

## Gender issues and technological refinement for women in rice farming

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### ABSTRACT

*A study was conducted in Cuttack district of Odisha to identify the gender issues in rice-based production systems and institute a comparison between men and women in rice farming with respect to participation, knowledge, evaluation of technology, varietal preference and perception on rice production for family requirement. The results revealed that all the traditional technologies were easily available, affordable, easy to use, not highly skilled and socially acceptable. On the aspects of efficiency, majority of the women perceived the traditional technologies viz., manual transplanting, manual weeding and harvesting by traditional sickles and parboiling in traditional way were not efficient. The results of on-farm trial revealed that the highest net return (Rs. 25,880 ha<sup>-1</sup>) and benefit: cost ratio (2.30) were recorded in the plots where the crop was established by transplanter and mechanical weeding by operating finger weeder (20 days after planting) followed by manual removal of weeds within rows. The feedback provided by the women farmers about CRRRI two-row manual rice transplanter and finger weeder has led to draw useful recommendations for refinement in farm implements.*

**Key words:** gender issues, women, rice farming, participation, implements, evaluation

Women in Indian agriculture are invisible even when a possibility of 'Feminization of Agriculture' is in the offing. Farmwomen's needs and problems are not well identified for which rice research is gender insensitive. Whatever technology generated specially for reducing the drudgery of women has not been tested in women perspective and their reactions have not been properly analyzed. As reported by Yianna (2004), during the 'International Year of Rice-2004', men and women farmers have different responsibilities in agricultural production systems, including rice farming. These differences in gender roles are not always obvious, but they must be recognized if rice production is to be increased, especially among small-scale farmers. Effective, sustainable rice production that provides food security to all people depends on gender roles being fully understood and considered in policy, planning, research and extension. Gender analysis is therefore an important tool in the development of rice farming. It identifies gender roles and responsibilities, indicates how much time different household members devote

to different tasks (and why) and shows how these tasks change according to the season and the time of day. As reported by DRWA (2013), the head of the family, usually a male person, initiates the selection of farm enterprise, assortment of crops/ enterprises, resource allocation, investment decision in farm, labour engagement and purchase of farm inputs. Although, both male and female participate in these activities and implement the same, the decision making still rests with the men in majority of the activities. However, women take lead in maintenance of family finance, saving, purchase of family consumption items, cooking items for the day, health of family members and spending for elders in the family, reflecting stereotypical gender roles in the rural society. In Asia women provide 50 to 90% of labour for rice cultivation. Rice farming is an area where participation of women is very significant and almost all the activities like seed selection, nursery raising, field preparation, transplanting, fertilizer application, weeding, harvesting, winnowing, parboiling, drying and storage are carried out by women

alone or jointly with men. They remain busy for 10 hours a day in sowing of rice during July, 11 hours a day for weeding in August and also as many as 11 hours a day for harvesting and threshing during October (Ahuja, 1998). In a study conducted in a tribal area of Odisha, Das *et. al.* (2008) reported that majority of the tribal farm women actively participated in almost all rice farming activities like, harvesting (97.5%), drying and cleaning (95.5%), winnowing (94%), storing of grains (86.5%), weeding (84.5%), transplanting (77%), thinning and gap filling (83%) etc. In another recent study conducted at the DRWA on the role of women in rice based production systems in five states viz., Odisha, Madhya Pradesh, Andhra Pradesh, Kerala and Uttarakhand, it was reported that over all participation of women was highest in rice crop (44.46%) followed by finger millet, vegetable, lentil and wheat (DRWA, 2013). Most of these operations involve drudgery and hence there is a need to increase the work efficiency by reducing workload and operational drudgery. Also due to increasing migration of men to urban areas, the future of rice production in India will depend largely on farmwomen.

In order to attract the farmwomen for a meaningful role in rice farming, greater emphasis should be given on gender role integration and technology generation. Technologies and tools introduced to communities to improve productivity or efficiency are often based on rural men's needs and perceptions, which may substantially differ from those of women farmers. This is due in part to the fact that agricultural research, technical training, and extension programmes have been targeted primarily at men (FAO, 1996). However, a recent study by Paris (2013) reported that Filipino women in rice farming were very proud of the fact that they were not only the family's treasurers but were partners with their husbands in decision-making on farm and household matters. They were thus potential contributors and beneficiaries of rice technologies through rice research. The testing of technology to address the problems of farmwomen is of utmost importance to provide feedback for further research. Keeping in view the above background, this study was conducted with the objectives to identify the gender issues in technology generation and adoption in rice-based production systems and to institute a comparison between men and women in rice farming

with respect to participation, knowledge, evaluation of technology, varietal preference and perception of rice production for family requirement.

