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RESEARCH ARTICLE

Facilitating adoption of integrated pest management practices in rice in Rajnandgaon district of Chhattisgarh

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ABSTRACT

Rice is the major crop grown in Rajnandgaon district. The important insects and diseases which damage the rice crop are stem borer, brown plant hopper, leaf folder, cut worm, blast and BLB etc. Due to heavy infestation of insect and diseases, farmers used to spend huge amount of money for purchase of pesticides to control insects and diseases. Keeping this view in mind, the IPM module was applied among the farmers by the KVK for reducing the cost of pesticides. This study was carried out by the Krishi Vigyan Kendra, Rajnandgaon through trainings, OFTs, FLDs and Advisory services etc. during 2009-10 to 2010-11.The major components taken under IPM modules were deep summer ploughing, Seed treatment (for diseases), green manure (*in situ*), balance use of fertilizers, seedling root dip/nursery treatment to control stem borer, 30 cm alley formations at every 2.5 to 3 meter distance for plant hopper and sheath blight, installation of light traps, pheromone traps, use of "T" shaped bird perches, application of neem oil, cow urine and warmi wash etc. It was revealed that the farmers reduced the cost of cultivation of rice by adopting IPM modules and more than 60 per cent farmers were adopted the above practices for insect and diseases management. Hence, the IPM module is very effective to manage insect and diseases in rice crop, other farmers also started to adopt this method in their fields. due to KVK efforts.

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INTRODUCTION

The modern agriculture with the aim of increasing production had paved way for various second generation problems, especially through high input agriculture. Some of the problems are inadequate response of crops to applied inputs, yield plateauing, resistance of insects and pests to chemicals, environmental degradation etc. The insects-pests, diseases and weeds are the major biotic bottlenecks in the production of crops, which are inflicting on an average 20-40% yield loss.

Rice (*Oryza sativa* L.) is the basic food crop of a large proportion of the world population. Rice is infested with relatively a large number of insects pests from the time of sowing till it is harvested. Insect pests are on the key biotic stresses limiting rice production in India. (Ghai *et al.*, 1979) accounted more than 823 insect species, which are reported to be pests of rice. More than one thousand insects have been reported to infest rice in fields as well as in storage conditions globally but only about two dozens of insects have been found as key pests in different rice ecologies in India (Prakash *et al*., 2003), Prakash and Rao (2005). The yield losses recorded were 21 to 51 per cent due to stem borer alone (Singh and Dhaliwal, 1994); 48.8 to 56.9 per cent due to stem borer and leaf folder (Murugesan and Chellaiah, 1983). Rice is the major crop of the Rajnandgaon district (C.G.) in *Kharif* followed by soybean, while in *Rabi* chickpea followed by Lathyrus are the major crops. Major insects and diseases in this area are yellow stem borer, brown plant hopper, leaf folder, cut worm, blast and bacterial leaf blight causing regular damage and infect to the rice crop.

Among them yellow stem borer and blast disease are dominant. The problem attained more prominence with the introduction of high yielding crop varieties and the associated increase in consumption of pesticides and fertilizers.

Keeping the above challenges in view, KVK adopted villages Kumhalori, Beltekari, and Parrikhurd under Rajnandgaon district an attempt to develop and use IPM modules against crop pests being carried out during 2009-2010 to 2010-2011 aiming to suppressing the crop pests, reducing the cost of production for getting higher yield with quality produce in this area.

MATERIAL AND METHODS

Intervention of KVK Rajnandgaon:

For success and better results of any programme, grass root level constraints need to be identified first. To understand problems and intervention points, the KVK employed participatory Rural Appraisal (PRA) methodology in the adopted villages. Apart from studying socio-economic aspects, various PRA tools like transect walk, social map, matrix and intervention analysis, seasonal and livelihood analysis etc were used to elucidate pertinent information. Socio economic data revealed that farmers of the villages were marginal to small with limited resources. The farmers were also having poor knowledge about the improved package of practices of rice.

