



FALL ARMY WORM *SPODOPTERA FRUGIPERDA* STRAINS IN GOA AND ITS INCIDENCE ON FODDER MAIZE

MARUTHADURAI R* AND R RAMESH

Crop Protection Section, ICAR- Central Coastal Agricultural Research Institute,
Ela, Old Goa, Goa 403402, India

*Email: duraianto@gmail.com (corresponding author)

ABSTRACT

Fall army worm (FAW) *Spodoptera frugiperda* (J E Smith) is a highly destructive invasive insect pest. Its incidence was observed during post kharif season 2019 at Old Goa, and it ranged from 43 to 83% @ 0.67 larvae/ plant with a maximum of 1.16 larvae/ plant during vegetative stage, and it was more than the reproductive stage. The mtCO1 analysis of the populations from Goa revealed the presence of both Rice (R) strain and Corn (C) strain which feed on fodder maize and sweet corn, and this confirms the prevalence of both the strains in Goa on fodder maize.

Key words: *Spodoptera frugiperda*, Old Goa, fodder maize, invasive pest, mtCO1, R and C strains, incidence, host plants, vegetative and reproductive stages, post kharif

Fall army worm (FAW) *Spodoptera frugiperda* (J E Smith) (Lepidoptera: Noctuidae) is a highly voracious insect pest native to tropical and subtropical region of Americas. It has a wide host range of >353 host plants (Montezano et al., 2018). The most frequently damaged plants are maize, sorghum, rice, millet, soybean, peanut, cotton, Sudan grass and other fodder grasses. In India, FAW was first reported on maize from Shivamogga district of Karnataka (Sharanabasappa et al., 2018). It is highly migratory and has rapidly spread all over the country and also reported in neighbouring countries like Nepal and China (Ratna et al., 2019; FAO 2019). The incidence on maize ranged from 9.0 to 62.5% and 6 to 100% (Shylesha et al., 2018; Mallapur et al., 2018) in different districts of Karnataka. This has two strains that are morphologically indistinguishable but differ in their host plant preference. The Rice (R) strain most consistently feeds on rice, Bermuda grass, and other small grasses while the Corn (C) strain prefers maize, sorghum and other large grasses (Pashley et al., 1985). Recent studies on its populations in India have revealed that majority of these were 'R' strain- feeds on maize, sorghum and sweet corn; while 'C' strain- feeds on sugarcane (Mahadevaswamy et al., 2018; Chormule et al., 2019). The knowledge on its strains and genetic diversity is important for developing IPM strategies (Srinivasan et al., 2018). Hence, the present study to explore the presence of FAW and its strains in the state of Goa on different host plants and to assess the damage incidence on fodder maize.

MATERIALS AND METHODS

Fodder maize variety African Tall was sown with the spacing of 50x 20 cm during post kharif season 2019 at the experimental farm of ICAR- Central Coastal Agricultural Research Institute, Ela, Old Goa, Goa. The area of experimental field was 1000 m² from which 30 plants were randomly selected and weekly observations were made on the number of larvae/ plant and plants damaged, assessed based on the damage symptoms viz., skeletonizing the upper epidermis, windows on leaves and faecal pellets in the whorls. To know the status of FAW strains in Goa, larvae were collected from the experimental field at ICAR as well as in other locations on different host plants viz., fodder maize, sweet corn and water melon. Larvae were placed in 1.5 ml micro centrifuge tubes separately. A single larva was selected and ground in a pestle and mortar using liquid nitrogen. About 25 mg of the ground powder was used to isolate the genomic DNA by using Wizard Genomic DNA purification kit (Promega Corporation, USA Cat. A1120) as per the manufacturer's instruction. The remaining individuals were preserved as voucher specimens at -70°C in ICAR-CCARI, Goa. PCR Amplification of a 658 bp region near the 5' terminus of the CO1 gene from the genomic DNA using primers (LCO 1490 5'-GGTCAACAAATCATAAAGATATTGG-3') and (HCO 2198 5'-TAAACTTCAGGGTGACC AAAAAATCA-3'). PCR reaction was carried out with a 20µl reaction mixture containing 1.0 µM of each primer, 10 µl master mix (Promega Corporations)

Table 1. Position-wise nucleotide variations in 5' terminus of mtCOI gene of FAW of "Rice strain" and "Corn strain"

Nucleotide position in the 5' mtCOI	Rice strain	Corn strain
34	A	G
79	A	G
133	C	T
169	A	T
220	T	C
451	C	T
526	C	T
532	T	C
562	T	C
596	C	T
625	A	T

Total number of strains used is 45 (34 rice, 11 corn strains)

on sugarcane in Maharashtra. Nagoshi et al. (2007) reported that both 'R' and 'C' strains feed on maize and other crops during the same crop period in Brazil. Nagoshi and Meagher (2004) compared the distribution of two strains from corn fields before and after harvest and found that the 'C' strain constitutes 72 and 39%, respectively. However, molecular diversity studies of Indian populations of FAW collected on maize, sweet corn and sorghum from six states of the country revealed the prevalence of 'R' strain (Mahadeva Swamy et al. 2018). It appears that 'R' strain has colonized maize, sweet corn and sorghum while 'C' strain has started adapting to sugarcane, fodder maize and sweet corn. Thus, the present study reports the presence of 'R' strain and 'C' strain of FAW from Goa on fodder maize and sweet corn. It also provides basic information on damage potential and larval density on fodder maize.

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