The Andhra Agric. J 62(3): 616-620, 2015

Knowledge, Adoption and Economics of Integrated Pest Management in Paddy in Vizianagaram District, Andhra Pradesh

Visalakshi Mahanthi
Regional Agricultural Research Station, Anakapalle-531 001

ABSTRACT

On-farm demonstrations of IPM in paddy were carried out by DAATT Centre (District agriculture advisory and transfer of technology centre) in Vizianagaram district, Andhra pradesh for suppressing the crop pests; reducing the cost of production to farmers and ensuring quality produce to the consumers. IPM verification trials were conducted under farmer's conditions as well as large scale implementation of IPM through farmers' participatory approach at five villages in Vizianagaram district of Andhra Pradesh. Adoption of IPM practices resulted in increase in rice yield from 5.45 to 6.33 tonnes/ha in Vizianagaram district during *kharif*, 2007, 2008 & 2009. The cost of plant protection using IPM in paddy is reduced by 31.5% as compared to farmer's practice of plant protection. The cost-benefit ratio of rice is 2.17 in IPM farmers as compared to 1.85 in Non-IPM farmers. Knowledge and adoption of IPM in paddy was studied in five villages consisting of 20 IPM farmers and non-IPM farmers. Majority of IPM farmer's (50%) had high extension contact and majority of non-IPM farmers had (54%) medium extension contact. Majority of IPM farmers (38%) having medium farm holding and majority of non-IPM (44%) were small farmers. Fifty two per cent of the IPM farmers possessed high knowledge level and remaining farmers possessed medium (36%) and low (12%) level knowledge regarding paddy IPM practices. Whereas forty four percent of non-IPM farmers possessed medium level of knowledge followed by high (40%) and low (16%) level of knowledge on paddy IPM. Forty percent of IPM farmers had high adoption level and forty eight percent of IPM farmers had medium adoption level. Thirty two per cent of non-IPM farmers had high adoption level of IPM practices followed by medium level adoption (28%). The success of IPM technology through demonstrations were found to be more suitable in increasing the knowledge and adoption level of the paddy farmers.

Key words : Adoption, Economics, IPM in paddy. Knowledge.

Pest management remains as an important functional component in rice production. Farmers currently protect the rice crop against the pests by spraying chemical pesticide. Most farmers are risk averse and seem to have a biased rationale towards the use of pesticides; they tend to use pesticide with modernism. However, farmers fail to control the pests with faulty application of chemical sprays. Furthermore, chemical sprays also pollute land and water, are toxic to non target organisms, accumulate in food grains, and can cause human health problems. In this context, Integrated Pest Management (IPM) has emerged out as the best alternative for combating pest and pesticide induced pollution problems in rice.Inspite of all its advantages, IPM technology has not spread over to all farmers. Moreover, adoption of IPM has not come out as a snap decision but has emerged as a mental process over a period of time among rice farmers. Attempt to develop and use IPM in rice aiming at suppressing the crop pests, reducing the cost of production in farmers and ensuring quality produce to the consumers. The strategy includes integration of cultural, mechanical, biological and traditional practices with chemical control being advocated as a last resort. Awareness on the use of various pest management measures including bio suppressors had been created by high-profile campaigns and field visits. This had evoked interest among the farmers in adopting the IPM practices. The success achieved in promoting Integrated Pest Management is mainly due to the awareness created and IPM skills transferred to the farmers.

MATERIAL AND METHODS

The District Agriculture Advisory and Transfer of Technology Centre in Vizianagaram district, Andhra Pradesh has conducted on farm trials for demonstration of improved IPM practices in rice cultivation. DAATTCentre has conducted a

total of five demostrations in five villages in Vizianagaram district. From each village twenty (20) IPM farmers and non–IPM farmers were randomly selected for the study. Data was collected from the sample of 100 farmers by personal interview method using structured pre-tested interview schedule.

