



A Guide for Fall Army Worm Identification and Management Version 2



National Plant Protection Centre
Department of Agriculture
Ministry of Agriculture and Forests
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THE PEST ORGANISM

Common name: Fall Army Worm (FAW)

Scientific name: *Spodoptera frugiperda* (J E Smith)

Order: Lepidoptera

Family: Noctuidae

Fall armyworm (FAW), *Spodoptera frugiperda* (J E Smith) is a very important invasive pest species native to tropical and subtropical America which been spreading rapidly through Africa since 2016, in Asian countries (India, China, Sri Lanka, Thailand, Myanmar) since 2018, and in 2020 arrived in Australia via Papua New Guinea.

In Bhutan, FAW was first detected and identified through morphological and molecular analysis from maize fields in Punakha in September, 2019. Since then NPPC has also confirmed its presence in maize in Chukha dzongkhag and reports of its infestations in Sarpang dzongkhag has also been documented. As per their feeding habits, the FAW is categorized under the two strains of “corn” and “rice”. Molecular analyses of specimens from Bhutan indicate it to be the “corn” strain that primarily prefers to feed on maize.

FAW is a serious pest due to its polyphagous habit of feeding on over 80 different crop species. While

FAW has a preference for maize, it can damage other crops such as sorghum, rice, sugarcane, cabbage, beet, groundnut, soybean, onion, cotton, pasture grasses, millets, tomato, potato and cotton. FAW can spread quickly across large geographic areas as the moths have been reported to migrate over 500 km and with favorable wind patterns, moths have been recorded to undertake flights of 1,600 km from the southern United States to southern Canada in 30 hours.

FAW is a pest of tropical origin, unable to undergo diapause or survive cold conditions. Therefore, in Bhutan, it may not be able to survive the cold winters or overwinter in the temperate regions. However, FAW might establish as permanent, multigenerational pest in the southern region of the country from which it can possibly migrate to the interior parts of the country with the availability of suitable host plants and onset of favorable climatic conditions.

LIFE CYCLE AND IDENTIFICATION OF FAW

The FAW life cycle is completed in about 30 days during the warm summer months but may extend to 60-90 days in cooler temperatures.

EGGS

Eggs are found in masses on the lower parts of the plant. It is mostly laid on the undersides of the leaves and occasionally also on the upper side of the leaves and stems. The eggs are laid in masses of up to several hundreds. Eggs are pale green or white at the beginning and turn brownish before hatching. The female also deposits a layer of grayish scales giving a furry appearance. The eggs hatch into larvae in 2-3 days. Neonates (small larvae) after hatching cling on the leaf with silken thread and with the help of wind it can swing and attach to spread to other nearby plants.



Eggs of FAW with fluffy hair



Neonates (young larvae) hatching from an egg mass



Newly hatched larva with a black



LARVAE

Half- to fully grown larvae are easy to identify. The larvae generally show **3 yellow stripes** on the back, followed by a **black**, then a **yellow stripe** on the side. It has a **black head** with a characteristic upside-down **Y-shaped** pale marking on the front. Four raised spots shaped like a **trapezium** on each body segment. On the second to last segment, the larva has a characteristic pattern of four dark spots forming a **square**. Each spot has a short bristle (hair). There are usually six larval instars stages which can complete development in 2-3 weeks to form pupa.



PUPA

Pupa are pale green and soft when newly formed, but its color gradually changes to a deep red-brown as it hardens. It is found 2-8 centimeters below the soil surface.



Male fall armyworm: has typical white spots on the tip and center of the forewings.



Female fall armyworm

ADULT MOTH

Forewings are **brown or grey**. Male fall armyworm moths have more patterns with a characteristic distinct **white spot** on the tip and center of each forewing. Males have a **disk shaped spot** on the center of the fore wing with three quarters of it being straw colored and one quarter being dark brown. The female moths have a greyish-brown forewing that is uniform in color. Both sexes have hind wings that are **silver-white** with a **narrow dark border**. Moths can live for an average period of one to three weeks and lay between 1000-2000 eggs.

Damage symptoms

After hatching, young larvae feed superficially, usually on the undersides of leaves and scrape the surface of the leaf, leaving visible thin semitransparent patches on the leaves called windows. As the larva grows in size, their feeding can result in small holes (pin hole damage) and bigger feeding holes (shot hole damage). Moist sawdust like frass (caterpillar poo) near the whorl and upper leaves of the plant are observed. When this dries it resembles sawdust. Deep feeding in the whorl may destroy developing tassels. Larvae can also enter through the side of the ear and feed on developing kernels.

**Some maize plants can still recover from certain leaf damage without losing much yield as they have a good capacity to compensate for foliar damage.*



Early instar damage by FAW:
Windowing



Pin hole damage



Shot hole damage on leaves



Frass on leaves



Maize whorl damaged by
FAW



FAW damaging cob



FAW damaging tassel

MONITORING OF FALL ARMYWORM

Regular field scouting and pheromone trapping is very important to initiate early measures in order to manage FAW effectively. Farmers often observe FAW infestations late, when large holes and frass are present by which major damage would have already occurred.

Pheromone traps: Helps determine the presence and buildup of FAW populations.

- Deploy 5 traps per acre, spaced 50 meters apart.
- Suspend the trap 1.5 meters above the ground.
Monitor every week, identify to separate from other species of trapped moths count and record the number of FAW trapped. Change the lures monthly.

Field scouting: Must be carried out regularly to detect **egg masses and early larval stages** which are easier to control.

- In the field, walk to make a letter “W” pattern avoiding the edges of the field.
- Stop at 5 points and inspect 10-15 plants at each stop. Look carefully at each plant for signs of recent FAW feeding damage.



Scouting pattern to monitor FAW in the field

SN	Maize crop stage	Action threshold	Recommended insecticides
1	Early whorl stage.	20% (10-30%)	Chlorantraniliprole 18.5% SC: 3 ml/10 liters of water Or Emamectin benzoate 5% SG: 2g per 10 liters of water
2	Late whorl stage	50% (40-60%)	Chlorantraniliprole 18.5% SC: 3 ml/10 liters of water Or Emamectin benzoate 5% SG: 2g per 10 liters of water
3	Reproductive stage	20% (10-30%)	Chlorantraniliprole 18.5% SC: 3 ml/10 liters of water Or Emamectin benzoate 5% SG: 2g per 10 liters of water

REFERENCES AND PHOTO SOURCES

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5. Fall Army worm in Africa: A Guide for Integrated Pest Management