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**Shiv Singh Kirar**  
Department of Agriculture, Govt  
of MP, Guna, Madhya Pradesh,  
India

**Ram Pratap Bain**  
Krishi Vigyan Kendra, JNKVV,  
Piprourdh, Katni, Madhya  
Pradesh, India

**Jeetendra Kumar Soni**  
Krishi Vigyan Kendra, JNKVV,  
Piprourdh, Katni, Madhya  
Pradesh, India

## A comparative study on Input utilization pattern in traditional and SRI methods of paddy cultivation in district Katni (M.P.)

**Shiv Singh Kirar, Ram Pratap Bain and Jeetendra Kumar Soni**

### Abstract

The input use pattern results showed lower cost in SRI nursery management against additional cost was incurred in traditional method of cultivation. The an average expenses on labour for various operations and expenses on material required lower in SRI method of paddy cultivation that traditional method of paddy. These per hectare cost C1 and C2 in traditional method of cultivation was higher of Rs.4281 per hectare than SRI method. It is concluded that the SRI farmers saved Rs.4709 per hectare in cost of cultivation (cost C3) over traditional method of paddy cultivation. Information collected from, Deputy Director of Agriculture, Office of Katni district.

**Keywords:** Input utilization pattern, traditional and SRI methods, paddy, Independent variables

### Introduction

Rice was first mentioned in the *Yajur Veda* (1500-800 BC) and then is frequently referred to in many Sanskrit texts. India has the world's largest area devoted to rice cultivation, and it is the second largest producer of rice after China. Over half of its rice area is irrigated, contributing 75% of the total production. In agriculture, rice is one of the staple food for 65 per cent of the population in India. India provides around 21% of global rice production from its 28% of the world's rice area. Rice area in India has fluctuated fairly stably around 43 million hectares during the last two decades, with a maximum rice area of 46.67 million hectares in 2012-2012. Total rice production was also the maximum during this year (104.4 million tonnes). It is noted that rough (unhusked) rice productivity, which was at 10.02 q/ha in 1950-1951, reached a maximum of 33.03 q/ha in 2012-2013. The average rice yield in the year of 2012-13 found to be 22.28 q/ha. Madhya Pradesh has geographical area of 3, 08,000sq.km.constituting 9.38% of the land area of the country. In Madhya Pradesh rice is grown in the area of about 16.62 lakh hectares with production of 22.27 lakh tonnes and productivity 14.15 q/ha (in the year 2011-12) which is far below than the average national productivity (2010 kg/ha).

System of Rice Intensification (SRI) emerged in the 1980's as a synthesis of locally advantageous rice production practices encountered in Madagascar by Fr Henri de Laulanie, a Jesuit Priest who had been working there since 1961 (Kumar and Shivay, 2004) [5]. But, it is Dr. Norman Uphoff from Cornell International Institute for Food and Agriculture, Ithaca, USA, who had brought this method to the notice of outside world in the late 1990s (Sivanagaraju, 2006) [8]. Today SRI is being adopted in many states in India and the response from farmers has been overwhelming seeing the benefits of the method, notwithstanding the constraints (Jayapal reddy *et al.*, 2013) [7]. In this study comparison has been made to compare input cost and output of paddy cultivation in traditional and SRI methods.

### Material and Methods

The study was conducted in Katni district of Madhya Pradesh. This district has been selected purposively because large number of paddy cultivators adopted SRI method of paddy cultivation. From the selected district 24 villages were selected for the present study and then selected 6 SRI and 6 non SRI farmers from each village with the help of random sampling method. Thus 288 farmers (144 SRI and 144 non SRI) were selected for the present study. Data collected through observation and interview with the farmers. Collected data have been classified, tabulated and interpreted.

**Correspondence**  
**Ram Pratap Bain**  
Krishi Vigyan Kendra, JNKVV,  
Piprourdh, Katni, Madhya  
Pradesh, India

**Result and Discussion**

The resource use pattern of paddy growers indicates the degree of resource management, their choice and decision-making in selection among different alternative resources to get maximum profit. The details regarding utilization pattern of resources in paddy cultivation with different methods are

presented as follows:

**1. Nursery management**

The input use pattern and their respective costs incurred on different inputs in nursery management of both the methods of paddy cultivation is presented in table 1.

**Table 1:** Input use pattern of raising nursery for rice cultivation with traditional v/s SRI method.

Input utilization	Traditional method		SRI method		Change over traditional per hectare
	per farm	per hectare	per farm	per hectare	
Human labour (days)					
Family	33.80	12.85	13.98	4.34	- 8.51
Hired	5.73	2.18	2.23	0.69	- 1.49
Total	39.53	15.03	16.21	5.03	- 10.00
Bullock pair (days)	5.26	2.00	4.19	1.30	- 0.70
Seed (kg.)	124.39	47.30	17.75	5.51	- 41.79
Manure (q.)	2.05	0.78	5.58	1.73	+ 0.95
Fertilizer (NPK) (kg.)	47.17	17.94	24.74	7.68	- 10.26
Plant protection (Rs.)	802.07	304.97	872.52	270.97	- 34.00
Other (Rs.)	116.89	44.44	52.48	16.30	- 28.14

*Source:* Information collects by respondents.