Expost facto design was used to study the knowledge and adoption of IPM practices by paddy farmers. Knowledge was operationalized as the amount of information and understanding possessed by the farmers about paddy IPM practices. Knowledge of farmers was tested against fourteen items related to paddy IPM practices. Adoption was operationalized for the purpose of investigation as practicing the recommended package of practices. Selected profile characteristics- Age, farming experience, farm size, extension contact, the extent of knowledge and level of adoption were measured by the schedule developed for the study. Frequency and percentages were worked out to know the extent of adoption of each IPM practice in paddy cultivation.

Components of IPM in paddy demonstrations:

- Growing of resistant paddy varieties
- Nursery protection with carbofuran granules @ 1.6 kg/ 10 cents nursery .
- Transplanting after removal of seedling tips to reduce stem borer.
- Use of rope running to expose leaf folder larvae and draining out water.
- Release of *Trichogramma chilonis* @ 40,000 per acre , 4-6 releases from 30-40 DAT.
- Application of nitrogen with potash and neem coated material.
- Need based use of chemical pesticides.

RESULTS AND DISCUSSION

Data on knowledge and adoption of IPM practices by farmers was presented in Table 1&2. Majority of the IPM farmers have high knowledge on mechanical practices like clipping the tips of seedlings before transplantation (40%); installation of pheromone traps (40%) and on cultural practices like formation of alleyways (40%); harvesting of paddy close to the ground level (40%);growing green manure crop preceeding paddy for soil incorporation (38%) and trimming of field bunds (38%) and application of carbofuran granules in nursery (38%). This might be due to the fact that majority of the IPM farmers belonged to middle age group having high farming experience with medium farm holding and high extension contact for technical advice. Similar findings were reported by Venkateswara rao *et al*., 2012 .

Most of the non-IPM farmers were adopting mechanical practices like clipping the tips of seedlings before transplantation (40%) and on cultural practices like formation of alleyways (38%) ; harvesting paddy close to the ground level(38%) ; trimming of field bunds (36%) ; release of *Trichogramma chilonis* (36%) ; application of pesticides based on ETL (36%) and application of carbofuran granules in nursery (34%). This might be due to the reason that , it is easy to follow, convenient involves less cost for pest management. This finding was in line with that of Prasad (2002) and Venkateswararao *et al* (2012). Majority of non-IPM farmers were partially adopting release of *Trichogramma chilonis* (24%); application of pesticides based on ETL levels (24%); raising green manure crop preceeding paddy (22%) and seed treatment with carbendazim (22%). This might be due to medium contact of farmers with Daatt centre scientists and also the farming experience of farmers. Sarada and Suneel kumar (2011) reported that more than half of the paddy farmers had medium adoption level of recommended IPM practices in West Godavari district.

Majority of the farmers are not adopting selection of suitable variety for better yields (82%); growing of green manure crops preceding paddy for soil incorporation (78%); seed treatment with carbendazim (78%). The reason given by the farmers was due to lack of knowledge and availability of suitable variety for better yields.

Hence, there is a need to organize awareness campaigns and training programmes along with skill demonstrations for facilitating the adoption of technologies at farmer's fields.

It was observed that majority of the farmers were not adopting recommended biological control practices like releasing of *Trichogramma chilonis* to parasitize the eggs of paddy stem borer and leaf folder (76% IPM& 86 % non- IPM farmers). This is due to non-availability of parasitoids locally to the farmers. State department

Table 1. Item wise analysis of knowledge and adoption of IPM and non-IPM farmers.

