

Symposium & Brain Storming Workshop
on
System of Rice Intensification (SRI)
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RAMETI

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NABARD

&

State Agriculture Universities

Facilitator
Rural Communes

System of Rice Intensification (SRI) in Maharashtra SIR DORABJI TATA TRUST-SRI NGO Partners



System of Rice Intensification (SRI)

- SRI paddy cultivation requires less water & less expenditure and gives more yields. Beneficial for small and marginal farmers for food security
- Father de Laulanie, who first promoted SRI, intended that it should enhance the human conditions, not just meet people's material needs, thus human resource development
- SRI provides immediate benefits: There is no transition period, even first season yield are usually higher than before and improve increase yield over time.
- Accessibility for the poor: The lower capital costs of using SRI means that its economic and other benefits are not limited by access to capital, nor does it require loans and indebtedness. Thus contribute rapidly to greater food security for the poor.

SRI farmers report the following advantages along with their higher yield:

- **Drought resistance**. Because SRI rice plants develop larger and healthier root systems, and are established at an early age, the plants are most resistant to drought and periods of water stress.
- **Resistance to lodging**. With stronger root systems and tillers, in part due to the greater uptake of silicon when soil is not permanently saturated, SRI plants show remarkable resistance to wind, rain and storm damage.
- **Reduced time to maturity**. When SRI methods are used properly the time for maturation can be shortened by as much as 15 days, even while yield is being doubled. This reduces farmers' risk of agronomic or economic losses due to extreme weather events, pests or disease and / or frees up the land for other production.
- **Resistance to pests and diseases**. This has been frequently commented on by farmers and is now being documented by researchers.
- **Conservation of rice biodiversity**. While high-yielding varieties and hybrids have given the highest yields with SRI method (all SRI yields over 15 t/ha have been achieved with improved cultivars), very respectable yields can be obtained with traditional varieties as SRI plants resist lodging despite their larger panicles.

SRI Six Management Practices

1. Early Transplanting:

- Transplant 8-12 day old seedlings, with only two small leaves (More tillering potential and root growth potential)
- Seedlings are transplanted shallow and therefore establish quickly. Single seedling with seed and soil are transplanted by using index finger and thumb and gently placing them at the intersection of markings.



2. Careful Transplanting:

- Minimize trauma in transplanting. Remove plant from nursery with the seed, soil and roots carefully and place it in the field without plunging too deep into soil (More tillering potential)
- A single rice seedling grows healthy in natural conditions and its root grows larger root volume and it receives nutrients from deeper layers of the soil.
- With larger root systems and larger canopies there are more tillers.

3. Wide Spacing:

- Plant single seedlings, not in clumps, and in a square pattern 25cm x 25cm apart or wider. Do not plant in rows. (More root growth potential)
- Rice plant roots and canopies grow better if spaced widely, rather than densely.
- This exposes each plant to more sunlight, air and soil nutrients, and allows easier access.



4. Weeding and Aeration: use simple mechanical "rotating hoe" that churns up soil; 2 weeding required, (More root growth, due to reduced weed competition, and aeration of soil, giving roots more Oxygen and Nitrogen due to increased microbial activity) Each additional weeding after two rounds results in increased productivity up to 2 t/ha / weeding.
5. Water Management: regular water application to keep soil moist but not saturated, with intermittent dryings, alternating aerobic and anaerobic soil conditions (More root growth because it avoids root degeneration, enables better absorption of nutrients from the soil).

6. Compost / FYM applied; 10 tons/ha (More plant growth because of better soil health and structure, and more balanced nutrient supply)

In SRI Cultivation 8 to 12 days old seedlings are planted. So root system grows well and gives 30 to 50 tillers. When all the 6 Management Practices are followed then per plant 50 to 100 tillers are produced and high yields can be realised. Maximum tillering occurs concurrently with panicle initiation. More filled grain per panicle and no lodging of crop.

Main Field Preparation:

- Land preparation is not different from regular irrigated rice cultivation.
- Leveling should be done carefully so that water can be applied very evenly.
- Provide a canal at every 3m distance to facilitate drainage.
- Draw lines both ways at 25x25cm apart with the help of a marker and transplant at the intersection.



Developing SRI Nutrient-Rich and Un-flooded Raised Nurseries:

The seedbeds have to be nutrient-rich and established as close to the main field as possible.



Nursery Management:

- Seed rate 2 kg/acre
- Nursery area 1 cent / acre
- Select healthy seeds
- Pre-sprouted seeds are sown on raised bed nursery
- Prepare raised nursery bed over plastic sheets
- Apply a layer of fine manure - Mix 7 parts soil with 2 parts well-decomposed cow & chicken manure, green manure, vermi culture and 1 part fresh or charred rice hull.
- Spread sprouted seed sparsely
- Cover with another layer of manure
- Mulch with paddy straw
- Water carefully

Preferring compost or farmyard manure to synthetic fertilisers:

- It is better to use organic nutrients, as they are better at promoting the abundance and diversity of micro organisms, starting with beneficial bacteria and fungi in the soil.
- This will promote proper microbial activity, thereby improving production.
- Under SRI method, even farmers who do not have access to organic manure may use less chemical fertilisers.
- The cow dung and urine mixed with a small quantity of jaggery is being extensively used in India under different names like Jeevamirtham, Amirthapani, starter solution, Janjeevani and so on. This solution mixed with the irrigation water or spray, is a most effective way.

