

**RESEARCH ARTICLE :**

# A study on knowledge and adoption of integrated pest management (IPM) by rice growers

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**SUMMARY :** The study was conducted in Kadapa district of Rayalaseema region in Andhra Pradesh on the knowledge and adoption level of integrated pest management practices by rice growers. It was found that majority (64.00%) of the respondents belonged to middle age and most of them (36.66%) were illiterates. It was found that regarding land holding majority (38.00%) of the respondents were semi-medium (5.01-10.00 acres) farmers whereas (49.33%) of respondents were cultivating paddy in an area upto 1 acre and majority (64.66%) of the respondents were having medium level of farming experience. It was also found that majority (64.66%) of the respondents belongs to general caste and (55.33%) of the respondents were having medium level of annual income (2-5 lakhs). Observations showed that (53.33%), (56.00%) and (54.00%) of the respondents had medium level of mass media participation, extension contacts and scientific orientation, respectively. More than half of the respondents had medium level of knowledge (59.33%) and had medium level of adoption (56.66%) of IPM practices of rice. Regarding few cultural practices respondents had (100.00%) knowledge and adoption. For the IPM practice "Use of biopesticides like *Pandora delphacis* against BPH" farmers had no knowledge and no farmer adopted it.

**KEY WORDS:**

Knowledge, Adoption, IPM practices, Rice growers

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## **BACKGROUND AND OBJECTIVES**

Rice (*Oryza sativa* L.) is the leading food crop, cultivated over an area of about 160.8 million hectares with the production of about 746.8 million tons globally (Anonymous, 2016a). In India, rice is cultivated over an area of 43.38 million hectares with a production of 104.32 million tones and productivity of 3093 kg/ha. Rice accounts for about 41.36 per cent of total food grains production and 44.34 per cent of cereals production of the country

(Anonymous, 2017). In Andhra Pradesh rice was cultivated in area of 2.16 million hectares which was 4.98 per cent of rice area in India, production was 7.49 million tons which contributes 7.19 per cent of total rice production in the country and the productivity of rice was 3466 kg/ha which is greater than the national rice productivity (Anonymous, 2016b). Though the productivity was greater than national average, it is showing decreasing trend in recent past due to high pest incidence. Losses in rice yield were estimated to be 10-

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25 per cent due to the attack of insect pest but it has been increased to 21-51 per cent (Dhenge *et al.*, 2013). In Rayala seema region of Andhra Pradesh, the key pests causing crop loss in rice are Yellow stem borer, leaf folder, Brown plant hopper and Gundhi bug (Manjula, 2009). With an intention of keeping the infestation of pest within normal limits the integrated pest management (IPM) practices are recommended for adoption by the rice growers. Keeping these facts in view, the present study was undertaken with the following specific objectives:

- To study the selected profile characters of rice growers.
- To assess the knowledge level of rice growers about integrated pest management practices.
- To assess the adoption level of integrated pest management practices by rice growers.

## **RESOURCES AND METHODS**

The Rayalaseema region of Andhra Pradesh consisting four districts Kurnool, Anantapur, Kadapa and Chittoor in which Kadapa district was selected purposively for the present study. Two mandals namely Badvel and Duvur in Kadapa district were selected, based on maximum area under rice cultivation. Three villages from each mandal were selected based on maximum area under rice cultivation and list of the farmers in selected villages was prepared with the help of village level agriculture and revenue officers. Total 25 rice growers were selected from each selected village randomly, making a total sample size of 150 rice growers.

To collect the information from rice growers a comprehensive interview schedule was prepared by the researcher in consultation with the experts and put for a pretesting in non-sampled area with identical situations before giving it, the final shape. The responses of the farmers were collected through the interview schedule. Later the responses were coded, tabulated, analyzed and results are presented.

