in banana var. Jahaji with two types of polythene *viz.*, transparent and blue coloured. In both the treatments maturity period reduced by 21 days and fruit yield increased by 23.46 and 17.63%, respectively compared to control.	
22.	**Effect of mulching on banana**	Maximum bunch weight (29.46 kg) and yield (57.35 t/ha) was recorded in black polythene mulch followed by transparent polythene. However, improvement in soil fertility and nutrient status in terms of available phosphorus and potassium was noticed with organic mulches (paddy straw and banana thrash) and available nitrogen with *Azolla*	
23.	**Integrated nutrient management in tomato**	The highest number of fruits/ plant (36.65) and fruit weight (73.16 g) and yield (32.36 t/ha) was recorded when 50 % of nitrogen was supplemented through FYM and 50 % by urea. The reduction of yield was recorded to be 31.52, 34.67 and 24.56% with the application of FYM, vermi-compost and combination of both the bio-fertilizers, respectively	
24.	**Integrated nutrient management in cabbage**	Maximum yield (342.65 q/ha) of cabbage was obtained with the application of pig manure (10 t/ ha) which was significantly higher compared to vermi-compost (292.13 q/ha).	
25.	**Cole crop production technology**	The varieties identified for cabbage, Cauliflower and broccoli are Bahar, Suhashini and Ashwarya respectively. Treatment of nursery bed with	

		Trichoderma harzianum culture @ 20g / m^2 before seed sowing is suggested for the management of damping off of seedlings. Raised bed / ridge furrow method is suggested to minimize disease incidence. For proper nutrient management application of FYM @ 2kg/m^2 + vermicompost @ 1kg/m^2 and neem cake @ 200g/m^2 along with the seedling treatment with Azospirillum + PSB (20%) for 10 minutes are recommended. Spraying of Boron rich micronutrient @2g/l after one month of planting is suggested to minimize browning. For insect pest management, manual collection and destruction of pests along with the application of neem based formulation @ 0.4% and application of BT culture @2g/l is suggested.	
26.	**Tomato Production technology**	The varieties identified for tomato under protected conditions are Anup, All Rounder and Indam Hybrid. The spacing of 0.8 m X 1.0 m is suggested under poly house and plant should be planted on ridges. Treatment of seedlings with Trichoderma harzianum culture (20%) is effective for management of blight. For nutrient management, application of FYM @ 2kg/m^2 + vermi-compost @1kg/m^2 and neem cake @ 200g/m^2 along with the seedling treatment with Azospirillum + PSB (20%) for 10 minutes are recommended. For management of fruit borer manual collection and destruction along with the application of BT culture @2g/l is suggested	
27.	**Enriched Vermi-composting**	A bed size of 8' X 4' X 20 cm is the suitable for vermi-composting. The unit should be cemented and covered with polythene cum agro-shed net for proper ventilation. A mixture containing partially decomposed cow dung (4 parts), legumes leaves (1 part) and Azospirillum and PSB @ 100g/quintal by using *Eisenia foetida* and *Eudrillus eugineae* earthworms produced enriched vermi-compost. The enriched vermi-compost contains N 2%, P 1% and K 2%. The number of earthworm should be 1000/ q of raw material for getting 70 kg vermi-compost ready within 50 days.	
28.	**Standardization of production technology of litchi**	The plant growing under moderate slope (3-10%) produces higher yield i.e. 17.85 kg/plant than steep slope (g=<10%) where yield is 14.40kg/ plant. However, the slopes beyond 10% are not suitable for production of quality litchi. Six types of mulches viz. Mango, Litchi, Moringa, Polyalthia, Chhan and Gliricidia were evaluated to conserve the moisture in basin of Litchi. The Fruit yield under Gliricidia mulch was 2.865 t/ha followed by 1.95 t/ha under Chhan mulch, whereas the lowest fruit yield (1.613 t/ha) was noticed under unmulched trees.	
29.	**Standardization of time of grafting for multiplication of Mango**	15 May to 15 September is the best period to perform soft wood grafting operation in 10 months old root stock of Mango in Tripura. Likewise, Stone grafting is possible during 15 June to 15 July with a success rate of 80%. For higher success rate, the root stock should be 10-15 days old.	
30.	**Standardization of production technology of Pineapple**	37 varieties were evaluated and the highest yield was recoeded in Arka Alok (25.70t/ha) followed by Arka Abha (25.10t/ha. These varieties were either resistant or tolerant to bacterial wilt in field condition. 18 F_1 hybrids were also evaluated. Out of these only All rounder, Samurudh, Swarksha, chiranjeevi, Tejoas, BWT-3 and Anoop were found to be better in Tripura during rabi season.	
31.	**Identification of suitable brinjal varieties for Tripura**	23 varieties were evaluated and out of these Saptarathi, Arka Nidhi, Singhnath-1, Singnath -2, Bolanath, BB-40, Arka Keshab, Arka Shirish and Arka Neelkiran were found better in Tripura during rabi season. Only Singhnath-1 and Singnath -2 were found resistant to bacterial wilt and suitable for year round cultivation in Tripura.	
32.	**Identification of suitable okra varieties for Tripura**	27 varieties were evaluated and out of these only Arka Anamika, Arka Abhay, VRO-6, Satdhari, Upkhar, Kaveri, Tulsi, panchali and SG-152 were recommended for cultivation due to higher yield and free from yellow vein mosaic virus.	

