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Knowledge and Adoption of Rice Farmers on Integrated Nutrient Management Practices of Rice

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ABSTRACT

The study was conducted in West Godavari District of Andhra Pradesh during the year 2009-10 to know the level of knowledge and adoption of Integrated Nutrient Management (INM) practices by Rice farmers. Seventy per cent of the rice farmers possessed medium overall knowledge level whereas 22.5 and 7.50 per cent of them possessed high and low knowledge levels, respectively regarding recommended INM practices of rice. Similarly, sixty five percent of the rice farmers had medium adoption level of recommended INM practices followed by low (22.50%) and high (12.50%) adoption. Further it was also observed that personal socio-economic characteristics of rice farmers like exposure in training programmes, innovativeness, scientific orientation, mass media exposure, extension participation and extension contact exhibited positive and significant relationship with knowledge and adoption level of rice farmers on INM practices of rice.

Key words : Adoption, INM, Knowledge, Rice

Rice is the major staple food crop in Andhra Pradesh occupies two third of the cultivated area with a production of greater than 10 Mt. Introduction of high yielding varieties responsive to chemical nutrients brought a spectacular increase in use of chemical fertilizers in rice. Andhra Pradesh ranks second in total fertilizer consumption (2.174 Mt) and consumption per unit gross cropped area (179 Kg ha^{-1}) according to the estimates of FAI, 2001. Nutrient mining by high yielding varieties was usually more than that applied through chemical fertilizers. This type of nutrient mining over years led to impoverishment of soil fertility and decline in crop productivity (Nambiar, 1992). Considering the importance of sustainable practices in increasing the yields in rice without any negative impact either to soil or to the environment, scientists have been advocating a good number of Integrated Nutrient Management (INM) practices for adoption by farmers. The main strategy is to substitute the chemical fertilizers by organic ones to provide a good balance between soil nutrient supply, crop requirements and sustainability of soil fertility and health on long term basis. Such an approach in the present day rice farming is instrumental in obtaining better response to applied nutrients and stabilizing the yields.

In spite of all its advantages, rice farmers were not adopting recommended INM practices and are over dependant on chemical fertilizers which has threatened the long term sustainability of soil fertility and health. There is a wide gap between the recommended INM practices and its application in farmer's field. Against this background, the present research study was carried out to assess the knowledge and adoption level of rice farmers with respect to recommended INM practices of rice and to find out the relationship of farmers selected personal socio-economic characteristics on the knowledge and adoption levels of INM practices.

MATERIAL AND METHODS

The present study was conducted in West Godavari District of Andhra Pradesh during the year 2009-10 in four adopted villages of Krishi Vigyan Kendra, Undi Viz., Matsyapuri, Andaluru, Mogallu and Adavikolanu. Ex-post facto research design was adopted for the study. Twenty paddy farmers from each village were randomly selected thus total sample size was 80 respondents. Knowledge was operationalized as the amount of information and understanding possessed by the rice farmers about INM practices. Adoption was operationalized for the purpose of investigation as practicing the recommended package of practices by the respondents. Knowledge and adoption of the rice farmers was tested against eleven items related to INM practices. INM package of practices recommended by Acharya N. G. Ranga Agricultural University were included in the study

to assess the knowledge and to measure the extent of adoption. The data on knowledge and adoption levels were collected from the sample of rice farmers through personal interview technique by using the pre-tested schedule. Respondents were categorized in to 3 categories i.e., low, medium and high based on their knowledge and adoption scores using mean and standard deviation as a measure of check. Frequency and percentages were worked out to know the knowledge and adoption levels of individual component of INM practices of rice. Information regarding 12 personal, socio-economic characteristics (independent variables) of rice farmers was collected with a pre-structured schedule using suitable scales. The data collected from the respondents were scored, tabulated and analyzed using zero order correlation tests.

RESULTS AND DISCUSSION

Overall knowledge level of rice farmers with respect to INM practices of rice

The results presented in Table 1 revealed that about two third (70.00%) of the rice farmers possessed medium over all knowledge where as 22.50 and 7.50 per cent of them possessed high and low knowledge level, respectively regarding recommended INM practices of rice. These knowledge levels reveal that majority of the respondents were medium in education, medium in economic motivation, innovativeness and scientific orientation, which might have made them to know the recommended INM practices to a medium level.

Knowledge level of rice farmers regarding specific INM practices of rice

Table 2 gives the details of knowledge level of rice farmers regarding specific INM practices. Majority of rice farmers (>68.00%) were having correct knowledge about the application of organic fertilizers like FYM/compost/poultry manure and growing of green manure crops like green gram/pillipesara/daincha/sun hemp in rice fallows during summer season. More than eighty per cent of the rice farmers did not have correct knowledge on usage of bio-fertilizers in rice. Also, majority of the cultivators (70.00%) were not having the correct knowledge about the recommended fertilizer dosages and the nutrient content of the fertilizers. Further, most of them had incorrect knowledge on improvement of nitrogen use efficiency, proper method and time of application of fertilizers. This trend reflects the ignorance of rice farmers with respect to recommended INM practices though many efforts were put by the farm scientists and other extension personnel. However, corrections of micro nutrient deficiencies like zinc and iron was known by considerable number of rice farmers (60.00 and 56.25%, respectively). Probably with long years of rice farming experience, majority of the farmers knew the importance of micro nutrient deficiencies.

