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System of Rice Intensification: An Opportunity for Marginal and Small Farmers

D K Pandey and S K Kamal

Krishi Vigyan Kendra, Palamu, Birsa Agricultural University, Ranchi – 834 006 (Bihar)

ABSTRACT

The experiment was conducted at the Krishi Vigyan Kendra, Palamu farm and tribal dominated Murma and Dulshulma villages of Satbarwa block. The analysis was done to see how the system of rice intensification method has helped in giving incremental food security for the marginal and sub marginal farmers. The analysis of yield attributes was done using pooled data of all the three land types (upland, midland and low land), irrespective of variety transplanted. For each land holding class, the average projected grain yield was worked out, using the average landholding pattern and multiplying this using average yield data for each land type. The grain yield for all the land types in each size class was added up and converted into a food security measure in terms of the number of days. The increase in average number of effective tillers per hill showed 233.3, 190.9 and 164.5 per cent more in upland, midland and lowland, respectively in SRI than traditional method. The average number of grains per panicle was 164.5, 56.1 and 50.3 per cent more in upland, midland and lowland, respectively in SRI than traditional method. Grain yield showed 79.9, 86.1 and 80.3 per cent increasing trends in upland, midland and lowland respectively, in SRI compared with traditional method whereas straw yield was 47.9, 50.6 and 72.7 per cent more over traditional method. Additional food security days found 125d extra under 0-0.4 ha land holding class while 415d extra under more than 0.8 ha area class.

Key Words: Cultivation, Income, Marginal farmers, Paddy, Small farmer, Traditional method.

INTRODUCTION

Input intensive agricultural practices have helped the country in achieving a quantum jump in food production. However, this production strategy did not benefit to millions of marginal and small farmers of Jharkhand at desired level. They still facing food insecurity and migrated to better endowed region during peak farming period. The system of Rice intensification (SRI) is reported to have advantages like low seed requirement, less pest attack, shorter crop duration, higher fertilizers and water use efficiency and the ability to with stand higher degree of moisture stress than traditional method of rice cultivation (Stoop *et al,* 2002; Uphoff, 2002; Thakur, 2010; Geethalaxmi *et al,* 2011; Jain *et al,* 2013). In India, rice is an important ingredient of household food-basket, yet its yield level is low, stagnant and uncertain (Barah, 2009) Increase in rice production has been one of the main objectives of agriculture development program by the government over the past decades and SRI has been promoted as a system rather than a technology. India needs to produce 115 million ton of rice by the year 2020 which can be brought either by horizontal or vertical expansion (Anon, 2011). There are no fixed set of practices to be adopted in system of Rice intensification (SRI) rather, it is based on socio- economic environment of an area and the practices may be modified accordingly. Jharkhand state with an area of 79,714 sq. km and a population of 32.9 m falls under agro-climatic Zone –VII i.e. the eastern plateau and hill region and most of its population residing in villages depend mainly on agriculture and allied activities for their livelihoods. All indices of agricultural development such as fertilizer consumption, farm sector credit off

Corresponding Author's Email: dkpande_semra@yahoo.com

– take, spread of HVV seeds, seed replacement ratio etc are for below the traditional average. Farmers of the region hopefully, continue to be innovative so that food security can be increased and poverty can be reduced, and so that climate change will not undo the progress. Therefore, the present study was carried out with the objectives to study generated interest and discussion among farming community about system of Rice intensification cultivation.

MATERIALS AND METHODS

The experiment conducted in KVK, Palamu farm and tribal dominated Murma– Dulsulma village of Satbarwa block.ter. Precipitation is rather variable however, occurs mainly during the average three months of monsoon period (mid June to mid September). The induction of SRI technology focuses more on small and marginal farmers involving on-site technical guidance. The analysis of yield attributes was done using pooled data of all the three land types (upland, midland and lowland), irrespective of variety transplanted. For each land holding class, the average projected grain yield was worked out, using the average landholding pattern and multiplying this using average yield data for each land type. The grain yield for all the land types in each size class was added up and converted into a food security measure in terms of the number of days using the formulae:

FS = (Y*0.66)/3.8, Where FS= Projected Food Security (in days).

Y = Yield of grain from household's total.

0.66 = Factor, to adjust the yield of paddy rice to the resulting amount of milled rice for consumption.

3.8 = Average per day consumption of rice (in kg.) by a typical family of 5 members.

The data was then segregated for each land type for comparison. The characteristics were analyzed separately for comparison between traditional and SRI methods of cultivation.

Table 1. Cultural methods followed in traditional and SRI method of cultivation.

