

Occurrence of invasive species of armyworm, *Spodoptera frugiperda* on sugarcane in Belgaum, Karnataka, India

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ABSTRACT

Study conducted to identify the spread of invasive species of armyworm, *Spodoptera frugiperda* to other major crops thus, roving surveys were conducted from December 2018 in some parts of Belgaum revealed that incidence of fall armyworm on sugarcane crop also apart from maize and sorghum in Karnataka. Survey conducted in and around Hukkeri, talukas, where the younger crop (30-45 days old) was infested by armyworm, *Spodoptera frugiperda*. Less damage was recorded on ratoon sugarcane as well as older crop. Newly sown sugarcane crop of 30-45 days in some pockets of Hukkeri taluka having initial damage of 0-5 per cent incidence. More incidence was observed on maize + sugarcane intercropping and also where the farmers followed *Rabi* crops as sugarcane and maize. Incidence was also noticed in one of the sugarcane trial at Bellad Bagewadi.

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INTRODUCTION

A large scale outbreak of a new pest has been reported in Karnataka maize fields, *i.e.*, fall army worm *Spodoptera frugiperda*, a native of western Hemisphere, from the United States to Argentina. Invasive alien species (IAS) pose a serious threat to agriculture and cost billions of dollars in terms of reduced production and productivity. A recent study showed that about 1300 species of invasive insect pests and pathogens have been introduced into 124 countries (Paini *et al.*, 2016). This is mainly due to increased transboundary

movement of agricultural commodities, anthropogenic activities, climate change etc. (Paini *et al.*, 2016). Occurrence of fall armyworm, *Spodoptera frugiperda* in India, which is a devastating pest in American continent on several crops (Tavares *et al.*, 2011). *Spodoptera frugiperda* is a polyphagous pest and caterpillar feed on leaves, stems and reproductive parts which found to feed on several crops that include maize, rice, sugarcane, sorghum, potato, cotton, tomato (Pogue, 2002). In Brazil, *Spodoptera frugiperda* causes upto 34 per cent reduction in maize grain yield that amounts to an amount to an annual loss of US \$400 million (Figueiredo *et al.*,

2006). *Spodoptera frugiperda* is found in most parts of the western Hemisphere, from southern Canada to Chile and Argentina (Todd and Poole, 1980). This species was reported to have spread to Africa –Sao Tome, Nigeria, Benin and Togo in 2016 and to Ghana in 2017 causing wide spread crop damage (Goergen *et al.*, 2016). The global agriculture often faces new threats from invasive alien insect pests, pathogens, weeds etc requiring immediate attention and co-operative action to manage the pestilence. In this regard, the fall armyworm (FAW), *Spodoptera frugiperda* is a notorious pestiferous insect with high dispersal ability, wide host range and high fecundity that make it one of the most severe economic pests. The FAW has been restricted to the Americas and recently in 2016 reported from various countries in Africa, posing a serious challenge of sustainability in Sub-Saharan African countries. Herewith we report the occurrence of the FAW on maize in various districts of Karnataka state, India. Identification of FAW has been carried out employing morphological and DNA barcoding. Phylogenetic analysis has revealed that FAW clustered with Florida (rice strain), Ghana, Nigeria, Uganda on maize. India predominantly being a tropical country favours high rate of multiplication round the year and its high pestiferous nature poses a formidable challenge to Indian agriculture warranting immediate action before it assumes a serious proportion (Sharanbasappa *et al.*, 2018).

Spodoptera frugiperda is found in most parts of the western Hemisphere, from southern Canada to Chile and Argentina. This species was reported to have spread to Africa –Sao Tome, Nigeria, Benin and Togo in 2016 and to Ghana in 2017 causing wide spread crop damage. Incidence of fall armyworm on sugarcane reported from Sugarcane Breeding Institute, Coimbatore during November 2018 at Erode and Karur districts of Tamil Nadu.

MATERIAL AND METHODS

Roving surveys were conducted from December 2018 in several parts of Belgaum district to determine the spread of fall army worm on sugarcane crop. Surveys were conducted in and around Hukkeri taluka. The specimens were also collected and examined. Some larvae were collected kept for rearing in the laboratory to know its life cycle.

Sample collection:

Larvae were collected from Badkundri, Hullohatti, Bellad Bagewadi villages of Hukkeri.

RESULTS AND DISCUSSION

Early instars are green in colour and full grown up larvae are dirty brown in colour. Some larvae were collected from sugarcane experimental plot at Hukkeri.

Larva:

First instar larva is greenish in colour with black head, while the final instars are with dark grey head and dull grey body with white subdorsal and lateral white lines. The mature larvae are with a white inverted on the head and with distinct black spots on the body. Arrangement pattern of black spots is square on 8th and trapezoidal 9th segment. The mature larvae were marked with whitish inverted 'Y' on the head with distinct black spots (pinacula) on the body. Grown up larvae were dark brown with granular texture all over the body. All the larval characters noticed were resembled those of *S. frugiperda*. Pupae was reddish brown colour.

Adult:

In female adults, forewings lack distinct markings with uniform greyish brown mottled colouration. Male adults are greyish brown; forewings grey and brown shaded with oval or oblique orbital spots, triangular white patch near apical margins of the forewing.

Nature of damage:

Early instars feeds on leaves by scraping and later they make row of holes on leaves. Grown up larvae feeds on leaves from edge damage results in more defoliation. It also found to feed on central shoot result in damage to growing point (leaf whorls). Usually larvae hides in cracks and crevices in day time (Fig. 1). Matti (2018) conducted surveys in and around Hukkeri, Gokaka and Chikkodi talukas, where younger maize crop (20-45 days old) was heavily infested (40-50%) with *Spodoptera frugiperda* and late sown crop of 25 days in some pockets of Gokak taluka having 50-60 per cent damage.

Host range:

Based on literature, this is considered as a serious polyphagous pest of various nature with a host range of

approximately more than 100 recorded plant species in 27 families (Goergen *et al.*, 2016). Pest prefers plants from graminace family including maize, sorghum, sugarcane, rice, wheat and other millets. There are reports on its infestation on other field crops like potato, soybean, groundnut, cowpea, cotton etc. Abrahams *et al.* (2017) reported preliminary evidence note on fall army worm causes major damage to economically important crops: viz., maize, sorghum, rice and sugarcane in Africa. Sisodiya *et al.* (2018) reported that occurrence of invasive armyworm *Spodoptera frugiperda* infesting maize in Gujarat, India.

It is native to the tropical and subtropical region of America, where it is serious pest of corn but also known

to attack more than 100 hosts. In addition, it is reported to cause major damage to economically important cultivated grasses such as rice, sorghum and sugarcane as well as horticultural crops like cabbage, beet, tomato, potato and onion besides cotton, pasture grasses, peanut, soybean, alfalfa and millets (Chapman *et al.*, 2000 and CABI, 2016). Within a short span of its introduction in Africa, FAW has been confirmed in over 43 African countries (Prasanna *et al.*, 2018). It is reported to cause a 34 per cent reduction in grain yield (Lima *et al.*, 2010) and annual loss upto US dollars 400 million in Brazil (Figueiredo *et al.*, 2015). To conclude, the pest shift its host range other major crops in state and adjoining states in India to survive in the absence of maize and maintain



the population in India throughout the year.

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