National Award for “Excellence in Water Management” – 2008

Beyond The Fence

PepsiCo India Holdings, Gurgaon

- **Amit Bose**
- **Ravi Sewak**
- **Dr Susheel Sankhyan**

Structure Of Presentation

- Historic Perspective
- Direct Seeding
  - India perspective
  - Sustainability benefits
  - The journey so far
  - Further opportunities
  - Farmer training package
- External Appreciation
  - IRRI
  - PAU
  - Media

PepsiCo in Agriculture – The Genesis

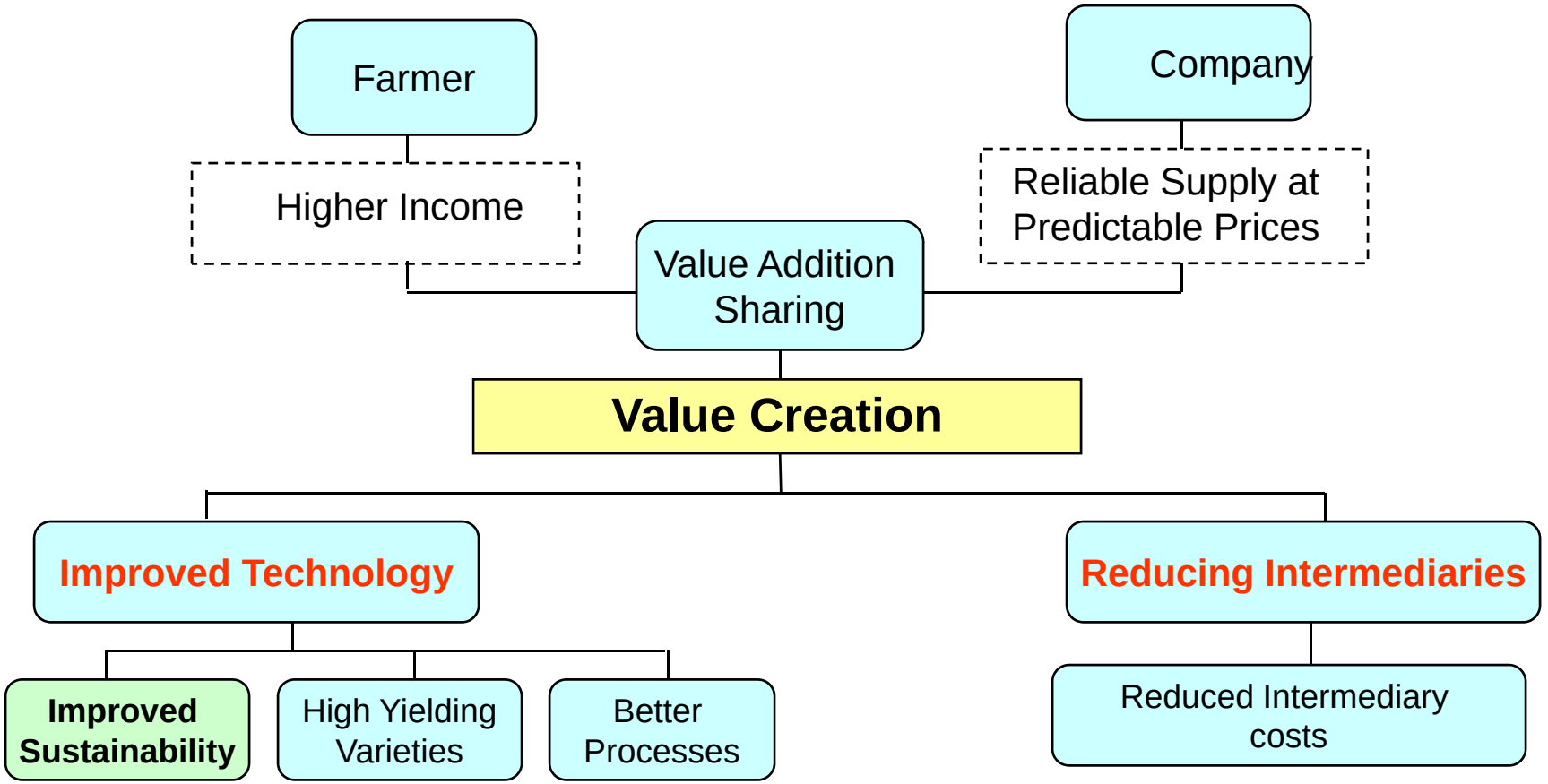
- PepsiCo's enters India in 1989 to manufacture, distribute & market beverages and snack foods.
- Precondition for entry is to invest in horticulture based food processing in Punjab.
- PepsiCo identifies processing of tomato as a viable opportunity in Punjab.