## MATERIALS AND METHODS

This study was conducted in Cuttack district, one of the major rice growing districts of Odisha to identify the gender issues in rice-based production systems. A total of 200 respondents from 100 farm families consisting of 100 men (Nm) and 100 women (Nw) were selected based on their active involvement in rice cultivation. To institute better comparison between men and women, gender disaggregated data (GDD) were collected on selected five parameters viz., participation, knowledge, evaluation of technology, varietal preference and perception on rice production for family requirement. On the basis of identified issues an on-farm trial was conducted in Salipur cluster of Cuttack district to evaluate two-row manual rice transplanter and finger weeder with the participation of 30 farmwomen in rice-based production systems. Field data and reactions of the farmwomen were collected through interview schedule and analyzed to bring out meaningful conclusions. The reactions of 30 randomly selected farm women were analyzed relating to four major activities viz., transplanting, weeding, harvesting and threshing and winnowing which were identified as the major domain of the women and tried alternate options for those activities where the reaction was negative. The scoring of reactions was done in a three point rating scale.

## RESULTS AND DISCUSSION

The findings revealed that among pre-harvesting activities, the total average family women hour was maximum for harvesting (40.04 hour) closely followed by transplanting (37.63 hour), seedling uprooting (30.75 hour) and weeding (28.24 hour), respectively, whereas, the total average family men hour was maximum for harvesting of crops (42.19 hour) followed by weeding (28.11 hour), transporting FYM/compost to field by head load (22.91 hour) and spreading FYM/compost in the field (15.76 hour) (Table 1). Regarding the involvement in post-harvesting activities, women contributed maximum time in parboiling (83.83 hour) and drying and winnowing (82.28 hour) which were much higher as compared to men's contribution.

**Table 1.** Activity-wise participation of family men and women in hours and days in rice cultivation

Rice Cultivation Activities	Family Women (n <sub>w</sub> =100)			Family Men (n <sub>m</sub> =100)		
	Average family women hour	Average family women day	Total average family women hour	Average family men hour	Average family men day	Total average family men hour
<b>Pre-harvest and Harvesting Activities</b>						
Ploughing/digging for seed bed preparation	0.07	0.05	0.00	6.79	1.35	9.16
Preparation of nursery bed	0.41	0.21	0.08	6.90	1.29	8.90
Removal of grasses/stubbles and leveling of seed bed	5.59	1.24	6.93	6.60	1.27	8.38
Nursery weeding	5.85	1.28	7.48	6.29	1.23	7.73
Seedling uprooting	7.12	4.32	30.75	2.12	1.38	2.92
Transporting FYM/compost to field by head load	6.57	3.22	21.15	7.03	3.26	22.91
Spreading FYM/compost in the field	5.65	2.06	11.63	7.20	2.19	15.76
Transplanting/sowing	7.68	4.90	37.63	1.75	1.22	2.13
Manual weeding	6.94	4.07	28.24	7.01	4.01	28.11
Harvesting of crops	7.32	5.47	40.04	7.70	5.48	42.19
<b>Post-harvest Activities</b>						
Carrying harvest to threshing floor on head load	6.80	3.82	25.97	7.17	3.82	27.38
Threshing/shelling by bullocks	5.12	3.96	20.27	7.64	4.55	34.76
Winnowing/cleaning	7.59	3.43	26.03	4.95	2.87	14.20
Bagging of produce	5.95	3.04	18.08	7.33	3.19	23.38
Carrying produce to home	5.31	2.94	15.61	7.27	3.20	23.26
Drying of produce and winnowing	6.69	12.30	82.28	2.07	5.83	12.06
Parboiling	7.29	11.50	83.83	6.21	11.32	70.29
Storing of seed	2.70	1.58	4.26	3.06	1.64	5.01
Preparing produce for marketing	2.28	1.88	4.28	2.32	1.95	4.52

Hence the findings highlighted that in pre-harvest activities, the family women contributed maximum time in harvesting of crops, transplanting/sowing, seedling uprooting and weeding. As weeding, harvesting and transplanting are drudgery prone, more emphasis should be given on R & D for developing women friendly technologies in this fields. The results also indicated that there are tremendous scopes for women in value addition. Also as women overtake in major activities of rice farming, a women-inclusive rice development policy is needed.

