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LOW COST IPM TECHNOLOGY FOR PARTICIPATORY SEED PRODUCTION OF RICE IN FAVOURABLE LOW LAND ECOSYSTEM OF ODISHA

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Introduction

Seed is the prime necessity of farmers and plays a significant role in yield increase of rice. The NRRI has taken initiative in on-farm production of quality rice seeds with farmers' participatory mode where farmers have grown the crop incorporating scientific technologies for the purpose. But the hot and humid climate of this eastern coastal region invites many insect pests and diseases of rice which results in economic loss to the farmers in terms of higher protection cost as well as yield loss to the crop. So, effort has been made to develop location specific package of practice for integrated pest management (IPM) in this area of seed production in Mahanga block, Cuttack district, Odisha during 2013-2016.

Area details

The rice crop area under IPM was 50 acres with rice variety Pooja, an NRRI variety of medium duration (145 days). The area was under shallow favourable low land ecology. It depended on mansoon rain for initial field preparation and other field operations such as nursery raising, transplanting etc. till the release of water in irrigation channel for rest of the cropping period. However, thirty day old seedlings were transplanted within 3rd week to 4th week of July during different years.

Problem survey

Pest problem: Survey was conducted at the initiation of the activity during kharif 2012 in seed production plots, as well as in adjacent farmers' fields. It revealed the appearance of thrips, hispa and case worm at early stage of crop growth within August-September. Leaffolder , yellow stem borer, brown plant hopper, bacterial blight, sheath blight and sheath rot incidence was observed during September-October. Case worm, brown plant hopper, leaf folder and sheath blight were of continuous occurrence in about 50% of the area whereas others attacked in less area and were of minor occurrence. Swarming caterpillar was identified as a new problem from 2015 and afterwards which invaded through irrigation channel and damaged the nursery and transplanted rice crop.

Swarming caterpillar

BPH

Case worm larvae

Feeding sympton of case worm

Integrated pest management (IPM): Integrated pest management (IPM) approach is an ecology based strategy for maintaining pest population below the economic injury level by the use of any or all control techniques that are economically, ecologically and socially acceptable. It relies on strengthening natural factors for pest suppression.

Scheduled based applications

Seed treatment for diseases: Since incidence of fungal diseases were increasing at vegetative stage, seed treatment with carbendazim @2gm/Kg of seed was recommended prior to sowing. It was also suggested to add water just enough to remain as a coat adhering to seeds for better efficacy. But about 95% farmers of the area were habituated of sowing sprouted seeds. So, they opted for soaking seeds in carbendazim solution. The dose was same but water was added upto the brim of seeds and kept for 24 hours. Then the seeds were taken out and kept for sprouting.

Fixing of Pheromone traps

Most of the pesticide application by farmers was for yellow stemborer infestation and farmers were applying granules like phorate, Carbofuran and Cartap hydrochloride to their plots twice, once at nursery or at initial transplanting or in late vegetative or panicle initiation stage, irrespective of insect incidence. Pheromone trap was introduced as a YSB-Monotoring tool @ 4 traps/ acre with scirpolure and farmers were trained to observe the number of trapped moths. Insecticide application was made in the area, where more population exceeded 3-4 male moths per day or about 21 – 28 moths per week.

Errors identified in problem solving

1. Pest identification was not proper. Particularly, Sheath blight had been mistaken for BPH and vice- versa. and insecticides were put in the place of fungicide. As a result,there was misuse of pesticides and the management of disease was at risk. Monitoring on the incidences of BPH, Sheath blight, caseworm etc. was lacking. They were detected at very later stage , when the pests had crossed the economic threshold level or already loss has been made..
2. No application of proper pesticides for a pest or use of quality pesticides was followed. No pest management activities were taken by about 40% of the farmers.

