IMPACT OF SRI METHOD OF RICE CULTIVATION ON PROFITABILITY AND SOCIO-ECONOMIC STATUS OF WOMEN SHGS IN MADHYA PRADESH

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Abstract

For analyzing cost and profitability under SRI and traditional method of rice cultivation a sample of 60 beneficiaries of SRI method and 60 non-beneficiaries were selected from two districts (Mandla and Balaghat) of Madhya Pradesh. It is revealed that due to SRI intervention there is 8.65% reduction in variable cost of cultivation and this is indirect savings of beneficiaries. Significant enhancement in yield of rice was observed due to SRI intervention and therefore cost of production as variable cost and total cost were reduced by 24.41% and 16.10% respectively. The comparative cost (Rs.7912.93) and profitability (Rs. 22013.03) of SRI method and cost (Rs. 8365.00) and profit (Rs. 23160.00) as per recommended package of practices revealed that the cost benefit ratio (3.78 & 3.77) is more or less identical in both the systems. The increased income due to SRI intervention on women SHG group helps in improving in living standard (85.07%) along with higher participation in social activities (94.63%) as social benefits. This also helps in improving savings (89.37%) and saving capacity (90.24%) which will ultimately resulted in higher investment in agriculture and household assets in future to improve economic status. Enhanced income also leads to avail medical and educational facilities for their spouses which are only available in peri-urban and urban areas.

Key Word: *SRI, RPP, SHG, Impact, Profitability and Cost-benefit ratio*

JEL : E23, E64, Z13, D13, Q55

Introduction

Rice is the most important staple food crop in India and the country occupies a vital position as a major producer and consumer. Rice provides 31 per cent of total calorie intake in India: (Gathorne-Hardy et al., 2016). In India, SRI is becoming popular with farmers and taking firm root with about 1 million hectares of area under SRI cultivation making it 2.42% of the country's total area under rice cultivation (Gujja and Thiyagarajan, 2013).The SRI is gaining popularity around the world in large part due to its impact on time, cost, and input saving along with women friendly practice of management. Looking to its multidimensional benefits many NGOs are promoting this as a best practice of rice cultivation. They create village level women self-help groups and develop women friendly capacity building programs on SRI method (Durga and Kumar, 2016).

Women are trained as farmer's leaders for gaining confidence and enhancing socio-economic status of the family and community. It also helps in reducing drudgery of women labour due to introduction of mechanical hand weeder and saving of time in different operations. A study in Andhra Pradesh, India shows that mechanical weeders reduced women's labor time for weeding by 76%, also reducing physical discomfort (Mrunalini and Ganesh, 2008**)**. A study conducted in Tamil Nadu, India shows that share of male labor in rice cultivation was decreased by 60% due to mechanical weeding by women labour. There is gain of 115% in net income per hectare (Thiyagarajan, 2004) due to adoption of SRI. In developing countries, NGOs have used SRI to raise farm income and food security to reduce the incidence of human trafficking (Rehman, 2010). Much of the grassroots leadership for the dissemination of SRI technique has come from women groups who, on their own, have spread the SRI, and who have actively promoted SRI at grass root level. One woman SRI farmer/trainer/ activist in Bihar state of India, coming from one of the lowest and poorest social groups in her society, has been elected as a member of that state's Legislative Assembly (http://timesofindia.indiatimes.com/, 2012).

In West Bengal, women are starting to exert their influence in political arenas for policies that support sustainable farming (Menon, 2014). SRI's multiple benefits for families and women prompted a march of 5,600 women in Madhya Pradesh, India, in 2012 to demand access to more resources for improving their farming operations, including training on SRI (Philipose, 2012). The economic analysis of traditional versus SRI method of paddy cultivation shows that there is marginal increase in cost of cultivation due to requirement of higher human labour but increase in net returns is about double over traditional method along with higher cost-benefit ratio (2.29). This shows that additional operational cost was compensated through yield advantage of SRI method of rice. The major reasons for practicing SRI method by sample farmers were less water requirement and higher yield levels (Shelke et al., 2017). In the present study the attampt have been made to analyse the impact of SRI on income generation and socio-economic development of women self help groups of tribes dominated areas of the Madhya Pradesh.

