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Study of Socioeconomic Profile of Paddy Farmers Adopting Alternate Wetting and Drying (AWD) Technology in Odisha, India

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Authors' contributions

This work was carried out in collaboration among all authors. Author BPD designed the study, conducted in field, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors AM and APK supervised the study, managed the analyses of the study and the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

The study was conducted in Puri District of Odisha, India along with the introduction of a new technology Alternate Wetting and Drying (AWD) in Rabi 2015. AWD was a very low cost water saving technology and farmers were made aware about it in the selected study area in nine villages, three in each three blocks of Puri district. The selected 144 farmers, 16 from each village who had adopted AWD were interviewed through a pretested interview schedule. 15 variables were taken to assess the socioeconomic profile of the farmers. The variables were quantified in terms of frequency and percentage. Respondents were categorized with respect to variables like social participation, cosmopoliteness, mass media exposure, extension participation, extension contact, progressiveness and scientific orientation on the basis of mean score and Standard Deviation The study revealed that majority (57.63%) of respondents belonged to middle aged category, maximum of 44 respondents (30.5%) having primary level education, majority (68%) of the respondents were

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marginal farmers, majority (78%) of respondents had high level of social participation, there was homogeneity among extension participation, average annual income, extension contact, mass media exposure, social participation and heterogeneity among all other variables.

Keywords: AWD; socio economic profile; respondents; homogeneity; heterogeneity.

1. INTRODUCTION

Rice is the dominant cereal crop cultivated throughout the world and the staple food of more than half of the world's population. More than 90% of rice is produced and consumed in Asia. India is one of the largest producers of rice with a production volume of 105 MT/year from an area of 44 MHa [1]. It has been estimated that 1000-1500 litres of water is required to produce 1.0 kg of rice [2].Hence rice cultivation is best suited to those regions where the rainfall is high or irrigation water is available adequately because it requires huge amount of water (about thrice that of wheat and maize). In fact, 20-30% of the rice production cost is incurred for irrigation only in case of irrigated rice [3]. Since, more irrigated land is devoted to rice than to any other crops in the world, wastage of water resource in the rice field should be minimized [4].Water is a precise natural resource and its availability is decreasing as population and industrialization increasing particularly in Asian Countries [5]. Therefore, it becomes indispensableto develop and adopt strategies and practices that will use water efficiently in irrigation schemes. One such strategy and practice that is said to use water efficiently in irrigation schemes is the "Alternate Wetting and Drying (AWD) technology" of cultivating rice, which is increasingly used in parts of Asia, especially in Japan, China, and India [6]. AWD is proven technology and widely tested in several locations of Asian countries particularly Philippines, China, Bangladesh etc [7]. AWD also reduces the environmental pollution by the ensuring judicious use of the fertilizers and reducing the greenhouse gas emission from the paddy field[8]. AWD is a water saving technology based on the principle of increase yield per unit transpiration, reducing non-beneficial depletions, effective use of rainfall and reducing outflow.

Rice is the major food crop of Odisha and covers about 69 percent of the total cultivated area (Odisha is 61.80 lakh ha). Out of total rice cultivated area of Odisha, kharif rice is grown in 41.24 lakh ha and only 3.31 lakh ha is used for rabirice production. Lack of adequate rainfall and assured irrigation water are important factors for low cultivation of rabi rice. Thus, there is a need for adoption of proper water saving technologies in Odisha. The adoption of new technology by farmers depends upon its effectiveness, however, socio economic factors also plays a vital role in rapid and wide adoption of the new technology. In pursuit of irrigation water saving in rice production system, anattempt was made to introduce Alternate Wetting and Drying (AWD) technology to the farmers [9-11]. This study was conducted in Puri district of Odisha in rabi-2015 to assess the socio-economic profile of the farmers for adoption of the technology [11,12].As AWD was introduced for the first time in the study area, it was essential to assess the socio economic profile of the farmers and its relation towards adoption of the technology.