In rice farming, various activities are carried out by the farmers and farm women. For each activity they preferred to use improved technology. But due to many constraints, improved technologies are not available in due time as a result they have to depend upon the traditional technology. As reported by FAO (1984) and Kumar (1985), traditional methods, which are very labour intensive, involve the use of non-

mechanical and very simple tools such as hoes, cutlasses and sickles etc are usually employed in small fields, and particularly in those cultivated by women. In a study conducted to standardize women specific practices in rice farming in Orissa, it was observed that women of family contributed highest hours per season (61.66 hours) in harvesting and post harvesting operations and participated lowest in land preparation (DARE/ ICAR, 2004). An ergonomic assessment on the traditional and improved method of paddy parboiling (with CRRI paddy parboiling unit) procedures revealed that the heart beat rate and energy expenditure were significantly reduced by using improved technology and the output was increased from 35kg per batch to 75kg per batch. The time duration of carrying out this activity also reduced from 2 days to 6 hours. Analysis of data revealed that except thresher-cum winnower all the activities in rice cultivation were found to be carried out by traditional methods (Table 2). Majority of the men and women

**Table 2.** Gender-wise evaluation of rice cultivation technology

Activities	Technologies	Gender	Evaluation of technology (n <sub>w</sub> =100, n <sub>m</sub> =100)											
			Easily available		Affordable		Easy to Efficient use/practice		Highly		Socially skilled		acceptable	
			Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
Transplanting/ Sowing	Manual transplanting	Men	98	0	98	0	98	0	57	41	0	98	98	0
		Women	98	0	98	0	91	5	46	52	0	98	98	0
	Broadcasting/ sowing	Men	21	0	21	0	21	0	16	5	0	21	21	0
		Women	21	0	17	0	2	0	2	0	0	2	2	0
Weeding	Manual weeding	Men	98	0	98	0	93	5	65	33	3	95	98	0
		Women	99	0	99	0	92	7	21	78	2	95	99	0
Harvesting	Traditional sickles	Men	99	0	99	0	99	0	52	47	2	97	99	0
		Women	99	0	99	0	98	0	34	64	1	97	98	0
Threshing/ Winnowing	By manual beating	Men	28	0	28	0	21	7	19	9	4	24	28	0
		Women	28	0	28	0	16	12	16	12	7	21	28	0
	Power thresher- cum- winnower	Men	72	0	53	19	62	10	72	0	13	59	72	0
		Women	72	0	53	19	56	16	72	0	21	51	72	0
Bamboo made winnower	Men	69	0	69	0	69	0	56	13	0	69	69	0	
	Women	69	0	69	0	47	22	61	8	0	69	99	0	
Drying produce	Sun drying	Men	99	0	99	0	99	0	99	0	0	99	99	0
		Women	100	0	100	0	100	0	100	0	0	100	100	0
Storage	Traditional bins	Men	21	0	21	0	21	0	16	5	2	19	21	0
		Women	21	0	21	0	21	0	21	0	6	13	21	0
	Gunny Bags	Men	68	0	68	0	68	0	57	11	4	64	68	0
		Women	68	0	68	0	68	0	63	5	9	59	68	0
Value Added product	Parboiling by traditional way	Men	99	0	99	0	46	53	88	11	21	78	43	57
		Women	100	0	100	0	7	93	68	32	56	44	100	0
	Puffed rice by traditional way	Men	36	0	36	0	4	0	4	0	2	2	4	0
		Women	36	0	36	0	36	0	36	0	31	5	36	0
Popped rice by traditional. way	Men	36	0	36	0	4	0	4	0	2	2	4	0	
	Women	36	0	36	0	36	0	36	0	28	8	36	0	

(The numbers indicate frequency as well as percentage)

opined that all the traditional technologies were easily available, affordable, easy in use, not highly skilled and socially acceptable. On the aspects of efficiency, majority of the women perceived the traditional technologies *viz.*, manual transplanting (52%), manual weeding (78%), harvesting by traditional sickles (64%) and parboiling in traditional way (32%) were not efficient. It indicates that improved women friendly technologies should be developed for these activities for better and efficient participation of farm women in rice farming.