2. AAU, Jorhat

Sl. No.	Name of the Technology	Salient Feature of the Technology	Year
1.	***In situ* water harvesting and micro-irrigation in banana**	The technology is about harvesting rainwater during rainy season and use it through drip irrigation for enhancing productivity. Mulching with rice straw was used as additional water saving technique. Use of drip irrigation for fertilizer application (fertigation) and the schedule there of is perfected. Promoted under TM by State Horticulture department. Practiced by farmers.	
2.	**Rejuvenation technique for declining citrus orchards**	Pruning, training and cleaning to remove unwanted, diseased and pest infected branches, correct soil pH by applying agricultural lime@1kg per plant, apply manure and fertilizer, manage phytophthora foot rot by soil drenching ,remove all weeds from the orchard. Medium number of farmers adopted the method.	
3.	**Integrated Nutrient Management in Khasi Mandarin (*Citrus reticulata*, Blanco)**	Application of 300g N, 150 g P2O5 as Rock phosphate and 600 g K2O along with 7.5 kg Mustard Cake (MC) , 20 g Azotobacter and 20 g PSB per plant per year recommended as cheaper INM pakage for Khasi mandarin. This could reduce the application of 50 % of inorganic N and P2O5 of the previous recommended dose of fertilizers.	
4.	**Bioregulators in capsicum**	Application of NAA @ 10ppm and boron @1ppm at the time of flowering gives maximum fruits (11.26) number, Fruit weight (54.37g/fruit) and highest yield of 613.33 g fruits /plant. The technology is used by the capsicum growers	
5.	**Optimum planting distance of capsicum under polyhouse**	Row to row 45cm and plant to plant 30cm gives the highest fruit yield of 3.99 kg/m^2 The technology is used by the capsicum growers	
6.	**Integrated pest management in tomato**	IPM module followed: Release of *Trichogramma chilonis* @ 1,00000 / ha (6 times at weekly interval) Sowing a row of marigold after every 14 rows of tomato. Collection and destruction of damaged fruits. Biofor PF (Jaiva Kiron) as root treatment against bacterial wilt Yellow sticky trap @ 15 /ha Need based insecticides application. Many vegetable growers are adopting the IPM package	
7.	**Integrated pest management in brinjal**	IPM module followed: Release of *Trichogramma chilonis* @ 50,000 / ha (6 times at weekly interval) Wood ash @ 200 kg /ha Clipping of infested shoots Destruction of infested fruits Biofor PF (Jaiva Kiran) as root treatment Need based insecticides application. Many vegetable growers are adopting the IPM package.	
8.	**Integrated pest management in potato**	IPM module followed: High ridging Mustard oil cake @ 250 kg/ha as soil application Malathion 5% dust as soil application @30 kg/ha Yellow sticky trap @ 15/ ha Need based fungicides application (Diathane M45 and Ridomil MZ-72 alternatively). Wood ash @ 200 kg/ha) Need based insecticides Many vegetable growers are adopting the IPM package.	

