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Analysis on Impact of Farm Women Groups on Paddy Productivity in Tamil Nadu

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ABSTRACT

Agriculture sector as a whole has developed and emerged with the infusion of science and technology. Women play a crucial role in agricultural development and allied fields. The extent of women's involvement in agriculture varies greatly from region to region. But regardless of these variations, women are actively involved in various agricultural activities. In many farming communities, women are the main custodians of knowledge on crop varieties. It is also estimated that 45.3% of the agricultural labour force consists of women. But a large number of women have remained as invisible workers. This study focuses on impact of farm women in Paddy productivity. It was observed that the women who are trained were well aware of loss of productivity than increasing yield by using particular technology. They had close contact with officials and other fellow farmer, they will make pre arrangement for proper time of adoption of technology like age of seedlings, harvesting time, irrigation at critical stage of crops etc compared to other farm women. Besides adoption of number of technologies, farm women from groups follows properly way of doing the activities required while adopting technology and at proper time as they remained focused compared to men.

Keywords

Farm women,
Impact study, Paddy
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Introduction

Paddy is the most important and extensively grown food crop in India and it is the staple food for more than half of the world population. India is the second largest producer and consumer of paddy in the world. India is also the fourth largest exporter of paddy in the world. In India, West Bengal occupies first place in paddy production. The Tamil Nadu is one among major paddy producing States in India.

Paddy is the principal crop extensively cultivated in all the districts of the state having a unique three-season pattern viz., Kar/Kuruvai/Sornavari (April to July), Samba/Thaladi/Pishanam (August to November) and Navarai/ Kodai (December to March). Rice is grown in all 30 districts and top four districts with a higher rice area were Villupuram, Nagapattinam, Thiruvarur and Thanjavur. Paddy accounts for 42 % of the total cropped area and accounting for 65 % of

the total food grains production in the State. Area of 18.55 Lakh ha has been covered during 2017-18 which is more than the normal area of 17.84 Lakh Ha utilizing the ground water potential and rainfall received in the State. The average productivity of Paddy crop is 3,806 Kg/Ha in terms of Rice. Total rice production in Tamil Nadu during the year 2017-18 is 112.91 million tonnes. The total cultivated Area (18.50 Lakh Ha), Production (69.50 Lakh Metric Tonnes) and Productivity (3,757 Kg/ha) in 2018-19

The scope for expanding rice production lies in enhancing productivity. Several studies have indicated that the adoption of recommended rice technology gives high yields and income to the farmers. The yield level of rice which is comparatively low at present need to be increased substantially. In general, recommended rice technologies are not accepted by all the farmers at a time and also to full extent.

Global research experience demonstrates, gender is a critical variable in the social analysis of technology promotion and in the constraints and success of technology adoption

The role of women is critical in the well-being of farm households (Gupta 1987). Apart from raising maintain the household, they assist in crop and animal production, all the while tending to the general health of their families (Farid *et al.*, 2009; Mun and Arindam 2014). Thus women are involved in all aspects of agriculture, from crop selection to land preparation, sowing, planting, weeding, pest control, harvesting, crop storage, handling, marketing, and processing (Fabiya *et al.*, 2007). That is why, the importance of developing farming technologies relevant to women have been recognized recently (Damisa *et al.*, 2007).

Women form the backbone of agriculture in India, as the majority of agricultural labourers (30- 40 %) are from women population (FAO, ILO 2005). Share of farm women in agricultural operations like land preparation is 32 %, seed cleaning and sowing (80 %), inter cultivation activities 86 % and harvesting-reaping, winnowing, drying, cleaning and storage (84%). The average time spent by farmwomen in household and agricultural activities showed that an active farmwoman spends five to nine hours per day on the farm. Agriculture and allied activities almost take the equal time and energy at par with household activities.

