



First authentic report of *Spodoptera frugiperda* (J.E. Smith) (Noctuidae: Lepidoptera) an alien invasive species from Pakistan

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Abstract

Spodoptera frugiperda (J.E. Smith) is an invasive alien species that belongs to family Noctuidae in insect order Lepidoptera. This is commonly known as Fall Armyworm (FAW). This is notorious pest of many crops particularly grasses like corn, rice, wheat but also attacks on other plants like cotton and potato etc. Primarily, it was regular pest in USA, Mexico and other South American States since last many decades. In 2016, it was reported for the first time from West Africa and in about one year or so, it had been spread throughout sub-Saharan Africa including Madagascar. In 2018 and early months of 2019, it was reported from South Asian countries like India, Bangladesh, Sri Lanka, Myanmar, Thailand and China. Having shared border with India and China, Pakistan was also expecting its presence but in spite of much vigilance on the part of public and private agencies, no solid proof was presented so far. In April 2019, some preserved noctuid larvae caught from various localities of Sindh, Pakistan were sent to MNS-University of Agriculture, Multan, Pakistan for identification. On careful identification with the help of available taxonomic keys, the larvae were identified as *S. frugiperda*. So, this report is being written for ready reference for policy makers, scientists, extension workers and farmers so that management strategy to coup this notorious insect pest may be planned to save food security in the country.

1. Introduction

Spodoptera frugiperda (T.E. Smith) is a notorious insect pest of many crops belongs to family Noctuidae of order Lepidoptera. It is commonly called as Fall Armyworm (FAW) and now it has gained the status of invasive species. It was originally evolved in Amazonian part of Brazil. It was also found in Central American States and Caribbean to Mexico. Southern States of USA were also attacked by this notorious lepidopteran pest. Prior to 2016, it was confined only in new world where it is considered as one of most crop damaging insect pests. In 2016, it was reported from West Africa (Georgen et al., 2016) and after that FAW spreads so rapidly that by the end of 2017, most of Sub-Saharan Africa has been reported to be infested by this invasive alien species, as reported from eastern and south Africa

(Sisay et al., 2018). It has been reported from Ghana and Zambia, that due to attack of FAW in these African countries, 98% corn farms have been affected (Day, 2018) which is staple crop in the continent. So this is a classic example of intercontinental spread that might be possible by unaided dispersal, carried through a commodity or by a vector (Cock et al., 2017).

By the mid of 2018, it has also reported from India (Sisodiya et al., 2018) and within six months, it has reported from Bangladesh, Sri Lanka, Thailand, Myanmar and China (FAO, 2019 a). The pest under consideration is strong flier that can fly about 100 km in one night (FAO, 2019 b). So bordering countries to those already got infestation are more likely to be attacked by this insect. Pakistan and India share a long cross-border with similar climate and crops which may include

cotton, corn, rice, tomato, potato and chilies etc. After the introduction of FAW in India in 2018, relevant people in public and private organizations in agriculture sector were cautious for the same but nothing had been reported with certainty. In March 2019, from fields of spring corn sown in various localities in Sindh, some lepidopteran larvae were caught and sent to Department of Entomology, MNS-University of Agriculture, Multan in preserved form for identification. On careful identification, it was revealed that those belong to *S. frugiperda*. Therefore, this report is being narrated for scientists, extension workers and policy makers as a ready reference so that the management plans against this notorious and invasive alien species may be prepared to ensure food security in the country.

2. Materials and Methods

Some un-identified preserved lepidopteran larvae were sent by field workers of Syngenta from Sindh to Department of Entomology, MNS-University of Agriculture, Multan, Pakistan for identification. Those were captured from spring corn in village Abari, Tando Allahyar, village Somara and Ori, Tando Jam, village Sehri, Tando Muhammad Khan and village Ajjan Shah, Hala, and from bottle gourd in Nasarpur. The larvae were identified under the microscope with the help of dichotomous keys of Pasa 1991.



Fig 1. Head of *S. frugiperda* showing conspicuous “inverted Y”.



Fig 2. Abdomen of *S. frugiperda* showing prominent dots.