9.	**Integrated pest management in watermelon**	IPM module followed: Seed treatment with *Trichoderma viridae* @ 4 gm/kg of seeds. Carbofuran 3G @ 7 kg/ha before sowing the seeds. Use of balanced dose of fertilizers and spacing to prevent the crop from overlapping. Hand collection and destruction of beetles. Racking of soil under the creepers. Use of poison baits (Citronella oil 2ml + Molasses 10 gm +Malathion 50 EC @ 2ml mixed in 1 litre of water). Mulching with straw. Need based application of insecticides Many vegetable growers are adopting the IPM package.	
10.	**Integrated pest management of okra**	IPM module followed: Use of Yellow sticky Trap (YST) @ 10 traps/ha. Spray of NSKE5% against Jassids and white fly during vegetative stage. Release of *Trichogramma chilonis* @ 1.0 lakh/ha at bud initiation stage at weekly interval for six times against okra fruit and shoot borer. Removal and destruction of damage fruits and shoots. Roughing of Yellow vein mosaic virus affected plants from time to time. Need based application of insecticides. (2 times at 15 days interval. Many vegetable growers are adopting the IPM package.	
11.	**Integrated pest management of cucumber**	IPM module followed: Seed treatment with *Tricodermma viridae* @ 4 gm/kg of seed. Application of Carbfuran 3G @ 7kg/ha before sowing of seeds. Use of balance dose of fertilizers and spacing to prevent the crop from overlapping. Hand collection and destruction of beetles. Raking of the soil under the creepers. Removal and destruction of damage fruits timely. Use of Poison baits (Citronella oil 2ml + Molasses10gm +Malathion 50 EC 2ml mixed in one litre of water). Need based application of insecticides. Many vegetable growers are adopting the IPM package.	
12.	**Integrated pest management of cabbage**	IPM module followed: Seed treatment with *Tricodermma viridae* @ 4 gm/kg of seed. Three realease of *Trichogramma chilonis* @ 1.0 lakh/ha at weekly interval. Growing of 2 rows of mustard after every 25 rows of cabbage (One row is planted 15 days before planting and another row 25 days after planting of cabbage) Spray of Bt formulation @ 500gm /ha after 15 days of planting. Spray of NSKE5% 2 times (fortnightly interval) at head initiation stage Need based application of insecticides. Many vegetable growers are adopting the IPM package.	
13.	**Integrated Pest Management Pea**	IPM module followed: Seed treatment with *Tricodermma viridae* @ 4 gm/kg of seed. Spray of NSKE5% after 30 days of sowing Hand collection and destruction of larvae and affected plants. Bird perches @ 50/ha to attract local predatory bird. Need based application of insecticides Use of YST @ 10/ha Many vegetable growers are adopting the IPM package.	
14.	**Integrated Pest Management of Capsicum**	IPM Module followed Seed treatment with *Tricodermma viridae* @ 4 gm/kg of seed. Malathion 5% dust @25 Kg /ha before transplanting. Spray of NSKE5% after 30 days after sowing.	