Since 1981 Denmark has supported four women-oriented agricultural projects in India with a total grant of DKK 278.9 million (1981-2006). During the two decades the projects have been running, their objectives have evolved from an initial focus on women's productive activities to a dual objective of raising the productivity of farm women and at the same time strengthening their position on society. The most important innovation had been the formation of Farm Women Groups (FWGs) from 1998 onwards, a total of around 1500 groups, generally consisting of 15 to 20 farm women, some trained, some not. These groups had gradually evolved into Self-Help Groups (SHGs). They were given one day's training in group formation as well as specialized training in both agriculture and other income-generating activities. Since 2000, some groups had been under transformation to become "micro entrepreneurs", thus radically expanding the scope of the project. Clusters and federations of some of the groups formed in order to augment their resource mobilization and strengthen their organizational sustainability. Although group formation had come belatedly, it has undoubtedly enhanced the effectiveness and impact of the project.

The agricultural aspects include an assessment of extension methodologies and messages used in the projects. Special attention must be paid to the appropriateness of the 'Training & Visit' approach, which until recently has been prevalent in the projects, and the relevance of the extension messages to the target group of women from poorer households. Finally, the evaluation must identify the impact of the project on the economic situation of farm women and their families.

It is important to assess whether the impact has led to increase effectiveness, cost-efficiency and sustainability of technology in agriculture. In this context the study was conducted with the objective to ascertain adoption level of recommended rice technologies by the women farmers, find out the role of and adoption of rice production technologies and to delineate the constraints experienced by the farmers.

Materials and Methods

The sampling design followed was simple random sampling. From each selected district, taluk and revenue villages a list of farm women group details had been prepared after consulting agricultural officials, Panchayat authorities, peoples' representatives. In the first stage, based on cropping intensity, the districts shown in Table 1 were selected.

From each district, 30 members of farm women group and 10 non members of farm women group were selected randomly to assess the technology adoption and the productivity changes. Totally a sample of 240 Farm women were to be interviewed, 180 from member of Farm Women Group (FWG) and 60 from Non-member Farm Women. The period of study was December 2015. Primary data has been collected using structured questionnaire through interview schedule method.

The secondary data on selection of need and crop based technologies, training details of different farm women groups on technology adoption and information on number of farm women groups, number of farm labour groups had been collected from Commissioner of Agriculture, Tamil Nadu and Joint Director of Agriculture, Coimbatore, Tamil Nadu.

Results and Discussion

Demographic details of the sample respondents

The demographic details of the sample respondents are shown below:

It could be inferred from the Table 2, one-fourth of sample women respondents were aged less than 35 years in the category FWG and the corresponding figure is 17 percent in FW. In both the groups, Two-third of them was in more than thirty five years i.e. economically active population. Education status shows that all are literates. Intermediary school educated women were high in member of women groups than non-members. Family size is comparable between the two groups. Farming Experience 50% was having less than 10 years and 33- 45 % of them were having less than 25 years. Almost 80 % of women's main occupation is agriculture only.

Land area under paddy cultivation

Among the sample respondents, 80 peoples were come under paddy growing households as in Table 3. The land area under rice in general would influence their method of cultivation whether it is in manual or mechanical or any other method.

Table 3 reveals that majority of the farmers (41.25%) had 2.51 to 5.0 hectares of land under rice, followed by 36.25 % had 5.01 to 10.0 hectares, 12.50 % of farmers holds >10 hectares among FWG. The majority of the

sample farmers belonged to medium and small size of land holding under rice followed by large farmers.

Economics of paddy cultivation per hectare

To assess the economics of paddy cultivation, costs have to be related to the returns. Both gross income and net income are estimated.

It could be observed from the Table 4, net income through farm women group was higher than farm women. The total cost difference for per hectare paddy cultivation between two categories was Rs.237.58. With respect to paddy either quantity or cost of input was not an important criterion for increasing productivity. Farm women group has higher yield of Rs.38212.72 and farm women as Rs.28103.32. Hence it is possible to increase production by yield increase if women are to be trained (Amin *et al.*, 2009; Khan, *et al.*, 2012; Begum and Yasmeen, 2011).

Role of gender in activities performed in paddy cultivation

Analyzing the gender role in paddy cultivation is a significant one. It is used to find out the way for using farm women group effectively (Table 5).