Materials And Methods

Area and sample selection : The study is based on both primary and secondary data. The Primary data were collected from the selected farm women respondents cultivating rice using SRI and traditional method. A list of all the beneficiaries (13115) of different districts of project area viz. Dindori (7425) Mandla (4380) and Balaghat (1310) were provided by the office of the Mahila Vitta Vikas Nigam (MVVN), Bhopal, Madhya Pradesh. Two districts, Mandla and Balaghat were selected purposively for selection of sample beneficiaries of SRI from project area of MVVN. One percent of beneficiaries were selected from project area (villages) of the districts (60) and equal numbers of non-beneficiaries (60) having identical size of holding and socio economic status were selected from same project site. Thus, the total sampling frame is comprised of 120 respondents. The relevant data were collected through survey method using pre-tested interview schedule. Collected data were analysed using different cost and profitability concepts and upliftment in socio-economic status were judge using appropriate measurement scale.

Results And Discussion

Cost of cultivation : Major proportion of variable costs accounts for operational cost, while among the material cost items major cost attributed to cost of fertilizer in both the groups. In SRI method the cost of seed is much lower (Rs.882.61/acre) as compared to traditional method (Rs.1470.33/acre) and this resulted in reduction of total variable cost by 8.65 percent. But still beneficiaries HH are using much higher seed rate (6 kg/acre) as compared to recommended seed rate of 3 kg/acre (Table-1). SRI is labour intensive technology, the estimates shows that the cost incurred in human labour in case of an average beneficiary was 21.85% higher as compared to cost of human labour on non-beneficiary

households. Rental value of owned land was found to be 21 per cent higher in case of beneficiary as compared to non-beneficiary mainly due to higher gross income of beneficiary (Rs.29925.96/acre) as compared to gross income (Rs.24739.21/acre) on non-beneficiary households. In case of other cost components not many differences were observed on beneficiary and non-beneficiary households.

Table 1: Cost Components Of Sri Method Of Rice Cultivation (Rs/Acre)

Particulars (1)	Beneficiaries (2)	Non-Beneficiaries (3)	% Difference over Non-Beneficiaries (4)
1.Operational Cost			
A.Human labour- Family	1143.17	938.16	21.85
- Hired	912.53	1006.76	-9.36
B. Machinery power	1378.09	1485.72	-7.24
Total operational cost	3433.79	3430.64	0.09
2.Material Cost			
A. Seed	882.61	1470.33	-39.97
B. Seed Treatment	35.5	41.25	-13.94
C. Manure	362.08	387.38	-6.53
D. Fertilizers	1551.24	1588.46	-2.34
E. Insecticides	872.33	912.67	-4.42
F. Weedicide	666.94	729.42	-8.57
G. Depreciation	108.44	101.69	6.64
Total cost	4479.14	5231.2	-14.38
Total Variable cost	7912.93	8661.84	-8.65
3. Fixed Cost			
A. Rental Value of own land @1/6 of gross return	4987.66	4123.21	20.97
C. Revenue /tax	30.00	30.00	0.00
D.Interest on Fixed capital @10%	944.12	868.53	8.70
Total Fixed Cost	5961.78	5021.74	18.72
Managerial Cost	1387.48	1368.36	1.40
Total Cost of Cultivation	15262.19	15051.94	1.40

The data on cost of cultivation of beneficiaries and non-beneficiaries households (HHs) is presented in table-2. It is observed from the data that on beneficiary HH farms the cost of cultivation is marginally higher (1.4%) from those of non-beneficiary farms and this was mainly due to higher proportion of fixed cost on beneficiaries farms. Operational cost was almost identical in both the groups (Rs.3430.00/acre).

There is a drastic reduction in expenditure on seed due to SRI intervention and this is indirect savings of beneficiaries HHs, this also reduced the variable cost by 8.65 per cent as compare to non-beneficiaries HHs.