Socio-economic analysis of IPM villages:

Ranking problems of low productivity of rice was done and they were prioritized as shown in Table 1. Of the problems identified high incidence of pests and diseases and discriminate use pesticides and fertilizers were on the top. The farmers expressed that they were unaware about availability of quality seed and pest resistant varieties.

Group discussion with rice farmers was held to know the major problems and cause for low returns of rice. The problems cause diagram (Fig. 1) revealed that some of the important reasons for low productivity of rice were unawareness about package of practices of INM and IPM, injudicious management of fertilizers, incidence of pest and diseases, indiscriminate use of pesticides and low soil fertility.

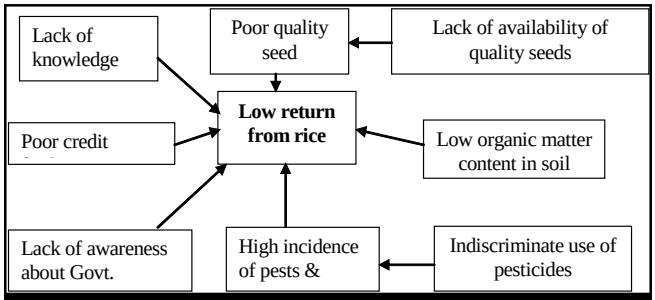

Fig. 1 : Problems cause diagram of low productivity of rice

Implementation of IPM package :

The study was conducted in three KVK adopted villages *viz.*, Kumhalori, Beltekari, and Parrikhurd of Block-Rajnandgaon, Dist. Rajnandgaon, Chhattisgarh during 2009-2010 to 2010-11. Various steps were followed by the KVK in planning and implementation of IPM strategy in rice in selected villages of 10 farmers in Rajnandgaon district, right from selection of village and farmers to evaluation of the impact of the intervention. Based on the PRA outcome and the interventions planned, the KVK has developed the IPM package (Fig. 2) to suit the needs of the local rice crop in consultation with the scientist of KVK, Rajnandgaon. The leaders of the groups were given skill training on improved rice crop management, preparation and on IPM package. A calendar of activities for each village was prepared to implement the IPM package.

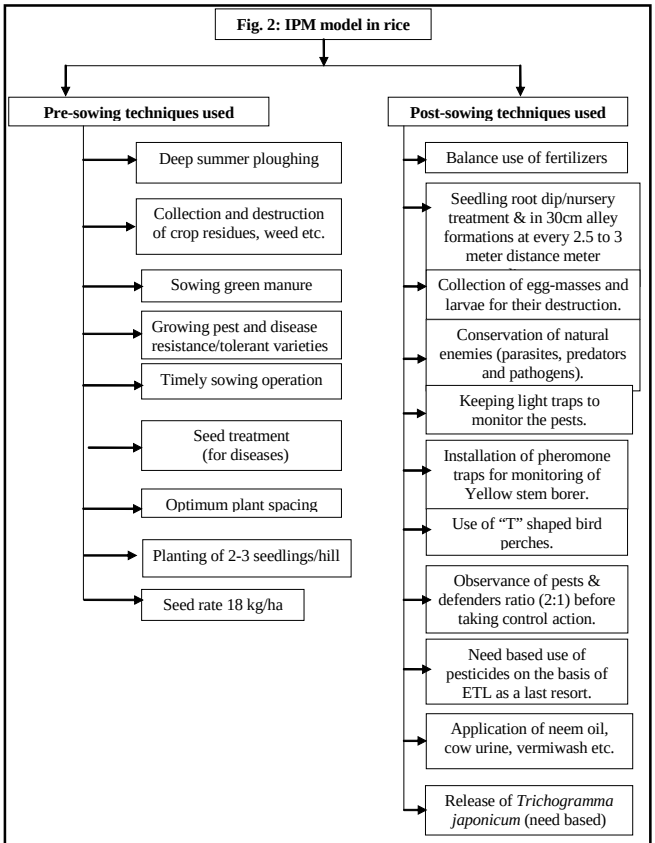

Fig. 2 : IPM model in rice

Bench mark survey :

From each selected village, ten rural people were randomly selected and hence a total of one hundred respondents were drawn for the study purpose. For measuring different aspects, a schedule was developed in light of the suggestions of the experts of KVK Rajnandgaon and

interviewing them personally collected the responses of farmers. The data so collected on knowledge, attitude, practices of farmers, identification of major pests problems, responsible for low yield were classified, tabulated and analysed.

