

Life cycle of Maize Fall armyworm / Leaf whorl armyworm

Maize Fall armyworm / Leaf whorl armyworm: Life cycle and damage symptoms

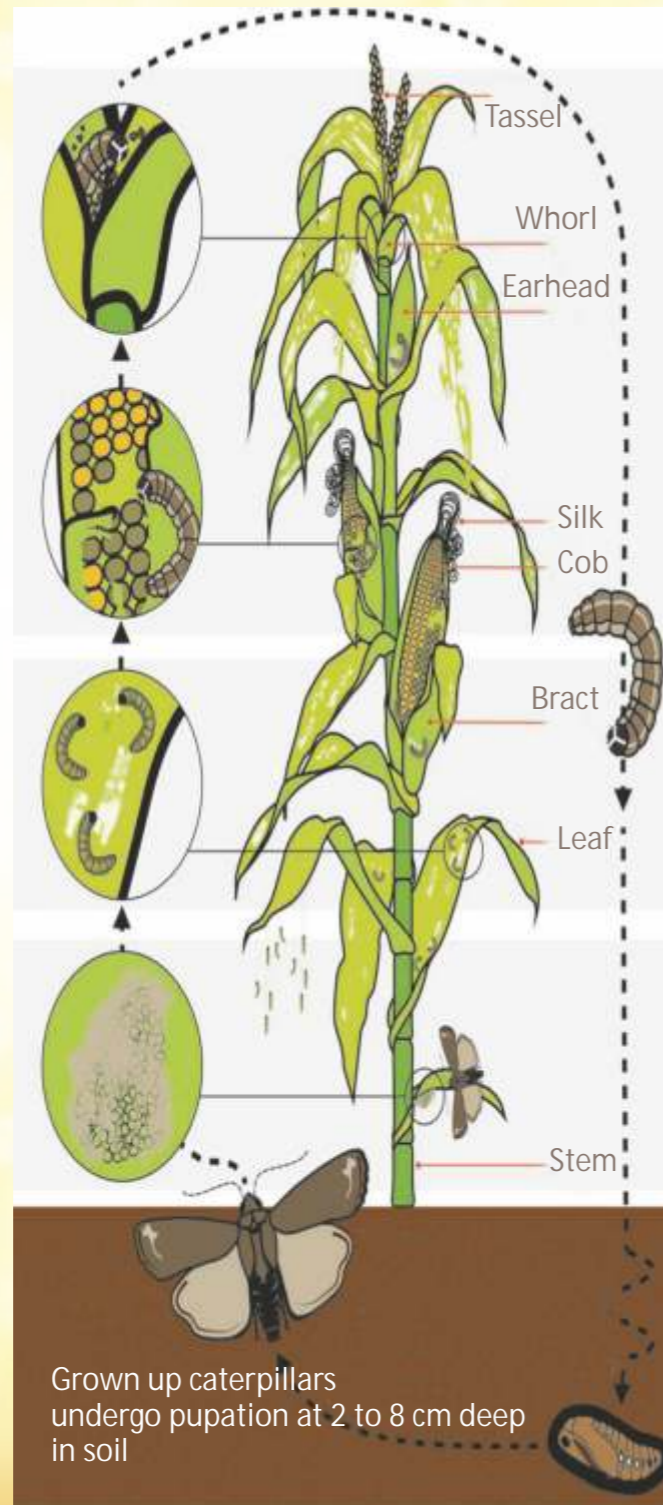
➤ The Fall armyworm life cycle includes egg, 6 larval stages (instars), pupa and adult.

Larval growth stage: 4-6 instars

- By stage 4-6, it reaches plant whorl and causes maximum damage to the plant and produces ragged holes in the leaves.
- Feeding on young plants can kill the growing point, resulting in no new leaves or cobs development.
- Often there are only 1 or 2 caterpillars in each whorl as they become cannibalistic.
- Large quantities of frass (caterpillar excreta) is seen in the whorl. When this dries, it resembles sawdust.
- On the older plants, caterpillar bores into the cobs and feeds on the developing kernels (seeds).

Larval growth stage: 1-3 instars

- After hatching, the young caterpillars feed superficially on the leaves by scrapping and it results in appearance of semi-transparent white patches on the leaves.
- Young caterpillars move to the new plants by spinning silken thread.
- Caterpillars prefer to feed in leafwhorls of young plants and feed more actively during night time.
- The adult female moth lays 100-200 eggs on the leaves.
- The eggs are covered in cream coloured protective scales. In 3-4 days neonates emerge from eggs and complete their life cycle in 36-42 days.