Country	Yield (Tons / Hectare)
World	24.00
USA	57.80
Greece	50.00
Italy	47.60
Spain	45.20
India	10.30

PepsiCo initiated Contract Farming in Punjab & within two years tomato output went up from 16 to 52 tons / hectare

FARMERS FRIEND – Higher Sustainable Income

PepsiCo's agricultural initiatives are guided by the basic principle of creating surplus value for the farmer



Direct Seeding Initiative Enables Improve Agricultural Sustainability

Direct Seeding – India Perspective

- India has about 110 million acres under paddy cultivation requiring 400,000 million KL of water annually
- Paddy cultivation requires about 3000 KL of water / acre
  - Traditionally seeds are sown in a nursery, manually transplanted to the main field and grown under 4 inches of water
  - Direct seeding of paddy eliminates these steps and saves 900 KL / acre P
- Even if 25% of the paddy cultivation can be moved to direct seeding, water saving will be over 25000 million KL – the total quantity consumed by Industry annually
- Savings
  - 30% reduction in water consumption
  - Rs 1400 / acre cultivation costs
  - Reduced Methane emission – Farmer can earn through Carbon Credits
    - Indian paddy emits 38 million tons of Methane; if saving in Methane emission by direct seeding is 30%, farmer can get a Carbon Credit of about Rs 2000 / acre – a huge incentive to move to direct seeding

Direct Seeding In Paddy – Progress Over The Years

- Direct seeding trials carried out in own farms during 2004 and 2005
  - Results indicated 30% reduction in water usage
  - No satisfactory answer on chemical weed control; hence manual weeding
  - Reduction in production costs
  - Equivalent or marginally higher outputs due to uniform planting density
- Issues to be resolved prior to commercialization at farmer fields
  - Mechanization of seeding operation
  - Weed control
- Machine developed for direct seeding
- During 2006 and 2007, trials in farmer fields over 20 and 100 acres respectively
- Trials done at own R&D farm with different herbicides

Direct Seeding Machine Developed By Pepsico

PepsiCo has bought many seeding machines and offers free access to farmers; also gives free seeds as incentive

2008 – Initiatives

Improvements implemented in 2008

- Optimum seed depth through modification in machines
- Better plant to plant spacing by introducing improved seed metering device
- Seed priming – Better germination and disease control
- Trials with new Herbicides have enabled find solutions to both pre and post emergence weeds
- Better nutrition of direct seeded crop through addition of chelated form of Zn, Fe and Sulphur M

Patent application for the seeding m/c in process

Work initiated with International Rice Research Institute, Manila

- An opportunity to test special seeds suitable for direct seeding
- Access to measurement tools for Methane emission

Work initiated to measure Methane emission reduction & to get UNFCCC approval of direct seeding as a means of Methane reduction

1100 acres of direct seeding during 2008 in 5 states; 10,000 acres by 2010

Effect Of Micronutrient Deficiency Correction

Before

After

Direct Seeding Demonstration To Punjab Farmers

Direct Seeding –10 Days Crop

Direct Seeding – 20 Days Crop

PEPSICO India

Direct Seeding- 30 Days Crop

Direct Seeding – 40 Days Old Crop

PEPSICO India

Direct Seeding – 70 days old crop

Direct Seeding – 120 Days Old Crop

Direct Seeding – Parmal 110 Days Crop

Direct seeding success in non-basmati will help expand acreage & farmer base

Operations Being Avoided

Puddling

Manual Transplanting

Standing water for first one and a half months

PEPSICO India

Direct Seeding Benefits

Operation / Input	Cost (Rs / acre)	
	Direct seeding	Transplanting
Land Preparation	750	750
Seed Cost	360	275
Nursery Raising cost	0	250
Puddling	0	1250
Transplanting cost/Seeding	250	1300
Fertilization	1255	965
Weed Control	1125	210
Plant Protection	2410	2410
Irrigation Costs	500	1000
Labour Costs	1000	650
Harvesting Costs	750	750
Transport	350	350
Misc Costs	500	500
Total	**9250**	**10660**
Production Cost Saving %	13	
Water Saving on direct seeding		
Qty of water used per acre (Lakh Litres/acre)	22.5	32.5
Water saving %	31	