With respect to working knowledge of gender on some production technologies, where both men and women were involved, the percentage of men having knowledge were found equal to women in ten out of thirteen methods/ implements/ practices, except broadcasting/sowing method (4:21), manual beating

method of threshing (5:99), and use of paddy thresher-cum-winnower (56:72) where men had better knowledge than women farmers (Table 3). Since manual beating of threshing is time consuming and requires muscle power, women should be given skill training on use and handling of paddy thresher-cum-winnower. Similarly, it can be inferred that, there is a need for imparting training to women on handling mechanical drum seeder and transplanter, as time saving and drudgery reducing implements.

Varietal selection is an important aspect in rice cultivation. Studies reveal that farmers always prefer varieties considering its yield and resistance to insects and diseases, whereas farm women's choice of variety is interlinked with their household roles and responsibility of feeding the family members. Therefore, women prefer rice varieties of short

**Table 3.** Distribution of respondents according to working knowledge related to selected rice cultivation technologies

Activities	Methods/ Implements/ Practices	Working Knowledge	
		Women (n <sub>w</sub> =100)	Men (n <sub>m</sub> =100)
Transplanting/ sowing	Manual transplanting	98 (98.0)	98 (98.0)
	Broadcasting /sowing	4 (4.0)	21 (21.0)
Weeding	Manual weeding	99 (99.0)	98 (98.0)
Harvesting	Traditional sickles	99 (99.0)	99 (99.0)
Threshing/ Winnowing	By manual beating	5 (5.0)	99 (99.0)
	Paddy thresher-cum-winnower	56 (56.0)	72(72.0)
	Bamboo winnower	69 (69.0)	69 (69.0)
Drying produce	Drying sun	100 (100.0)	99 (99.0)
Storage method	In traditional bins	21 (21.0)	21 (21.0)
	In gunny bags	68 (68.0)	68 (68.0)
Value added product	Parboiling	100 (100.0)	98 (98.0)
	Puffed rice making	36 (36.0)	36 (36.0)
	Popped rice making	36 (36.0)	36 (36.0)

(The numbers indicate frequency as well as percentage)

**Table 4.** Gender-wise varietal preference to different qualities

Crop	Variety	Gender	Cooking Quality (n <sub>m</sub> =100, n <sub>w</sub> =100 )												Mean Score
			Expansion			Colour			Texture			Taste			
			G	M	P	G	M	P	G	M	P	G	M	P	
Rice	CR 1018	Men	13	0	0	13	0	0	13	0	0	13	0	0	1.56
		Women	13	0	0	13	0	0	8	5	0	7	6	0	1.45
	China	Men	17	0	0	17	0	0	14	3	0	17	0	0	2.04
		Women	17	0	0	17	0	0	14	3	0	17	0	0	2.04
	Durga	Men	50	0	0	50	0	0	50	0	0	50	0	0	6.00
		Women	50	0	0	50	0	0	50	0	0	50	0	0	6.00
	Moti	Men	32	0	0	32	0	0	32	0	0	32	0	0	3.81
		Women	23	9	0	32	0	0	23	9	0	27	5	0	3.61
	Nali Saruchina	Men	9	0	0	0	9	0	9	0	0	9	0	0	1.08
		Women	9	0	0	0	9	0	9	0	0	9	0	0	1.08
	Pooja	Men	42	0	0	42	0	0	42	0	0	42	0	0	5.04
		Women	42	0	0	42	0	0	42	0	0	42	0	0	5.04
	Sarala	Men	61	0	0	61	0	0	61	0	0	61	0	0	7.32
		Women	54	7	0	61	0	0	61	0	0	61	0	0	7.25
	Sarugula	Men	6	0	0	0	6	0	6	0	0	6	0	0	0.66
		Women	6	0	0	0	6	0	2	4	0	3	3	0	0.59
Swarna	Men	22	0	0	22	0	0	22	0	0	22	0	0	2.64	
	Women	22	0	0	22	0	0	22	0	0	22	0	0	2.64	
Green gram	Jhainmuga	Men	58	13	0	54	17	0	52	19	0	71	0	0	8.03
		Women	71	0	0	71	0	0	71	0	0	71	0	0	8.52
	Pusha baisakhi	Men	18	0	0	18	0	0	18	0	0	18	0	0	2.16
		Women	11	7	0	18	0	0	12	6	0	7	11	0	1.44
Black gram	T-9	Men	21	0	0	21	0	0	21	0	0	21	0	0	2.52
		Women	12	9	0	21	0	0	21	0	0	21	0	0	2.43