2. METHODOLOGY

The study was carried out during rabi-2015in Puri District of Odisha. A total of 3blocks;Pipili, Nimapara, and Gop of Puri district were purposively selected in consultation with Cereal System Initiative in South Asia (CSISA) staff for the proposed study. These blocks were having rice growing areas in rabi season with assured irrigation source such as borewells and lift Irrigation points. Three field days were conducted in each block for awareness of the technology among the farmers. Field days were arranged in collaboration with CSISA and Agricultural Dept., Govt. of Odisha. A total of 9 villages, 3 from each blocks and 144 farmers, 16 from each village were selected for the study. All the selected farmers involved in the experiment or adopting AWD were taken as respondents of the survey through an interview schedule. Information regarding their socioeconomic profile comprising 15 variables such as; age, education, caste, etc. were evaluated for studying the adoption behavior of farmers towards AWD technology. Respondents were categorized into low, medium and high with respect to variables like social participation, cosmopoliteness, mass media exposure, extension participation, extension contact, progressiveness and scientific orientation on the basis of mean score and Standard Deviation (S.D.). Social participation refers to the degree with which the respondents

were involved in different social activities (village decision making, collective work for the village, developmental activities, social function).A man with greater social participation is supposed to be more up to date and more enthusiastic about new innovations. Cosmopoliteness is defined as the degree to which an individual is oriented outside his social system. The variable was measured by the frequency of visit to outside. Exposure of the respondents to mass media namely Radio, T.V., Internet, Newspaper, Farm magazine and Extension publication were taken into consideration. The user of each medium is assigned score on the basis of its frequency. Such as:- regular user got 2 score, occasional user 1 score and no user zero score. Extension participation refers to the extent of involvement of the respondents in the extension activities such as training, demonstration, exhibition, exposure visit, awareness campaign and farmers' fair. The variable was quantified by scoring and respondents were categorized accordingly. Extension contact was operationalized as the frequency of contacts (Very frequently, frequently and never) of the respondent with extension personnel of different development departments. Progressiveness refers to the use of new ideas or opportunities, it was measured by the response of the farmers as Yes/No. Thus Progressive farmers always have positive attitude towards new technology and improved practices. Unless the farmers have scientific aspiration, he cannot develop interest for new technologies and adoption of the technologies. Each individual has different level of scientific orientation or aspiration. It affects his/her adoption behavior by changing his/her knowledge level, attitude and understanding towards the innovation or a new technology.

3. RESULTS AND DISCUSSION

Table 1 indicates the socioeconomic profile of the respondents interested in AWD technology. From the study it is observed that, majority 57.63% (83 numbers) of respondents belonged to middle aged category and were more interested towards AWD technology than the young and old farmers. Middle aged farmers had both experience and proper decision making power. It also revealed that old farmers exhibited less interest towards AWD technology and preferred traditional practices of continuous flooding.

The data regarding education of the respondents (Table 1) showed that, a maximum of 44 respondents (30.5%) out of 144 have primary level of education and only 5.55% (8 numbers) graduated. Maximumrespondents (45%) showing interest towards AWD technology mostly belong to OBC category.

The data regarding family type and family size of the respondents revealed that majority i.e. 57% (82 numbers) of the respondents had joint family and 61 percent (88 numbers) belonged to small family (5 member/family) category. From the above analysis, it could be concluded that although there were more joint families in the area, the families were small having members up to five. Joint families were relatively resource rich and shows better involvement of the members which might lead to adoption of a new technology.

From the survey regarding land holding of the respondents revealed that, majority (68 %) of the respondents were marginal farmers having land holding up to 1 ha and were more interested in AWD technology to save irrigation water as they were resource poor. The findings led to the conclusion that large farmers had no interest in AWD as irrigation water is not a constraint for them.

Data in Table 1 indicate that, farmers having medium income level i.e. Rs. 10000 to Rs. 100000 had more interest towards AWD than the farmers having income level up to Rs. 10000 and above Rs. 10000. It indicated that farmers having income level less than Rs. 10000 were not ready to adopt AWD because of their low risk bearing ability and farmers having income level more than Rs. 100000 had less interest in AWD due to no net income from AWD.

