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System of Rice Intensification (SRI): A Resource Conservation Technology

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SUMMARY

Higher temperature due to climate change will increase the temperature that will increase the crop's water requirement. One of the major constraints in rice production across the globe is the scarcity of water. "More rice for every drop of water used" will be the guiding principle for rice cultivation in future production. System of Rice Intensification (SRI) is one of the alternative technologies that reduce the requirements of water. System of rice intensification helps farmers to achieve higher yields with reduced inputs: fewer seeds, less water, lower costs of production and often less labour. This makes it more accessible to resource-limited farmers than Green Revolution Technologies and thus it can assist in poverty reduction as well as enhanced food security.

INTRODUCTION

The system of rice intensification (SRI) developed in Madagascar is gaining acceptance in many parts of India and in other countries. Young seedlings are transplanted at 8-12 days old. Seedlings are carefully lifted from the nursery and transported to fields in baskets or on trays for immediate transplanting. Seeding rate: 5-7 kg/hectare. 1-2 seedlings per hill are transplanted with shallow depth (1-2 cm) into soils that are not flooded. Roots are carefully positioned just under the soil surface to avoid trauma to the roots, thereby avoiding "transplant shock." Wider spacing, with hills 20-30 cm apart, set out in a square or matrix pattern to facilitate moving through the field with a weeder, and to expose plants fully to the sunlight. Non-flooded aerobic soil conditions with intermittent irrigation. Where possible, small applications of water, or alternate wetting and drying during the growth period; just 1-2 cm of water on fields after the plants flower. Organic matter is preferred to the extent feasible but may be complemented with synthetic fertilizers. Combinations can be used to ensure appropriate soil: plant nutrient balance. Manual weeders can remove weeds and aerate the topsoil at the same time. Integrated Pest Management (IPM) practices are encouraged. SRI plants are generally more resistant to pests and diseases so require less chemical protection.

Benefits of SRI

47% Yield increase 40% Water saving
23% Reduction in costs per hectare
68% Increased income per hectare

SRI practices enhance the rice plants' growing conditions by:

- Reducing the recovery time of seedlings needed after transplanting;
- Reducing crowding and competition;
- Optimizing soil and water conditions.

These conditions contribute to:

- Larger, deeper root systems;
- Enhanced photosynthetic capacity;
- More productive plants that is more resistant to climate extremes, pests and diseases;
- More grain yield.

SRI methods require:

- Less time before transplanting, as seedlings can be ready in 8-12 days instead of one month;
- 80-90% fewer seeds, due to much lower plant populations;

- Less time required for transplanting due to fewer seedlings;
- 25-50% less water, as the field is not continuously flooded;
- Less cost per hectare, as there is less need for purchased seeds, synthetic fertilizers, herbicides or pesticides, and in some countries less labor is required.

A research trial was conducted at SKUAST-K Shalimar, Srinager in Research council meet (RCM) during 2008 and it was observed that SRI + 100 % of RDF of NPK through chemical fertilizer gave significantly higher grain yield (q/ha) as compared to other treatments **(Table 1)**. In a research trial conducted at Kudhwani by Nazir, N (2010) on agronomic manipulation of system of rice intensification (SRI) observed higher yield of rice (*Oryza sativa* L.) with16 days seedlings; 01 seedling hill^{-1}; 25 x 25 cm; RFD + FYM 10 t ha^{-1}; chemical + Rotary weeder; Alternate wetting and drying (AWD) (Table 2) as compared to other treatments.

Table 1: **Effect of system of rice intensification on grain yield (q/ha), straw yield (q/ha) and test weight (g) of rice.**

Treatments	Grain yield (q/ha)		Straw yield (q/ha)		Test weight (g)	
	2006	2007	2006	2007	2006	2007
T1: Farmers practice	51.38	53.11	65.25	68.28	25.74	26.12
T2: Recommended package of practices	52.80	54.30	66.53	72.11	26.65	27.23
T3: SRI practices	57.52	62.20	72.42	78.24	27.34	28.10
T4: : SRI practices with no fertility	55.24	59.05	68.26	74.05	26.88	27.67
T5: : SRI practices + 50 % N through FYM	58.90	62.22	73.44	78.42	27.19	28.36
T6: : SRI practices + 50 % N through chemical fertilizer	60.65	64.26	73.99	80.08	27.70	28.31
T7: : SRI practices + 50 % N through FYM + 50 % N through chemical fertilizer	61.42	66.36	74.32	82.66	27.62	28.45
T8: : SRI practices + 100 % N through chemical fertilizer	64.77	68.22	77.72	84.20	27.92	28.80
CD at 5 %	2.28	3.06	4.08	4.31	0.46	0.58

Source: RCM *Kharif*, 2008

Table2: Grain yield, straw yield (q ha^{-1}) and harvest index (%) of rice as affected by different treatments

Treatment	Grain yield (q ha^{-1})	Straw yield (q ha^{-1})	Harvest index (%)
T_1	63.23	88.52	44.86
T_2	66.36	93.51	44.23
T_3	67.53	94.54	43.67
T_4	68.56	95.90	42.79
T_5	50.33	70.62	41.62
T_6	51.36	72.01	41.89
T_7	70.86	96.20	43.11

T_8	72.63	101.66	42.72
T_9	74.76	104.64	42.57
T_{10}	77.61	108.68	42.36
SE ± (m)	**1.18**	**1.42**	**0.95**
C.D.(p=0.05)	**3.15**	**4.22**	**NS**

T_1 = 30 days seedlings; 03 seedling hill^{-1}; 15 x 15 cm; RFD + FYM 5 t ha^{-1}; Butachlor + 1 hand weeding; Submergence with 3-5 cm water

T_2 = 16 days seedlings; 03 seedling hill^{-1}; 15 x 15 cm; RFD + FYM 5 t ha^{-1}; Butachlor + 1 hand weeding; Submergence with 3-5 cm water

T_3 = 16 days seedlings; 01 seedling hill^{-1}; 15 x 15 cm; RFD + FYM 5 t ha^{-1}; Butachlor + 1 hand weeding; Submergence with 3-5 cm water

T_4 = 16 days seedlings; 01 seedling hill^{-1}; 25 x 25 cm; RFD + FYM 5 t ha^{-1}; Butachlor + 1 hand weeding; Submergence with 3-5 cm water

T_5 = 16 days seedlings; 01 seedling hill^{-1}; 25 x 25 cm; FYM 10 t ha^{-1}; Butachlor + 1 hand weeding; Submergence with 3-5 cm water

T_6 = 16 days seedlings; 01 seedling hill^{-1}; 25 x 25 cm; FYM 20 t ha^{-1}; Butachlor + 1 hand weeding; Submergence with 3-5 cm water

T_7 = 16 days seedlings; 01 seedling hill^{-1}; 25 x 25 cm; RFD + FYM 10 t ha^{-1}; Butachlor + 1 hand weeding; Submergence with 3-5 cm water

T_8 = 16 days seedlings; 01 seedling hill^{-1}; 25 x 25 cm; RFD + FYM 10 t ha^{-1}; Rotary weeder; Submergence with 3-5 cm water

T_9 = 16 days seedlings; 01 seedling hill^{-1}; 25 x 25 cm; RFD + FYM 10 t ha^{-1}; chemical + Rotary weeder; Submergence with 3-5 cm water

T_{10} = 16 days seedlings; 01 seedling hill^{-1}; 25 x 25 cm; RFD + FYM 10 t ha^{-1}; chemical + Rotary weeder; Alternate wetting and drying (AWD)

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