duration, easy in threshing and dehusking and having desirable cooking quality. Sharma *et. al.* (1997) reported that in Jeypore region of Odisha, India, the primary centre of origin of cultivated rice *Oryza sativa*,

farm women had the major responsibility for selection and storage of paddy seed for the next season.

The data on varietal preference by men and women on selected cooking qualities (Table 4) revealed

that the rice variety *Sarala* (a fine grain HYV with good cooking quality and marketability) was ranked first with the mean score of 7.32 (men) and 7.25 (women) followed by *Durga*, *Pooja*, *Moti* and *Swarna*. Similarly, in case of green gram they preferred *Jhainmuga* (good cooking quality and aroma), a local variety as against Pusa baisakhi. The gap in mean score on cooking quality between men and women were either nil or negligible.

After rice crop, farmers are willing to grow second crop i.e., pulses, vegetables and oilseeds for fulfilling their family requirement and additional income may not be possible due to agro-climatic situation, structure of land, non-availability of water etc. Non of the farmers irrespective of gender were interested to take up other cereals, spices, fodder and fuel wood in the study area surveyed. Analysis of willingness of men and women to produce brought out that 84% of women were willing to produce vegetables (Table 5). Hence, rice-vegetable cropping pattern may be taken-up as a long term strategy to improve social, economic and nutritional status of farm women. Also 21 per cent of women were willing to produce pulses for dal in case of insufficiency.

On the basis of identified issues, an on-farm trial was conducted in Salipur cluster of Cuttack district to evaluate selected technologies with women perspective in rice-based production system with four interventions viz., farmers' practice ( $T_1$ ), planting by transplanter with hand weeding ( $T_2$ ), planting by transplanter with mechanical weeding by finger weeder ( $T_3$ ), line planting in rows with hand weeding ( $T_4$ ). The highest net return (Rs. 25,880 ha<sup>-1</sup>) and benefit : cost ratio (2.30) were recorded in the plots where the crop was established by transplanter and mechanical

weeding by operating finger weeder (20 days after planting) followed by manual removal of weeds within rows (Table 6). This could be due to reduction in the labour cost in mechanical transplanting and weeding.

A field testing was carried out on CRRI two-row manual rice transplanter and finger weeder as alternate options and were evaluated with an objective to examine the possibility of replacing the manual transplanting and weeding which were opined by women as inefficient and drudgery prone. A group of 30 women who worked with two-row-transplanter and finger weeder as well as in traditional method gave their qualitative assessment. The farm women favoured the CRRI two-row-transplanter on account of 'quick in doing job', 'socially acceptable' and 'prestigious' (Table 7a) very strongly (score above 2.5 out of 3 in the rating scale). The other positive points which were endorsed strongly (score 2-2.5) were on 'generation of higher income', 'easy in doing the transplanting' and 'bright future of the machine'. The two most negative aspects of transplanter are 'more mistakes in operation' and 'fear of accident' (Table 7b) for which there should be more skill oriented training for solving the operational difficulties.

In a similar type of study on ergonomic evaluation of two-row and four-row manual rice transplanters of the CRRI for assessing their suitability for use by farm women and for determining the physiological workload with women workers, Singh (2009) reported that both the rice transplanters could reduce drudgery by 36.1 and 69.8 per cent in terms of physiological cost/ha as compared to traditional practice. On a per hectare basis, four-row rice transplanters were found to be more energy efficient (52.7 per cent) as compared to two-row rice transplanters. The equipment avoided the bending posture that is adopted during traditional method. Reducing the load of nursery up to half of its weight could reduce the pulling force up to some extent.

