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First Report on The Occurrence of Fall Armyworm, *Spodoptera frugiperda* (J.E. Smith) (Lepidoptera: Noctuidae) on Ginger (*Zingiber officinale*) in Bangladesh

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A b s t r a c t

Fall armyworm (FAW), *Spodoptera frugiperda* (J.E.Smith) (Lepidoptera: Noctuidae), is a highly polyphagous pest of maize and other cereals in tropical and subtropical regions of the world. FAW is native to the Americas and its recent invasion in Africa, Asia and Oceania has severely impacted yields of several food crops. This pest has been recorded on maize in Bangladesh. Subsequently, the pest was reported to attack on cabbage and tobacco from Rangpur, Bangladesh. Recently, the pest was found to attack on ginger (*Zingiber officinale*) fields from June to July. In 2023 and 2024 the infestation rate was 28.00% and 26.78% respectively. This is the first record of the FAW on ginger in Bangladesh. It is suspected that the infestation spread gradually to the ginger-growing areas in Bangladesh.

Keywords: Ginger, First record, Fall Armyworm and Incidence.

Introduction

Since ancient times, ginger (*Zingiber officinale*) has been used as a medicine, herbal and a vital cooking spice worldwide (Nour and Yap, 2017). Ginger is an herbaceous plant native to Southeast Asia (Kumar *et al.,* 2018 and Bijaya, 2018). As a folk medicinal plant, ginger has its application in Southeast Asia, Africa, China, India etc. (Bhatt *et al.* 2013). Ginger consumption benefits heart disease, cancer, high blood pressure, bacterial disease, obesity, blood sugar and osteoarthritis. Ginger is a low-cost, easily accessible herbal medicine that can easily replace rare and expensive chemical medications while posing fewer risks. Ginger is a widespread and widely used spice in Bangladesh. Furthermore, ginger production in Bangladesh was net 1.73 million tons in 2018-19, while demand was nearly three million tons, with imports accounting for 42 to 45 percent of the total (TBS, 2020).

There are several reasons why ginger production in Bangladesh is low and those shortcomings must be identified for Performance of trend models of ginger production appropriate research outcomes and policy invocation. Smaller efforts to produce ginger may result in increased production. The main problem of ginger production of Bangladesh is the attack of several kinds of insect pests. Among them Rhizome fly (*Mimegralla coeruleifrons* Macquart), Shoot borer (*Conogethes punctiferalis*), white grub (*Holotrichia* sp.) and Grey weevil are reported earlier.

Fall armyworm (FAW), *Spodoptera frugiperda* (J.E.Smith) (Lepidoptera: Noctuidae), is a highly polyphagous pest of maize and other cereals in tropical and subtropical regions of the world (Sparks 1979). FAW is native to the Americas and its recent invasion in Africa, Asia and Oceania (FAO 2021) has severely impacted yields of several food crops (Overton *et al.* 2021). This noctuid pest is highly destructive and the caterpillars can feed on over 350 plant species grown commercially or non-commercially across 76 plant families, with a preference for maize (*Zea mays* L., Poaceae) (Montezano *et al.* 2018). These caterpillars can feed on