<table>
<tr><td></td><td></td><td>Biofor PF (Jaiva Kiron) as root treatment against bacterial wilt.
Clipping off the affected shoots and twigs.
Use of Yellow sticky Trap (YST) @ 15 traps/ha.
Removal and destruction of dead shoots and twigs.
Spray of Captaf @ 2gm/ lit against fruit rot.
Need based application of insecticides.
Many vegetable growers are adopting the IPM package.</td><td></td></tr>
<tr><td>15.</td><td>Evaluation of Black cantered gerbera cultivars for Assam under polyhouse cum rainshelter condition.</td><td>Different gerbera cultivars were evaluated in Assam condition following recommended fertilizer dose, irrigation and intercultural operations. Propagation is done by suckers. Suckers are planted during the month of Sep-Oct. The spacing was maintained at 30cm x 30cm. FYM 5kg per sqm was applied 15 days before planting gerbera. The levels of NPK@ 30gN, 10gP_2O_5 and 20kg K_2O per sq m was found to be the best economic level for the agroclimatic conditions of Assam.
Adopted by the farmers of Hajo (Kamrup).</td><td></td></tr>
<tr><td>16.</td><td>Production technology of gerbera</td><td>Gerbera is propagated by suckers. Suckers are planted during the month of Sep-Oct. Suckers are planted in the raised beds, everyday application of water is necessary to make the soil in moist condition. The spacing was maintained at 30cm x 30cm. FYM 5-6 kg per sqm was applied 15 days before planting gerbera. The levels of NPK@ 20: 20:20 g/sqm was found to be the best economic level for the agroclimatic conditions of Assam.
This technology is adopted in Hajo (village. Pakorkona, Kishmatbansor, Kulhati, Satdola, Dodora and Dodhi.), Charigaon (Jorhat), Bokul (Dibrugarh), Makum(Tinsukia)</td><td></td></tr>
<tr><td>17.</td><td>Spacing for planting material (cutting) production of carnation</td><td>Production of planting materials with suitable spacing for higher yield and quality flower production. The plants have to be spaced at 15x10cm.
This technology was adopted by TATA tea of Hatikhuli Tea estate.</td><td></td></tr>
<tr><td>18.</td><td>Gladiolus cultivars for Assam Condition.</td><td>Corms are planted in the month of Oct-Nov. Earthing up should be done at four leaf stage. NPK should be applied in the ratio of 1:2:2 @ 56g per sqm.
This technology is adopted in Hajo (village. Pakorkona, Kishmatbansor, Kulhati, Satdola, Dodora and Dodhi.), Charigaon (Jorhat), Bokul (Dibrugarh), Makum(Tinsukia)</td><td></td></tr>
<tr><td>19.</td><td>Spacing for planting material (seed) production of marigold</td><td>Marigold seeds are sown in Oct-Nov transplanted in the main field when the seedlings are 5-7cm in height. A spacing of 45x40cm has to be used
Moderate numbers of farmers adopted the technology.</td><td></td></tr>
<tr><td>20.</td><td>Growing media for Pseudobulb production of Hybrid Orchid cv.Oncidium.</td><td>The pseudobulbs are planted during the month of March-April. The growing media should be porus, free from water stagnation and 30-50% shading is required.
Moderate numbers of farmers adopted the technology.</td><td></td></tr>
<tr><td>21.</td><td>Growing substrate for sucker production of Anthurium Cv: IAHS- 1</td><td>Growing media should be porous, free from water stagnation, proper air circulation. The suckers are are separated when they become 5-6 leaf stage with 2-3 good roots.
Moderate numbers of farmers adopted the technology.</td><td></td></tr>
<tr><td>22.</td><td>Packaging of khasi mandarin in cfb boxes for transportation</td><td>Five boxes, viz, bamboo, wooden, corrugated fibre board (CFB I) box, CFB II and CFB III were designed
Technical specifications of the CFB boxes
<table>
<tr><td>Parameters</td><td>CFBI</td><td>CFB II</td></tr>
<tr><td>Internal dimension (LxWxH) in mm</td><td>420x300x320</td><td>420x300x320</td></tr>
<tr><td>No. of ply</td><td>5</td><td>5</td></tr>
<tr><td>Breathing holes</td><td>18 nos. of circular holes (3cm. diameter).</td><td>12 nos. of circular holes (2 cm. diameter)</td></tr>
<tr><td>Capacity</td><td>128 nos. of mandarins</td><td>128 nos. of mandarins</td></tr>
<tr><td>Stack load</td><td>120 kg</td><td>120 kg</td></tr>
</table>
CFB separators are used inside the boxes in order to separate each fruit from other to reduce damage due to abrasion.
The technology has been demonstrated in the citrus growing areas and to the traders.</td><td></td></tr>
</table>