Also the farm women provided interesting feedback on CRRI finger weeder (Table 8a and 8b). The farmwomen favoured the CRRI finger weeder very strongly on account of 'socially acceptable', 'more efficient' and 'prestigious'.

The feedback provided by women farmers on the technologies has led to draw useful

**Table 5.** Gender perception on rice-based production system for family requirement

Requirement	Willing to produce second crop after rice		
	Women (n <sub>w</sub> =100)	Men (n <sub>m</sub> =100)	Total (N=200)
Other cereals	0 (0.0)	0 (0.0)	0 (0.0)
Pulses for dal	21 (21.0)	10 (10.0)	31 (15.5)
Oilseeds for oil	4 (4.0)	4 (4.0)	8 (4.0)
Vegetables	84 (84.0)	63 (63.0)	147 (73.5)
Spices	0 (0.0)	0 (0.0)	0 (0.0)
Fodder	0 (0.0)	0 (0.0)	0 (0.0)
Fuel wood	0 (0.0)	0 (0.0)	0 (0.0)

**Table 6.** Yield performance and economics of different treatments

Treatments	Grain yield (t ha <sup>-1</sup> )	Straw yield (t ha <sup>-1</sup> )	Cost of cultivation (Rs ha <sup>-1</sup> )	Gross return			Net return (Rs ha <sup>-1</sup> )	B:C ratio
				Grain	Straw	Total		
Farmer's practice	3.44	3.78	14,750	27,520	2270	29,790	15,040	2.02
Transplanter + Hand weeding	5.24	5.6	21,360	41,920	3360	45,280	23,920	2.12
Transplanter + Mechanical weeding	4.96	5.32	19,880	42,560	3200	45,760	25,880	2.30
Line planting +Hand weeding	5.62	6.15	26,250	44,960	3690	48,650	22,400	1.85

**Table 7a.** Reactions of farmwomen regarding the use of CRRI two-row manual paddy transplanter (Positive Responses)

Reaction Parameters	Agree	Moderately Agree	Disagree	Mean Score
Easy	9	21	0	2.3
Quick in doing job	18	12	0	2.6
Socially acceptable	23	7	0	2.7
Prestigious	22	8	0	2.7
Future of the machine	11	17	2	2.3
More income generation	16	14	0	2.5

**Table 7b.** Reactions of farmwomen regarding the use of CRRI two-row manual paddy transplanter (Negative Responses)

Reaction Parameters	Agree	Moderately Agree	Disagree	Mean Score
More laborious	2	11	17	2.5
Tiring	4	16	10	2.2
Pressure on waist	2	12	16	2.4
Pressure on hand	2	10	18	2.5
Pressure on fingers	4	15	11	2.2
Difficulty in to and fro motion	3	18	9	2.2
More mistakes in operation	11	13	6	1.8
Fear factor in smooth performance	8	9	13	2.1
Fear of accident	15	11	4	1.6

**Table 8a:** Reactions of farmwomen regarding the use of finger weeder (Positive Responses)

Reaction Parameters	Agree	Moderately Agree	Disagree	Mean Score
Easy	9	15	6	2.1
Quick in doing job	14	15	1	2.4
More efficient	15	15	0	2.5
Socially acceptable	20	10	0	2.6
Prestigious	18	9	3	2.5
Future of the machine	12	18	0	2.4
More income generation	6	24	0	2.2

**Table 8b.** Reactions of farmwomen regarding the use of finger weeder (Negative Responses)

Reaction Parameters	Agree	Moderately Agree	Disagree	Mean Score
More laborious	0	18	12	2.4
Tiring	0	12	18	2.6
Pressure on waist	3	9	18	2.5
Pressure on palm	3	8	19	2.5
Difficulty in to and fro movement	0	18	12	2.4
More mistakes in operation	7	18	5	1.9
Fear factor in smooth performance	3	21	6	2.1
Fear of accident	4	18	8	2.1

recommendations for refinement of programmes on farm implements for women. The study also suggests undertaking research for development of efficient and gender-sensitive technology in rice and their popularization. Rice-vegetable cropping pattern may be taken-up as a long term strategy to improve social, economic and nutritional status of farmwomen.

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