Integrated pest management in paddy- technology performance in farmers' fields under frontline demonstrations

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ABSTRACT

Frontline demonstrations on integrated pest management in paddy were conducted for three years during Kharif season (2014-2016) in farmers' fields in three different villages of two Taluks (Turuvekere and Tiptur) in Tumkur district of Karnataka. It was observed that average grain yield performance of 30 demonstrations in an area of 12 ha ranged from 52 to 55 q/ha. There was 25.78 per cent increase in grain yield in integrated pest management (IPM)-scheduled fields over non- IPM fields during all the three years of demonstrations besides reducing pest, disease and weeds. In terms of economics also IPM-demonstrated fields were found economically superior with higher B:C ratio of 1:1.57 as against the lower B:C ratio of 1:1.38 in non-IPM fields.

Keywords: Paddy; IPM; FLD; insect pests; diseases; weeds; field

INTRODUCTION

Paddy is a staple food crop of Tumkur district grown in an area of 10578 ha with a production of 38892 quintals next to finger millet and little millets. The predominant factors contributing to yield loss in paddy are pests, diseases and weeds. Among the diseases blast, sheath blight and bacterial leaf blight; insect pests like stem borer and leaf roller and monocot and dicot weeds continue to cause huge crop losses in one or the other part of the district.

Farmers have substantial difficulty in managing these problems because of improper diagnosis and awareness about pest and disease losses and their management practices. Conventional pest control method ie use of chemical pesticides is a regular practice. However their excessive and inappropriate use in agro-ecosystem in the last two decades or so has resulted in degradation of the environment while the pest problems like development of resistance, resurgence and pesticide treadmill seem greater than ever (Trivedi and Ahuja 2011). The extent of pesticide residues in the environment is also a matter of great concern. Research results have indicated that food commodities are contaminated with persistent pesticide residues (Arora et al 2006). Hence there is an urgent need to evolve strategies and technologies that will not only meet increasing demands for food but also those that will enable to produce more without the problems encountered as stated above. This target can be achieved only with integrated pest management (IPM) and it is implemented by utilizing sound ecological approaches which are aimed at optimizing control measures rather than maximizing them. Realizing the benefits of IPM International Rice Research Institute, Phillippines has been advocating IPM techniques in rice and demonstrating their efficiency at the farm level since 1980 (Samiayyan et al 2010). Considering the merits of rice IPM two modules were evaluated for their suitability and economic gain in IPM assessed through frontline demonstrations (FLDs).

METHODOLOGY

Krishi Vigyan Kendra, Tumkur conducted frontline demonstrations on integrated pest management technologies on paddy during 2014 to 2016 in Kharif season with total area of 4.0 ha by involving 10 farmers each year (0.4 ha area with each farmer). Totally 30 demonstrations were laid out over an area of 12 hectares by involving 30 farmers in 2 Taluks of Tumkur district (Turuvekere and Tiptur). Demonstrations were

conducted under irrigated condition and the soil of demonstration plots ranged from medium to high in nutrient status.

The different modules used for evaluation were two treatment schedules viz IPM and non-IPM (conventionally cultivated farmers' practice). IPM schedule included seed treatment with carbendazim @ 4 g/kg, soil application of weedicide Londax power @ 4 kg/ac (bensulfuron methyl 0.6% + pretilachlor 6% GR), pheromone traps @ 20 traps/ha against yellow stem borer for mass trapping and need-based spraying with quinolphos @ 2 ml/l and hexaconazole @ 1 ml/l against sheath blight.

The observations on pests, diseases, weeds and yield data were recorded from IPM and non-IPM demonstrations and were compiled for working out the cost-benefit ratio.

RESULTS and DISCUSSION

The data on effect of IPM technologies in frontline demonstrations on paddy yield presented in Table 1 show that the yield ranged from 52 to 55 q/ha with average yield of 53.66 q/ha whereas in non-IPM schedule it was found to be 42.66 q/ha. There was 25.78 per cent increase in IPM demonstrations over non-IPM demonstrations.The highest grain yield of rice 55 q/ha was recorded in IPM module compared to 43 q/ha in 2014. Similar trend was observed in 2015 and 2016 where grain yield was 52 and 41.5 (2015) and 54 q/ha and 43.5 q/ha (2016) in IPM and non-IPM schedules respectively.

