

## **FALL ARMYWORM: A NEW EMERGING THREAT TO CEREAL FOOD CROPS**

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Food security is highly threatened by changing climates globally, these changes creating havoc from time to time. Fall armyworm (*Spodoptera frugiperda*) native to South America from there spread to Africa and was first detected in 2016. By 2018 it affected the north continent (10 states and territories) of Africa ravaged millions of hectares of maize and sorghum crops. Fall Armyworm (FAW) a dangerous pest native to America first reported in African states (central and western) in early 2016. Now FAW is spreading towards eastern parts, where the upcoming harvest is expected to damage by the pest. Even spreading beyond Africa to Asian countries like India and from there to other countries like China and Pakistan as this pest can spread very fast. The prevailing climatic changes hindering any predictions to say anything with certainty about its way of spreading to other parts of the world.

This pest can primarily affect maize but can feed on more than eighty (80) crop species (rice, millet, wheat, sugar cane, sorghum, and vegetables, etc) and damage heavily especially at the larval (caterpillar) stage (FAO, 2018). FAW larvae scatter in large numbers, ingest almost all vegetation on the way. The presence of green to straw-colored feces of match head size on the ground between cereal rows is the first visible sign of FAW caterpillars. They hide in the plant joints during the daytime and attack on leaves at night. FAW at the larvae stage feeds on leaf mass, indirectly reduce grain yield by affecting the photosynthetic leaf area. At the seedling stage, breakage of meristematic tissues can reduce the plant stand establishment or modified plant architecture (Buntin, 1986). These Armyworms outbreak and result in unpredictable loss to a range of vegetative and reproductive plant organs (Hardke et al. 2015).

Its lifecycle starts from eggs, hatching into caterpillars, that grow to become pupae, finally develops into a moth. All life stages are dangerous for the crop. The optimal temperature reported for FAW ranges from 11 to 30°C (FAO, 2018). Simmons, (1993) reported 30-35°C as the optimum temperature for development. However, low-temperature slows down the larval growth (Abrahams et al. 2017). Crop damage becomes more significant under water stress environments as compared to the FAW alone (FAO, 2018).

FAW usually damages leaves signalized by torn feeding and moist sawdust-like material close to the funnel and apex of leaves. To minimize the devastating effects of FAW on different crops, American farmers and scientists have studied this pest for centuries to manage the FAW. Their findings and experiences regarding sustainable management practices can be adapted to other parts of the world, threaten by FAW in the context of the socio-economic environment. These pests have the potential to fly 100 km per night and also to engulf a large number of crops as mentioned above. The insect can destroy crops throughout the year in the favorable tropical and sub-tropical climate provided with weeds and crops to feed on. FAW feeding, in the beginning, looks similar to other stem borers. In maize FAW feeding in the leaf funnel can damage emerging tassels. These worms try to enter through the side of the ear and feed on the flourishing seeds, in contrast to the stem borers that enter from the upper or lower part of the ear. We know that smallholding farmers rely largely on wheat and rice crops for their food and lively hood. In the Asian region, small-holding farmers cover up to 80% of farmlands, where rice, wheat, and maize make most of the cereals consumed daily.