## **OBSERVATIONS AND ANALYSIS**

The results obtained from the present study as well as discussions have been summarized under following heads:

### **Profile characters of rice growers:**

The data given in Table 1 show that majority

(64.00%) of the respondents belongs to middle age followed by old age (20.66%) and young age (15.33%). It also explains that majority (36.66%) of the respondents were illiterates, 24.66% of the them were educated upto high school followed by higher secondary (16.00%), primary school (14.00%) and college education (8.66%). The data given in table also revealed that regarding land holding majority (38.00%) of the respondents were semi-medium farmers followed by medium farmers (20.66%), marginal farmers (17.33%), small farmers (16.00%) and big farmers (8.00%). It was also found that majority (49.33%) of the respondents were cultivating paddy in an area upto 1 acre whereas (29.33%) of the respondents were cultivating paddy in an area of 1.01 to 2 acres followed by (21.33%) in an area of above 2 acres. The data shown also revealed that majority (64.66%) of the respondents were having medium level of farming experience followed by high level (18.00%) and low level (17.33%) of farming experience.

The data presented in Table 1 show that majority (64.66%) of the respondents belonged to general caste whereas (18.66%) of them belongs to backward caste and (16.66%) to scheduled caste. It also depicted that majority (55.33%) of the respondents were having medium level of annual income followed by low level (30.66%) and high level (14.00) of annual income. The observations from the table also revealed that majority (53.33%) of the respondents were having medium level of mass media participation followed by high (28.67%) and low (18.00%) level of mass media participation. The data given also revealed that majority (56.00%) of the respondents were having medium level of extension contacts followed by high level (24.66%) and low level (19.33%) of extension contacts. The table also explained that regarding the scientific orientation, majority (54.00%) of the farmers belonged to medium level followed by high level (27.33%) and low level (18.66%) of scientific orientation.

### **Knowledge level of rice growers about integrated pest management (IPM) practices:**

From the observations given in Table 2 it was revealed that regarding some IPM practices all the respondents had full knowledge such as "Remove the stubbles of previous crop and bushes from the field (100.00%), plough the field after harvest of previous crop to kill the hibernating larvae or pupae of insects (100.00%) and harvesting of crop close to soil surface

(100.00%). For some IPM practices majority had full knowledge such as “Use weedicides in early stages of crop to control alternate host of pest (94.66%) and chloropyriphos @ 2ml/litre to control stem borer, leaf folder, Gundhi bug (91.33%)”. For few practices like “Use of biopesticides like *Pandora delphacis* against BPH (100.00%) and releasing *Trichogramma.spp* @ 70,000 cards/ha (73.33%)” majority of the respondents had no knowledge.

#### Overall knowledge level of rice growers:

The observations given in Table 3 revealed that

majority (59.33%) of the respondents were having medium level of knowledge about IPM practices whereas 26.00% of the respondents were having high level of knowledge and 14.66% of the respondents were having low level of knowledge on IPM practices.

#### Adoption level of integrated pest management practices by rice growers:

It is clear from Table 2 that the majority of respondents had completely adopted some IPM practices like “remove the stubbles of previous crop and bushes from the field (100.00%), plough the field after harvest

**Table 1 : Socio-personal and economic factors (variables) of respondents**

Sr. No.	Variables	Categories	Respondents (n=150)	
			Frequency	Percentage
1.	Age (Years)	Young (Upto 35)	23	15.33
		Middle (36 to 55)	96	64.00
		Old (>55 years)	31	20.66
2.	Education	Illiterate	55	36.66
		Primary school	21	14.00
		High School	37	24.66
		Higher secondary	24	16.00
3.	Total land holding (acres)	College education	13	8.66
		Marginal (Upto 2.50)	26	17.33
		Small (2.51-5.00)	24	16.00
		Semi-medium (5.01-10.00)	57	38.00
		Medium (10.01-25.00)	31	20.66
4.	Area under paddy	Big (>25.00)	12	8.00
		Upto 1 acre	74	49.33
		1.01-2 acres	44	29.33
5.	Farming experience (Years)	Above 2 acres	32	21.33
		Low (1-10)	26	17.33
		Medium (11-20)	97	64.66
6.	Caste	High (above 20)	27	18.00
		General caste	97	64.66
		Backward caste	28	18.66
7.	Annual income	Scheduled caste	25	16.66
		Low (< 2 lakhs)	46	30.66
		Medium (2-5 lakhs)	83	55.33
8.	Mass media participation	High (>5 lakhs)	21	14.00
		Low (0-5)	27	18.00
		Medium (5-10)	80	53.33
9.	Extension contacts	High (10-18)	43	28.67
		Low (0-5)	29	19.33
		Medium (5-10)	84	56.00
10.	Scientific orientation	High (10-16)	37	24.66
		Low (0-6)	28	18.66
		Medium (7-15)	81	54.00
		High (15-20)	41	27.33