3. Results and Discussion

After careful examining, the unidentified lepidopteran larvae have been identified as *Spodoptera frugiperda*. The genus *Spodoptera* belongs to family Noctuidae in order Lepidoptera, and contains 30 species (Pogue, 2002), many among these are notorious crop pests. *S. frugiperda* have been reported more than 100 host plant species and prefers grasses (Pogue, 2002). Prior to introduction of *S. frugiperda* in Pakistan *S. litura* (Taro caterpillar) and *S. exigua* (Beet armyworm) has been found damaging many crops like cotton, corn, vegetables, ornamentals and fruit trees in the country.

Historically, it was identified and named for the first time in 1797 as *Phaleana frugiperda* by Smith and Abbot, the species name was shifted to another genus *Laphygma* in 1852 (Luginbill, 1928). The genus *Laphygma* was declared as synonym of genus *Spodoptera* in 1958 and since then, the valid name is *Spodoptera frugiperda*.

The morphological characters of examined specimens are in conformity with those found in literatures (Luginbill 1928, Passoa, 1991, Sisodiya et al., 2018). Among the distinguished ones include adfrontal area on the face bears whitish epicranial sutures which look like “inverted Y” (Fig. 1). Pinacula or elevated spots on abdominal dorsum are conspicuous and brownish in colour (Fig. 2). Moreover, epidermis looked rough in texture when examined closely or under higher magnifications.

References

- Abro, G., Syed, T., Tunio, G., & Khuhro, M. (2004). Performance of transgenic Bt cotton against insect pest infestation. *Biotechnology*, 3(1), 75-81.
- Aflitto, N. and Tom De Gomez. 2014. Sonic Pest Repellents. *College of Agriculture and Life Sciences*. p. 1-4.
- Aflitto, N. C., & Hofstetter, R. W. (2014). Use of acoustics to deter bark beetles from entering tree material. *Pest management science*, 70(12), 1808-1814.
- Aheer, G., Ahmad, K., & Ali, A. (1994). Role of weather in fluctuating aphid density in wheat crop. *Journal of Agricultural Research (Pakistan)*.
- Cock, M. J., Beseh, P. K., Buddie, A. G., Cafá, G., & Crozier, J. (2017). Molecular methods to detect *Spodoptera frugiperda* in Ghana, and implications for monitoring the spread of invasive species in developing countries. *Scientific Reports*, 7(1), 4103.

- Day, R., Abrahams, P., Bateman, M., Beale, T., Clottey, V., Cock, M., J. & Gomez, J. (2017). Fall armyworm: impacts and implications for Africa. *Outlooks on Pest Management*, 28(5), 196-201.
- FAO (2019 a). Briefing note on FAO Actions on Fall Armyworm.
- FAO (2019 b). Fall Armyworm (FAW); Q & A. <http://www.fao.org/3/a-i7471e.pdf>
- Goergen, G., Kumar, P.L., Sankung, S.B., Togola, A. & Tamò M. (2016). First report of outbreaks of the Fall Armyworm *Spodoptera frugiperda* (JE Smith) (Lepidoptera, Noctuidae), a New Alien Invasive Pest in West and Central Africa. *PLoS ONE* 11(10): e0165632. <https://doi.org/10.1371/journal.pone.0165632> <http://www.fao.org/3/BS183E/bs183e.pdf>
- Luginbill, P. (1928). The fall army worm (Vol. 34). US Department of Agriculture. *Technical Bulletin No.34*.
- Passoa, S. (1991). Color identification of economically important *Spodoptera* larvae in Honduras (Lepidoptera: Noctuidae). *Insecta Mundi*, 414.
- Pogue, M. (2002). A world revision of the genus *Spodoptera* Guenée (Lepidoptera: Noctuidae). American Entomological Society. Philadelphia. 1-202.
- Sisay, B., Simiyu, J., Malusi, P., Likhayo, P., Mendesil, E., Elibariki, N. & Tefera, T. (2018). First report of the fall armyworm, *Spodoptera frugiperda* (Lepidoptera: Noctuidae), natural enemies from Africa. *Journal of Applied Entomology*, 142(8), 800-804.
- Sisodiya, D. B., Raghunandan, B. L., Bhatt, N. A., Verma, H. S., Shewale, C. P., Timbadiya, B. G., & Borad, P. K. (2018). The fall armyworm, *Spodoptera frugiperda* (JE Smith) (Lepidoptera: Noctuidae); first report of new invasive pest in maize fields of Gujarat, India. *Journal of Entomology and Zoology Studies*, 6(5), 2089-2091.