The percentage of people involved in farm women group is higher when compared to farm women (Santhi *et al.*, 2018). Field preparation for nursery and main field, irrigation, threshing and transportation of input and produce were done by mostly men. Nursery management starting from seed treatment, seed selection and hardening done mostly by both. Sowing 100 % done by men. Transplanting, gap filling, weeding,

harvesting and winnowing 100 % done by female (Singh and Vinay, 2013). Chemical fertilizer and pesticide application was done by men. Purchase of input and marketing still dominated by men. Farm women from groups follows properly way of doing the activities required while adopting technology and at proper time as they remained focused compared to men which is important for increasing yield in trained group (Amin *et al.*, 2009; Khan *et al.*, 2012; Begum and Yasmeen, 2011)

Level of adoption and timeliness of improved paddy technologies by women farmers

Adoption of technologies like seed selection, seed treatment with *Azospirillum* and *Pseudomonas* @ 10 g/Kg of seed hardening, nursery management, manure (FYM 1ton/ha, Pre-emergence herbicides (3 or 4 DAS), age of seedling *i.e.* transplanting at 18-22 DAS and Zinc Sulphate application varies around 70-80 % (Table 6).

Farm women trained were well aware of loss of productivity than increasing yield by using particular technology. Since they had close contact with officials and other fellow farmer, they will make pre arrangement for proper time of adoption of technology like age of seedlings, harvesting time, irrigation at critical stage of crops etc compared to other farm women.

Most of women are risk averters and they would like to take more preventive measures than controlling it after occurrence. Besides the non-adoption, other women were lacking in awareness and knowledge compared to trained women.

Table.1 Selection of sample respondents

S.No	District	Member of Farm Women Group	Farm Women	Total
1	Coimbatore	30	10	40
2	Erode	30	10	40
3	Thanjavur	30	10	40
4	Ramanathapuram	30	10	40
5	Thiruvannamalai	30	10	40
6	Villupuram	30	10	40
	Grand Total	180	60	240

Table.2 General profile of sample farmers (N=180)

S.No	Category	FWG		FW	
		Number	Percentage to Total	Number	Percentage to Total
1	Age Distribution (years)				
a.	< 35	47	26.11	10	16.67
b.	35-45	110	61.11	38	63.33
c.	46-60	21	11.67	12	20.00
d.	>60	2	1.11	0	0.00
2	Educational Status				
a.	Illiterate	0	0.00	1	1.67
b.	Primary	23	12.78	17	28.33
c.	High school	62	34.44	15	25.00
d.	Secondary	66	36.67	17	28.33
e.	Degree	29	16.11	10	16.67
3	Family Size (no)				
a.	Up to 3	34	18.89	6	10.00
b.	4 – 6	134	74.44	49	81.67
c.	>6	12	6.67	5	8.33
4	Family type				
a.	Nuclear	125	69.44	35	58.33
b.	Joint	55	30.56	25	41.67
5	Farming Experience (years)				
a.	<10	106	58.89	31	51.67
b.	11 to 25	60	33.33	27	45.00
c.	>25	14	7.78	2	3.33
6	Occupational Status (in numbers)				
a.	Agriculture as primary occupation	150	83.33	49	81.67
b.	Agriculture as secondary occupation	30	16.67	11	18.33

FWG = Farm Women Group, FW = Farm Women

Table.3 Area under paddy cultivation

S.No	Particulars	FWG		FW	
		Number	Percentage to total	Number	Percentage to total
1.	Number of paddy growing households	80	66.67	15	50
2.	Number of Technology Adopters	48	60.0	9	60
3.	Percentage of farm households growing paddy by land holding size	80	66.67	15	50
	< 2.5 acres	8	10.00	7	14
	2.51 to 5.00 acres	33	41.25	5	10
	5.01 to 10.00 acres	29	36.25	3	6
	> 10 acres	10	12.50	0	0
4.	Percentage of paddy growing households adopting IPT	48	60.0	9	60
	< 2.5 acres	8	16.67	5	8.34
	2.51 to 5.00 acres	24	50.00	3	5
	5.01 to 10.00 acres	14	29.17	1	1.67
	> 10 acres	2	3.34	0	0

