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## Report of fall army worm *Spodoptera frugiperda* Smith, J. E., from Uttarakhand

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**Abstract**

Incidence of Fall Armyworm *Spodoptera frugiperda* Smith, J. E., on Maize was observed in Pantnagar, Udham Singh Nagar, Uttarakhand in last week of July 2019. Identification of the pest was confirmed based on the morphological characteristics. Third instar larvae of the pest were brought to the laboratory and reared. The larvae had undergone to pupation nine days after collection. Pupal period lasted for 4 days. Adults emerged were left for mating and egg laying. The mating period was found to last for 5 days. Eggs were laid in batches of 80 to 160. Incubation period was 4 days. The pest has a devastating record on various crops in South India. The spread of this voracious pest into Uttarakhand was highly notable due to the economic loss it causes. The present report gives an alarm for the state to take preventive and control measures against the pest.

**Keywords:** Fall army worm, *Spodoptera frugiperda*, Uttarakhand, maize, G.B.P.U.A.T

**Introduction**

The invasive agricultural pest Fall Armyworm (FAW), *S. frugiperda*, Smith, J. E., poses a serious danger to agriculture and cause billions of dollar in relations of reduced production and productivity. The FAW is a polyphagous pest that feeds on at least 100 plant species belonging to 27 families [1]. FAW has been confirmed in over 43 African countries [2]. It is reported to cause a 34% reduction in grain yield [3] and annual loss up to US dollars 400 million in Brazil [4]. It is reported to cause major damage to economically important cultivated grasses such as rice, sorghum, and sugarcane as well as 23 horticultural crops like cabbage, beet, tomato, potato and onion besides cotton, pasture grasses, peanut, soybean, alfalfa and millets [5, 6]. This pest has been noticed for the first time on the Indian subcontinent in mid-May 2018 in maize fields at the College of Agriculture, (UAHS), Shivamogga. Comparable information has also just been released based on independent surveys by the National Bureau of Agriculturally Important Insect Resource (NBAIR) under the Indian Council of Agricultural Research [7]. FAW has spread quickly due to its short reproductive cycle and ability to travel long distances quickly in the adult (moth) stage. Therefore, urgent attention and preparedness on the threat of FAW is crucial. The FAW flies on prevailing winds, has a short life-cycle, and attacks a wide range of crops, rendering it a serious economic risk to our farmers.

**Materials and Methods**

During the survey in Pantnagar, district Udham Singh Nagar of Uttarakhand, maize field located in Crop Research Centre G.B.P.U.A.T Pantnagar showed distinguished damage symptoms. The damaged plants were showing characteristic shot hole with ragged leaf symptoms. Third instar larvae along with the damaged shoots were brought to the laboratory of Department of Entomology, College of Agriculture, G.B.P.U.A & T, Pantnagar for detailed observation. The larvae were reared in the laboratory condition at room temperature and all the stages viz., egg, larva, pupa and adult were critically examined for distinct morphological characters to identify the pest. Male genitalia was dissected [8] and compared with earlier findings [1, 9]. Before Dissection of male genitalia abdomen was boiled in 10% KOH solution then dissected and imaged under binocular microscope. For further confirmation larvae and adult stage of insects were sent to the Division of Entomology, Indian Agricultural Research Institute, New Delhi and the pest was identified as Fall Army Worm, *S. frugiperda* Smith, J. E., which is registered under RRS. No. 15131-33/19 in IARI.

## Results and Discussion

### Nature of damage

Characteristic shot holes on the leaves. Grown up larvae were found limited to whorls and feeding between the leaves showed the characteristic symptom of ragged appearance (fig- 1, 2, 3, 6). A mass of faecal matter accumulated within the whorl. Larvae were feeding on developing shoots.

### Egg

Eggs were creamy white covered with greyish scales, deposited in the batch of 80 to 160 eggs. (Fig-6)

### Larva

Early instar larvae were light greenish colour with black head. The mature larvae were marked with whitish inverted 'Y' on the head with distinct black spots (pinacula) on the body. The third instar larvae were pupated in 9 days. The four black spots on the 8th abdominal segment were organized in a square and on the 1 to 7th and 9th segment arranged in a trapezoidal form (Fig- 4, 7). Grown up larvae were dark brown with granular texture all over the body. All the larval characters noticed were resembled those of *S. frugiperda* Smith, J. E. [10].

