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Review Article

IPM of Chick PEA

Anuhya Samudrala[1]* and Sai Thilak Koosi[2]

[1]*Department of Entomology, College of Agriculture, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India*

[2]*Department of Entomology, College of Agriculture, Sardar Krushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat, India*

***Corresponding Author:** Anuhya Samudrala, Department of Entomology, College of Agriculture, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India.

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Abstract

Chickpea Cicer arietinum which belongs to leguminaceae is one of the major pulses grown in India and other countries like Australia, Myanmar, Turkey, Pakistan and Ethiopia. Almost 90 percent of global production comes from these countries. This Chickpea is attacked by many pests of which major pests include Gram pod borer and cutworm and termites. There are minor pests which consist of semi looper, black bean aphid, tobacco caterpillar. About 15% of crop loss in Chickpea is because of insect pests. IPM is the most effective technique to control insect pests and at the same time maintain ecological balance in the environment. IPM encourages the natural enemies like predators and parasitoids (biological control) and uses cultural, mechanical, physical methods to control pests. It also uses chemical control but as a last option for controlling of pests. The major constraints in adopting IPM is most of the farmers are unaware of these practices. Effective strategies should be implemented so that these IPM practices become an integral part of crop pest management.

Keywords: Chickpea; Pod Borer; IPM; Management

Introduction

Chickpea (*Cicer arietinum* L.) is an ancient self-pollinated legume crop, originated from south-eastern Turkey and the adjoining part of Syria. third most important grain legume crop in the world is occupied by Chickpea, *Cicer arietinum*, with India being the largest producer. Insect pests are a major constraint to chickpea production. In India, the legume pod borer *Helicoverpa armigera* and gram cut worm, sucking pests and other borer the major insect pest of chickpeas. *India accounts for 68% of total global output of chickpea and incidentally it is one of the largest consumers. Chickpea is grown in about 8.68 million ha in India with tentative production of 5.35 million tonnes. By far the most economically important insect pest of chickpea is the pod borer, Helicoverpa armigera Huebn. Substantial yield losses due to this pest have been reported across South Asia. For example, in various chickpea growing areas of India, yield losses in particular fields or plots in the range of 10-85% have been documented [7]. Large scale cultivation of cotton and pigeon pea (preferred hosts of H. armigera) in south and central India has further aggravated the pest situation in general due to population shifts of the pest from one host to another host. In Pakistan, during chickpea season 2001-2002, an outbreak of H. armigera was reported by farmers growing chickpea near cotton areas [3]. IPM is a knowledge-intensive sustainable approach for managing pests by combining compatible cultural, biological, chemical, and physical tools in a way that minimizes economic, health, and environmental risks with the help of pest scouts. IPM relies heavily on knowledge of pests and crop interaction to choose the best combination of locally available pest management tools Therefore, IPM is not a single product that can be stored on shelves like pesticide, and it does not rely on single method to solve all our pest problems. Pests also co-evolve and adapt very quickly to single control tactics through natural selection, and those multiple methods used simultaneously, or an "integrated" approach, is the most effective for long-term, sustainable management programs.*

Pest problem and losses

Chick pea is attacked by so many insect pests and are categorized based on their geographical and environmental conditions in Haryana black bean aphid (*aphis fabaescopoli)* in Rajasthan and Haryana termites (*Odentotermusobesus Ramb)* in eastern Uttar Pradesh semi looper (*Autographanigrisigna walker*) Bihar, Haryana, West Bengal, and Assam cutworm (*spdopteraexigua Hubner*) and in Andra pradesh tobacco caterpillar (*Spodoptera litura Fabricius*) attack is seen. Out of all these major pests which are at regional level Gram pod borer (*Helicoverpa armigera Hubner*) cutworm (*Agrotisipsilon Hufnagel*) and termite are considered as major insect pests at national level. *Helicoverpa armigera Huebn.* Substantial yield losses due to this pest have been reported across South Asia. For example, in various chickpea growing areas of India, yield losses in particular fields or plots in the range of 10-85% have been documented [8]. An annual loss of about 15% is because of the insect pests, their losses in percentage are as follows: 10%-90% loss by Gram pod borer, 5%-30% loss by Gram cut worm, 5%-15% [5] loss by termites and 0%-10% loss is by semi looper.