FWG = Farm Women Group, FW = Farm Women

Table.4 Economics of paddy cultivation per hectare

Particulars	FWG		FW		Difference
	Quantity	Value	Quantity	Value	
Variable cost					
Seeds kg	63.35	950.25	75.31	1129.65	-179.40
FYM t	4.45	2892.50	0.62	403.00	2489.50
N kg	146.46	1318.14	161.00	1449.00	-130.86
P kg	58.43	1110.17	42.68	810.92	299.25
K kg	52.95	423.60	40.19	321.52	102.08
Plant protection chemicals (ml)	798.21	1045.66	939.80	1231.14	-185.48
Human Labourmandays	141.39	11593.98	165.00	13530.00	-1936.02
Bullock Labourpairdays	4.29	553.41	4.59	592.11	-38.70
Seed treatment with Azospyrillum	4.75	42.75	0.00	0.00	42.75
Seed hardening Kcl	215.00	215.00	0.00	0.00	215.00
Zinc sulphate application	32.50	74.75	12.50	28.75	46.00
Top dressing with urea and neem cake	21.00	210.00	0.00	0.00	210.00
Butaclor	1.50	492.00	0.72	236.16	
Gypsum application	123.00	282.00	0.00	0.00	282.00
Machine Labour machine hrs	34.61	1810.10	35.75	1869.73	-59.62
Interest on working capital @8%		1841.14		1728.16	112.99
Irrigation charges	12.90	3225.00	17.70	4425.00	-1200.00
Subtotal		28080.45		27755.13	325.32
Fixed cost					
Land revenue		12.51		12.5	
Rental value of land		3457.95		3387.75	70.20
Depreciation		290.41		468.59	-178.18
Interest on fixed capital @ 11%		381.75		374.02	7.73
Sub total		4142.62		4230.36	-87.74
Total cost		32223.07		31985.49	237.58
Yield	4706	38212.72	3461	28103.32	10109.40
Net income		10132.27		348.19	9784.08
Cost of 1 kg of paddy		5.97		8.02	-2.05

FWG = Farm Women Group, FW = Farm Women

Table.5 Role of gender in activities performed in paddy cultivation (%)

S.No	Activities	FWG			FW		
		Male	Female	Jointly	Male	Female	Jointly
1	Nursery management	60	5	35	0	0	0
2	Ploughing	81.7	0	8.3	95		5
3	Seed selection	0	25	75	94	0	6
4	Seed treatment with azospyrillum	0	45	55	92	0	8
5	Seed hardening	0	30	70	0	0	0
6	Transportation of organic manure	85	0	15	96	0	4
7	Application of organic manure	50	0	50	88	0	12
8	Main field preparation	100	0	0	100	0	0
9	Chemical fertilizer (basal)	41	15	44	90	0	10
10	Chemical fertilizer (top dressing)	35	10	55	76	0	24
11	Top dressing with urea and neem cake	45	10	45	0	0	0
12	Seed treatment	50	0	50	0	0	0
13	Sowing seed	91	0	9	5	90	5
14	Gypsum application	17	15	68	88	0	22
15	Transplanting at 18-22 DAS with correct spacing (20*10 cm)	0	87	13	2	91	7
16	Irrigation	90	2.5	7.5	96	0	4
17	Hand weeding 30-35 DAT	0	84	16		98	2
18	Spraying of pesticides	90	0	10	92	0	8
19	Harvesting main crop	4	82	14	0	92	8
20	Threshing, winnowing	90	0	10	95	0	5
21	Packing and transport	100	0	0	100	0	0
22	Marketing	100	0	0	100	0	0
23	Purchasing inputs	55	40	5	55	40	5
24	Transport of fodder	96	0	4	96	0	4
25	Rat control	20	25	55	95	0	5

