

# **Economic analysis of System of Rice Intensification (SRI) methods in Morang district of Nepal, main season, 2005**

Rajendra Uprety, DADO Morang, Biratnagar, Nepal

## **Introduction**

Rice is the main crop and leading commodity contributing in Nepalese economy. But rice cultivation is becoming less attractive and less profitable day by day because the prices of inputs are increasing rapidly while production and price of rice is not increasing by as much.

Within the last 10 years, the price of DAP (di-ammonium phosphate) has been raised from NRs. 12,500 to 26,000 per metric ton, urea has gone from NRs. 56,00 to 27,000, and murate of potash (MOP) has raised from NRs. 8,500 to 15,000. Similarly, tractors' price has become doubled, labor cost has more than doubled, and fuel (diesel/petrol) for irrigation costs more than 3 times.

During this time, the price of rice has remained similar or at most slightly raised. This situation has made rice cultivation less profitable, and farmers are becoming less attracted towards this crop. In Nepal during rainy season, rice is the main crop being grown, covering more than 80 percent of the cultivated area, as the main food crop for a majority of Nepalese. With the prevailing methods of rice production, cost is very high and profitability is becoming low.

In this situation, we need an alternative way to reduce the cost of production and increase productivity. The System of Rice Intensification (SRI) method of rice cultivation is a new method for Nepalese farmers being introduced in the last few years. It is starting to spread to larger areas of Nepal. In the last three years, the number of SRI farmers has been increasing rapidly.

Starting from a single farmer in the first year, the number of SRI users in Morang District has surpassed 1400 within three years. From one location, it has now reached 53 Village Development Committee areas out of 64. In the same way, SRI plot size which started with 100 square meters as reached 2.2 hectares for the largest farmer using the new methods. All together, the SRI area in Morang District was more than 100 hectares in the 2005 season.

Many new districts are joining in SRI movement. Panchthar, Dhankuta, Sunsari, Dang, Dhanusha, Sarlahi, Kavrepalanchowk, Bhaktapur and Rupandehi have already started using SRI methods and are getting very good performance.

## **Methodology**

To analyze the economics of SRI methods, the District Agriculture Development Office (DADO) Morang conducted a survey among SRI users. For data collection, 50 farmers, randomly-selected, were interviewed using a pre-tested questionnaire. Information about production costs and income was collected. Production costs for normal farmer methods and resulting income were collected from the same farmers for comparison. Besides this, some secondary data have been acquired and used to compare in broader perspective. Microsoft Excel and SPSS computer software package have been used for data analysis.

## Results and Discussion

Based on data analysis of result, the following information has found in Morang about SRI economics. Farmers have used SRI method on extents ranging from one katha (336 square meters) to 65 kathas (22,000 square meters). Beginning farmers have used SRI on a small scale as trials, while experienced farmers used it on larger areas. Some farmers have put all of their rice area under SRI.

**Table 1. Average costs, returns and net profits from rice cultivation in terai, Nepal (2003/2004)**

SN.	Land type (methods/ water supply)	Yield Kg/ha	Total costs (Rs./ha)	Returns from grain (Rs./ha)	Returns from by-products (Rs./ha)	Gross income (Rs./ha)	Net profit (Rs./ha)	Cost of rice (Rs./kg)	Output/ Input ratio/ha
1	Improved/ irrigated	3376	23070	29053	3541	32594	9524	5.82	1.41 *
2	Improved/ unirrigated	2575	21901	22406	3431	25837	3933	7.20	1.18 *
3	Local/ irrigated	2399	17989	20960	1695	22656	4667	6.81	1.26 *
4	Local/ unirrigated	1813	18613	16297	2569	18875	262	8.88	1.01 *
5	SRI methods	6147	23205	56361	6339	62700	39495	2.74	2.7 **

\* Source: Statistical Information on Nepalese Agriculture (2003/2004). MOAC/Nepal.

\*\* Source: District Agriculture Development Office, Morang (2005)

According to the results of data analysis, SRI methods have been found to be considerably more profitable than conventional as well as improved methods. According to data published in the annual Statistical Information on Nepalese Agriculture (Ministry of Agriculture and Cooperatives/Nepal), terai farmers produced 3,376 Kg rice by investing Rs. 23,070 in irrigated areas. From this production, farmers realized net profit of Rs. 9,534. It was very low compared with the average production and profit from SRI methods (Rs. 39,495) by investing a similar amount of expenditure (Rs. 23,205). Production cost of per kilogram rice has found to be more than double with conventional methods compared with SRI. Similarly, the output/input ratio of SRI was more than double (2.7) compared with conventional methods (1.26-1.41).

