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Effect of Integrated Pest Management Practices in Paddy

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A B S T R A C T

In Karnataka Mandya district is one of the important paddy growing area. Mono cropping, faulty cultivation practices with continuous submerged conditions are causing higher pest and disease incidence and leading to lower yield. In this context KrishiVigyana Kendra, Mandya demonstrated integrated pest and disease management practices in 30 farmer's field. The objectives of the study were to minimize the use of chemical pesticides and to establish the use of eco-friendly management practices. The IPM practice includes blast tolerant variety BR 2855, seed treatment with carbendazim 50 WP @ 2 gram per kg of seeds, recommended dose of fertilizer application, clipping off the tip of paddy seedling before transplanting, release of tricho cards 25/ha, use of pheromone traps 20/ha, need based spray of Kitazin 45 EC @ 1 ml and chloropyriphos 20 EC @ 2 ml per liter of water. The results from the IPM demonstration showed that less leaf blast (14, 10, 12 per cent), stem borer (5.60, 7.50 and 8.80 per cent) incidence in all the three years of study as compared to farmers practices. It also obtained high mean yield (57.46) and B:C ratio (2.45).

Introduction

Paddy is an important cereal crop of India. About half of the Indian population survives on this cereal. This is grown both in irrigated and semi irrigated condition. In India paddy occupied an area of about 44.01 million hectare with a production of 115.91 million tones and average productivity was2578 kg/ha (India stat, 2019).

In Karnataka Cauvery command area is known for paddy cultivation throughout the year. Most of the farmers in the district are cultivating paddy crop either in one or two seasons. In Mandya district, paddy occupies an area of 65,522 ha with a production of 1,84,307 MT and productivity of 3400 kg/ha. Use of locally available varieties, mono cropping, faulty cultivation practices with continuous submerged conditions are causing higher pest and disease incidence and leading to lower yield.

Among the major insects pest yellow stem borer is major destructive pest found in Mandya region. Whereas leaf blast and neck blast are the major among the diseases (Chetana, 2018). Indiscriminate use of pesticides can easily disrupt the natural balance between insect pests and their natural enemies. Thus, although insecticides may be

needed in some cases, they must be used judiciously in order to maximize the effect of the natural control agents. Conservation of bio-control agents is prime important and can be achieved by limiting broad spectrum insecticides use, or by applying insecticides which are selectively toxic to pests but not to predators (Arvind *et al.*, 2018).

In this context, KrishiVigyan Kendra, Mandya demonstrated IPM technologies through various extension activities in different villages of Mandya district.

Materials and Methods

The demonstration on integrated pest and disease management technology in paddy was conducted by KrishiVigyan Kendra, Mandya in farmers' field during 2018, 2019and 2020. The demonstrations on integrated pest management (IPM) on rice were conducted in 12 hectare at 30 farmers' field in three village of the district.

Before initiation of the demonstration soil sample were collected at a depth of 15 cm from farmers field. Processed soil samples were analyzed for soil pH, EC, organic carbon, available N, $P_2O_5$and K_2O. Based on soil test results the farmers were advised with balanced and timely application of nutrients. The soil pH ranged from 7.3-8.2 which indicate neutral to saline soils. The electric conductivity was normal ranging 0.215-0.386 dsm^{-1} and soil organic carbon ranged from 0.23 -0.36 per cent indicates low soil carbon status in all soil samples. The available nutrient status varied from nitrogen (196-246 kg/ha), P_2O_5 (18-30 kg/ha) and K_2O (180-262 kg/ha) respectively indicating low to medium.