S.no	IPM practice Cultural practices	Knowledge				Adoption			
		IPM farmers (50)		Non-IPM farmers (50)		IPM farmers (50)		Non-IPM farmers (50)	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1	Growing green manure crop preceeding paddy and incorporation into the soil improves soil fertility	19	38%	19	38%	11	22%	6	12%
2	Seed treatment with carbendazim reduces the incidence of blast in the early stage of crop growth	15	30%	11	22%	11	22%	4	8%
3	Growing of pest resistant paddy varieties and use of disease free seed	11	22%	9	18%	9	18%	6	12%
4	Application of carbofuran granules at one week before pulling the seedlings reduces stem borer and gall midge at early stages	19	38%	12	24%	17	34%	9	18%
5	Clipping tips of seedlings before transplantation destroys the eggs of stem borer	20	40%	16	32%	20	40%	15	30%
6	Transplanting 2-3 seedlings per hill	18	36%	15	30%	15	30%	14	28%
7	Application of complex fertilizers at basal and straight fertilizers in splits reduces the pest and disease incidence	18	36%	16	32%	16	32%	13	26%
8	Formation of alleyways to control BPH	20	40%	16	32%	19	38%	11	22%
9	Release of *Trichogramma* @ 40,000 per acre , 4-6 releases from 30-40 DAT	18	36%	10	20%	12	24%	7	14%
10	Application of pesticides based on ETL is more economical	18	36%	14	28%	12	24%	8	16%
11	Installation of pheromone traps for stem borer monitoring	20	40%	18	36%	18	36%	14	28%
12	Monocropping paddy favours pests and disease build up	18	36%	16	32%	15	30%	14	28%
13	Harvesting of paddy need to be done close to the ground level to prevent pest incidence	20	40%	18	36%	19	38%	15	30%
14	Trimming field bunds reduces weeds,insect pests and disease incidence	19	38%	16	32%	18	36%	13	26%

Table 2. Distribution of respondents based on profile characteristics.

S.no	Profile characteristics	IPM farmers (50)	Non-IPM farmers (50)
1	Age:		
	Young : 25-36	12(24)	10(20)
	Middle : 37-46	30(60)	19(38)
	Old : 47-60	8(16)	21(42)
2	Farming experience :		
	Low : 0-10	15(30)	8(16)
	Medium: 11-22	11(22)	22(44)
	High : 23-34	16(32)	20(40)
3	Farm size :		
	Marginal : upto 2.5 acre	11(22)	17(34)
	Small : 2.6-5.0	14(28)	22(44)
	Medium : 5.1-10	19(38)	8(16)
	Large : >10	8(16)	3(6)
4	Extension contact :		
	Low : 0-10	9(18)	14(28)
	Medium: 11-22	16(32)	27(54)
	High : 23-34	25(50)	9(18)
5	Knowledge :		
	Low : 0-9	6(12)	8(16)
	Medium: 10-18	18(36)	22(44)
	High : 19-27	26(52)	20(40)
6	Adoption :		
	Low : 0-9	6(12)	20(40)
	Medium: 10-18	24(48)	14(28)
	High : 19-27	20(40)	16(32)

of agriculture should establish more bio-agent production laboratories to meet the demand of farmers.

Further, it was observed that majority of the farmers have knowledge on pest ETL's but not adopting application of pesticides based on ETL (IPM farmers - 76% & non-IPM farmers-84%). Generally farmers adopt the technology only after success is established by the other farmers in the village. Hence, DAATTCentre worked in harmony with farmers in conducting demonstration and trainings.This may be due to the reason that majority of the farmers could not able to detect economic threshold level (ETL) limits for pests in rice. Majority of paddy farmers were not following installation of pheromone traps (64% IPM & 72% non-IPM) for trapping stem borer male moths.

Majority of the farmers felt that stem borer was the most serious pest followed by plant hopper. All the farmers applied pesticides to control the serious pests. The number of insecticide sprays were cut down from 3-4 to an average of 1-2 in paddy cultivation. The cost of plant protection using IPM in paddy is reduced by 63% as compared to farmer's practice of plant protection. The cost-benefit ratio of rice is 2.17 in IPM farmers as compared to 1.85 in non-IPM farmers. Non-IPM farmers spent an average of Rs.2465/- per ha and IPM farmers spent an average of Rs.913/- per ha towards plant protection. The average paddy yields recorded by adopting IPM practices were 6.33 t/ha whereas yields recorded in non-IPM plots were 5.45 t/ha. Pesticides shared 2.23 percent of the total cost in IPM plot and 9.54 per cent in non- IPM plot. This indicates that adoption of IPM practices will reduce the pesticide use. With the adoption of IPM, paddy farmers earn a net amount of Rs.23,907/- per hectare which was Rs.9319/- more than their income before adopting the IPM package (Table 3).

