

## Original Research Article

# First Report of the Occurrence of Fall Armyworm, *Spodoptera frugiperda* (J.E. Smith) on Finger Millet (*Eleusine coracana* Gaertn) in Gujarat, India

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## ABSTRACT

A study was conducted to identify the new invasive pest infesting finger millet in Gujarat, India. During the field visit in the month of September 2020, finger millet crops in experimental plots of Hill Millet Research Station, Rajendrapur farm, Waghai, the Dangs, Gujarat found infested with new invasive pest. Damage per cent during second week of October in different villages of the Dangs ranged from 26.22 to 46.82 per cent. Larvae were collected and brought to the laboratory of Department of Entomology, College of Agriculture, Navsari Agricultural University, Waghai for identification and further study. Based on morphological characterization, the pest is identified as fall armyworm, *Spodoptera frugiperda* (J. E. Smith) and it is the first confirmed report of occurrence of new invasive pest in finger millet crops of Gujarat, India.

## Keywords

Finger millet,  
invasive pest, fall  
armyworm,  
*Spodoptera*  
*frugiperda*

## Introduction

Finger millet is traditionally known as 'Ragi'. It is the most popular one among the small millet group. It is the crop of ancient times and known for their suitability to dry lands, hill and tribal agriculture. Its unique nutritional properties particularly high fibre content, quality protein, mineral compositions contribute significantly to nutritional security. They require small quantity of water, mature early and are well suited for cultivation under adverse conditions. The flexibility exhibited by this crop is helpful in their adjustment to different ecological conditions and make them ideal crop for climate change. They are emerging as important crop for developing functional

foods for the expanding diabetic and obese populations of India. These crops are hardy and demand very little attention with respect to plant protection. The problem of pests on these crops was negligible in the earlier years. Finger millet as such does not need any specific plant protection measure. But, In recent year (September-October-2020), outbreaks of fall army worm on finger millet is noticed in Gujarat.

Fall Armyworm (FAW), the feared pest from the Americas for long, has been found on maize for the first time in Africa in 2016<sup>(1)</sup>. Since its first report from Africa, it had spread to India within a couple of years. Globally several important plant species such as maize, rice, sorghum, cruciferous crops,

cucurbits, cotton, banana, beans, solanaceous vegetable crops, cowpea, groundnut, potato, soybean, ginger, besides some wild grasses and sugarcane have been reported as major hosts of FAW<sup>(2)</sup>. In India, this pest has been identified to occur on maize in many districts of Gujarat, Karnataka, Andhra Pradesh, Telangana and Maharashtra states since 2018. It was first identified on Maize in Shivamogga district of Karnataka state<sup>(3)</sup>. Subsequently it was found feeding on sugarcane in the state of Maharashtra and Tamil Nadu<sup>(4, 5)</sup> and on Rice<sup>(6)</sup> and Ginger<sup>(7)</sup> in Karnataka. FAW was also reported in Andhra Pradesh on Bajra and Sorghum<sup>(8)</sup>.

In the Dangs, Gujarat besides maize several other crops viz., finger millet, little millet, rice, black gram, sugarcane and vegetables are grown. In the Dangs, Finger millet is an important millet crop. The high fecundity and dispersal ability of this insect may help its expansion of host range and geographical range within the country. In this context our present observation of FAW on this crop will bear a commercial significance.

### **Materials and Methods**

The authors have carry out a repetitive field visit in the Dangs district for the survey and collection of FAW from maize fields. On reports of occurrence of lepidopteran pests in finger millet crops in experimental plots of Hill Millet Research Station, Rajendrapur farm, Waghai, the Dangs, Gujarat, the authors went to inspect the field to provide suitable advisory. The finger millet crop was 2-3 months old and showed distinguished damage symptoms. The field were randomly searched for the damage and presence of FAW larvae. The damaged plants were showing characteristic shot hole with ragged leaf symptoms. Developing finger were also damaged with typical symptoms of fall armyworm damage. As the larvae observed

were different from known lepidopteran species, they were brought to the laboratory of Department of Entomology, College of Agriculture, Navsari Agricultural University, Navsari for detailed observation.

The larvae were reared in the laboratory and all the stages viz., egg, larva, pupa and adult were critically examined for distinct morphological characters to identify the pest<sup>(9)</sup>. For recording per cent damage, the plants in an area of one m<sup>2</sup> were observed for the incidence. Incidence was recorded in terms of damaged plants to the total number of plants in area of one m<sup>2</sup>.

### **Results and Discussion**

Fall armyworm incidence was noticed for the first time on finger millet crops in experimental plots of Hill Millet Research Station, Rajendrapur farm, Waghai, The Dangs, Gujarat on 25<sup>th</sup> September 2020. Severe damage was observed during second week of October-2020 on finger millet at Hill Millet Research Station, Rajendrapur farm, Waghai and on farmers' fields at Nadagkhadi, Dhulchond, Hanvantchond and Lavarya villages of the Dangs district. Damage per cent during second week of October in different villages of the Dangs ranged from 26.22 to 46.82 per cent.

### **Damage symptoms**

The early instar larvae scrape the chlorophyll which leads to white elongated patches (Figure 1-A). Later larval instars cause windows on leaves because of voracious feeding and faecal pellets in whorls (Figure 1-B). Later larval instar enter in to shoot and feed inside and faecal pellets noticed on infested shoot (Figure 1-C). At reproductive stage larvae also damage ear head of finger millet and faecal pellets on finger (Figure 1-D).

**Table.1**

Sr.no.	Village	Per cent damage
1	HMRS, Rajendrapur	46.82
2	Nadagkhadi	33.60
3	Dhulchond	35.25
4	Hanvantchond	26.22
5	Lavarya	34.28

**Fig.1** A. white elongated patches, B. faecal pellets in whorls, C. faecal pellets on infested shoot, D. damage ear head with faecal pellets on finger



**Fig.2** A. inverted 'Y' on head capsule and four black spots arranged in a square on the last but one abdominal segment, B. pupa, C. Male, D. Female



## Marks of identification

The mature larva is with a typical inverted 'Y' on head capsule and four dark spots on 2<sup>nd</sup> segment from posterior end of abdomen (four black spots arranged in a square on the last but one abdominal segment) (Figure 2-A).

The pupa is reddish brown in colour with cremaster, pupates in the soil and plant debris (Figure 2-B) <sup>(10)</sup>. Male Adults were greyish brown, forewings grey and brown shaded with oval orbital spots, triangular white patch near apical margins of the forewing (Figure 2-C). In female adults, forewings lack distinct markings with uniform greyish brown mottled colouration (Figure 2-D).

They were compared with the original available identification keys specific to *Spodoptera* spp. for confirming the genus and species. All the larval characters resembled those of *S. frugiperda*.

The above larval and adult characters were compared with the taxonomic literature and the species was confirmed as *Spodoptera frugiperda* (J.E. Smith) and conclude that new pest *S. frugiperda* incidence was noticed on finger millet in the experimental fields of Hill Millet Research Station, Waghai, India and it is possible to spread other millets and cereals <sup>(11, 12)</sup>.

The findings of morphological characterization studies validate the species as *S. frugiperda* and this is the first confirmed report of invasive pest the fall armyworm, *Spodoptera frugiperda* (J. E. Smith) (Lepidoptera: Noctuidae) in finger millet fields of Gujarat State, India. Looking to its host range and migration ability it may spread to other cereal and vegetable crops.

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