Table 2: Cost Of Cultivation Of Sri **(Rs/Acre)**

Particulars (1)	Beneficiaries (2)	Non- Beneficiaries (3)	Change over Non-Beneficiaries (%) (4)
1. Variable Cost	7912.93 (51.85)	8661.84 (57.55)	-8.65
(a) Operational Cost	3433.79 (22.50)	3430.64 (22.79)	0.09
(b) Material Cost	4479.14 (29.35)	5231.20 (34.76)	-14.38
2. Fixed Cost	5961.78 (39.06)	5021.74 (33.36)	18.72
3. Managerial Cost	1387.48 (9.09)	1368.36 (9.09)	1.40
Total Cost of Cultivation	15262.19 (100)	15051.94 (100)	1.40

(Figures in parentheses shows percentage to total cost)

The indirect cost (fixed cost) was higher on beneficiary HHs farms (Rs. 5961.78 /acre) as compared to non-beneficiary HHs farms (Rs.5021.74/acre) and this was mainly due to higher rental value of owned land estimated on the basis of one-sixth of gross income. In total variable cost the share of total operational cost was lower as compared to material cost which revealed that the beneficiary as well as non-beneficiaries HHs is adopting recommended technologies partially.

Profitability : The data on productivity and profitability from SRI method of rice is analyzed and are presented in Table 3. The data

show that there was yield advantage of 20.85% on beneficiaries HHs as compared to non-beneficiaries HHs due to SRI method of rice cultivation. The advantages in net income were 36.92 and 51.37% at total variable and total cost. In SRI method households received marginally higher price (1.31 %) in the market due to early harvest of the produce. Thus, overall increase in gross income was higher (20.97%) as compared to increase in yield.

Net income over variable and total cost was also higher on beneficiaries HHs farms as compared to non-beneficiaries HHs farms. Similarly, there is reduction in cost of production by 24.41 and 16.10 percent at variable and total cost respectively due to higher productivity per unit of area. The cost benefit ratio was also higher on beneficiaries HHs farms (1.97) as compared to non-beneficiaries HHs farms (1.65).

Table 3: Profitability In Cultivation Of Rice Through Sri (Rs./Acre)

Particulars (1)		Beneficiaries (2)	Non- Beneficiaries (3)	% Change over Non-Beneficiaries (4)
Yield (q/acre)		17.85	14.77	20.85
Gross Income		29925.96	24739.21	20.97
Net Income	Over Variable Cost	22013.03	16077.37	36.92
	Over Total Cost	14663.77	9687.27	51.37
Cost of production (Rs/q)-	Over Variable Cost	443.30	586.45	-24.41
	Over Total Cost	855.02	1019.09	-16.10
Return/Rs. investment	Over Variable Cost	3.79	2.86	32.52
	Over Total Cost	1.97	1.65	19.39

This revealed that among the women beneficiary households the SRI method of rice cultivation is more advantageous as compared to traditional method.

Cost of cultivation of SRI as compared to recommended package of practices : The cost of cultivation of SRI on beneficiaries HHs farms as compared to cost as per recommended package of practices (RPP) was estimated and data on the same are presented in table 4. The RPP for each crop in different location used to be decided/ recommended by the team of scientists based on field trials/demonstrations for harnessing its full potential through utilizing resources efficiently.

The data shows that operational cost was marginally lower (6.29%) on beneficiary households when compared with operational cost as per recommended package of practices. Similarly material and total variable cost was lower by 4.71 and 5.40 per cent respectively. This reflected in yield reduction of 3.51 per cent only.

Table 4: Cost Of Cultivation Of Sri: Beneficiaries Farms Vs. Rpp (Rs./Acre)

Particulars (1)	Beneficiaries (2)	RPP (3)	% Difference over RPP (4)
Human labour	2055.70	2089.44	-1.61
Machinery and bullock Power	1378.09	1575.00	-12.50
1. Total Operational Cost	**3433.79**	**3664.44**	**-6.29**
A. Seed	882.61	800.00	10.33
B. Seed Treatment	35.50	46.00	-22.83
C. Manure	362.08	422.56	-14.31
D. Fertilizers	1551.24	1632.00	-4.95
E. Insecticide	872.33	950.00	-8.18
F. Weedicide	666.94	740.00	-9.87
Depreciation	108.44	110.00	-1.42
2. Total Material Cost	**4479.14**	**4700.56**	**-4.71**
Total Variable cost (1+2)	**7912.93**	**8365.00**	**-5.40**
Yield (q/acre)	17.85	18.5	-3.51
Gross Income	29925.96	31525	-5.07
Net Income	22013.03	23160	-4.95

Return/Rs. investment over operational cost	3.78	3.77	0.35

Marketed surplus : Marketed surplus of rice has been analysed both for beneficiary and non-beneficiary HHs and the data on the same are presented in table 5. Marketed surplus shows the amount of production which is actually marketed by the producer for generation of revenue for household expenditure. It is observed from the data that beneficiary HH marketed 12.25 q/acre in the market which is 59.71 per cent higher as compared to non-beneficiaries HH mainly due to higher productivity.