The experiment consisted of two treatment schedules *viz.*, IPM (recommended practice) and non-IPM (farmers' practice). IPM practices includes blast tolerant variety BR 2855, seed treatment with carbendazim 50 WP @ 2 gram per kg of seeds, recommended dose of fertilizer application, clipping off the tip of paddy seedling before transplanting, release of tricho cards 25/ha, use of pheromone traps 20/ha, need based spray of Kitazin45 EC and chloropyriphos 20 EC. The observations on diseases were recorded by following 0 – 9 scale as per IRRI, Philippines (Anonymous, 2002) and then converting into per cent disease intensity by using the formula.

$$\text{Per cent disease index (PDI)} = \frac{\text{Sum of the disease rating scores}}{\text{Number of observation}} \times \frac{100}{\text{highest disease grade}}$$

The data on stem borer incidence was recorded a random area of 1 m^2 was selected every time and observed for recording the pest incidence at 15 days interval from 30 days after transplanting till crop harvest. Borer incidence was recorded by counting the healthy and infested plants in each variety to calculate the percentage infestation of the pest as follows.

$$\text{Per cent stem borer infestation} = \frac{\text{No. of infested tillers}}{\text{Total tiller}} \times 100$$

Results and Discussion

The results from the demonstration revealed that the incidence of leaf blast and neck blast in IPM field was 14 and 5 per cent, 10 and 4 per cent and 12 and 3 per cent (Table 1) in 2018, 2019 and 2020 respectively. The incidence of yellow stem borer was observed 5.60, 7.50 and 8.80 (Table 1) per cent in 2018, 2019 and 2020 respectively. Similar finding have been reported by Sandeep *et al*, (2020).

Evaluation of economics clearly revealed that the net returns from the IPM practice were substantially higher than farmers practice.

The average yield was recorded 57.46 in IPM practices as compared to farmers practice where it recorded 53.43 q/ha (Table 2). IPM practices recorded average net return of 43540 Rs/ha whereas farmer practices recorded 34636 Rs/ha. The average benefit cost ratio of 2.45 was observed in IPM practices whereas 2.01 (Table 2) in farmers practices. This is mainly because of increase in cost of cultivation in usage of non-recommended chemicals and imbalance use of fertilizer. The higher yield and net return in IPM fields due to less damage caused by pest and diseases and cost of cultivation too.

Table.1 Effect of treatments against plant growth factors and pest incidence of paddy

Year	Treatment	Plant height (cm)	Number of tillers	Length of the panicle (cm)	Leaf blast incidence (%)	Neck blast incidence (%)	Stem borer incidence (%)
2018	**Recommended IPM practice**	98.23	12.50	20.21	14.00	5.00	5.60
	Farmers practice	94.00	9.55	18.40	35.00	18.00	15.75
2019	**Recommended IPM practice**	95.25	12.00	22.25	10.00	4.00	7.50
	Farmers practice	93.50	10.50	20.80	23.0	12.00	28.00
2020	**Recommended IPM practice**	96.12	14.62	21.56	12.00	3.00	8.80
	Farmers practice	91.00	13.20	19.80	28.0	12	13.60

Table.2 Impact of treatments on Yield and economics of the paddy

Year	Yield (q/ha)		Gross returns (Rs.)		Cost of cultivation (Rs.)		Net return (Rs.)		B:C	
	Farmers practice	IPM practice	Farmers practice	IPM practice	Farmers practice	IPM practice	Farmers practice	IPM practice	Farmers practice	IPM practice
2018	50.70	55.20	60840	66240	31000	28000	29840	38240	1.96	2.37
2019	55.80	58.00	69750	72500	35000	31000	34750	41500	1.99	2.34
2020	53.80	59.20	75320	82880	36000	32000	39320	50880	2.10	2.64
Mean	53.43	57.46	68636.6	73873.3	34000	30333.3	34636.6	43540	2.01	2.45

In conclusion the indiscriminate use of pesticides can easily disrupt the natural balance between insect pests and their natural enemies. Thus, although insecticides may be needed in some cases, they must be used judiciously in order to maximize the effect of the natural control agents. In response to raising concern about the sustainability of conventional agriculture, we have to promote Integrated Pest Management (IPM).

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