Agri Articles
(e-Magazine for Agricultural Articles)
Volume: 02, Issue: 04 (JULY-AUGUST, 2022)
Available online at http://www.agriarticles.com
©Agri Articles, ISSN: 2582-9882

Integrated Pest Management in Rice Cultivation

(*Anita Trivedi, Yogendra Singh, Pratibha Rawat and Navprabhat Singh)
Mount Valley Development Association Doni, Megadhar, Ghansali, Tehri Grhwal Uttarakhand 249155
*Corresponding Author's email: anitatrivedibhatt16@gmail.com

Rice is a staple food of at least half of the world's population and is grown approximately 148 million ha of land globally. Nearly 90 percent of the area falls in the Asian region. So we have to make the crop pest free. Integrated pest management is the broad ecological approach for pest management which includes all the skills, techniques and practices such as cultural, mechanical and biological methods for suppressing the pest population below economic injury level. IPM is a dynamic approach and process which varies from area to area, time to time, crop to crop and pest to pest etc. and aims at reducing the losses with due consideration to human and animals besides safety to environment. It is a globally approached process for achieving sustainability in agriculture.

Introduction

The word integrated Pest Management was used for the first time by Smith and Van dan Bosch in 1967and in 1969 the first time was formally recognized by the US National Academy of Sciences. IPM is the ecosystem-based strategy that focuses on long term prevention of pests or their damages. It has four basic elements that are natural control, sampling economic levels and insect biology and ecology. IPM has been important measures for crop protection since the 1960s. IPM includes the management of insect, regular monitoring of pests, application of chemical and biological pesticides etc. IPM helps to increase the profit of the farmers by taking consideration of the cost of the input and consequences of the environment. Since a large number of human population in the world are involved in rice cultivation, they are using IPM for the pest control and benefited by it because of reducing losses and increasing yield.

Major Insect Pest of Rice

1. Yellow stem borer (*Scirpophaga incertulas)*
2. Brown plant hopper (*Nilaparvata lugens)*
3. Gundhi bug (*Leptocorisa acuta)*
4. Gall midge *(Orseolia oryzae)*
5. White backed plant hopper (*Sogatella furcifera)*

Major disease of Rice

1. Rice blast (*Pyricularia oryzae)*
2. Bacterial leaf blight (*Xanthomonas campestris)*
3. Sheath blight (*Rhizoctonia solani)*
4. False smut (*Ustilaginoidae virens)*
5. Brown spot (*Helminthosporium oryzae)*
1. *Panicum spp.*

Major pest of Rice

1. Field mice (*Musa spp*.)
2. Soft furred field rat (*Millardia meltada)*

Pest Monitoring

Agro ecosystem analysis (AESA): AESA is an approach that can be used to analyse field situations with regard to pests, predators, soil conditions, plant health, the influence of climate factors and their interrelationship of growing healthy crops. The methodology of AESA is as under:

- Field observations: The field should be enter at least 5 ft away from the bund. Site should be selected with a dimension of 1sq. mt. visual observations are recorded on flying insects, pests, and defenders which remain on plants, pests borer that remain under the soil.
- Drawing: Draw pest and defenders on the chart. Draw healthy plants with green colour and disease plant with yellow colour. Indicate the soil condition, weed population, rodent damage etc.
- Group discussion and decision making: The observations by the farmers recorded in the chart. The extensions functionaries during their visit to the village mobilize the farmers, and critically analyse the factors such as the pest population defender population, the influence of prevailing weather, soil conditions on the likely build up of defenders or pest populations.

Insect Pest Management practices

There are four types of practices that we can use. These are-

Cultural practices

- Raise pre crop kharif grow Sesbania or sunhemp and incorporate 45 days old crop in soil during land preparation wherever possible.
- Select suitable resistant and moderately resistant variety.
- Use disease and insect free pure seed.
- Seed treatment with c*arbendazim* 50 % WP @ 2g/kg seed for soil borne disease and *carbosulfan* 2 g/kg of seed for root nematodes. For termites seed treatment with *chlorpyriphos* 20 % EC @1000 ml /ha along with 10% solution of gum arabica.
- Sowing or planting should be done during proper time.
- Raising of healthy nursery.
- During transplanting rice seedling should be free from weed plants.
- Destruction of leftover nursery, removal of weeds from fields and cleaning of bunds.
- Balanced use of fertilizers and micro-nutrients as per recommendation. Proper water management.
- In direct sown rice, the crop should be sown in lines at recommended spacing for doing inter-weeding operations. Mechanical methods should be done after 3-4 weeks.
- Farmer should harvest the rice plant close to ground level to destroy insect pest present in the internodes.
- After harvest, the fields should be flooded thoroughly with water and after that plough the field with help of discs to kill larvae of stem borer present in the stubbles.
- Summer ploughing of field also needed.