Benefits/Advantages of IPM

IPM as defined by FAO a pest management system that in the context to the associated environment and the population dynamics of the pest species utilizes all suitable techniques and methods in a compatible manner as possible and maintains the pest population below those causing economically unacceptable damage or loss. IPM includes cultural, mechanical, physical, biological and chemical control but chemical control is utilized as last option of pest control. This is because of increased usage of pesticides leads to insecticides resistance, pest resurgence, pest replacement and pesticide residues. so, there is a need for sustainable farming and IPM is a globally accepted strategy which helps us to reduce chemical usage and drives us move towards sustainable agriculture.

Integrated pest management in chickpea

Using of resistant tolerant cultivars, chemicals and biological agents and modified cultural practices together constitute for integrated pest management and controlled the insect pest incidence for some extent. The research on the Integrated Pest Management in pulses was initiated in 1979 with the establishment of the Project Directorate of Pulses at Kanpur. Individual components impact was studied for management of insect pest incidence integration of management was subsequently taken through the network of All India Coordinated Research Project (AICRP) on Pulses. And also, wide variety of agro climatic conditions and cropping patterns also influence the pest abundance and the losses incurred by the pest attack and individual approach for pest management will not effectively manage the pest and therefore integration of all practices for pest control should be initiated and make it feasible and economically viable to adopt it.

Cultural practices

Deep ploughing of field should be done immediately after harvesting the crop. Destruction of stubbles should also be done. Nematode prone areas will be treated with neem cake/mahua cake@500kg/ha. Intercropping with linseed/mustard/wheat/coriander/rabi sorghum should be done. Maintaining of bird perches @20/ha. Selection of early maturing varieties and early sowing should be done to avoid pest that attacks the crop at early stages. Sowing of marigold as trap crop at borders or in between the rows as intercrop of pest attraction avoid excessive vegetative growth and timely removal of weeds should be done. Avoid solanaceous crop during *kharif* in nematode prone areas and trimming of bunds and destroying of rodents burrows should be done to reduce the havoc of rodents. Practice burrow smoking using natural smoking materials in ANGRAU/NIPHM burrow fumigator for 2-3 min for each burrow. Plough the fields to demolish the rodent habitat and maintain weed free fields to reduce alternate source of food and habitat [1].

Mechanical practices

Heaps of grasses on the bund will prone for congregation of larvae and it should be mechanically destroyed @20/ha. Bird perches should be installed and after the maturity/harvesting of crop it should be removed.

Monitoring

Monitoring of adult moths can be done through by using pan/trays placed below light traps or by commercially available light traps. Gram pod borer can be monitored by using pheromone trap is mostly recommended practice. Roving survey is done to know the initial development of pest in the endemic areas these surveys are taken up in the initial crop stages and endemic areas are identified to take the roving surveys plant protection measures should be initiated only based on the ETL level of a particular pest. Surveillance through pheromone traps for two insects ' viz., *Helicoverpa armigera* and *Spodoptera litura* can be done by installing pheromone

traps @ 5/ha. After each recording the trapped moths should be destroyed. Light traps set up @ 1 trap/acre 15 cm above the crop canopy for monitoring and mass trapping insects. Light traps with exit option for natural enemies of smaller size should be installed and operate around the dusk time (6 pm to 10 pm).

Biological management

Spray crude NSKE 5% or Azadirachtin 0.03% (1000 ppm). Neem oil based WSP @ 2500 to 5000 ml/ha [4] at pre-flowering stage at 15 days interval). Conservation of *viz*., *Campoletis*, lady bird beetles, *Chrysopa*, Stinkbugs, Reduviid bug, Predatory wasps and spiders by intercropping with coriander. Application of HaNpv @250Le/ha + (adjuvant-charcoal @0.05% + phagostimulant jaggery @0.5%+UV retardant-tinopal @0.05%) to early instars larvae (1 to 3rd). Spraying of Bt (*Bacillus turengenesis*) varkurstaki (HD 1, serotype 3a) at the rate of 1kg per ha. Spraying of white muscardine fungus.In eco-friendly management, *Paecilomyces lilacinus* (0.02 per cent), *Beauveria bassiana* (0.02 per cent) and *Verticillium lecani* (0.02 per cent) can be used to reduce larval population [2].

Chemical management

The recommended insecticides are flubendiamide 39.35 SC, emamectin benzoate 5 SG, indoxacarb 14.5 SC and spinosad 45 SC. For sucking pests chemical insecticides like imidacloprid, thiamethoxam, acetamiprid, dimethoate are very effective. And also Soil application of granule insecticide like carbofuran 3G @ 15kg ha-1 at the time of sowing reduces the incidence. Spray of neonicotinoid insecticides like imidacloprid is effective. Spray of Chloropyriphos 20 EC at a dosage of 2500ml per hectare for controlling podborer and cutworm. For the control of podborer Quinolphos 25 EC, Monocrotophos 36% SL, Novaluron 10 % EC.