Table 5: Marketed And Marketable Surplus Of Sri (Q/Acre)

Particulars (1)	Beneficiaries (2)	Non- Beneficiaries (3)	% Change over Non-Beneficiaries (4)
Production	17.85 (100.00)	14.77 (100.00)	20.85
Stored quantity of previous Year	2.20	1.05	109.52
Home Consumption	5.32 (29.80)	4.72 (31.95)	12.71
Quantity kept for seed	2.48 (13.89)	3.43 (23.22)	-27.70
Marketed Surplus	12.25 (68.62)	7.67 (51.92)	59.71

Figures in parenthesis show percentage to respective total

Out of the total availability, beneficiary HH (17.85 q/Acre) sale 68.62 per cent in the market and 29.80 and 13.89 per cent is kept for home consumption and retain for the seed and for sale as seed to farmers of the locality. On the contrary non-beneficiary HHs keeps 31.95% quantity for home consumption. On the contrary non-beneficiaries sale 51.92% of the production in the market and quantity retain for seed was 23.22%. The higher quantity retained for seed by non-beneficiary households reflects that they use higher seed due to traditional method of rice cultivation and therefore their extent of marketed surplus was lower (Table-5).

Impact on socio-economic status : The overall impact of activity on living standard was found to be positive on beneficiaries related to SRI method of rice production management. Since the majority of beneficiaries HHs reported that their level of living standard improved (85.07%) and level of self-assessment (87.33%), educational standard of children (91.55%), participation in social activities (94.63%), expenses on maintenance of livestock (83.66%) and level of decision making capacity (92.65%) have been improved many fold after joining the SHGs.(Table 6). The majority of them also reported that after associated with SHGs their saving habits (89.35%), saving capacity (90.24%) and control over financial expenditure (87.45%) have been improved.

The ownership of assets and availing modern services was also be judged and observed that ability to adopt modern technology in farming has been improved (91.55%), ability of technology utilized in capital services (92.20%) also improved, and purchasing power to purchase TV, mobile and motor cycle (94.31%) has been also improved after association with SHGs.

Constraints related to adoption of SRI : The constraints reported by the selected respondents in adoption of SRI are presented in Table 7. The major constraints as expressed by the majority of beneficiaries rice cultivators were unavailability of labours at the time of requirement for performing various farm operations manually (90.00%), high labour charges (70.00%), high cost of input materials (66.67%), lack of capital (60.00%), high price of seed, lack of irrigation facility (53.33%), lack of skilled labour (41.67%), inadequate supply of electricity (23.33%) and lack of training (21.67%) are the other constraints reported by the rice cultivators using SRI method of rice production in the study area.

Table 6: Impact Of Shgs Activity On Living Status Of Beneficiaries (%)

Particulars (1)	Neutral (2)	Improved (3)	Very much Improved (4)
Overall Benefit			
Level of Self-Assessment	0.00	87.33	12.67
Level of Living Status	5.82	85.07	9.11
Education of Children	1.12	91.55	7.33
Social Activities	0.00	94.63	5.37
Health Status	1.04	90.18	8.78
Decision making capacity	2.13	92.65	5.22
Maintenance of Animal	7.92	83.66	8.42
Saving Habits			
Improvement in Saving	0.00	89.37	10.63
Saving Capacity	1.07	90.24	8.69
Control on financial Expenditure	4.20	87.45	8.35
Earning Income Capacity	0.00	77.88	22.12
Freedom from Capitalistic	1.37	81.25	17.38
Assets ownership and availing modern services			
Purchase of Land	0.00	87.33	12.67
Purchase of Animal	5.82	85.07	9.11
Adoption of Technology in Farming	1.12	91.55	7.33
Ability of technology utilize in Capital Services	3.43	92.20	4.36