**Harvesting**

- The grain matures even while the Crop is Green in colour. Hence, farmers should be ready to undertake timely harvesting.

SRI Training & Capacity Building

SRI is a new technology, which needs a social mobilisation to convince the farmers to adopt the system leaving their conventional practice. Visual effects would have more persuasive influence than trainings and counselling and farmers would be sensitised to adopt SRI and organic practices.

Exposure Visits of Farmers to SRI Demonstration Fields

- Exposures to places where SRI has been demonstrated and practiced
- Interaction with practicing farmers of SRI and organic farming

SRI requires some skills, which are very different from the traditional practices of paddy cultivation. The farmer will have to learn about seed treatment, raised seedbed, land preparation and drainage, use of weeder, transplanting 8 to 12 days old seedlings, planting single seedling with wider space which are very much in contrast to conventional practices.

Raised Bed Nursery produces young, healthy seedlings for SRI

Raised Bed Nurseries are basically SRI nutrient-rich and un-flooded raised nurseries, which is one of the major requirements in SRI.

How to establish SRI Nutrient-rich and un-flooded raised nursery:

- 1) To plant 1 acre with 1 seedling per hill, 25 x 25 centimeters (10 x 10 inches) apart, use 2kg per acre of good-quality seeds with a minimum germination rate of 80%.
- 2) Soak your seeds in salt water for 12 hours. Drain the water after 12 hours, and keep the seeds moist by covering them for another 24 hours. By this time, the seeds will have sprouted buds and the first seed root will be about 2 to 3 millimeters long.
- 3) 4 cubic meters of soil mix for every 100 square meters of nursery area. Mix 7 parts soil with 2 parts well-decomposed and dried cow & chicken manure, green manure, vermi culture and 1 part fresh or charred rice hull.
- 4) Prepare the raised firm surface nursery area by increasing & raising the height of the soil by 4 to 6 inches (provide canals to facilitate drainage). Prepare a 100-square-meter nursery area for every 1 hectare that will be planted.



Select a level area near or in the main field. Level your seedbed and spread banana leaves or plastic sheeting on top to prevent the roots of the seedlings from penetrating into the soil.

- 5) Lay the soil mixture. Do this with or without using a wooden frame/bricks/bamboo or wooden sticks above the plastic sheets. For those using a wooden frame or frames, place the frame on top of the plastic sheets. The frame should be half a meter long, 0.3 meter wide, and 4 centimeters deep, divided into equal segments (or one small frame 12 x 12 inches). Smaller segments are required to facilitate transplanting the seedlings to the field without damaging the roots. Then, fill the frame almost to the top with the soil mixture you prepared.
- 6) Sow the pre-germinated seeds uniformly. Sprinkle soil and pat gently to embed them at about 2–3 centimeters into the soil, mulch with paddy straw and then sprinkle water immediately. Cover the nursery area with plastic sheets.
- 7) Water the nursery twice a day for 5 days and keep it covered with rice straw, banana leaves or plastic sheets to keep the soil moist. Protect the nursery from heavy rains for the first 5 days after seeding.
- 8) Five days after seeding, remove the plastic sheets & paddy straw and continue to water twice a day.

(If your seedlings show yellowing after 7 days, it means that they lack nitrogen (if green manure fertilizers were not used). You can solve this by sprinkling the seedlings with 0.5% urea & water solution.

- 9) About 8 to 12 days after seedling, transport them to the field, along with soil. A metal / bakelite (2 mm) / wood / aluminum (1 mm) boards could be used for lifting the seedlings along with soil and transplanting in the field, without any disturbance to the roots.



System of Rice Intensification

The System of Rice Intensification (SRI) is a water saving, methane emission reducing rice cultivation strategy. Instead of flooding paddy fields as in current rice cultivation, the SRI consists of watering and draining the fields in a manner that significantly reduces the amount of water required. Essentially, SRI changes agronomy practices in a manner that enables prolific root formation and tilling that leads to more panicles and hence more grains per plant. This has an obvious impact on raising crop yields. This strategy increases weeds in the fields which have to be dealt with but apart from reducing the use of water in crop production, SRI also reduces the build up of methane by doing away with standing water in rice paddies.

Relevance of SRI for Climate Change

Changes in climate will affect rice production and thus have an impact on food security. It has been estimated (IWMI 2007) that for every 1°C rise in mean temperature, there is a corresponding 7 percent decline in rice yield. The International Food Policy Research Institute calculates a 12-14 percent decline in world rice production by 2050 due to the effects climate change. Beyond increasing yields, SRI offers three major benefits that have significant climate implications if applied on a large-scale:

- Reduced demand for water
- Reduced methane gas emissions
- Reduced use of nitrogen fertilizers

In addition, with SRI Practices, rice plants have stronger stems and root system that are more resistant to flooding and storm damage compared to those grown using conventional practices. Perhaps even more important, their deeper root systems make crops more drought-resistant.

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