Post-sowing techniques used :

Monitoring of the crop growth and pest incidence, record of pest load in the pheromones traps and presence of biological agents were noted regularly by the KVK staff. The staff visited the plots at three days intervals. The farmers were trained about IPM in their own fields during the field visits. The group leaders were also trained on monitoring of pest incidence with knowledge of economic thresh hold (ETL) levels of different pests. The KVK also trained the extension functionaries and utilized their services in monitoring of crop. To disseminate the results of IPM and to bring more are under IPM package, KVK organised exposure visits of farmers to successful farmers fields at various villages.

Similarly pest and diseases infested areas were identified by On Farm Trials, Front Line Demonstrations and other advisory services, attempts to develop and use of IPM modules against crop pests. Integrated Pest Management technologies were practiced during the year 2009-10 and 2010-11at Rajnandgaon district aiming to suppressing the crop pests in infested areas, reducing the production cost for getting higher yield with quality produce in this area. The IPM model is given in Fig. 2.

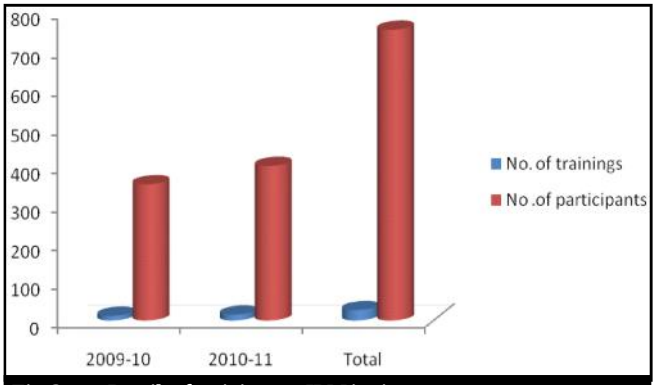

Fig. 3 : Details of trainings on IPM in rice crop

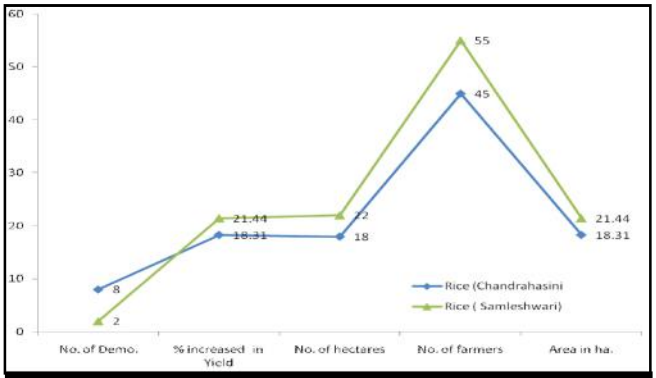

Fig. 4 : Front line demonstrations on rice during 2009-10 and 2010-11 (Technology demonstrated-Varietal evaluation and IPM)

RESULTS AND DISCUSSION

Trainings, front line demonstrations, On farm testings, Advisory services and method demonstrations were used systematically to convince and disseminate the IPM practices among the farming community during 2 years. The training programmes on IPM were conducted on rice during the 2 years period *i.e.* 2009-10 and 2010-11. A total of 27 training programmes were conducted with 754 participants in rice crops (Fig. 3).

FLDs were conducted to demonstrate the productivity potential of the improved crop production technologies, including IPM recommended practice. During the year 2009-10 and 2010-11, FLD programme on rice were conducted in an area of 10 hectare involving 24 farmers and horizontal spread of technologies were adopted in 40 hectare areas among 100 farmers (Fig. 4). Improved varieties like Samleswari and Chandrahasini which are tolerant to BPH, gall midge, blast were demonstrated and their yield ranged from 34-44 qt/ha.