Table 2 reveals that78 percent of respondents had high level of social participation followed by 15 percent and 7 percent of respondents having medium and low level of social participation respectively. Due to high social participation, the farmers came across the technology and used it. Majority (45.83%) of the respondents had medium level of cosmopoliteness followed by 32.64 percent respondents had high level of cosmopoliteness and 21.53 percent of respondents had low level of cosmopoliteness. The cosmopoliteness of respondents reflects their attitudes for progressive thinking and adoption of new technology for higher economic returns. Majority (51%) of the respondents had medium level of mass media exposure followed by 25 percent and 24 percent respondents had

high and low level of mass media exposures respectively. Majority (51%) of the respondents had medium level of extension participation followed by 26 percent and 22 percent respondents had low and high level of extension participation respectively. The data in the Table 2 depicted that only 0.69 percent (1 number) of the respondents had low extension contact where as 84.72 percent (122 numbers) and 14.58 percent (21 numbers) of the respondents had medium and high level of extension contact respectively. It indicated that the respondents had good extension contact with the extension functionaries of the area. Majority (48%) of the respondents had medium level of progressive-ness followed by 28 percent and 24 percent of respondents had high and low level of progressiveness respectively. Results obtained from the Table 2 revealed that 52 percent (75 numbers) of the respondents had medium level

Table 1. Study of socio-economic profile of the farmers for adoption of AWD technology

Sl. No	Variable	Category	Frequency (N=144)	Percentage (%)
1.	**Age**			
		Young	39	27.1
		Middle aged	83	57.6
		Old	22	15.3
2.	**Education**			
		Illiterate	13	9
		Primary	44	30.5
		Middle School	33	23
		High School	38	26.4
		Intermediate	8	5.55
		Graduation and above	8	5.55
3.	**Caste**			
		General	50	35
		OBC	65	45
		SC	29	20
		ST	0	0
4.	**Family Type**			
		Nuclear	62	43
		Joint	82	57
5.	**Family Size**			
		Small	88	61
		Medium	47	33
		Big	9	6
6.	**Size of Land Holding**			
		Landless	12	8.35
		Marginal	98	68
		Small	20	13.9
		Medium	12	8.35
		Large	2	1.4
7.	**Average Annual Income**			
		Up to Rs. 10000	2	1
		Rs. 10000- Rs. 50000	76	53
		Rs. 50000- Rs. 100000	55	38
		>Rs. 100000	11	8
8.	**Agricultural Implement Possession**			
		Tractor	6	4
		Power tiller	6	4
		Sprayer	65	45
		Water pump	25	17
		Others	7	5
		No implement	35	24

Table 2. Categorisation of respondents according to different level of variables

Sl. No.	Variable	Categories (N=144)					
		Low		Medium		High	
		f	%	f	%	f	%
1	Social Participation	10	7	22	15	112	78
2	Cosmopoliteness	31	21.53	66	45.83	47	32.64
3	Mass Media Exposure	35	24	73	51	36	25
4	Extension Participation	38	26	74	51	32	22
5	Extension Contact	1	0.69	122	74.72	21	14.58
6	Progressiveness	35	24	69	48	40	28
7	Scientific Orientation	38	26	75	52	31	22

**F: Frequency*

Table 3. Covariance analysis of socio-economic variables

Sl. No.	Variables	Min.	Max.	Mean	Std. Deviation	CV%
1.	Age	1	3	1.88	0.64	34.13
2.	Education	1	6	3.06	1.29	42.18
3.	Caste	1	3	1.85	0.73	39.30
4.	Familytype	1	2	1.57	0.50	31.66
5.	Family size	1	3	1.45	0.61	42.21
6.	Land holding	1	5	2.26	0.78	34.65
7.	Annual Income	1	4	2.52	0.66	26.11
8.	Agricultural implement possession	0	4	0.75	0.92	122.65
9.	Social participation	0	15	8.92	2.58	28.95
10.	Cosmopoliteness	1	6	3.72	1.30	35.01
11.	Mass media exposure	2	23	12.19	3.52	28.90
12.	Extension participation	6	14	8.01	1.99	24.91
13.	Extension contact	6	18	8.10	2.33	28.78
14.	Progressiveness	0	6	2.73	2.08	76.07
15.	Scientific orientation	0	18	10.10	5.71	56.54

of scientific orientation where as 26 percent (38 numbers) and 22 percent (31 numbers) of the respondents had low and high level of scientific orientation respectively. It indicated that the respondents had good level of scientific orientation which can help them for adoption of new technologies in farming.