Purchase of T.V., Mobile & Motorcycle etc	3.99	94.31	1.69

Table 7: Constraints Related To Adoption Of Sri Method Of Sowing

Particulars (1)	Percentage (2)
High cost of input materials	66.67
High price of seed	53.33
High labour charges	70.00
Lack of training	21.67
Lack of skilled labour	41.67
Inadequate supply of electricity	23.33
Unavailability of labours at the time of cultivation practices	90.00
Lack of capital	60.00
Lack of irrigation facility	53.33
Lack of appropriate Knowledge about bed preparation for SRI	45.00

Thus there is still need to strengthen handholding support to these tribal women SHGs specially for developing backward and forward linkages for enhancing their income and socio-economic status so that paddy and poverty should not grow simultaneously.

The results clearly revealed that due to adoption of SRI system of rice cultivation there is reduction in cost of production, enhancement in productivity, and due to early harvesting, farmers fetch higher price for their produce in the market. The gross income of an average beneficiary was found to be higher than non-beneficiary. The beneficiary HHs convert their more production in to value terms as reflected from higher marketed surplus on these farms. It is also observed that increased income due to SRI intervention on women SHG group helps in improving socio-economic standard along with higher participation in social activities as social benefits and stress management. This also helps in improving savings which will ultimately resulted in higher investment in agriculture and household assets in future to improve economic status. Enhanced income also leads to avail facilities which are available in peri-urban and urban areas. The comparison of cost and profitability shows that the household beneficiaries are adopting recommended technologies to the fullest extent. Cost-benefit ratio is just identical under both the levels of adoption showing positive impact of a project. This leads to conclude that the present level of adoption of SRI method is most profitable, but still there is a scope to reduce the cost of cultivation by reduction in cost of seed and enhancing fertilizer use efficiency through application of bio-fertilizers.

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References

I. **Durga A.R. and Kumar D Suresh 2016.** More crop per drop of water: adoption and dis-adoption dynamics of System of Rice Intensification. *IIM Kozhikode Society & Management Review* **5** (1): 74–82.

II. **Gathorne-Hardy A, Reddy D N, Venkatanarayana M and Hariss-White B. 2016.** System of Rice Intensification provides environmental and economic gains but at the expense of social sustainability: A multi-disciplinary analysis in India. *Agricultural Systems* 2016, **143**: 159–168.

III. **Gujja B and Thiyagarajan T M. 2013.** New hope for Indian food security? The System of Rice Intensification. The gatekeeper series of the Natural Resources Group at IIED. Available at http://pubs.iied.org/pdfs/14587IIED.pdf, Accessed on **22** August 2014.

IV. **http://timesofindia.indiatimes.com/, 2012**

V. **Menon A. 2014.** India: In Bengal, women agriculturists take charge. The Citizen, Oct. 13. http://thecitizen.in/NewsDetail.aspx?Id=920&India:/In/Bengal,/Women/Agriculturists/Take/Charge.

VI. **Mrunalini A and Ganesh M. 2008**. Work load on women using cono weeder in SRI method of paddy cultivation. *Oryza* **45**: 58-61.

VII. **Philipose P. 2012**. Rural champions of change. The Hindu, Feb. **28**. http://www.thehindu.com/news/national/other-states/rural-champions-of-change/article2941702.ece?css=print.

VIII. **Rehman T, Young girls face trafficking as lack of rains drives worsening rural poverty, May 5, 2010**. AlertNet, Thomson-Reuters Foundation. http:// www.trust.org /item/20100505 134500-w5jiz/?source=search.

IX. **Shelke R D, Meshram D U and Sable S N. 2017.** Comparison between traditional and improved method of paddy cultivation for doubling farmers income. *Bulletin of Environment, Pharmacology and Life Sciences* **6** (1): 512-516.

X. **Thiyagarajan T M. 2004**. On-farm evaluation of SRI in Tamiraparani Command Area, Tamil Nadu, India. Presentation to World Rice Research Congress, Tsukuba, Japan, November **4-7.** http://sri.ciifad.cornell.edu/conferences/wrrc/wrrcppts/wrintnseveraju.ppt.