23.	**Technology to reduce post-harvest losses by application of preharvest spray with carbendezim (0.1%) and *trichoderma virideae***	Two sprays during August and September should given with carbendezim (0.1%) and *Trichoderme virideae.* The fruits should kept under ambient, ZECC and cold room environments for enhancing shelf life. The physiological loss in weight (PLW) and decay loss shall be minimum in the carbendezim treated fruits. This technology has been demonstrated in Tinsukia district of Assam.	
24.	**Shelf life extension of banana**	Shrink wrapped banana hands treated with food grade wax delay the ripening period (10 d in ambient, 13 d in ZECC and 20 d in cold room). Carbendazim (0.1%) treated and shrink wrapped fruits, and also the waxed and shrink wrapped fruits remain unaffected by crown rot i.e., to increase the shelf life. This technology has been demonstrated to the farmers of Jorhat, Sibasagar and Golaghat districts of Assam. The farmers started applying the technology.	
25.	**Shelf life extension of green ginger**	After harvesting the green ginger should be harvested and collected from the farmer's field and to be washed properly. Excess water should be allowed to drain out and to be treated with Stayfresh (1:1) and Stafresh(1:1) to increase the shelf life. Demonstrated among the ginger growers of Golaghat district. The farmers have adopted the technology.	
26.	**Shelf life extension of minimally processed fruits and vegetables**	The slices of cucumber should be dipped in 1% citric acid + 3% ascorbic acid +25 ppm benzoic acid Pineapple slices should be dipped in 2% calcium chloride+3% citric acid + 2% ascorbic acid +25 ppm benzoic acid Bulbs of jackfruit should be dipped in 1% ascorbic acid +2% citric acid +2% calcium chloride +50 ppm benzoic acid These anti-oxidant treatments will extend the shelf life of the products. The technology has been able to create interest among entrepreneurs. Moderate number of farmers adopted the technology.	
27.	**Protocol for development of ready to serve beverages from local fruits**	RTS beverages from indigenous fruits of Assam blended with or, without other fruit juices are to be prepared with 15% juices maintaining proper sugar: acid ratios by using chemical preservatives like KMS and Na benzoate so that their TSS and acidity should be maintained at 15% and 0.3% respectively. Local processing units and self-help group have adopted the technology. Local entrepreneurs have benefited by adopting this technology.	
28.	**Wine from locally available fruits**	Local people use to prepare rice beers and wines from local fruits like jackfruit etc. To the filtered juice/ prepared juice, culture containing wine yeast (*Saccharomyces cerevisiae*) to be added @ 5% and It should be fermented at 28±1˚C for 6-8 days till the TSS become stable. The clarified wine is to be stored in glass bottles after pasteurization. The local entrepreneurs have benefited by adopting the technology.	
29.	**Value added products from local chilli cultivars**	Development of different value added products like powder, flakes, paste etc. from local chilli types having high export potential. The product has been compared with internally established two chilli types Lemon Drop and Goronong. The technology has been demonstrated and been able create interest among entrepreneurs	

3. CAU, Imphal

Sl. No.	Name of the Technology	Salient Feature of the Technology	Year
1.	**Standardization of growth regulators for stem cuttings of passion fruit**	750ppm IBA treatment with 3 nodes cutting gives the best survival percentage with highest leaf emergence and resulted in better number, diameter and length of roots and shoot. Farmers have started following the techniques.	
2.	**Standardization for passion fruit trailing methods**	Telephonic trailing using G.I.Wire (2.65 mm gauze) for passion fruit training was found to be most economical. Spacing = 2 mX 6 m Plant population per ha = 833 plants/ha Practiced for massive multiplication.	
3.	***In vitro* protocol of Banana var. Meitei Hei established**	MS medium containing NAA (0.1mgl-1) and BAP (0.5mgl-1) gives the best response (100%).	
4.	**Black poly mulching in pineapple**	Black poly mulching of 60% coverage(1.82x3437m) have been developed and standardized for increasing the yield and quality of pineapple under Manipur conditions Fruit yield, sucker-slip production, overall plant growth and yield was the best. Widely practiced for massive multiplication.	
5.	**Staggering production in pineapple**	High density planting using various planting materials for year round production with spacing of 25 x 50 x 80 cm accommodating 61,538 plants/ha Started practice for massive multiplication	
6.	**Selection of suitable sucker size for planting**	Suckers weighing 400g have been found to be the best planting size for Kew var. Farmers of the 4 districts have started practicing.	
7.	**Pineapple processing**	**Fruit to Juice:** 2.36 kg fruit worth Rs. 11.8 can produce 1 Kg juice or 1 lit. juice worth Rs. 23.58 and Juice recovery %= 42.37% **Juice to Squash:** 1 lit. juice worth Rs. 23.58 can produce 5 bottles worth Rs.225 of squash @Rs. 45/bottle. Under home condition a sum of Rs.1847/- per day can be earned by converting 60 kg fruit to 90 bottle squash of 700ml. Farmers have started this practice on home scale basis .	
8.	**Double and single row pineapple planter technology**	Use of pineapple planter for increasing yield and reducing mandays by 50% Consideration/started the practice by the farmers.	
9.	**Pineapple wine production technology**	Pineapple wine containing 24% alcohol from pineapple juice @1.5 kg +KMS(1g)+citric acid(10g)**+** *hamei culture* (prepared from *Albizia myriophyla*,12g). Not yet started by the farmers.	
10	**Rootstocks trial for inverted T-budding of Tamenglong oranges**	Grafting of Tamenglong orange on various rootstocks viz. Trifoliate, Rich 16-6, *Citrus karna, Citrus latepes*, Cleopatra mandarin, X- Farmers have started plantation from supplied planting material.	
11	**Selection of nucellar seedling from polyembryonic varieties**	True to type seedlings production. Around 10,000 katchai lemon, 10,000 Tamenglong orange have been raised by direct broadcast method in polyhouse. Widely adopted by the farmers.	