Overall adoption of rice INM practices by rice farmers

Table 3 reveals that 65.00 per cent of rice farmers were found to be in medium level of adoption while 22.50 and 12.50 per cent of the farmers belonged to low and high levels of adoption of INM practices, respectively. This might be due to fact that they had medium to high knowledge level about recommended INM practices of rice which made them to think of pros and cons in making a decision either to accept and adopt or reject a practice. They also had medium to high levels of innovativeness, scientific orientation, extension exposure, mass media exposure and participation in training programmes which would have contributed to more awareness about the INM practices thereby enhancing the knowledge level which in turn leads to more adoption.

Adoption of specific INM practices by rice farmers

A perusal of Table 4 revealed that majority of rice cultivators (53.75%) have not been either practicing the application of FYM as per the recommendations or not growing the green manure crops. Though rice farmers know the application of more organic fertilizers and growing of green manure crops would increase the fertility of soil, reduce the incidence of pest and disease menace and reduce the expenditure on chemical fertilizers, being tenant farmers could not able to incur proportionate amount for purchasing FYM since the cost forms the major part of the cost of nutrient management. The growers also opined that rodents find major harborage during summer season in the green manure pulse crop and render a huge amount of damage for the subsequent rice crop. It was quite astonishing to observe that great majority (96.25%) of rice farmers have not applied the bio-fertilizers. They were of the view that bio-fertilizers did not play a significant role in increasing the yield and its application was labor intensive as the bio-fertilizers had to be applied separately.

Table 1. Distribution of rice farmers based on their overall knowledge on recommended INM practices of rice

n = 80

Category	Frequency	Percentage
Low	6	7.50
Medium	56	70.00
High	18	22.50
Total	80	100.00
Mean	5.81	
SD	2.89	

Table 2. Item analysis of extent of knowledge of recommended INM package of practices by rice farmers

n = 80

Component of INM	Correct knowledge		Incorrect knowledge	
	Frequency	Percentage	Frequency	Percentage
1.Nitrozen fertilizers can be reduced to the extent of 20-25% by using FYM, compost and poultry manure along with chemical fertilizers	69	86.25	11	13.75
2.By growing green manure crops like pulses, daincha, Pillipesara in paddy fields 20-25% of nitrogen, phosphorus and potassium can be saved.	55	68.75	25	31.25
3.Using bio fertilizers like azolla, azospirillam and phospho bacteria 10-20% of nitrogen and phosphorus fertilizers could be reduced.	14	17.50	66	82.50
4.Using chemical fertilizers as per the recommendation NPK 24kg, 16kg, 16kg in kharif, 48 kg, 24kg, 16kg in rabi .	28	35.00	52	65.00
5. Nitrogen fertilizers should be used in 3 equal splits i.e., 1st dose during last puddling, 2nd dose in tillering stage and 3rd dose at panicle initiation stage.	24	30.00	56	70.00
6. Thin film of water should be maintained at the time of N fertilizer application and water should be given 36-48 hrs after nitrogen fertilizers application.	39	48.75	41	51.25
7. To improve nitrogen use efficiency urea need to be mixed with 10 kgs neem cake or 250 kgs wet soil.	23	28.75	57	71.25
8. Total P&K fertilizers should be applied as basal	28	35.00	52	65.00
9. Complex fertilizers need to be applied as basal	24	30.00	56	70.00
10.In two cropped areas in every rabi season 20kg $Znso_4$ should be applied as basal. When Zn deficiency is observed on crop 2gm $Znso_4$ /lt water should be sprayed 2-3 times with 5 days interval.	48	60.00	32	40.00
11. If iron deficiency is observed it can be corrected using 10 gm annabedhi + 1gm citric acid /lt water	45	56.25	35	43.75

Table 3. Distribution of rice farmers based on their overall adoption of recommended INM practices of rice.

n = 80

Category	Frequency	Percentage
Low	18	22.50
Medium	52	65.00
High	10	12.50
Total	80	100.00
Mean	19.57	
SD	4.52	

Table 4. Item analysis of extent of adoption of recommended INM package of practices by rice farmers.