To bridge the gap between the researchers and the farmers, the field visits were conducted. The data presented in Table 1 indicate the number of farm advisory services, guest lectures and number of farmers visited in KVK to seek solutions

Table 1 : Activities of KVK for promoting IPM in major crops under Rajandgaon district

Year	Diagnostic service	Scientist visit to farmers field	KVK visits	Guest lectures
2009-10	20	50	70	4
2010-11	59	64	120	8
Total	79	114	190	12

Table 2 : Farmers field schools conducted in Rajnandgaon district by the Department of Agriculture with the technical guidance of the KVK

Year	No. of FFS attended by KVK scientists	No. of farmers
2009-10 & 2010-11	10	300

against the infestation due to pests and diseases during the period of 2009-10 to 2010-11.

Farmers field school is a school without walls, wherein farmer's fields provide the learning experience throughout the crop growing period. Farmer's field schools were conducted by the Department of Agriculture from the year 2009-10 onwards for rice crop. These Schools were conducted in particular day of every week. The farmers were divided into one group (30 farmers) at village under all 9 blocks of the Rajnandgaon district. Farmers could master the skills to identify and assess the pest and beneficial insect's population, based on which, they were able to arrive at various pest management strategies in different stages of the crop growth. The data on the number of Farmers Field Schools attended by KVK, scientists in Rajnandgaon district from 2009-10 to 2010-11 in rice crop given in Table 2.

Five pheromone traps per hectare were installed for pest monitoring against yellow stem borer. The data on pheromone trap catch (Fig. 5) revealed that the moths started falling in the traps from the very beginning but in few numbers. The moth catch reached its peak between 2nd fortnight of August and 1st fortnight of September (2-20 moths/ha). approximately during 40 to 70 days of crop growth. Bird perches were installed @40-100/ha, which resulted in attracting large number of birds to facilitate easy picking of the grown up caterpillars by birds. Use of neem oil had helped in controlling and acted as antifeedent for borer.

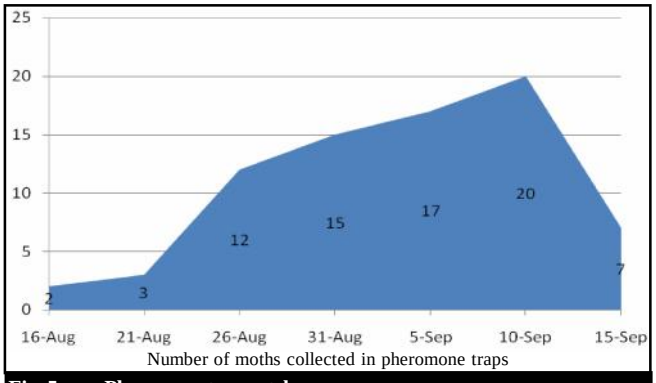

Fig. 5 : Pheromone trap catch

The above mentioned IPM technologies were adopted by the 10 farmers and their cost of plant protection (Rs./ha) were evaluated. The observation reveled that farmers adopting the integrated pest management technologies decreased the cost of plant protection as compared to the non-IPM technologies. This observation corroborates with the findings of Kenmore (1997), Rajak *et al*. (1997), Garg *et al.* (2008).

Conclusion and recommendations :

Efforts of the KVK in popularizing the IPM concept have created significant changes at the farmers level. Comprehensive and holistic efforts of the KVK in the form of trainings, front line demonstrations and field visits and its technical support to the Farmer's Field schools conducted by the Department of Agriculture of Rajnandgaon district have been responsible for all this. More than 60 per cent of the farmers adopted the IPM measures to control the pest menace at Kumhalori, Beltekari, and Parrikhurd villages. Another significant factor was that repeated emphasis was given about the IPM methods not only in the training conducted exclusively for IPM but also in the other crop production trainings, demonstrations and farmers visits to the KVK Technical support and trainings given to the extension functionaries have supplemented the KVK efforts, thus creating a multiplier effect to popularize IPM strategies in Rajnandgaon district.

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