4. CPCRI, Kahikuchi

Sl. No.	Name of the Technology	Salient Feature of the Technology	Year
2.	**Arecanut Based High Density Multi Species Cropping System**	Rooted cuttings of black pepper is planted at 30-45cm away from the base of the arecanut palm (6-7 years old) and later trailed on to the palm. The vines are allowed to grow only up to a height of 12 ft so that harvesting of arecanut/pepper will not be hindered. Banana suckers and rooted cuttings of citrus are planted in the inter row spaces in alternate rows. In each of these rows these crops are alternated with ginger/turmeric beds 2.5x1.0m. In addition, pineapple suckers are planted in the space between arecanut palms in the same row in beds of size 1x1m. Recommended package of practices are followed for arecanut and each of the component crops so that the full yield potential of the crops is exploited. The system is being demonstrated in 15-20 farmers' fields and the adoption by farmers is encouraging.	
3.	**Management of Ganoderma wilt disease of arecanut caused by *Ganoderma lucidum*.**	The diseased palms should be isolated from the neighbouring healthy palms as described above. Recommended doses of fertilizers @ 220g urea, 250g SSP and 230 g MOP in two splits, 1st in April-May and 2nd during Sept- Oct, along with 12 kg cow dung to be applied per year. Neem cake @2kg/palm fortified with 100g *Trichoderma viride* should be applied at half yearly interval. The manures and fertilizers are to be applied in a circular ring around the palm at a radius of 75-100 cm and 15-20 cm depth. The basin of the palm is to be drenched with 0.3% Calixin @10- 15 l/palm at quarterly intervals. The management package has been demonstrated in farmers' fields in Tilapara and Musculi Garopara villages of Goalpara district and encouraging results obtained.	
4.	**In-situ moisture conservation practices in sloping lands**	Among the different practices tried, catch pit with pineapple downstream was found to be the best one in which 55-69% increase in yield of arecanut palms over control was obtained. Trenches/pits of size 2m length, 30cm width and 30cm depth are dug across the slope on contour lines in the inter rows of arecanut palms in staggered manner so that each trench will cover the upstream area of a palm. The soil is put downstream the trench and pineapple suckers are planted in a triangular pattern. Initial care to be taken for the establishment of the pineapple suckers. The method is demonstrated in farmers' fields and they started adopting the practice.	
5.	**Management of bud rot of arecanut caused by *Phytophthora meadii***	Infected portion should be removed by making longitudinal side slit and scooped off by using chisel and hammer and then to be treated by spraying with Bordeaux mixture 1% or Dithane M-45 @ 0.3 % and placing Phorate 10G sachets @ 10g/palm in the treated portion. Dead and disease advanced palms to be removed and destroyed by burning or deeply burying in the soil so that spread of the disease will be controlled for the next season also. The management package has been demonstrated to farmers in training programmes and farmers showed their interest in taking up the package.	
6.	**Production of quality arecanut seedlings using standardized potting mixtures**	Three potting mixtures were found to be superior in producing quality seedlings *viz*: sand + vermicompost (2:1), soil + sand + FYM (1:1:1), and soil + sand + vermicompost (1:1:1). The inputs are mixed properly in the mentioned combinations and filled in polybags of size 25 x 20cm. Three month seedlings from the primary nursery are transplanted to these polybags and kept under partial shade. The seedlings are to be irrigated at regular intervals. After 12-15 months, healthy and vigorous seedlings having more than five leaves, bold base and reasonable height are selected for planting in the main field.	
7.	**Vermicompost using arecanut based farm waste**	Areca wastes are chopped into small pieces of 10cm and heaped. The heap is sprinkled with water daily and maintained for about two weeks.	