### How to Identify FAW?

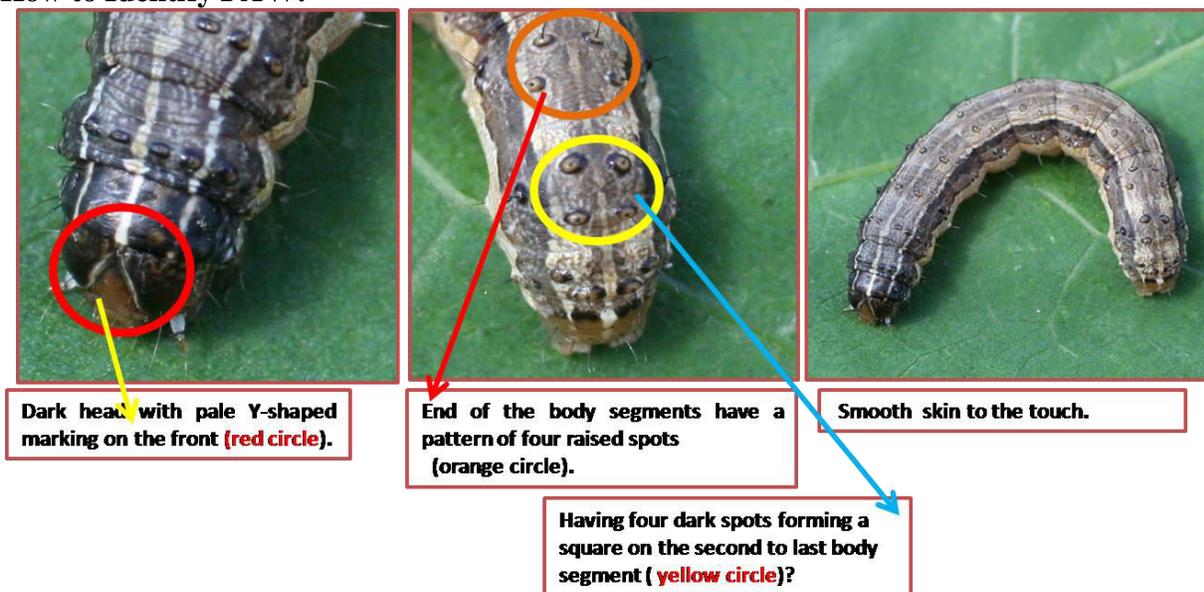


Figure 1. The figure is showing that how to identify the fall armyworm. (a) Showing the Y-shaped marking on the head (red circle). (b) Showing that each of the body segments has a pattern of four raised spots when seen from above (Yellow circle); Showing four dark spots forming a square on the second to last body segment (orange circle) (c) Showing four dark spots forming a square on the second to last body segment. (C) Showing smoothness of the skin as a phenotypic marker to identify the pest (Source: CABI plant-wise).

### **Monitoring of FAW on wheat crop**

To protect the damages from FAW pest, start scouting the field right from the germination at various field spots for the presence of larvae on wheat plants and the strength of the pest attack whether it is widespread or confined to certain areas or just edges. The pests can be spotted as caterpillars with light green to dark brown and also look for the pale Y-shaped marking and four dark spots on the head. Secondly, look for the sawdust-like material on the leaves and also the windowpane like the appearance of the leaves due to damaged green tissues (Fig. 2). Look for any leaf injury and presence of caterpillars. The threshold for the given treatment is 2-3 larvae per linear foot of row in wheat with active feeding symptoms. These pests feed during night and cloudy weather.

### **Directions to protect the wheat crop from fall armyworm**

To minimize the damage to crops by FAW, early maturing varieties should be planted and late planting should be avoided, and also plant a crop at the same time to avoid continuous food source for the insect (CIMMYT, 2017; Henderson et al. 1966). Early maturing varieties can help to escape the pest infestation at the end of the crop season. Moreover, optimum use of fertilizer at the right time may help to compensate for the damage done by the pest. Making friendly/ optimal surrounding environment for beneficial insects (beetles and parasitoids) on the edges of the crop field. Eradicating unwanted weeds/ grasses from the field margins can help to reduce the food sources for the worms and ultimately reduced damage to the crop.



**Fig a Eggs mass of *S. frugiperda* (Desiree van Heerden, Syngenta)**



**Fig b Early damage: "windowpane"**

Figure 2. The identification of Fall Armyworm on the wheat crop (a) Eggs mass of *S. frugiperda* (Desiree van Heerden, Syngenta), (b) Early damage: “windowpane” Source (Phil Sloderbeck, Kansas State University, Department of Entomology).

**How to differentiate FAW from other armyworms (maize stem borer and cotton bollworm)?**

Although cotton bollworm mostly depicts a similar dot pattern on the back but has a paler head, inverted Y can also be found but of the same colour as the rest of the head. Cotton bollworm feels rough to the touch due to spines unlike the fall armyworm (Figure 3). However, FAW can be spotted as caterpillars with light green to dark brown in colour and pale Y-shaped marking with four dark spots on the head (Figure 1).



Figure 3. Differentiating Fall Armyworm from other armyworm species

**Conclusion**

Cereal crops like wheat and rice are the main food crops in the country. Hence, to safeguard these crops from such outbreaks is imperative to ensure food security for the fast-growing population of the country. An integrated approach that is called Integrated Pest Management (IPM) consisted of cultural practices along with chemical and biological control measures that can be employed to control the infestation of these devastating Fall Armyworms.

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