**Table 2. Difference in cost of production between SRI and farmers' methods in Morang (2005)**

Sn.	Cost of cultivation	SRI	Conventional	Difference
1	Seed	119	1250	1131
2.	Nursery preparation	614	935	299
3	Land preparation	5337	5337	0
4	Fertilizers	2711	2711	0
5	Transplanting	2189	2888	699
6	Weeding	4430	2160	(2270)
7	Topdressing	524	524	0
8	Irrigation	1532	2700	1168
9	Pesticides	392	900	508
10	Crop cutting + threshing	5357	4320	(1037)
<b>Total production cost (Rs./ha)</b>		<b>23,205</b>	<b>23,725</b>	<b>520</b>

Note: costs in brackets represent more cost required for SRI methods.

When the comparison of production costs between conventional methods and SRI was analyzed, it was found that conventional method was somewhat more expensive (Rs. 23,725/ha) than SRI (Rs. 23,205/ha). Survey results showed that SRI needs more expenditure only for weeding and crop harvesting and threshing. Average weeding cost (manual weeding) for SRI was found to be double that of conventional methods, and about 25% more for harvesting and threshing. But by using a rotary weeder for weeding, farmers have actually reduced their weeding cost to less than conventional method (Rs. 1800-2000/ha for three weedings). So the cost of production with SRI methods could come down considerably if farmers have access to the rotary weeder. This would make adoption of SRI more profitable for its users.

Regarding other expenditures, the cost of irrigation has been reduced by 43%; expenditure in pesticide was 57 % less with SRI compared to conventional method. Similarly, the cost for rice seed was reduced by 90%, and nursery preparation has been reduced by 32%. Other costs like land preparation, fertilizers, and topdressing were found to be similar with both methods.

**Table 3. Production cost of rice farming with SRI methods in Morang (2005)**

SN.	Cost range (Rs./ha)	Frequency	Percentage	Remarks
1	Up to 15000	2	4	
2	15001-20000	12	24	
3	20001-25000	20	40	
4	25001-30000	10	20	
5	30001 and above	6	12	
<b>Range: Rs. 12,889-34,530; Average: Rs. 23,203; Median: Rs. 23,091</b>				

Average production cost of rice cultivation by SRI is slightly less than the conventional average. Cost of production for 68% farmers was found to be less than NRs. 25,000. The cost of production varied due to cost of labor according to growing places. Labor cost has been found to range from NRs. 35 to 120/day/labor; similarly cost of plowing was found to range from NRs. 125 to 175/plow/day; such differences in the cost of labor make a big difference in the expenditure on cultivation. The difference of man-days was not very high compared to conventional method. So the average cost of production in both methods was not very different.

**Table 4. Gross return of rice farming with SRI methods in Morang (2005)**

SN.	Range of gross return (Rs./ha)	Frequency	Percentage	Remarks
1	Up to 50,000	7	14	Gross return range with farmer's method was Rs. 25,680-49,200, and the average was Rs. 33,331/hectare.
2	50,001-60,000	15	30	
3	60,001-70,000	17	34	
4	70,001-80,000	6	12	
5	80,001 and above	5	10	
<b>Range: Rs. 39,600-90,300; Average: Rs. 62,700; Median: Rs. 62,100.</b>				

Gross return with SRI methods has been found to be very high compared with conventional methods despite the similar cost of inputs. Average gross return with SRI was NRs. 62,700/ha, almost double the conventional-method gross return, which was NRs. 33,331/ha. Other details are presented in Table 4.

**Table 5. Net income from rice farming with SRI methods in Morang (2005)**

SN.	Range of net income (Rs./ha)	Frequency	Percentage	Remarks
1	Up to 30,000	10	20	Net income range with farmers' methods was Rs. 6,410-32,300, and the average income was Rs. 15,014 per hectare.
2	30,001-40,000	21	42	
3	40,001-50,000	11	22	
4	50,001-60,000	5	10	
5	60,001 and above	3	6	
<b>Range: Rs. 25,811-70,061; Average: Rs. 39,497; Median: Rs. 38,530</b>				

Net return with SRI was found to be more than doubled compared to use of conventional methods. The net return from SRI methods was NRs. 39,497/ha (maximum was Rs. 70,061), but with conventional methods, it was only NRs. 15,014/ha. Among SRI users, 80% of farmers had net return of more than Rs. 30,000/ha, double the conventional level of income from rice production. More details are presented in the annex tables.