IPM components imposed upon

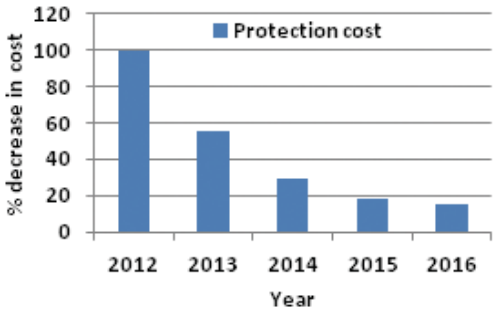
1. Identification of pests was assured through training at the village site through field visit and problem identification. The crop protection division had developed pest diagnostic pocket diaries and rmobile APP as rice xpert, were provided to the farmers for their ready reference.in the field. Initial provision of pheromone traps were made to identify and assess the population size of yellow stem borer so that foliar spray treatment can be made to that particular area at brood emergence of the moth. Monitoring BPH and WBPH was through taping of basal portion of rice plant during September – October so that application of insecticides or neem oil could be done at proper time.
2. Seed treatment was made with carbendazim as scheduled base application for the management of fungal diseases like sheath blight and sheath rot.
3. Need based application of 0.5% neem oil + 0.2% detergent liquid solution as foliar spray for caseworm, leaf folders and BPH could keep the population low. Application of chlorantraniliprole, thiamethoxam and acephate as foliar spray to YSB brood(moth emergence period) was effective against the pest. The particular treatment also served as a control measure for the management of BPH and leaf folde which were infesting at the same time.

Results

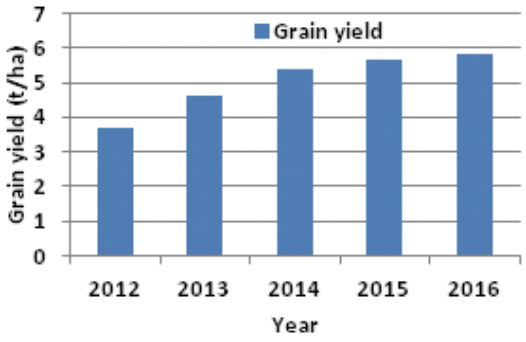
Through identification of pests, the problem like case worm, leaf folder, BPH,

YSB were identified at the initial level of infestation. Timely management options taken, reduced pest incidence gradually to minimum withont any endemic situation. There were 10 pest incidences during 2012 out of which four were endemic and though YSB was not endemic , farmers were applying the granules and spray on scheduled base whereas sheath blight was mistan as BPH . Pesticides applied was not effective, rather increasing the disease incidence. This mistaken identity was corrected through training on monitoring devices and the following results were obtained–

1. The number of pests decreased from 2012 to 2017 and even if more pests were observed during years like 2013, 2015 and 2016, their intensity decreased as protection measures were taken at initial incidence.



Decrease of protection cost in IPM



Increase of grain yield in IPM

2. The infested area gradually came down due to early detection of pests and prompt necessary action taken.
3. Increase in the number of spiders was observed @ 3-5/ m^2.with 2-3 egg masses.
4. Accordingly, amount of pesticide use was also decreased.
5. The overall protection cost(only material cost) reduced from 100% during 2012 to only 9% during 2017.
6. Yield increase was realized from an average of 3.70 t/ha during 2012 to 5.83 t/ha during 2016 with about 57.6% increase over the first year .
7. There was an overall gain of increased yield as well as low protection cost for the farmers.

Coclusion

Location specific integrated pest management was the effective and economic method of managing insect pests and diseases in rice. It became more successful with the participation of local farmers. But it was always dependent on the knowledge level of the farmers which was increased by providing proper training, equipped with diagnostic materials and methods, particularly to identify the pest at proper timing and selecting proper methodology of management. It resulted in higher or potential yield of the variety Pooja with low protection cost. It also gave an insight to the farmers of judicious use of pesticides which altimately, was of low cost and also did not pollute the rice environment.

Citation

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