Mechanical Practices

- Egg masses and larvae of pest should be collected so that insect cannot be made.
- Removal and destruction of diseased and infested plant parts.

- Clipping of rice seedling tips at the time of transplanting fields to minimize carryover of rice hispa, case worm and stem borer.
- Use of coir rope, cleaning of bunds, use of light traps, use of oil in the paddy water.
- The light trap is used to control seed bugs.

Biological practices

- Natural bio control agents such as spiders, bugs, meadow grasshopper, damsel flies, carabids, beetles, dragon flies, telenomus, bracon etc. should be conserved.
- *Trichogramma japonicum* may be released @ 1lakh/ha on appearance of egg masses/moth of yellow stem borer and leaf hopper in the field.
- Some biological pesticides like neem seed kernel extract, bacillus thuringiensis are used in the rice field to control larval growth, feeding, and performance of life leaf hopper.
- In some broad sense biological approach of pest control also includes the use of pheromones released of insect sterile and the use of biopesticides.

Chemical practices

- It includes the use of chemical pesticides for pest control. But high use of pesticides cannot lead to the sustained long-term production of rice. So, the use of pesticides must be based on ecological principles.
- Resort to chemical as the last choice only after the regular pest and when the pest population cross ETL.
- For gall midge use *Carbofuran* 3% @ 25000-66600 g/ha or *Carbosulfan* 25% EC @ 800-1000 ml/ha in nursery stage.
- For stem borer *Cartap hydrochloride* 4% granules @ 18750 g/ha in nursery stage.
- To protect from brown leaf plant hopper use *Carbosulfan* 3% CG @ 25000-66600 g/ha, for hispa spray *quinolphos* 25% gel @ 1000 ml/ha, for caseworm spray *carbaryl* 10% DP @ 25000 g/ha.

Difficulties in the adoption of IPM

The implementation of IPM in the last decades seems to be weakened and the use of pesticides causing the pest outbreak seems to be increased. Because of the attack of disease the plant health is getting more complicated. The main important obstacales in the ipm is that it requires the combined efforts of farmers and the total community. Because the pest can move easily from one field to another that are small and separated by short distance. Other important challenge is lack of training among the farmers, lack of knowledge about the implementations of ipm and it is labour intensive. IPM practices were not adopted by some farmers in Thailand because of its unsustainability in long farms, difficulties in the implementation of IPM and the farmers had strong confidence in the potential of chemical pesticides for the control of pest.

Suggestions to Increase Adoption of IPM

To increase the implementation of IPM, its very necessary to give education and training to the farmer. Motivational programme and educational movement is necessary to increase the adoption of IPM. Educated farmer will be more aware about the consequences of harmfulness of pesticides. Extension programme can also play an important role in the implementation of IPM. Government policies and actions like reducing the pesticides subsidies and providing monetary support to strengthen extension, research and technical services can be helpful for the successful implementation of IPM.

Conclusion

In conclusion the widespread use of insecticides is ineffective and economically wasteful in long run. Many insecticides control pest population but in case of human health and

environmental effect insecticides are not so adequate in long run. In addition, most synthetic and natural pesticides are susceptible to ineffectiveness due to resistance build up in insects. Thus, the only viable solution for the future is integrated pest management. The economic benefits reduce production cost, sustainability in nature of these systems present a logical answer to the pest and insect problem.

References

1. https://www.researchgate.net/publication/347788759- INTEGRATED PEST MANAGEMENT AND ITS APPLICATION IN RICE
2. https://niphm.gov.in-Integrated Pest Management Package for Rice.
3. http://agropedia.iitk.ac.in-Integrated Pest Management in Rice
4. http://www.cabi.org-Integrated pest management in rice