### Conclusion

System of Rice Intensification (SRI) method has been gaining popularity in Morang district and other parts of the country. Its cost-effectiveness and profitability are the main factors of attraction to the farmers. According to farmers' response, weeding is their main problem with SRI method. By introducing the rotary weeder and making it easily available in local markets, we can make SRI methods easily acceptable and also further reduce production costs. The improvements in gross returns and net profits show that by disseminating SRI method, we can strengthen food security, help in poverty reduction, and uplift the living standards of our resource-poor farmers living in remote areas in helpless situation.

### Annex:

**Table 1. Distribution of the cost of seed when using SRI methods in Morang (2005)**

SN.	Cost range (Rs./ha)	Frequency	Percentage	Remarks
1	Up to 100	27	54	48% respondents have expended no more than Rs. 94 on seed for one hectare of rice planting.
2	101-150	14	28	
3	151-200	8	16	
4	201 and above	1	2	
<b>Range: Rs. 75-225; Average: Rs. 119; Median: Rs. 94</b>				

**Table 2. Distribution of cost of nursery preparation when using SRI methods in Morang (2005)**

SN.	Cost range (Rs./ha)	Frequency	Percentage	Remarks
1	Up to 500	15	30	30% respondents have expended <Rs. 500/ha for their nursery preparation.
2	501-1,000	30	60	
3	1,001 and above	5	10	
<b>Range: Rs. 138-1,500; Average: Rs. 614; Median: Rs. 525</b>				

**Table 3. Distribution of cost of land preparation when using SRI methods in Morang (2005)**

SN.	Cost range (Rs./ha)	Frequency	Percentage	Remarks
1	Up to 4,000	9	18	Same for both methods.
2	4,001-5,000	13	26	
3	5,001-6,000	11	22	
4	6,001-7,000	14	28	
5	7,001 and above	3	6	
<b>Range: Rs. 2,970-9,000; Average: Rs. 5,337; Median: Rs. 5,175</b>				

**Table 4. Distribution of cost of fertilizer when using SRI methods in Morang (2005)**

SN.	Cost range (Rs./ha)	Frequency	Percentage	Remarks
1	Up to 2,000	11	22	6% respondents did not use any fertilizers in their field.
2	2,001-3,000	23	46	
3	3,001-4,000	9	18	
4	4,001 and above	7	14	
<b>Range: Rs. 00-5,130; Average: Rs. 2,711; Median: Rs. 2,798</b>				

**Table 5. Distribution of cost of transplanting when using SRI methods in Morang (2005)**

SN.	Cost range (Rs./ha)	Frequency	Percentage	Remarks
1	Up to 1,500	12	24	Average transplanting cost with farmer methods was Rs. 2,888/hectare.
2	1,501-3,000	33	66	
3	3,001-4,500	5	10	
<b>Range: Rs. 1,050-4,500; Average: Rs. 2,189; Median: Rs. 2,100</b>				

**Table 6. Distribution of cost of weeding when using SRI methods in Morang (2005)**

SN.	Cost range (Rs./ha)	Frequency	Percentage	Remarks
1	Up to 2,000	5	10	By using rotary hand weeder, farmers' weeding cost has been reduced to only Rs. 1,800/hectare.
2	2,001-4,000	21	42	
3	4,001-6,000	14	28	
4	6,001-8,000	7	14	
5	8,001 and above	3	6	
<b>Range: Rs. 1,050-9,000; Average: Rs. 4,430; Median: Rs. 3,750</b>				

**Table 7. Percentage differences in net income resulting from use of SRI and farmers' methods in Morang (2005)**

SN.	Net income differences (in %)	Frequency	Percentage	Remarks
1	Up to 100%	9	16	
2	101-150%	10	20	
3	151-200%	14	30	
4	201-250%	10	20	
5	251% and above	7	14	
<b>Range: 28-356%; Average: 174%; Median: 165.35%</b>				

**Table 8. Distribution of production cost of rice per kilogram with SRI methods in Morang (2005)**

SN.	Production cost of rice (Rs./kg)	Frequency	Percentage	Remarks
1	Up to 2	6	12	Per kilogram production cost range with farmers' methods = Rs.3.5-8.5, and the average cost was Rs. 6/kilogram, as summarized in Table 9.
2	2.1-2.5	15	30	
3	2.6-3.0	9	18	
4	3.1-3.5	13	26	
5	3.6-4.0	3	6	
6	4.1 and above	4	8	
<b>Range: Rs. 1.4-6.2; Average: Rs. 2.8; Median: Rs. 2.6</b>				

**Table 9. Production cost of one-kilogram rice by SRI and farmers' methods in Morang (2005)**

SN.	Method	Average (Rs./ka)	Minimum (Rs./kg)	Maximum (Rs./kg)
1	SRI methods	2.8	1.39	6.2
2	Farmers' methods	6.0	3.5	8.5

