



Spodoptera frugiperda: An Emerging Pest of Maize

Babita Bhatt¹ and Anjali Joshi²

Article ID: 30

¹Department of Entomology, GBPUA&T, Pantnagar

²Department of Genetics and Plant Breeding, GBPUA&T, Pantnagar

Corresponding Author: babitabhattach91@gmail.com

Introduction

Maize (*Zea mays* L.) being monoecious in nature is the third most widely cultivated crops in the world after wheat and rice. It is also known as queen of cereals. In Indian context maize is grown throughout the year but is predominantly a *kharif* crop covering 85% of the total area under cultivation in this season. Owing to its higher adaptability it is capable of being grown under diverse environments including tropics, sub tropics and temperate regions. Though highly adaptable to diverse agro climatic zones, maize is frequently affected by a number of biotic and abiotic stresses which are responsible for markedly affecting its quality and quantity. Among biotic stresses insect pests are the major factors affecting the quality of maize crop. The crop is attacked by various insect pests at different crop growth stages. *Chilo partellus*, *Sesamia inferens*, *Helicoverpa armigera*, *Aherigona orientalis*, *Calocoris angustatus*, *Mylocerus spp.*, *Pyrilla perpusilla*, *Rhopalosiphum maidis* and *Peregrinus maidis* are some insect pests attacking maize crop.

Besides, all these insect pests, *Spodoptera frugiperda*, fall armyworm (Noctuidae: Lepidoptera) is a newly introduced insect pest attacking maize crop throughout the country. It is a native of North America. A study revealed the Southwest monsoon winds and the strong flight capacity of this pest to be responsible for its spread from African continent to Indian continent every year from June to September. Thus, this pest was reported from India in June, 2018 in the maize growing fields of Karnataka. Further in the month of August this pest was reported from 15 districts of Maharashtra. It has also been reported from the sugarcane growing fields of Tamil Nadu. Presently, this notorious pest is seen attacking various crops in almost all the states and union territories of country thereby, assuming the status of major pest of corn throughout India.

Host Range

Spodoptera frugiperda (fall armyworm) is a polyphagous pest attacking more than 300 plant species including cereals, forage grasses, ornamental and vegetable crops. The most preferable host are the crops belonging to Gramineae/Poaceae family including sweetcorn, maize, sorghum, millets, sugarcane, wheat, rice etc. These larvae acquire an armyworm habit when they are large in numbers thereby consuming all the vegetation in their path. Several weed plants such as *Digitaria spp.*, *Agrostis spp.*, *Sorghum halepense*, *Cyperus spp.* etc. are also the host crop of this insect pest.



Identification

The pest completes several generations in its life cycle depending upon the climatic conditions. At a temperature of 15⁰C to 30⁰C a single female moth lays dome shaped eggs on the underside of leaf or on the inner side of the leaf whorl in maize crop. These eggs are loosely covered with pale yellow coloured hairs. After egg hatching (usually 2 to 10 days) initial larval instars of fall armyworm larva are green in colour with black head. At latter stages the dorsal surface of larvae develops brown colour and lateral white lines are formed. It also has an inverted Y-shaped mark on its head and four dark spots that form a square towards the end of its body on 8th and 9th abdominal segments. The larval body lacks microspines giving it a smooth appearance when it is touched. This pest usually has six larval instars while occasionally it may have five also. The larva enters into pupation in the soil by burrowing about 2-8 cm soil surface. The fully formed male moth is brown with triangular white spots at the tip and near centre of the wing. In female moths the forewings are less distinctly marked. The adult moths are nocturnal and they live for about 12-14 days.

Nature of damage

The young larvae feed gregariously and damage the leaves by scrapping the epidermal layer of leaves leaving behind a silvery transparent membrane. Older larvae cause an extensive damage by feeding on the leaves and leaving behind only the midrib and stalks of the plant. The larvae reduces the growth potential of plant by burrowing the growing point such as buds, whorls etc. of the host plant. The fall armyworm larvae may also burrow through the husk on the side of the ear of corn plant and feed on kernels. Cannibalistic nature has been observed in second and third instar larvae therefore, usually one or two larvae are present per whorl.

An attack by this pest at an early stage of plant may result in high plant mortality leading to huge yield loss. In Africa, this pest in the year 2017-18 resulted in the monetary loss of US \$2 billion putting the food security at risk in this continent. In India in the year 2019, outbreak of *Spodoptera frugiperda* in maize field of 122 villages in Mizoram lead to a loss of Rs 20 crores. This pest is considered as a threat to global food security in India since this notorious pest is expanding its host range from maize to sugarcane.

Management

Ploughing the field exposes the larvae and pupae thereby making them vulnerable to adverse environmental conditions and causing their mortality. Intercropping with suitable crops such as legume crops (beans, soybean and groundnut), habitat manipulation and maintaining or restoring the soil organic carbon content can also be adopted. Mechanical methods include hand picking of the egg masses and caterpillars. Neem, cymbopogon and pyrethrum are some of the botanicals that are effective in managing this insect pest population. Entomopathogenic fungi such as *Beauveria bassiana* and *Metarhizium anisopliae* are effective against egg and second larval instar of fall armyworm. Virus based insecticides mainly belonging to Baculovirus group such as multiple nucleopolyhedrovirus (SfMNPV), entomopathogenic nematodes (*Steinernema feltiae*, *S. carpocapsae* and *S. riobravivis*) parasitizes the larval instars and have a high potential for managing this pest. Chemical



protectants such as cypermethrin, permethrin, lambda cyhalothrin, emamectin benzoate and malathion have recommended to manage this pest. However, these insecticides produce several adverse effects on environment, soil and non-target organisms (humans and natural enemies) therefore it is desirable to use ecological control (cultural, mechanical, botanicals, biopesticides) to manage this insect pest.

Conclusion

Enormous loss both in terms of quality and quantity have been reported by this insect pest throughout the World. High host range of this insect pest raises the concern to manage it at an early stage by adopting suitable Integrated Pest Management programme for maize crops. Future concern should be on working at Host Plant Resistance aspect of insect pest (*Spodoptera frugiperda*) management so as to develop a greater number of resistant varieties against this polyphagous pest and minimize the loss caused by it.