Sr. No.	Practice	Traditional method	System of Rice intensification Method
1.	Nursery	50kg/ha in an area of 1000m2 and grown in flooded situation. Far away from their home (Need extra care so late in preparation)	Uniformly distributed 5 kg/ha under pulverized soil raised bed (100m2/ha) irrigated 2 times a day. Near home.
2.	Seeding age at transplanting	30-35 d old seedling	12-16 d old seedling
3.	Plant spacing and density	3-5 Seedling/hill at a spacing of 20 x 15 cm	One seedling/hill in a square system of planting at a spacing of 25 x 25 cm.
4.	Weed management	Manual weeding one times (25 DAT) two times (20 and 35 DAT)	Weeding by cono-weeder on 14, 28 and 40 DAT.
5.	Water Management	Transplanted into a puddle condition with 5-6 cm pounded water, and same level maintained during of the vegetative phase to achieve yield.	Transplanted into a puddle condition without any ponding water. Ponding situation require only during cono-weeder operations.
6.	Nutrient Management	In both set farmers were advised to use fertilizer in 4:2:1 ratio keeping farmers status and capacity.The entire amount of P and K was applied at final land preparation, N in 3 splits (50% basal), 25 % at vegetative stage and 25 % at panicle initiation.	

RESULTS AND DISCUSSION

The data (Table 2) indicate that the objective of meeting food security needs through SRI method. The increment assessed through the respective method of cultivation and found average 125d in case of lowest land holding class I (0-0.4 ha) to 415d in case of land holding class III (> 0.8 ha).

The yield characteristics of different parameters of SRI vs. traditional system were analyzed under different land situation (Table 3). The increase in average number of effective tillers per hill showed 233.3, 190.9 and 164.5 per cent more in upland, midland and lowland, respectively in SRI than traditional method. The average number of grains per panicle showed 164.4, 56.1 and 50.3 per cent more in upland, midland and lowland respectively in SRI than traditional method. Grain yield shows 79.91, 86.05 and 80.30 per cent increasing trends in upland, midland and lowland, respectively in SRI compared with traditional method. Straw yield shows 47.9, 50.6 and 72.7 per cent increase over traditional method in upland, midland and lowland, respectively. Obtaining results ensure increase in food security days for farm family and their animal husbandry both.

The average number of effective tillers per hill for SRI has count 32 while in traditional method average is 11. The average number of grains obtained per panicle in SRI method is 218 as against 124 with traditional method of cultivation. Average grain yield in SRI was 53.13q/ha as compared to 29.14q/ha in traditional system. Average straw yield is 58.52q/ha in SRI as against 37.02q/ha in traditional system. No extra fertilizer used in SRI and less volume of water used.

Data of table 5 indicate that the cost of cultivation is both the system is almost equal while B: C ratio that is about 1.8 times higher in SRI (Table 6).

Table 2. Average food security following SRI and traditional system.

Land holding class (ha)	Food security (No. of days)		Additional food security
	SRI	Traditional	
0-0.4	292	167	125
0.4-0.8	418	263	155
>0.8	729	314	415

Table 3. Yield characteristics of SRI Vs Traditional in different land situation.

Attribute	Upland			Midland			Lowland			Average		
	SRI	Tradit-ional	% Increase	SRI	Tradit-ional	% Increase	SRI	Tradit-ional	% Increase	SRI	Tradit-ional	% Increase
Effective tillers hill (Av.)	30	09	233.3	32	11	190.9	34	13	161.5	32	11	190.9
No. of grain/ Panicle(Av.)	201	76	164.4	217	139	56.1	236	157	50.3	218	124	75.8
Grain yield (q/ha)	34.83	19.36	79.9	59.76	32.12	86.0	64.80	35.94	80.3	53.13	29.14	82.3
Straw yield (q/ha)	43.73	29.56	47.9	66.94	44.46	50.5	64.89	3758	72.6	58.52	37.2	57.3

Table. 4 Cost of Cultivation SRI Vs Traditional.

Sr. No.	Particulars	Cost of cultivation (in Rs./ha)	
		Tradition	SRI
1.	INPUTS(Seed and fertilizer)	3110	4425
2.	Labour component		
	A) Human Labour	6680	5600
	b) Animal Resource	1500	1500
3.	Machinery (Tractor on rent)	1200	960
	Total Expenditure	12490	12485

Table 5. Cost Benefit analysis of Paddy following Traditional System Vis – a – Vis SRI.

Cost: Benefit Components	Rate/ kg	Traditional		SRI	
		Yield kg/ha	Income	Yield kg/ha	Income
Income from Grain	11	29.14	32054/-	5313	58,443/-
Income from Straw	2	37.02	7404/-	5852	11,704/-
Total Income			39,458/-		70,147/-
Cost of Cultivation			12,490/-		12,485/-
B:C Ratio			3.15		5.62

CONCLUSION

It was concluded that the SRI method of cultivation was highly efficient to use nutrient and water and meeting food security to paddy grower farmers as compared to traditional system of rice cultivation. Besides, the less resource use, the profitability (return per rupee) in SRI Rice cultivation was higher vis-a-vis conventional method. Hence, the farmers have to be educated and empowered through training and demonstrations. Hence, appropriate interventions like empowering farmers through training and demonstrations with proper guidance from extension personals has to be made for larger adoption in the study area.

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