n=80

Component	Fully adopted		Partially Adopted		Not adopted	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1.Nitrozen fertilizers can be reduced to the extent of 20-25% by using FYM, compost and poultry manure along with chemical fertilizers	13	16.25	24	30.00	43	53.75
2.By growing green manure crops like pulses, daincha, Pillipesara in paddy fields 20-25% of nitrogen, phosphorus and potassium can be saved.	15	18.75	22	27.50	43	53.75
3. Using bio fertilizers like azolla, azospirillam and phospho bacteria 10-20% of nitrogen and phosphorus fertilizers could be reduced.	0	0.00	3	3.75	77	96.25
4. Using chemical fertilizers as per the recommendation NPK 24kg, 16kg, 16kg in Kharif , 48 kg, 24kg, 16kg in rabi .	3	3.75	38	47.50	39	48.75
5. Nitrogen fertilizers should be used in 3 equal splits i.e., 1st dose during puddling, 2nd dose in tillering stage and 3rd dose at panicle initiation stage.	9	11.25	41	51.25	30	37.50
6. Thin film of water should be maintained at the time of N fertilizer application and water should be given 36-48 hrs after nitrogen fertilizers application.	5	6.25	24	30.00	51	63.75
7. To improve nitrogen use efficiency urea need to be mixed with 10 kgs neem cake or 250 kgs wet soil.	4	5.00	7	8.75	69	86.25
8. Total P&K fertilizers should be applied as basal	8	10.00	22	27.50	50	62.50
9. Complex fertilizers need to be applied as basal	11	13.75	30	37.50	39	48.75
10.In two cropped areas in every rabi season 20kg $Znso_4$ should be applied as basal. When Zn deficiency is observed on crop 2gm $Znso_4$ /lt water should be sprayed 2-3 times with 5 days interval.	43	53.75	31	38.75	6	7.50
11.If iron deficiency is observed it can be corrected using 10 gm annabedhi + 1 gm citric acid /lt water	36	45.00	26	32.50	18	22.50

Table 5. Coefficient of correlation of personal socio-economic characteristics of rice farmers with their knowledge and adoption of INM practices.

N=80

S. No	Correlates	'r' value for Knowledge	'r' value for adoption
1	Age	0.0457^{NS}	0.1212^{NS}
2	Education	0.6298**	0.1698^{NS}
3	Farming experience	0.0120^{NS}	0.2201*
4	Economic motivation	0.3265**	0.0921^{NS}
5	Cosmopoliteness	0.0397^{NS}	0.1325^{NS}
6	Social participation	0.0972^{NS}	0.0248^{NS}
7	Participation in trainings	0.3059**	0.2976**
8	Innovativeness	0.3215**	0.2549*
9	Scientific orientation	0.4115**	0.4209**
10	Mass media participation	0.4756**	0.3142**
11	Extension participation	0.6950**	0.2969**
12	Extension contact	0.5704**	0.6167**

** - Significant at 1% * - Significant at 5%

NS – Non significant 'r' – Correlation coefficient

Around 50.00 per cent of the respondents had not applied chemical fertilizers as per the recommendations. The reason given by them for this trend was that there would be more wastage of fertilizers due to frequent irrigations. Further, the common tendency prevailing among the farmers was that application of complex fertilizers more than the recommended number of splits by most of the respondents (48.75%) and the reason quoted was that more the application of complex fertilizers more would be the yield. Greater than 78 per cent of the cultivators are following the correction of zinc and iron deficiencies in rice as per the recommendation. The possible reason might be that most of the rice farmers were convinced as to the profitability and practicability of this practice, hence the higher percentage of the respondents were correcting micro nutrient deficiencies.

Relationship of selected characteristics of respondents with their knowledge and adoption

The correlation of coefficient of knowledge and adoption with selected personal, socio-economic characteristics of rice farmers was presented in table 5. The relational analysis revealed that among the 12 independent variables, training exposure, innovativeness, scientific orientation, mass media exposure, extension participation and extension contact were positively significant with the knowledge and adoption level of rice farmers. It was observed that education and economic motivation showed positive and significant relationship with knowledge only and exhibited non significant relationship with adoption level. The variable, farming experience which shows non significant association with knowledge exhibited positive relationship with adoption level of rice farmers. The other variables such as age, cosmopoliteness, social participation had non significant relationship with knowledge and adoption levels of rice farmers.

The innovative proneness character of rice farmers with more scientific outlook having higher extension and training participation levels have direct effect on gain in knowledge about recommended INM practices of rice. Moreover, they had high level of extension contact with special reference to source of information, thus helped the rice farmers to adopt the recommended INM technologies in their fields. It is evident from the findings that the improvement in these characters would positively enhance knowledge

and adoption levels. These findings derive support from the findings of Raji et al., (1996), Parthasarathi (1997) and Ramesh and Govind (2008).

Conclusion:

The present study revealed that application of chemical fertilizers was more than the recommended level which results in soil degradation and ecological imbalance besides costing too much to the farmers. There is an urgent need to educate the rice growers on INM practices and abuse of farm inputs by the farm scientists and extension personnel of state department of Agriculture.

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