Awareness on the adoption of IPM practices was created by diagnostic field visits, front line demonstrations, method demonstrations, trainings to farmers and extension functionaries and also through farmers field schools.

The findings indicated that majority (60%) of the IPM farmers belonged to middle age while majority (42%) of the non-IPM farmers belonged to old age. The middle and young aged farmers are motivated towards adoption of innovations and able to adopt the IPM practices. Majority of the IPM farmers had high farming experience (43%) while majority of the non-IPM farmers had high level of farming experience (44%). Farming experience correlated with the age of the farmers as old farmers had more years of farming experience than the young farmers. Majority (38%) of the IPM farmers were having medium farm holding and majority

Table 3. Cost of cultivation of paddy using IPM and non-IPM practices.

S.no	Particulars	IPM practice	Non-IPM practice
1	Productivity (t/ha)	6.33	5.45
2	Cost of plant protection (Rs./ha)	913.00	2465.00
3	Cost of other operations (Rs./ha)	19,455.00	21,062.00
4	Total cost of cultivation (Rs./ha)	20,368.00	23,527.00
5	Gross returns (Rs./ha)	44,275.00	38,115.00
6	Net returns (Rs./ha)	23,907.00	14,588.00
7	Cost Benefit ratio	1: 2.17	1: 1.85

of non-IPM farmers were small farmers. Majority (50%) of IPM farmers had high extension contact . This might be due to the fact that majority of the farmers were educated and frequently contacted different extension functionaries on technical matters. Majority of non–IPM farmers (54%) had medium extension contact. Knowledge level of majority of the IPM farmers (52%) was in the high level, whereas, 44 per cent of non-IPM farmers had medium level of knowledge. This was confirmed with the findings by Prasad (2002). With reference to adoption level of IPM practices, 40 per cent of IPM farmers had high level of adoption and 48 per cent of IPM farmers had medium level of adoption. Whereas , thirty two per cent of non-IPM farmers had high level of adoption and 40 per cent of non-IPM farmers had low level of adoption.

Conclusions

Majority of IPM farmer's (50%) had high extension contact and majority of non-IPM farmers had (54%) medium extension contact. Majority of IPM farmers (38%) having medium farm holding and majority of non-IPM (44%) were small farmers. Fifty two per cent of the IPM farmers possessed high knowledge level, whereas forty four percent of non-IPM farmers possessed medium level of knowledge paddy IPM. Forty percent of IPM farmers and thirty two per cent of non-IPM farmers had high adoption level of IPM practices. Adoption of IPM practices resulted in increase in rice yield from 5.45 to 6.33 tonnes/ha in Vizianagaram district during kharif, 2007, 2008 and 2009. The cost of plant protection using IPM in paddy is reduced by 31.5% as compared to farmer's practice of plant protection. The cost-benefit ratio of rice is 2.17 in IPM farmers as compared to 1.85 in Non-IPM farmers. The success of IPM technology through demonstrations were found to be more suitable in increasing the knowledge and adoption level of the paddy farmers.

Comprehensive and holistic efforts of DAATT Centre and its technical support to the department of agriculture in promoting IPM in paddy through farmer's field schools has created significant change in paddy cultivation.

LITERATURE CITED

Sarada O and Suneel Kumar G V 2011 Extent of adoption of Integrated pest management practices by paddy growers. *The Andhra Agricultural Journal,* 58(1): 95-98.

Venkateswararao, Ratnakar R and Jain P K 2012 Impact of farmer field schools in KVK adopted villages on level of knowledge and extent of adoption of improved practices of paddy (*Oryza sativa* L.). *Journal of Research. ANGRAU,* 40(1):35-41.

Prasad C 2002 A study on the impact of On-Farm Extension Demonstrations (OFEDs) in Rice in Nellore district of Andhra Pradesh.M.Sc(Ag.) Thesis submitted to Acharya NG Ranga Agricultural University, Hyderabad.

(Received on 21.09.2013 and revised on 30.09.2014)