Current debates and significant gaps in the research

Most of the research on individual components of a potential IPM package for the target crop like chickpea and other food legumes has been done in isolation from other components, whether on research stations or in farmers' fields. If an ecological approach to insect management is to be followed then it is likely, and logical, that a combination of several of these components will be necessary. Thus, these review attempts to identify optimum combinations of potential components of IPM that would be most relevant to apply in the fields of resource poor farmers growing chickpea. It is recognized that optimum components of IPM also need to be compatible with the other agronomic components of an integrated crop management (ICM) package. Thus, insect pest management options are viewed from a systems perspective to the farming enterprise. Examples of successful IPM approaches operating in farmers' fields have been sought, for their possible extrapolation to other situations. Admittedly, there are few examples of direct farmer involvement in evolution of IPM packages for food legume crops including chickpea, as currently advocated [6]. However, it is generally cognized that the need to involve farmers themselves in the evolution and evaluation of IPM strategies and hope that this assembly of information relating to IPM of chickpea will facilitate increased activities.

Constraints/problems in adopting of Ipm

The foremost constraints in adopting Ipm is farmers are unaware of the IPM technology and its method of application. Though if farmers were taught by Ipm practices but there is proper supply of bio pesticides and bio agents, their mass multiplication will become cumbersome and required trained personnel. There is no proper availability of true resistant varieties, lack of forewarning systems and besides these the linkages between research and extension system are weak.

Strategies for effective implementation of IPM practices

The basic approach to any pest management system will undoubtedly involve group action along the following lines:

- All farmers should sow synchronously at the optimum time and spacing. All farmers should prefer the cultivar that is less susceptible to the problem pests.
- If nonpolluting pesticides are known to be of undoubted economic value, then they should be applied as efficiently and as timely as possible, according to counts of eggs and young larvae.
- The crop should be harvested as soon as its reaches to its maturity, and crop residues should either be removed or plowed in.
- There should be a closed season during which the crop and, if feasible, the alternative hosts of the damaging pests are not grown in the area.
- Training of the farmers and extension personnel in IPM methodology
- Aggressive demonstration campaigns by R&D institutions in collaboration with state functionaries and non-governmental organizations (NGOs)
- Improved availability of critical inputs bio-pesticides, bio-agents and resistant varieties
- Development of monitoring tools and forewarning systems
- Advocate use of safer pesticides and appropriate application methods
- Research on multiple disease and pest resistant varieties.
- Holistic integration of all in formations to develop bio-intensive and cost-effective practices.

Conclusion

The major pests in the chickpea can be controlled by following IPM practices and there were some constraints reported like non availability of bio agents in market, non available at the right time, lack of proper awareness among farmers regarding IPM practices and all these can be overcome by providing the required inputs at the right time and conducting training programmes to farmers at the village level to motivate and guide farmers to implement IPM practices in their field.

Bibliography

1. www.niphm.gov.in

2. Ahmed K. "Research on Pulses Entomology at National Agricultural Research Center". *Islamabad Proceedings of the Group Discussion: Pulse Pests Management* 502 (1983): 28-30.

3. "Annual Report, Food Legumes Improvement programme". Pakistan Agricultural Research Council. *ANONYMOUS*, (2002).

4. Das GP. "Efficacy of Neem Oil on the Eggs and Grub Mortality of *Callosobruchus Chinensis* Linn. (Bruchidae: Coleoptera)". *Trop. Grain Legume Bull* 34 (1987): 14-15.

5. Lal SS., *et al*. "Assessment of Crop Losses in Chickpea Caused by *Heliothis Armigera*". *FAO Pl. Prot. Bull*, 33 (1985): 27-35.

6. Ooi PAC. "Plant Protection in the Tropics. Tropical Plant Protection in the Information Age". *Proceedings of the MAPPS Fifth International Conference* (1999): 57-60.

7. Reed W. "Estimation of Crop Losses Due to Insect Pests in Pulses". *Indian Journal of Entomology (Special Issue)* 2 (1983): 263-267.

8. Yadava CP and SS Lal. "Studies on Host Plant Resistance against Gram Pod Borer, *Helicoverpa Armigera* in Chickpea". *Symposium on Integrated Pest Management for Sustainable Crop Production*, (1997).