The Data in Table 1 revealed, in traditional method of paddy cultivation, the human labour utilization was found to be 15.03 days per hectare; while, the bullock labour days was 2 days per hectare. When compared to Labour Day’s utilization in SRI method of paddy cultivation it was 5.03 human labour days and on an average 1.3 bullock labour days.

It is concluded that the SRI farmers saved 10 days of human labour and 0.70 bullock labour days per hectare over traditional method of paddy cultivation. It is found that the traditional method of paddy growers used on an average 47.30 kg of seed per hectare. It is well known fact the seed rate was variable in quantity in different varieties method of cultivation practices and skill of labour during sowing practices etc. On the other hand, the seed rate was only 5.51 kg per hectare for SRI method of paddy cultivation. It is concluded that the SRI farmers saved 41.79 kg of seed per hectare over the traditional method of paddy cultivation.

The application of chemical fertilizer (NPK) also shows higher quantity (17.94 kg per hectare) in traditional method of cultivation, while in SRI method of cultivation the farmers used on an average 7.68 kg NPK on per hectare basis. The lower use of NPK in case of SRI method was compensated

with the use of FYM and organic manure. Now, the scientist recognized that the higher use of chemical fertilizer is hazardous for soil, crop and subsistence of life and higher use of organic manure is found to low-cost intensive and profitable for soil, crops and living organisms (Jayapal reddy *et al.*, 2013).

It is concluded that the SRI farmers saved 10.26 kg of chemical fertilizer per hectare over the traditional method of paddy cultivation. In case of plant protection measures utilization pattern in traditional v/s SRI method of paddy cultivation the traditions paddy growers used the chemical of Rs.304.97 on plant protection measure per hectare where as it was only Rs.270.97 for SRI method of paddy cultivation. It is concluded that the SRI farmers saved Rs.34.00 of chemical as plant protection measure per hectare over the traditional method of paddy cultivation (Narasimhan *et al.*, 2003; Pal Krishna *et al.*, 2004) [6].

**2. Labour utilization pattern in traditional v/s SRI method of paddy cultivation**

The patterns of labour utilization in both the methods of cultivation are depicted in table 2.

**Table 2:** Labour use pattern of rice cultivation with traditional v/s SRI method.

S. No.	Practices	Traditional method (days)		SRI method (days)		Change over traditional per hectare
		Per farm	Per hectare	per farm	per hectare	
A.	Bullock labour	22.23	8.45	29.78	9.25	+ 0.80
B.	Machine labour	13.97	5.31	15.27	4.74	- 0.57
C.	Human labour					
I	Land preparation	31.34	11.92	34.60	10.75	- 1.17
II	Transplanting	36.30	13.80	53.30	16.55	+ 2.75
III	Manure and fertilizer application	13.38	5.09	16.33	5.07	- 0.02
IV	Interculture	34.45	13.10	45.09	14.01	+ 0.91
V	Irrigation	38.09	14.48	28.54	8.87	- 5.61
Vi	Plant protection measure	13.86	5.27	14.10	4.38	- 0.89
Vii	Harvesting and Threshing	37.98	14.44	49.09	15.25	+ 0.81
viii	Other work	12.81	4.87	22.68	7.04	+ 2.17
Ix	Total human labour	218.19	82.96	263.65	81.88	- 1.08

*Source:* Information collects by respondents.

The Data in Table 2 revealed, the overall picture that there was very nominal difference of labour utilization pattern in both the methods of paddy cultivation. It is concluded that in

traditional method of paddy cultivation, the human labour utilization needs to be 82.96 days per hectare, while in SRI farmers used 81.88 days of human labour per hectare which

were less by 1.08 man days as against the traditional method.

**3. Crop production and management:**

In raising of crop, farmers use so many inputs as required for its cultivation. In case of rice production with two methods of

cultivation (traditional v/s SRI method), it is pertinent to study the input (material) utilization pattern to developed the managerial aspect of farming suitable to the area. The pattern of input (material) used in both the methods of paddy cultivation are described in table 3.

**Table 3:** Input use pattern (except labour) in rice cultivation with traditional v/s SRI method.

Input utilization	Traditional method		SRI method		Change over Traditional per hectare
	Per farm	Per hectare	Per farm	Per hectare	
Manure (q.)	60.29	22.92	125.24	38.89	+ 15.97
Fertilizer (NPK) (kg)	318.05	120.93	234.38	72.79	- 48.14
Irrigation charges (Rs.)	2573.19	978.40	1072.39	333.04	- 645.36
Plant protection (Rs.)	5215.10	1982.93	3860.05	1198.77	- 784.16

*Source:* Information collects by respondents.