3.1 Covariance Analysis of Socio-economic Variables

The Covariance analysis of the variables revealed that, there was greater consistency among extension participation (24.91%), average annual income (26.11%), extension contact (28.78%), mass media exposure (28.9%) and social participation etc. Greater variability was observed among all other variables. Hence it is indicated that, there was homogeneity among extension participation, average annual income, extension contact, mass media exposure, social participation and heterogeneity among all other variables. The data in the Table 3 as a whole indicated that there was heterogeneity among the socio-economic variables. It implied that the respondents were of different socio-economic background.

4. CONCLUSION

Although AWD was a proven technology and widely adopted in different countries, it was introduced first time in Odisha and the study area. The study was necessary to understand the socioeconomic factors on adoption of the technology (AWD).It could be concluded that there was homogeneity among extension participation, average annual income, extension contact, mass media exposure, social participation and heterogeneity among all other variables. It implied that the respondents were of different socio-economic background. High level of social participation, medium level of cosmopoliteness, mass media exposure, extension participation, extension contact, progressiveness and scientific orientation among

the respondents itself implied the relation of the above factors along with adoption of AWD. The study was limited only to the farmers involved in the adoption of a new technology i.e. AWD in their area. The AWD technology could be disseminated to more area in large scale and study of different factors could be possible in a comparative manner along with control farmers.

CONSENT

As per international standard respondents' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. FAO. FAOSTAT Data; 2016. Available:www.faostat3.fao.org/browse/FB/CC/E (Accessed on 03 May 2017)
2. SAIC (SAARC Agriculture Information Centre), IRRI develops technology for producing irrigated rice with less water. SAIC Newsletter. A Quarterly Publication of SAARC Agriculture Centre. 2007;17(2): 4-6.
3. Alam MS. Factors affecting yield gap and efficiency in rice production in some selected areas of Bangladesh. Ph.D. thesis, Faculty of social sciences (Dept. of Economics). Jahangirnagar University, Savar, Dhaka; 2006.
4. IRRI. 2004. Online databases. In: Available:http://www.knowledgebank.irri.org/water management /rice.html
5. Tabbal DF, Bouman BAM, Bhuiyan SI, Sibayan EB, Satar MA. On-farm strategies for reducing water input in irrigated rice: case studies in the Philippines. Agricultural Water Management. 2002;56:93–112
6. Hoek WVD. Sakthivadivel R, Renshaw M, Silver JB, Birley MH, Konradsen F. Alternate wet/dry irrigation in rice cultivation: A practical way to save water and control malaria and Japanese encephalitis. Research Report 47. Colombo, Sri Lanka: International Water Management Institute; 2001.
7. Lampayan RM, Bouman BAM, de Dios JL, Lactaoen AT, Espiritu AJ, Norte TM, Quilang EJP, Tabbal DF, Llorca LP, Soriano JB, Corpuz AA, Malasa RB, Vicmudo VR. Adoption of water-saving technologies in rice production in the Philippines. Paper presented at the International Workshop on ''Transitions in Agriculture for Enhancing Water Productivity. TamilNadu, India; 2003.
8. Tao Song, Feiyun Xu, WeiYuan, Moxian Chen, Qijuan Hu, Yuan Tian, Jianhua Zhang and Weifeng Xu. Combining alternate wetting and drying irrigation with reduced phosphorus fertilizer application reduces water use and promotes phosphorus use efficiency without yield loss in rice plants. Agriculture Water Management. 2019;223:105686. Available:https://doi.org/10.1016/j.agwat.2019.105686
9. Dutta BP. A study on the adoption behaviour of rice farmers towards Alternate Wetting and Drying (AWD) technology in Puri District of Odisha(M.Sc. Thesis); 2015.
10. Nhung TT, Le Vo P, Van Nghi V, Bang HQ. Salt intrusion adaptation measures for sustainable agricultural development under climate change effects: A case of Ca Mau Peninsula, Vietnam. Climate Risk Management. 2019;23:88-100.
11. Singh R, Kundu DK, Kannan K, Thakur AK, Mohanty RK, Kumar A. Technologies for improving farm-level water productivity in canal commands. Water Technology Centre for Eastern Region, Bhubaneswar, India, Research Bulletin. 2008;43:1-56.
12. Wu W, Ma B, Uphoff N. A review of the system of rice intensification in China. Plant and soil. 2015;393(1-2):361-381.

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