		Later these chopped materials are arranged in beds of one meter width and convenient length. For this, cement tanks or pits can be used. A layer of 10-15 cm tank waste material is alternated with 2cm layer of cow dung, over which earth worms are released at the rate of 1 worm per kg of biomass. The wastes are converted into fine granular vermicompost within 90 days. During the period the earthworm population becomes 10 times. The system is being demonstrated in 20 farmers' fields and more than 250 training programmes have been organized on this technology for the farmers of North eastern states. The adoption by farmers is encouraging.	
8.	**Rooting medium for large scale production of rooted black pepper cuttings**	The bio-agent, *Trichoderma viride* is added and mixed with the rooting mixture, prepared by mixing sand, soil and FYM in the ratio 1:1:1 and filled in polybags of size 10x12cm. Rooted cuttings are then planted in the polybags and maintained by watering at regular intervals.	
9.	**Soil health improvement and reduction of external inputs in arecanut based cropping system by recycling the residual biomass**	About 10-12 tonnes of biomass are produced by arecanut and the component crops (Black pepper, banana, citrus, pineapple etc.) together in the arecanut based HDMSCS. This biomass has to be systematically composted and enriched in pits dug for the purpose in a corner of the field itself in batches. The process gets faster if earthworms are utilized for the purpose. Normally the compost is ready within a period of 3-6 months. Normally the recovery of compost ranges from 70-75% yielding 7-8 t/ha. The compost when ready has to be added back to the crops uniformly and incorporated in the soil twice in a year along with fertilizers. Only 2/3rd of the recommended dose of fertilizer needs to be applied to arecanut and the component crops to obtain the optimum yield.	

5. CPRS, Shillong

Sl. No.	Name of the Technology	Salient Feature of the Technology	Year
1.	**Spray schedule for managing Late Blight of potato**	Judicious spray of fungicides against Late Blight: ➢ Spray the crop with mancozeb 0.2% (2 gms fungicide/litres of water) as soon as weather conditions become congenial for disease appearance, spray should be given on the lower side of the foliage ➢ Sticker *viz*. Triton AE 0.1%(1 ml in 1 lt. of water) or some other stickers available in the market may be mixed with the spray solution ➢ Subsequent sprays should be need based depending on the variety grown and disease severity Apply two more sprays of metalaxyl + mancozeb (0.25%) at 15 days interval or Cymoxanil (Curzate M8) 0.2% at 10 days interval.	
2.	**Use of stable bleaching powder for managing bacterial wilt**	Apply stable bleaching powder @12kg/ha mixed with fertilizer in furrows while planting. It reduces wilt incidence by 80%.	
3.	**Use of lantana leaves for managing potato tuber moth (PTM) in stores**	➢ Cover healthy tubers stored in country stores with 2-3 cm thick layers of chopped dried leaves of *Lantana* spp., below and above the heap. Dry leaves of soapnut, neem, eucalyptus and eupatorium can also be used effectively.	
4.	**Refined Nur-Bun method of potato planting in Meghalaya**	➢ Using the refined method (60cm x 20cm spacing) the seed rate was reduced and therefore, costly seed material could be saved. Refined method was found compatible with existing land structure as no extra alteration in the land structure was required.	

6. NRC for Orchids, Pakyong

Sl. No.	Name of the Technology	Salient Feature of the Technology	Year
1.	Production technology of Cymbidium	Modified growing media, Improved nutritional doses at vegetative and flowering stage, Shading requirements at different months, Post harvest treatments of flowers. Farmer's are slowly but steadily accepting the technologies.