Grown up caterpillars undergo pupation at 2 to 8 cm deep in soil

Maize Fall armyworm / Leaf whorl armyworm

Spodoptera frugiperda



Guide for Pest Management Practices

Preventive measures	Monitoring	Control measures	Control measures
<ul style="list-style-type: none"> • Deep ploughing to expose pupae for predation and direct exposure to sun light • Wherever possible, sow early at first rain and follow synchronous planting in entire maize area to reduce population build up and multiple generations of FAW • Intercrop/Alley/Mixed crop of maize with suitable pulse crops of particular region (pigeon pea/black gram/ green gram) • Follow proper crop management process through recommended dose of manures and fertilizers 	<ul style="list-style-type: none"> • Start scouting as soon as maize seedlings emerged and observe for the presence of damage symptoms • Observe for the presence of egg mass or white patches on leaves. At later stages observe for damage on leaves (elongated holes, torn appearance with frass) • Action threshold: Early to mid whorl stage (15-30 days after sowing) - 5 to 10 % damaged plants • Mid stage (30-50 days after sowing) - 10-20 % damaged plants • Later stage (50-70 days after sowing) - more than 20 % damaged plants 	<ul style="list-style-type: none"> • Collection and destruction of egg masses and neonate larvae whenever seen in the field • Application of 5% NSKE / neem formulation - azadirachtin 10000 ppm @ 2 ml per liter of water to kill eggs and neonate larvae • At early crop stage (15-30 days after sowing): Release egg parasitoid <i>Trichogramma pretiosum</i> @ 3 cards (50000 eggs)/acre - two times at 15 days interval. (Egg cards are available at NBAIR, Hebbal and RCIPMC, Kadugodi, Bangalore and State biocontrol labs) • Spray entomopathogenic fungi <i>Metarhizium rileyi</i> (= <i>Nomuraea rileyi</i>) @ 2-3 grams per liter of water (It is available at UAS, Dharwar) or <i>Metarhiziumanisopliae</i> @ 3 grams per liter (It is available in all state biocontrol labs) 	<ul style="list-style-type: none"> • Application of Bt insecticide @ 2 ml/l • Spraying of spinetoram 11.7 SC @ 0.5 ml • chlorantraniliprole 18.5 SC @ 0.4ml • orthiamethaxam 12.6 % + Note: Spray should be directed into to the leafwhorls <p>Restrictions</p> <ul style="list-style-type: none"> • Restricted entry interval after insecticide sprays (REI) • Bt insecticide - One day • Spinetoram - Four hours • Chlorantraniliprole - 12 hours • Thiamethaxam + lambda cyhalothrin - 24 hours

Fall armyworm / Maize leaf whorl armyworm



Prabhu Ganiger | Shylesha, A.N. | Murali Mohan, K. Mallapura, C.P. | Sharanabasappa Bhaktavatsalam, N. | Kalleshwaraswamy, C.M. | Prakash, K.N. Sudhakar, T.M. | Malvika Chaudhary



Fall armyworm – How to identify



Fall armyworm / Maize leaf whorl armyworm

➤ Fall armyworm (Spodoptera frugiperda) is a new pest in India, damaging maize crop.

The caterpillars mainly feed on young maize plants.

➤ They have also been recorded causing damage on sorghum and pearl millet (Bajra).

Identification

- Does it have a dark head with an inverted Y-shape marking on the front (blue circle)?
- Does it have four dark spots forming a square towards end of the abdomen (red circle)?

Damage symptoms

- Fall armyworm caterpillars feed inside whorls on young plants.
Young caterpillars feed by scrapping the leaves, resulting in formation of white, semi-transparent patches on the leaves.
- Damage by grown up larvae is characterized by torn appearance on leaves and presence of moist saw dust like frass near the whorls on upper leaves of the plant.
- Deep feeding in the whorl may destroy developing tassels.
- Caterpillars enter the cob and feed on developing kernels.

Leaf whorl armyworm - Damage and symptoms



Young caterpillars feed by scrapping and produce semi-transparent patches on the leaves



Young caterpillars spin silken threads and move from one plant to another plant



Early instar larvae feed in the whorls and result in formation of small holes on leaves



Grown up larvae feed extensively and results in 'torn appearance' of the plant



Feeding results in extensive damage to the leaves and frass is seen on the whorls



Caterpillars occasionally also feed on cobs



Larvae feed on developing kernel on the cob



Fall armyworm damage symptoms on maize crop



Adult females lay 100-200 eggs in masses on the leaves



Eggs are covered in cream colour edprotective scales



After hatching, the young caterpillars feed by scrapping the leaves



As they grow, caterpillar's colour changes from light green to brown



Larva of fall armyworm has four dark spots forming a square on tail end of the abdomen



Larval head is dark with a pale inverted Y shaped marking on the head



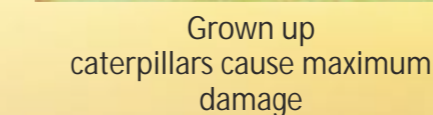
Grown up caterpillars cause maximum damage



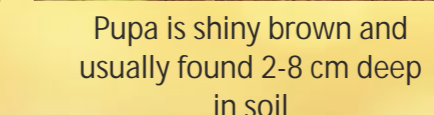
Pupa is shiny brown and usually found 2-8 cm deep in soil



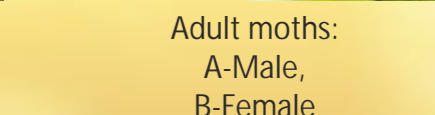
Adult moths:
A-Male,
B-Female



Grown up caterpillars cause maximum damage



Pupa is shiny brown and usually found 2-8 cm deep in soil



Adult moths:
A-Male,
B-Female