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Bionomics and Integrated Management of Fall Army Worm (FAW), *Spodoptera frugiperda*

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Abstract:-

The Fall Army Worm(FAW), *Spodoptera frugiperda*, which is a polyphagous pest of many crops, mostly cereals. The pest is indigenous to the Americas' tropical and subtropical regions. Based on its vast range of hosts (more than 400), natural capacity to live in a variety of settings, robust migrating ability, high fecundity, and quick development of insecticide resistance, it is classified as a "Super pest". The maize is a staple crop of many countries and it is third most grown crop after wheat and rice. Maize crop is highly susceptible to this invasive pest. Due to this pest, maize grower farmers are not getting the yield and productivity of maize which cause the suicide cases in many countries. The Integrated Pest Management (IPM) of this pest is very much important by using various applications as cultural methods, physical methods, bio-control agents (parasitoids, predators), microbial agents (viruses, bacteria and entomopathogenic fungi), pheromones (sex attractants), Botanicals, ITK methods and chemical control.

Key words- Fall Army Worm, *Spodoptera frugiperda*, Maize, Polyphagous, Super pest, IPM

Introduction

Due to its great value as a stable food, as well as its stover demand for animal feed and fuel, as well as for construction uses, maize is one of the most important and well-known cereal crops. The "Queen of Cereals", or maize, is the third most significant cereal crop in the world after rice and wheat. This pest affects a variety of economically significant farmed crops, including maize, millet, wheat, potato, soybean, cowpea, peanuts, sorghum, rice, sugarcane, even vegetables and cotton. It is time to consider pest to FAW that harm the high-value crops that have been produced. The livelihood of a farmer is significantly impacted as a result of autumn armyworm's severe destruction to this crop. This is first reported in 2018 AD from Karnataka, India, was made in Asia. FAW has created numerous resistances and cross-resistance mechanisms against various pesticides and transgenic *Bacillus thuringiensis*

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(Bt) maize, over the course of the last few decades.To control this pest, sustainable crop management should be used. Numerous linked organisations, like IRRI, CIMMYT, FAO, etc., place a strong emphasis on its prevention measures.

Identification

Initially white or pale green, eggs eventually cover themselves in scales and turn a distinct brown colour before hatching. The simplest to recognise are caterpillars that are half-developed or fully grown. The larvae are typically identified by three yellow stripes on the back, a black stripe on the side, and three more yellow stripes on the back. The second-last portion has four dark specks arranged in a square. A short hair covers each area. The head is dark and has the typical frontal upside down Y-shaped pale marking. The back wings are greywhite, whereas the front wings are dark brown.

Biology

The FAW, adult population is nocturnal by nature. In warm weather, a female moth can produce up to 1500–2000 eggs in her lifetime of 2–3 weeks by laying 6–10 egg masses, each containing 100–300 eggs. Near the plant's base, masses of eggs are frequently placed on the underside of the leaves. These eggs have protective scales on them that were shed from the mouth's abdomen after they were laid. Within 2 to 3 days, the eggs hatch. There are six stages of larvae. The colour of young larvae is faint. At the most advanced stages, they

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change from brown to light green before turning dark. The larval stages span for twelve to twenty days (depending on temp. and environmental conditions). Before pupating, the caterpillars burrow 2 to 8 cm deep into the soil. The 20–30mm long loose silk oval cocoon has been made by them. The pupa, which is dark brown, usually hides in the earth but can also do so on a stalk. Pupa lives last 12–14 days before emerging as adults. The moth is 3–4 cm in width and has a two–three week lifespan.

Nature of damage

The young caterpillars feed superficially after hatching, typically on the undersides of leaves. When the leaves are fed, "windows" semi-transparent patches appear on the leaves. In young plants, the leaf whorl is desired and growth points can be killed by feeding, which prevents the development of new leaves or cobs. There are frequently only 1 or 2 caterpillars in each whorl because, as they grow older, they develop cannibalism and will eat one another to lessen competition for food. The plant is covered in a significant amount of frass. This will resemble sawdust when it dries, feeding activity increases at night by the caterpillars.

Management

The pest can be managed by using various integrated tactics which are mentioned below –

- ITKs :- By using Activated soil, sour& fermented butter-milk, Agni-astra and Darek-astra
- Cultural methods:- apply push-pull technology as habitat management strategy which entails using a repellent intercrop (Desmodium as a "push") and an attractive trap

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plant(Napier grass as a "pull"), destroy the egg masses and caterpillars by hand picking, avoid late planting etc.

- Biological agents as predators(ants, wasp and earwig) and parasitoids (*Trichogrammapretiosum*, *Telenomus remus* and *Cotesia marginiventris*)
- Microbial methods are very much effective which include viruses such as *Spodopterafrugiperda* Multicapsid Nucleopolyhedrovirus (SfMNPV), fungi as *Metarhizium anisopliae*,*Metarhizium releyi*, *Beauveria bassiana* and bacteria,such as the *Bacillus thuringiensis*(Bt) etc.
- By using sex Pheromones or sex attractants
- Botanical extracts can also be used as Neem extracts, Marigold and Nicotiana etc.
- Chemical method:- This should be the last strategy for managing any pest because it cause some harmful effects on environment, animal and human beings. FAW can be effectively managed by using Spinosad 45 SC @ 0.3 ml/lit; Emamectin benzoate 5 SG @ 0.4/lit; and Chlorantraniliprole 18.5 SC @ 0.4ml/lit etc.

Conclusion

America's subtropical and tropical regions are home to the Fall Army Worm (FAW). The pest, which was discovered in Africa in 2016 and was first found in India in 2018, is costing farmers in Karnataka and other southern Indian states significantly. The infestation has reached Mizoram in the northeast, Uttar Pradesh in the north, Gujarat in the west, Chhattisgarh in the centre of India, and a number of states in the south as of 2019. Twenty Indian states have reported seeing the pest. Recently, FAW's existence has also been established in Bangladesh and Sri Lanka. Among the more than 80 plant species that FAW larvae can eat include maize, rice, sorghum, millet, sugarcane, vegetable crops, and cotton. If poorly handled, it might result in severe yield losses. Each year, it may produce numerous generations. In addition, for the short, medium, and long terms, it is crucial to introduce, validate, and use low-cost, environmentally safe, and efficient technological interventions. In order to effectively control in India, numerous national and international organisations and institutions have been working on developing the necessary measures.

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