FWG = Farm Women Group, FW = Farm Women

Table.6 Level and timeliness of adoption of improved paddy technologies by women farmers (%)

S.No	Technologies	FWG (n=48)				FW (n=15)			
		Adopted	FA	PA	Timeliness	Adopted	FA	PA	Timeliness
1	Deciding varieties for season	87	76	24	91	75	55	45	54
2	Seed selection	69	93	7	93	28	65	35	69
3	Seed rate (60 kg/ha)	85	95	5	97	48	75	25	78
4	Seed treatment with Azospirillum & Pseudomonas @ 10 g/Kg of seed	76	95	5	90	0	72	28	74
5	Seed hardening	74	84	16	89	0	64	36	56
6	Gypsum application	78	77	23	84	0	59	41	52
7	Nursery management	75	74	26	91	30	63	37	50
8	DAP basal application (40 kg/ 800 m ²)	89	87	13	92	37	78	22	63
9	Manure (FYM 1 ton/ha)	73	82	18	91	12	92	8	92
10	Pre emergence herbicides (3 or 4 DAS)	75	81	18	93	26	76	24	58
11	12.5 t/ha FYM in main field	29	35	80	91	0	0	0	0
12	Age of seedling <i>i.e.</i> transplanting at 18-22 DAS	72	92	8	95	29	76	24	52
13	Spacing (20*10 cm)	84	94	6	92	42	69	31	60
14	Gap filling	82	95	5	95	25	81	19	59
15	Plant population	83	90	10	91	36	79	21	69
16	Control of Tungro Virus.	54	85	15	89	12	83	17	70
17	Zinc Sulphate application	75	78	22	90	26	65	35	65
18	Pre emergence herbicide (7 DAT)	26	86	14	93	16	64	36	62
19	Fertilizer NPK (150:50:50) application	94	71	29	94	73	33	66	57
20	Hand weeding 30-35 DAT	95	92	8	91	25	85	15	73
21	Plant protection measures	64	95	5	93	84	82	18	85
22	Dry and semi dry sowing				65				
23	Top dressing with urea and neem cake	87	76	24	92	11	82	18	64
24	Inter cropping with Pulses for dry and semi dry paddy	49	52	48	59	10	92	8	38
25	Rat control	82	73	27	90	35	85	15	69

(FWG = Farm Women Group, FW = Farm Women, FA=Fully adopted, PA= Partially adopted)

Table.7 Distribution of farm women group and farm women according to income and expenditure

Yield Kg/ha	Frequency		Mean Yield kg/ha		Income Rs./ha		Expenditure Rs/ha		Profit	
	FWG	FW	FWG	FW	FWG	FW	FWG	FW	FWG	FW
1000-2000	1.30	2.20	1952	1865	15850.2	15143.8	15080.0	14841.0	770.2	302.8
2001-3000	6.20	27.20	2889	2422	23458.7	21666.6	21755.0	21453.0	1703.7	213.6
3001-4000	25.00	36.72	3950	3525	32074.0	28623.0	23075.9	23368.0	8998.1	5255.0
4001-5000	48.80	25.99	4898	4218	39771.8	34250.2	22432.8	22714.0	17339.0	11536.2
5001-6000	15.00	7.89	5879	5202	47737.5	42240.2	21730.1	21909.0	26007.4	20331.2
6001-7000	3.70	0.00	6525	0	52983.0	0.0	22035.0	0.0	30948.0	0.0
Mean			4706	3461	38213.4	28654.0	22340.4	22144.1	15873.0	6509.9
Difference				1244		9559.3		196.2		9363.1

Table.8 Recommended package of practices of technology included in training by the department