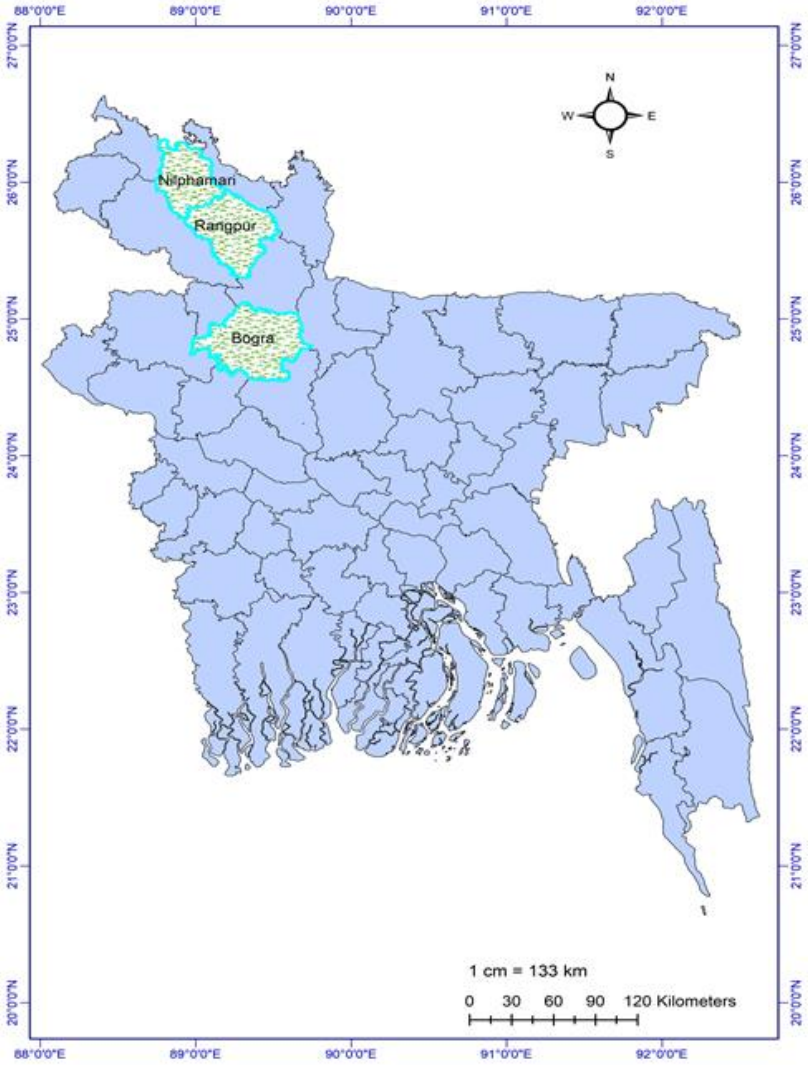

Figure 1. Map of Study area (ArcGIS)

different phenological stages of maize and could result in maize yield loss of up to 70% if attacked early growth stage of maize (Hruska 2019). Owing to the increase in international trade and long-distance migration ability, the FAW has rapidly spread in new geographical regions and threatened global maize production (Early *et al.* 2018). The high adaptability, fecundity and polyphagous nature made them a key pest of maize in the invaded region under suitable environmental conditions (Jing *et al.* 2021). In this study we investigated the incidence of Fall armyworm on ginger crop in Bangladesh.

Materials and Methods

Ginger fields were surveyed during June to July in 2023 and 2024 to know the level of FAW infestation in different areas of Bogura, Nilphamari and Rangpur in Bangladesh (Figure 1). Ginger fields were thoroughly searched for any damaged leaves, plants, excreta or larval activity in the plant. The larva was brought out to the laboratory, reared on ginger leaves and observed their morphology (Photo 1). Though the typical markings on the larva were distinct to the naked eyes, a handheld lens was used for better viewing and confirmation. For incidence study, for this purpose, 1 m2 area in each spot were observed for a particular pest attack and then percentage of plant infestation was calculated based on total number of plants/m^2.

Results and discussions

FAW was found to attack ginger in all locations, infested plant exhibited characteristic symptom of papery windows, pin or shot holes and ragged appearance of whorl along with moist saw dust-like faecal matter in the form of lumps on leaves and presence of larva in the plant. The characteristics morphological characters like presence of inverted “Y” on head with distinct black dots on the body with four black dots in a square pattern on the 8th abdominal segment were found on the larvae and the observed specimen were matched with the identification keys of *S. frugiperda* (Passoa, 1991; Sharanabasappa *et al*., 2018). Percent of infestation ranged from 10% to 43% in 2023 and 21.10 to 38.60 in 2024. (Table 1). The typical character of fall armyworm adults were also confirmed in the laboratory with the identification keys of *S. frugiperda* (Todd *et al*. 1980.). The maximum incidence (43%) was observed in SRC

Photo 1. *S. frugiperda* infestation on ginger

research field and minimum in Taraganj, Rangpur in 2023 and same scenario was observed in 2024. This is the first record of the FAW on ginger in Bangladesh. In India, the pest was found to attack on ginger during 2019 (Shankar, G. and Yasushi Adachi, 2019).

Table 1. Fall army worm *S. frugiperda* infestation on Ginger foliage in Bogura, Nilphamari and Rangpur during 2023

Locations	Varieties	Infestation (%)	
		2023	2024
Location-1	BARI Ada-1	43.00±1.13	38.60±3.87
	BARI Ada-2	38.00±2.24	20.10±2.08
	BARI Ada-3	34.00±2.78	21.10±2.52
Location-2	Local	15.00±3.15	32.22±2.65
Location-3	Local	10.00±2.75	21.88±1.78
Average		28.00	26.78

Location-1= Research field, SRC, Bogra; Location 2= Uttor Durakothi, Kishorganj, Nilphamari, Location 3= Chakla, Alampur, Taraganj, Rangpur

FAW is an invasive pest, the widespread and highly economic importance would threaten the ginger production in Bangladesh if the control measures are not conducted properly. So, the ginger growers need to visit the crop carefully from seedling to harvesting stage, whether the crop is infested or not. Farmers are to be advised to follow BARI developed integrated approach against the pest and not to grow maize near the ginger field as maize is the main host of the pest.

Considering the feeding potential of this pest, the pest may become a limiting factor to ginger cultivation in Bangladesh, so proper monitoring about the pest in major ginger growing areas should be undertaken and yield losses due to the pests need to be assessed.

Conflict of interest

There is ano any conflict of interest among the authors.

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