Repeated measurement over the years have confirmed the water savings

Further Opportunities - Zero Tillage

Tilling is done to make the soil friable and to aerate the soil

- Tilling results in dormant weed seeds in deep soil to rise, and germinate
- It is traditionally done through tractors / bullocks

Zero Tillage Paddy Cultivation

The direct seeding machine aerates the soil where the seed is sown, and eliminates the need to till the entire land

Benefits of zero tillage

– Cultivation cost further reduces by Rs1000 / acre

– Less weed incidence; lower dependence on chemicals, thus improved soil health

– Reduces effort put in by the farmer

Direct Seeding – Zero Tillage 70 Days Old Crop

Proposed to take to farmer fields next year to popularize the concept

Direct Seeding – Farmer Training

बासमती धान की सीधी बुआई हेतु उन्नत कृषि क्रियाऐं

सीधी बिजाई के लाभ / फायदे

1. इससे 30 प्रतिशत सिंचाई जल की बचत होती है।
2. इससे पड़लिग / कद्दू करने से छुटकारा मिलता है।
3. मजदूरी की लागत में बचत होती है।

इसकी सफलता के कारक

इसकी सफलता तीन मुख्य कारकों पर निर्भर रहती है।

1. बीज की गहराई व उसका अंकुरण
2. खरपतवार नियंत्रण
3. सूक्ष्म तत्वों की कमी का निदान / समाधान

खेत का चुनाव व तैयारी

साधारणतः मध्यम संरचना की भूमि सीधी बिजाई के अधिक उपयुक्त रहती है किन्तु सीधी बिजाई करने से पहले खेत में होने वाली खरपतवारों के विषय में ध्यान रखना आवश्यक है। सामान्यतः मौथा की अधिकता वाले खेत धान की सीधी बिजाई के लिए उपयुक्त नहीं रहते हैं किन्तु बिजाई के 15 दिन पूर्व राउन्ड अप (20 मिली / लीटर पानी में) छिड़कने पर इस समस्या से बचाव हो सकता है। सही तरह से समतल खेत में बिजाई पूर्व सिंचाई दें व वत्तर आने पर 2 से तीन बार जुताई करने के बाद पाटा लगाऐ ताकि आसानी से सीड ड्रिल द्वारा बिजाई की जा सके। बीज की सही गहराई पर बिजाई होने से अकुरण में सुधार होता है।

बीज की मात्रा व बीजोपचार

खेत मे सीधी बिजाई के लिए 8 किलो प्रति एकड़ बीज की आवश्यकता होती है। बीज को 1 ग्राम स्ट्रेप्टोसाइक्लीन और 5 ग्राम ईमिसान 10 लीटर पानी में घोल कर कम से कम 15 घंटे तक भिगोकर उपचारित करें। उपचारित बीज को छायादार स्थान में फैला कर 2 घंटे तक सुखाने के बाद ड्रिल की सहायता से बिजाई करें।

बिजाई

बिजाई की मशीन (ड्रिल) को इस प्रकार एडजेस्ट करे कि बीज 2–3 सेमी से अधिक गहराई में न पड़े। 15 मई से 15 जून के मध्य में तर–वत्तर खेत में बिजाई करें। खरपतवार नियंत्रण के लिए 1.5 लीटर स्टोम्प प्रति एकड़ का भूमि में पर्याप्त नमी की स्थिति में प्रयोग करें। यदि कारणवश बिजाई के समय खेत में नमी कम हो तो बुआई के तुरंत बाद सिंचाई करें व 2–3 दिन बाद स्टोम्प की वही मात्रा का छिड़काव करें।

उर्वरक

धान की सीधी बिजाई में कद्दू / पड़लिग / गारा के बिना ही बिजाई होने से फसल में जस्ते व लोहे की कमी होने है जिसे नीचे दिए उपायों से सरलता से दूर किया जा सकता है।