Table 2 : Distribution of the rice growers according to practice-wise adoption of integrated pest management practices (n=150)							
Sr. No.	Practices	Knowledge			Adoption		
		FK	PK	NK	FA	PA	NA
<b>Cultural practices</b>							
1.	Remove the stubbles of previous crop and bushes from the field	150 (100.00)	0 (0.00)	0 (0.00)	150 (100.00)	0 (0.00)	0 (0.00)
2.	Plough the field after harvest of previous crop (to kill the hibernating larvae or pupae of insects)	150 (100.00)	0 (0.00)	0 (0.00)	150 (100.00)	0 (0.00)	0 (0.00)
3.	Clipping tips of leaf blades before transplanting to eliminate eggs of rice stem borer and Rice hispa	93 (62.00)	0 (0.00)	57 (38.00)	86 (57.33)	0 (0.00)	64 (42.66)
4.	Early transplanting of Seedlings. (20-25 days) (controls gall midge)	72 (48.00)	0 (0.00)	78 (52.00)	64 (42.66)	0 (0.00)	86 (57.33)
5.	Destroy the leftover in nursery after transplanting to avoid further infection	134 (89.33)	0 (0.00)	16 (10.66)	127 (84.66)	0 (0.00)	23 (15.33)
6.	Formation of alleyways of 30 cm width after every 2-3 meters helps to reduce the pest infestation of BPH	130 (86.66)	20 (13.33)	0 (0.00)	130 (86.66)	20 (13.33)	0 (0.00)
7.	Passing a rope over the crop in vegetative phase against leaf folder and caseworm	81 (54.00)	0 (0.00)	69 (46.00)	62 (41.33)	0 (0.00)	88 (58.66)
8.	Harvesting of crop close to soil surface	150 (100.00)	0 (0.00)	0 (0.00)	150 (100.00)	0 (0.00)	0 (0.00)
9.	Crop rotation is important to break continuity in insect pest build up	122 (81.33)	0 (0.00)	28 (18.66)	110 (73.33)	0 (0.00)	40 (26.66)
<b>Mechanical practices</b>							
1.	Removing of weeds from the field regularly (Cono-weeder/Manual )	136 (90.66)	14 (9.33)	0 (0.00)	130(86.66)	20 (13.33)	0 (0.00)
2.	Remove the infected plant and destroy	127 (84.66)	13 (8.66)	0 (0.00)	116 (77.33)	18 (12.00)	16 (10.66)
3.	Rodent management by using traps	79 (52.66)	66 (44.00)	5 (3.33)	61 (40.66)	33 (22.00)	56 (37.33)
<b>Host plant resistance</b>							
1.	Selection of resistant varieties (Rasmi, Jyothi, Krishnaveni, etc.)	94 (62.66)	0 (0.00)	56 (37.33)	73 (48.66)	0 (0.00)	77 (51.33)
<b>Chemical control</b>							
1.	Application of carbofuran 200 g/cent of nursery in a little water 5 days before pulling nursery	69 (46.00)	23 (15.33)	58 (38.66)	55 (36.66)	34 (22.66)	58 (38.66)
2.	Chemical uses for root dip treatment of rice seedling (Chloropyrifos @ 2ml/litre)	127 (84.66)	14 (9.33)	9 (6.00)	106 (70.66)	35 (23.33)	9 (6.00)
3.	Use weedicides in early stages of crop to control alternate host of pest	142 (94.66)	6 (4.00)	2 (1.33)	119 (79.33)	28 (18.66)	3 (2.00)
4.	Applying Urea in Optimum quantities i.e. 110kg Urea/ha	95 (63.33)	55 (36.66)	0 (0.00)	61 (40.66)	89 (59.33)	0 (0.00)
5.	Use of insecticides on ETL basis	54 (36.00)	96 (64.00)	0 (0.00)	41 (27.33)	109 (72.66)	0 (0.00)
6.	Chloropyrifos @ 2ml/litre to control stem borer, leaf folder, Gundhi bug	137 (91.33)	6 (4.00)	7 (4.66)	114 (76.00)	29 (19.33)	7 (4.66)
7.	Fipronil @ 2ml/litre or Acephate 1.5g/liter to control BPH	123 (82.00)	12 (8.00)	15 (10.00)	123 (82.00)	11 (7.33)	16 (10.66)
<b>Behavioral and Biological control practices</b>							
1.	Use of botanical pesticides like <i>Neem</i> oil @ 0.05%	86 (57.33)	64 (42.66)	0 (0.00)	63 (42.00)	16 (10.66)	71 (47.33)
2.	Arrange bird perches @ 10/ha	108 (72.00)	42 (28.00)	0 (0.00)	102 (68.00)	48 (32.00)	0 (0.00)
3.	Arrange pheromone traps @ 12/ha	119 (79.33)	21 (14.00)	10 (6.66)	96 (64.00)	28 (18.66)	26 (17.33)
4.	Releasing <i>Trichogramma</i> . spp @ 70,000 cards/ha	24 (16.00)	16 (10.66)	110 (73.33)	21 (14.00)	19 (12.66)	110 (73.33)
5.	Use of biopesticides like <i>Pandora delphacis</i> against BPH	0 (0.00)	0 (0.00)	150 (100.00)	0 (0.00)	0 (0.00)	150 (100.00)