The effect of herbicide on monocot and dicot weeds was recorded and the data are presented in Table 2. The mean monocot weed count was 2.25/m^2 in IPM and 3.75/m^2 in non-IPM schedule. Similarly in case of dicot weeds the count was 2.40/m^2 in IPM and 4.61/m^2 in non-IPM schedule. Thus there was decrease in the number of weeds due to implementation of IPM.

The observations recorded on effect of IPM demonstrations on incidence of pests and diseases are presented in Table 3 .The results revealed that in the plots under IPM in case of insect pests there was 6.80 per cent stem borer and 8.36 per cent leaf roller infestation and in case of diseases 9.00 per cent blast, 12.33 per cent sheath blight and 7.00 per cent bacterial leaf blight incidence compared to 10.53 per cent stem borer and 11.80 per cent leaf roller infestation and 13.66 per cent blast, 19.66 per cent sheath blight and 11.66 per cent bacterial leaf blight incidence in non-IPM plots.

The adoption of IPM technologies resulted in higher net income in economic terms also (Table 4).

Table 1. Yield performance of IPM in paddy demonstration under FLD programme

Year	Name of the block/village	Variety	Number of farmers	Area (ha)	Yield (q/ha)		Change in yield (%)
					IPM schedule	Non-IPM schedule	
2014	Lakkasandra	IR-64	10	4	55.00	43.00	27.91
2015	Barepalya	IR-64	10	4	52.00	41.50	25.30
2016	Beerasandrapalya	IR-64	10	4	54.00	43.50	24.13
Mean	-	-	10	4	53.66	42.66	25.78

Table 2. Effect of herbicide on monocot and dicot weeds under FLD programme

Year	Monocot weed count (mean number/m^2)		Dicot weed count (mean number/m^2)	
	IPM schedule	Non-IPM schedule	IPM schedule	Non-IPM schedule
2014	2.50	4.85	2.00	4.50
2015	2.70	3.80	2.50	5.50
2016	1.56	2.60	2.70	3.84
Mean	2.25	3.75	2.40	4.61

Table 3. Effect of IPM treatments on pests and diseases of paddy under FLD programme

Year	Insect pest infestation (%) in IPM and non-IPM schedules				Disease incidence (%) in IPM and non-IPM schedules					
	Stem borer		Leaf roller		Blast		Sheath blight		Bacterial leaf blight	
	IPM	Non-IPM	IPM	Non-IPM	IPM	Non-IPM	IPM	Non-IPM	IPM	Non-IPM
2014	8 .00	11.00	8.50	12.50	9.00	14.00	11.00	17.00	05.00	09.00
2015	5.80	10.00	8.00	11.50	9.50	15.00	12.00	20.00	05.00	08.00
2016	7.80	10.60	8.60	11.40	8.50	12.00	14.00	22.00	11.00	18.00
Mean	6.80	10.53	8.36	11.80	9.00	13.66	12.33	19.66	7.00	11.66

Table 4. Cost economics of IPM in paddy demonstration under FLD programme

Year	Economics of IPM schedule (Rs/ha)				Economics of non-IPM schedule (Rs/ha)			
	Gross cost	Gross return	Net return	BCR	Gross cost	Gross return	Net return	BCR
2014	46000	71500	25500	1.54	43000	63700	20700	1.48
2015	44500	67600	23100	1.51	41000	53950	12950	1.31
2016	41000	68200	27200	1.66	38000	52200	24700	1.37
Mean	43833	69100	25266	1.57	36333	60116	19450	1.38

The farmers earned average net income of Rs 25266/ ha through the use of IPM as against Rs 19450/ha in non-IPM technology. Due to IPM the benefit-cost ratio of 1:1.57 was achieved as against 1:1.38 in non-IPM technology. Thus there is a wide scope to increase the area under these demonstrations in paddy growing areas of the district as also suggested by Dash et al (2005, 2006) and Karthikeyan et al (2010).

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