उर्वरक देने का समय	उर्वरकों की मात्रा (किलोग्राम प्रति एकड़)				
	यूरिया	डी. ए. पी.	एम. ओ. पी.	लिबरल जिंक	लिबरल लोहा
बुआई के समय	15	25	20	0.5	0.5
बुआई के 20 दिन बाद	15	0	0	0	0
बुआई के 35 दिन बाद	10	0	0	0	0

बिजाई के समय 25 किलो डी.ए.पी., 0.5 किलो लिबरल जिंक और 0.5 किलो लिबरल लोहा बिजाई यंत्र (सीड ड्रिल) की सहायता से व शेष उर्वरकों को बिखेर कर दें। बिजाई के 30–35 दिन बाद लिबमिक्स 2 ग्राम प्रति लीटर पानी में घोल कर छिड़कें। यह जिंक व लोहे की कमी की पूर्ती में सहायक होता है।

खरपतवार नियंत्रण

बिजाई के समय स्टोम्प 1.5 लीटर प्रति एकड़ छिड़के। चौड़ी पत्तीवाली खरपतवारों के लिए बुआई के 15 दिन बाद सन राईस 50 ग्राम प्रति एकड़ का छिड़काव करें। यदि खेत में स्वांक, स्वाकी या अन्य घासकुल की खरपतवार हो तो विप–सुपर 250 मिली प्रति एकड़ की दर से बुआई के 20–25 दिन बाद छिड़के।

कीटों की रोकथाम

तना छेदक की रोकथाम के लिए 10 किलो पदान या 6 किलो रिजेन्ट 60 किलो रेत के साथ मिला कर पहली बार जुलाई के अंत में व दूसरी बार अगस्त मध्य में एवं तीसरी बार सितम्बर माह के पहले सप्ताह में प्रति एकड़ की दर से दें।

रोगों की रोकथाम

बासमती धान की किस्मों में ब्लास्ट, शीथ ब्लाईट व शीथ रॉट रोग सामान्यतः लगते हैं। ब्लास्ट की रोकथाम के लिए इन्डोफिल जेड–78 (75 डब्ल्युपी) 500 ग्राम या हिनोसान 200 मिली को 200 लीटर पानी के साथ प्रति एकड़ की दर से छिड़कें। शीथ ब्लाईट व शीथ रॉट रोगों की रोकथाम के लिए टिल्ट 25 ईसी 200 मिली या बावस्टीन 50 डब्लुपी 200 ग्राम को 200 लीटर पानी के साथ प्रति एकड़ की दर से 15 दिन के अंतर में दो बार छिड़कें।

सिंचाई

मौसम व खेत में नमी के आधार पर सिंचाई दें।

कटाई व गहाई

फसल के ठीक सं पकने पर कटाई करें। फसल कटाई के समय दाने हरे नहीं होने चाहिऐ व उनमें नमी का स्तर 17 प्रतिशत से अधिक नहीं हो।

PepsiCo Extension Services Team Guide Farmers On Direct Seeding

Direct Seeding – Appreciated By Experts

-----Original Message-----
From: Kumar, Virender (IRRI) [mailto:Virender.Kumar@cgiar.org]
Sent: Monday, June 16, 2008 12:04 PM
To: Dr. Susheel Sankhyan; Gathala, Mahesh Kumar (IRRI); calebdresser@gmail.com
Cc: Bose, Amit Kumar {PI}; Bharati, Vivek {PI}
Subject: RE: IRRI message

Dear Dr. Susheel,
Good to hear from you. Thank you very much for inviting us. We had great time with you and we saw a wonderful work PEPSICO is doing. IRRI is always there to provide all technical inputs for making this technology a success. We are impressed with your work. All your trials received all attention and care at right time and that's why there is no problem in germination and there is no problem of weeds so far. That what we have to teach farmer, doing this in a right way. If things are being done in right way, this technology has lot of potential.

We will send out trip report to Dr JK Ladha, IRRI-India Representative and we all inform him about your all good work and your CSR (Corporate social responsibility) mission. As we discusses, you may please plan to visit in early July to discuss formal collaborative research work. I will let you know the availability of Dr. Ladha in July once i will hear from him.
I completely agree that we need to work together to make this technology a success. We will complement each other and in that way our effort will be multiplied and enhanced exponentially.