### Pupa

Pupal period ranges from 3 to 4 days and the pupa looks

reddish brown in colour with cremaster (Fig-5)

### Adult

Male greyish brown; forewings grey and brown shaded with oval or oblique orbital spots, triangular white patch near apical margins of the forewing (Fig-11). In female adults, forewings lack distinct patterns with uniform greyish brown mottled colouration and mating period was of 5 days.

### Genitalia

Male genitalia with uncus bowed in apical half, slender and keen at apex; Valve quadrate, ampulla somewhat curved, clavus small; costal process thin, inclined in the centre, extended. The coremata with single lobe on each side (fig- 9&10). The male genitalia dissected was like to earlier reports [1, 9] strongly suggesting that the species is *S. frugiperda* Smith, J. E.

In last few years invasive insect pests reported in India were Western Flower Thrips, *Frankliniella occidentalis* (Pergande) [11], South American Tomato leafminer, *Tuta absoluta* (Meyrick) [12-14], Coconut rugose spiraling whitefly, *Aleurodicus rugipericulatus* Martin [15] and Neotropical solanum whitefly, *Aleurothrix ustrachoides* (Back) [16]. However, addition of another voracious feeding insect viz. *S. frugiperda* Smith, J. E. to this list has the enormous impact on Indian agriculture.



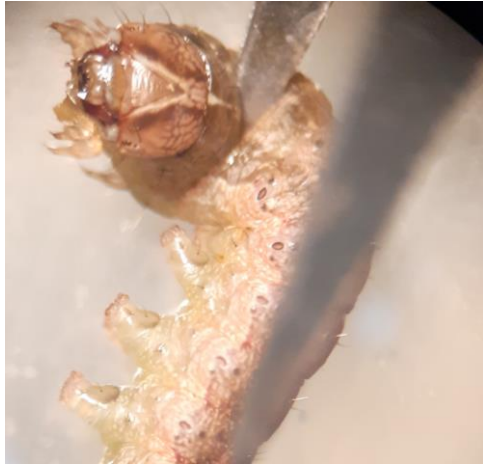
Fig 1: Damaged Maize Plant



Fig 2: *S. frugiperda* feeding and excreting on the leaves



Fig 3: Damaged Whorl by *S. frugiperda*



**Fig 4:** Characteristic “Y” shaped marking on the head of Larvae of *S. furgiperda*



**Fig 7:** Larva of *S. furgiperda*



**Fig 6:** Damage shoot by *S. furgiperda*



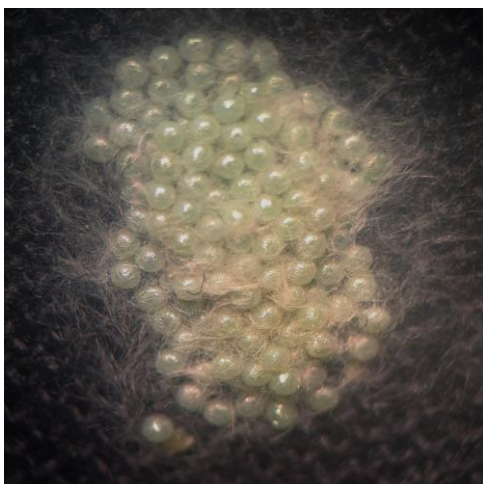
**Fig 9:** Genitalia (dorsal) of *S. furgiperda*



**Fig 5:** Pupae of *S. furgiperda*



**Fig 10:** Genitalia (ventral) of *S. furgiperda*



**Fig 6:** Eggs of *S. furgiperda*



**Fig 11:** Adult of *S. furgiperda*



## Conclusion

Fall armyworm (FAW), *S. frugiperda* Smith, J. E., is the most destructive pest species of maize plants in Brazil and other South American countries. The occurrence of fall armyworm has been recently reported in Karnataka and now it reached to Uttarakhand. Effect of chemical control method is imperfect by the larval behavior of this species; these larvae stopover inside the maize whorl, making it hard to reach the aim with insecticidal sprays. So, for the management of this pest, assessment of the influence on maize yield, early warning, awareness raising and IPM -led approaches are very important.

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