In order to measure the level of utilization of package of practices, many studies recommended as the best way of analysis i.e. expenditure on particular components of technology utilized on a unit area. Therefore, this expenditure method of analysis of input utilization was adopted to analyse the cost of production per unit of area of paddy at different levels of input utilization.

The SRI method of paddy cultivation is based on organic farming system and less use of chemical fertilizers. The data depicted that application of organic manure was more in SRI method of paddy cultivation i.e. 38.89 quintals per hectare, while, it was used 22.92 quintals per hectare in traditional method of paddy cultivation. It is concluded that the SRI farmers used higher manure (about 16 quintals per hectare) over the traditional method of paddy cultivation. The data depicted that the application of chemical fertilizers was more in the traditional method of paddy cultivation (120.93 kg per hectare of N.P.K.), while, it was used only 72.79 kg per hectare of N.P.K. in SRI method of paddy cultivation.

It is concluded that the SRI farmers saved about 48.14 kg per hectare of N.P.K. over the traditional method of paddy cultivation. The use of plant protection measure also found to have variation in different methods of paddy cultivation. In case of plant protection measures utilization pattern in traditional v/s SRI method of paddy cultivation, the traditional paddy growers used the chemicals of Rs.1982 per hectare on plant protection measure where as it was only Rs.1198 per hectare for SRI method of paddy cultivation.

It is concluded that the SRI farmers saved Rs.784 per hectare for chemicals as plant protection measure over the traditional method of paddy cultivation. Irrigation is the essential factor of production in paddy cultivation (Bheemappa, 2001) [1]. The data revealed that in SRI method the water management practices desired that the soil should be kept moist but not to break, the soil also not saturated by providing alternating wetting and drying. On the other hand, in traditional method of paddy cultivation, soil needs moist condition (water standing) throughout the duration of paddy cultivation. In case of irrigation charges, water utilization pattern in traditional v/s SRI method of paddy cultivation the traditional, paddy growers used the water charges of Rs.978 per hectare where as it was only Rs.333 per hectare as water charges for SRI method of paddy cultivation. It is concluded that the SRI farmers saved Rs.645 per hectare of water charges over the traditional method of paddy cultivation.

**4. Aggregate per hectare input utilization pattern and their respective costs**

In estimation of cost of cultivation with traditional method v/s SRI method of paddy, the total cost was incurred into two parts i.e. cost of labour under different operations and material costs. The pattern of inputs (labour and material) utilization on per hectare basis and their respective costs in both the methods of paddy cultivation for sample respondents is presented in table 4.

**Table 4:** Input use pattern and their respective costs per hectare in rice cultivation with traditional v/s SRI method.

Input utilization	Traditional method		SRI method		Change over Traditional per hectare
	unit	Cost	Unit	Cost	
Human labour (days)	97.99	17148	86.91	15209	-1939
Bullock labour (days)	10.45	3657	10.55	3692	+35
Machine labour (hours)	5.31	2655	4.74	2370	-285
Seed + treatment (kg.)	47.30	1282	5.51	238	-1044
Manure (q.)	23.70	2370	40.62	4062	+1692
Fertilizer (NPK) (kg)	138.87	2780	80.47	1620	-1160
Irrigation charges (Rs.)	-	1023	-	361	-662
Plant protection (Rs.)	-	2286	-	1470	-816

*Source:* Information collects by respondents.

The Data in Table 4 revealed that the total bullock labour cost and cost of manure per hectare under SRI method of paddy cultivation was found to be higher which accounted up to Rs.35 and Rs.1692 only. On the other hand, it could be concluded that on an average expenses on labour for various operations and expenses on materials required lower under

SRI method of paddy cultivation than that under traditional method of paddy (Chahal and Chahal, 1989; Dash *et al.*, 1995) [2, 3].

**Conclusions**

1. The input use pattern results showed lower cost in SRI

nursery management as against the additional cost was incurred in the traditional method of cultivation. The SRI method of paddy cultivation promising to overcome the shortage of water in irrigated rice. Thus, SRI is the most suitable method of rice cultivation to poor resource farmers who have relatively more family labour and less water facilities for irrigation.

2. The cost of cultivation of paddy with traditional and SRI method was estimated and it was found that on an average the total cost of cultivation (cost  $C_3$ ) was found to Rs.42842 per hectare in traditional method, while it was on an average Rs.38133 per hectare in SRI method of paddy cultivation. The results indicated that the paddy cultivation under traditional method was costly than SRI method.
3. The per hectare cost of cultivation under traditional method was higher Rs. 4709 than SRI method of paddy cultivation. It is concluded that the SRI farmers saved Rs.4709 per hectare in cost of cultivation (cost  $C_3$ ) over traditional method of paddy cultivation. The high cost incurred in material input like seed, chemical fertilizer, plant protection and water charges was the major reason for higher cost per hectare under traditional method of cultivation.

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