Packages	Recommended	Purpose
Seed selection and Treatment	Egg floatation in Salt water solution Thiram/ Carbendazim 2g/kg of seed	Better germination, population, vigour, seed rate, disease mgt.
Seed hardening	KCl 400g in 40 lit of water for 40 kg of seed	To provide drought resistant
Nursery Management	8 cents for 24 kg of seed (2 ½ for hectare)	Loss of seed thereby reduce seed rate and good growth
Gypsum application	200kg/acre	To prevent crest formation in soil and root snapping
Control of Tungro Virus. Per acre	Light trap, NSKE 5%, Carbofuran 1.4 kg for 8 cents 15 DAS	To prevent loss by disease
Azospyrillum Treatment	7 packets	Reduction in N dose, bacteria to fix atm N.
Zinc Sulphate Application	25 kg +50 kg sand /ha	To prevent zinc deficiency and loss in yield
Transplanting	at 18-22 DAS	To get max tillering and good crop.
Plant population	2-3 seedling/hill at planting 2-3 cm depth	No of plants and depth of planting enhances more tillering and yield.
Top dressing with urea and neem cake	Urea and neem cake @ 5:1	To avoid quantity N fertilizer loss due to water logging.
Inter Cropping with Pulses for dry and semi dry paddy	Every 4 rows one row pulses	Better crop, additional income, N fertilizer Reduction.
Rat control	Poison bait	Physical damage and loss of grain

FYM application and intercropping with pulses is still very low even among FWG members. Instead they were applying green manure. Adoption of preventive measures like Zinc sulphate and pre-emergence herbicide were still low level. Spacing and depth of planting were correctly followed by groups since they were well aware of its benefits

Distribution of farm women group and farm women according to income and expenditure

The difference between sample groups also confirmed by the following Table 7 to show how income and expenditure distributed among farm women and farm women group.

Mean yield was higher in FWG than FW. Contribution of women group in agriculture clearly shows their focus on productivity (Begum and Yasmeen 2011). Therefore, it is expected that families with women's in farm women groups participation in agriculture should have higher technical efficiency than those without any women's participation.

Reasons for productivity changes in paddy and recommended technologies for paddy Cultivation

Problems noticed in paddy cultivation were labour and irrigation water for crops require more water. Physiological characters and requirements of crop will vary from season to season like duration, tillering stage, water requirements and stress, drought tolerance etc. Crop production will greatly affected if not planted in a suitable season.

Another technique is seed selection. This had numerous advantage in terms of maintaining, optimum population with good crop growth with less of diseased free seedlings there by reducing seed rate to greater extent.

Many of the viral diseases are seed borne and cannot be controlled by pesticides.

Transplanting at 18-22 DAS i.e., young seedlings is important for better root development after transplanting. Even if the age of seedling was delayed or proponed by one day that will have very severe effect on reducing productivity. Planting single seedling per hill give more no of tillers and good grains. But farmers used to plant 2-3 seedlings per hill and with more depth of more than 5 cm. The reason was that most of the farmers were not prepared to take risk and also were of the view that excess number of seedling lead to more tillers and thereby able to get higher yield and planting deeply would ensure better crop stand by strong root development and tillering.

Gypsum is applied to prevent crest in soil and root snapping. Zinc deficiency is a major micronutrient problem in paddy. Rice Tungro Virus is major disease that damage crop very extensively. This can be prevented by controlling pest transmitting that virus and to prevent the attack Neem seed kernel extract 5 % can be applied.

Fertilizer loss in water logged conditions is another problem. This can be managed by split application of N fertilizers and also coating urea with Neem cake prevents nutrient loss by water since it facilitate slow releasing nutrient.

In conclusion, farm women who trained were well aware of loss of productivity than increasing yield by using particular technology. Since they had close contact with officials and other fellow farmer, they will make pre arrangement for proper time of adoption of technology like age of seedlings, harvesting time, irrigation at critical stage of crops etc compared to other farm women. Besides adoption of number of technologies,

farm women from groups follows properly way of doing the activities required while adopting technology and at proper time as they remained focused compared to men. Besides the reason for non-adoption by other women were lack of awareness and knowledge compared to trained women. It shows that female labour use was three times higher than male labour. Farm women group used near to recommended quantity of inputs compared to non-members. Hence it is possible to reduce the cost of production and yield increase simultaneously if women are to be trained.

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