Keep updating us and feel free to ask any questions if you have any at any time.

Thanks for hosting us.
Regards
Virender Kumar
Scientist (Weed Science)
IRRI-India office
NASC Complex, First floor,
DPS Marg, Pusa, New Delhi 110012

IRRI Scientists' visit

PAU Director's visit

Direct Seeding – Noticed By Media

BUSINESS STANDARD

NEW DELHI
09 NOV 2006 P-11

Pepsi's paddy cultivation method saves water by 40%

ASHISH SHARMA
Jalandhar, 8 November

While environmentalists have expressed concern at the continuous lowering of the water table in Punjab, PepsiCo today introduced a solution for it in the form of direct seeding of paddy to save water by at least 40 per cent.

"After our experiments on 25 acres at Jallowal here, it has transpired that the direct seeding technique has reduced water consumption by 40 per cent (1,000 kl/acre) and production cost by Rs 1,000-1,200 per acre," Abhiram Seth, PepsiCo India executive director (exports & external affairs), said, adding fields that were cultivated using this technique were currently in the process of being harvested.

Earlier, PepsiCo India had carried out trials to reduce water consumption during paddy cultivation at its R&D farms at Jallowal for over three years, he said.

"Generally, paddy is grown by planting seeds in a small nursery and manually transplanting the paddy saplings after about four weeks to the main cultivation area. The saplings are then allowed to grow and the fields are kept under about 3 inches of water, mainly to reduce growing weeds. This 'puddle irrigation' requires high water consumption," Seth said, adding the direct seeding method tested by PepsiCo had been shown to reduce water consumption and production cost.

"Paddy cultivation is known to be highly water-intensive. Over a period, this has resulted in a decline in the water table in Punjab. In addition, farmers have been incurring high energy cost due to the extensive running of pump sets. PepsiCo India, as part of its effort to improve sustainability in Indian agriculture, started this project three years ago," he said, adding PepsiCo was working to share the results of the direct seeding trials with a larger community of farmers and would like to popularise this method in order to reduce water consumption and production cost during paddy cultivation.

Pepsico has hi-tech plans for paddy crop in Punjab

Direct Seeding Tech Will Reduce Water Consumption By 40% Claims Co

Viney Sharma
JALANDHAR

FARMERS in Punjab are adopting innovations fast. In one of the first experiments of its kind, PepsiCo India plans to introduce direct seeding technology for paddy cultivation.

With the new technique, water consumption will be reduced by 40% (1,000 kl/acre) and the production cost by Rs 1,000 per acre.

The company also plans to set up the world's largest horticulture project wherein four million seedlings per annum will be planted to make large quantities of juices available. It is set to grow 32 varieties of citrus fruits. For this, the company will be procuring germplasm from Florida, Brazil and other places for its joint venture with the Punjab government near Jalandhar (Jallowal).

Punjab is already facing the problem of water depletion, and if the company's claims prove correct, the direct seeding technology can prove to be a boon for the farmers. In some pockets the water level is as low as 800 meters and as per the surveys after 5-6 years the farmers will have no option but to diversify.

Talking about the direct seeding technology, PepsiCo India Holdings ED Exports & External Affairs Abhiram Seth, says: "We hope to raise the area to 4,000 acres from the present 20 acres in an year. It will also solve the problem of water depletion to a large extent."

As per PAU, some other companies can also come up with similar innovations in the agriculture sector.

Punjab Agriculture University, is also recommending that farmers adopt this technology.

PAU director of extension education Dr Sarjit Singh Gill, says: "This will ensure optimum plant population, that is 33 plants per square meter. At present it is 25 plants per square meter. These steps will help farmers."

The company's agriculture-related product exports from India are likely to reach $60 million this year. It's also providing technical knowhow to the Punjab government and two citrus plant projects at Hoshiarpur and Abohar each costing Rs 50 crore. "Both these projects will be commissioned by 2007," says Pepsi Foods executive vice-president exports Amit K Bose.

At present, almost 45,000 acres of area is under citrus fruit cultivation. The Punjab government plans to raise it to 1 million acres by 2015.