



Fall Armyworm in India: Their Management

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Introduction of Fall Armyworm

The Fall Armyworm (Pest) was firstly found in the tropical regions of America and Argentina. It normally survives the winter successfully in the United States only in southern Florida and Southern Texas. And then when summer comes, its moths (adults) fly to other places and cover a long distance every year during the summer months. It is believed that its moth (adult) can travel 100 km in one night and which it gradually spread. In India, this insect was first seen in a maize field in Chikkaballapur district of Karnataka state in June 2018, it did not take long for scientists to identify this new insect. By the second week of July, researchers from the National Bureau of Agricultural Insect Resources (NBAIR), an institute under the Indian Council for Agricultural Research, said the new pest was the Fall Armyworm (FAW). The spread of fall army worm (pest) has been rapid in India. In the year 2019, the pest has spread to Mizoram in the Northeast, Uttar Pradesh in the North, Gujarat in the West, Chhattisgarh in central India and several states in the south. This year, farmers in the northeastern states have been suffering in a big way. Epidemic of this insect has been reported from about 20 states of India. FAW incidence was closely monitored in Maize, sorghum, and other millet fields. Based on the whorl damage, sorghum was found to be the most preferred host among maize (55-65%) followed by millets (60.1%), pearl millet (41.4%), barnyard millet (22.9%) and finger millet (10.2%). It is believed that this reduction in production was due to the fall army worm.



Figure 1: Scientific classification: Kingdom: Animalia, Phylum: Arthropoda Subphylum: Hexapoda Class: Insecta, Subclass: Pterygota, Order: Lepidoptera, Family: Noctuidae, Sub Family: Noctuinae, Genus: Spodoptera Species: frugiperda

Source: Journal of Entomology and Zoology

Life- Cycle of Fall Armyworm:

Egg

The diameter of the eggs ranges from 0.3 to 0.4 mm. The eggs lay on the undersides of leaves or on the tops of leaves. And eggs lays as two to four layers on the surface of the leaf and sometime on the stem. The female provides a protective layer to the egg clusters

by covering them with hair on her abdomen. About 1000 eggs can be laid by a female during her life time. Egg maturity takes up to 2-3 days (20-30 °C). The egg sare in clusters of about 150-200 numbers.

Larva

The larvae of the fall armyworm are light green and dark brown in color with longitudinal stripes. The larva can be about 4.0 - 4.5 cm in length. The larva has eight legs and the larva undergoes metamorphosis five times in its life. The head of the newly born larva is black in color and the rest of the body is green. In the third metamorphosis, the underside of the body turns brown, with even white lines forming. The head turns reddish brown in the fourth to sixth transformation and firstly, is black-brown at first. A white inverted "Y" mark is also found on fully mature larvae. If you look carefully, the texture of the upper cell wall (skin) of the larva is rough or dry. The duration of the larva is about 14 days in summer and 30 days in winter.

Pupa

The length of the pupa is less than of the mature larva. The colour of the pupa is bright brown. Pupation mainly occurs in the soil. But sometimes it also happens in crop residues if the soil is very hard. They form cocoons on the surface of the soil. The duration of pupa is about 8 to 10 days in summer and 20 to 30 days in winter.

Adult (Moth)

The wingspan of the moth spreads to about 32 to 40 mm and male insect, the front wing is usually brown and greenish brown, on which triangular white spots are also found. Which are less clearly visible on the wings of female moths, which are uniform greyish brown and fine beige in colour. The back feathers are uniform silvery white in both males and females and the outer border is grey in colour. Adults are nocturnal and most active during evening's time. The female usually lays most of her eggs during the first four to five days of her life, with a moth's life span of about 10 days, sometimes up to 21 days in certain circumstances.

Host plants

This insect belongs to the polyphagous class, which causes damage to more than 80 plant species, mainly maize, oats, millet, groundnut, sugarcane, soybean, sweet corn, tobacco and wheat etc.

Damage identification

The larva of this insect initially prefers to feed on the soft vegetative part of the plant. The newly hatching larva initially eats by scraping the tissue (green part) from one side of the leaf, and the green layer remains on the opposite side. After the second or third metamorphosis, the larvae start making holes in the leaves, gradually making various holes in the leaves of the plant, making them reticulate and insect faces are also found on the leaves and eating the leaves from the edge. As it grows, it disintegrates the entire leaves of the plant and sometimes leaves only the stalk. This is due to its cannibalistic behaviour that a larger larva - eats other smaller larva, so usually per One to two larvae appear on the plant. The larva destroys the plant's growth-development potential by piercing the veil of the plant.

Economic impact

Bowdran., *et al.* (2019) reported that standing crop losses in maize between 26.4 to 55.9% in the yield. Where in Chimweta., *et al.* (2019) have reported damage level in the crop between 58-60% yield loses.

Integrated Pest Management (IPM)

- To avoid this pest, do deep ploughing the field in the summer month, due to deep ploughing the pupa comes upwards due to which its natural enemies like bird, heron etc. eat it.
- Adopt crop rotation and changes the sometime of sowing of crops.
- Manage the crop residues after harvesting, killing the eggs, larvae, pupae and adults left in the field and Keep cleanliness around the field
- Use the recommended dose fertilizers in proper quantity.
- Must visit the field at least twice a week and see if any egg or bunch of eggs is seen in any way, destroy it immediately.
- Plant at least 5-10 stands per acre for birds to sit.
- Use of Punch in the field for monitoring
- Use the species of egg parasite *Trichogramma* and *Telenomus remus* @ 50,000 per acre in the field at weekly intervals.
- Apply neem cake at 250 kg per hectare in the soil to prevent pupa to adult.
- Apply 5% extract of Neem seed kernel or Neem Oil (*Azadirachtin*) 1500 ppm @ 40-50 ml/10 ltr of water immediately on showing early signs of damage.

- Use the *Metarhizium anisopliae* and *Beauveria bassiana* have been found effective management against eggs, first and second – instar larvae of fall armyworm
- If the pest population cross the economic damage level (EIL) of this insect is 5%, if the plant is affected, use chemical insecticides in the field.
- For chemical control, use Agrochemical Company's Krioxam (Thiamethoxam 25% WG) @ 80-100 gm/acres in seed treatment and soil treatment or Cryster-5 (Emamectin Benzoate 5%SG) @ 5 g/10 liters of water, or two sprays of KARE (Indoxacarb 14.5% SC) @ 80- 100 ML/acre or ANTH 505 (Chloropyriphos + Cypermethrin) @ 400- 500 ML/acre, or JOSH (Imidacloprid 17.8% SL) @ 400 -500 ML/acre At 10-15 days interval, first spray at economic loss level and second spray, 10-15 days after first application.