# Numbers in parenthesis are percentages. FK: full knowledge, PK: partial knowledge, NK: no knowledge, FA: full adoption, PA: partial adoption and NA: no adoption

Sr. No.	Knowledge level	Respondents	
		Frequency	Percentage
1.	Low (0-25)	22	14.66
2.	Medium (26-40)	89	59.33
3.	High (41-50)	39	26.00

Sr. No.	Adoption level	Respondents	
		Frequency	Percentage
1.	Low (0-25)	28	18.66
2.	Medium (26-40)	85	56.66
3.	High (41-50)	37	24.66

of previous crop to kill the hibernating larvae or pupae of insects (100.00%) and harvesting of crop close to soil surface (100.00%).” However, it was found that higher proportion of the respondents had partially adopted the practices like “use of insecticides on ETL basis (72.66%) and applying urea in optimum quantities *i.e.* 110kg urea/ha (59.33%).” Few IPM practices were not adopted by majority of respondents like use of biopesticides like *Pandora delphacis* against BPH (100.00%) and releasing *Trichogramma* spp. @ 70,000 cards/ha (73.33%), passing a rope over the crop in vegetative phase against leaf folder and caseworm (58.66%) and early transplanting of seedlings (57.33%).

#### **Overall adoption level of rice growers:**

From the Table 4 it is clear that more than half of the respondents (56.66%) had medium adoption level, 24.66% of the respondents had high level of adoption and 18.66% of the respondents had low level adoption of suggested integrated pest management practices.

#### **Conclusion:**

In this study it was found that farmers were not having enough knowledge on biological control practices and few other practices, it is important to make them aware of the IPM practices of paddy crop as it has been principal food crop in Andhra Pradesh. The knowledge and adoption levels of the farmer were at medium level

which has to be raised so that loss of yield due to pest infestation can be controlled.

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