Short Communication

Genus *Spodoptera* (Hadeninae: Noctuidae: Lepidoptera): A New Species from Southern Punjab, Pakistan

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Abstract

A comprehensive and a comparative taxonomic study of new species of the genus *Spodoptera* i.e. *Spodoptera hirsutus* is very similar to the *Spodoptera litura* but easily distinguish on the basis of different characters of genitalia. Specimens of this genus were identified on the base of their genitalia characters. This new species *Spodoptera hirsutus* was collected from Muzzafarghar with the help of light traps. The abdomen was dissected for the removal of genitalia and these genitalia were mounted permanently with Hoyer’s medium. A key to the species of the genus *Spodoptera* from Pakistan is also given here.

Taxonomic review of Noctuidae becomes superlative and very essential with this contextual the state of Pakistan. This was selected to the taxonomic study of Noctuidae. This research is initiative clue for further description, illustration and classification of unidentified species of the genus *Spodoptera* from Pakistan.

The Noctuidae has most important insect pests which damage the cereal and cash crops. Among the Noctuidae, the genus *Spodoptera* have most damaging species of agricultural crops (Pogue and Passoa, 2000). *Spodoptera* are polyphagous in nature. Immature of this genus have numbers of host plant viz. more than 100 plant species; most of them are the economically important plants (Robinson et al., 2010). The larvae feed gregariously on plant leaves (Ahmad et al., 2007) The larvae of genus *Spodoptera* prefers to feed on tender leaves that result in severe damage to the most economical crops and vegetables (Zucchi, 1984).

The larvae of *Spodoptera* spp. mostly feeds on the underside portion of the leaves which causes skeletonization of leaves. Initially, there are several small feeding spots on leaves which lead to tunnels’ formation as a result of harsh feeling like cabbage hearts. It mainly damages the foliage, leaves, and fruits (Waterhouse and Norris, 1987).

The larvae of *Spodoptera* creates brown flag syndrome in bananas and grapes (Ranjith et al., 1997), causing 5 to 10% yield losses (Balikai et al., 1999). Morphological identification and description of genus *Spodoptera* is difficult from their closely resembling color pattern of wings, types of legs and antennae thus genital examination is necessary (Brambila, 2014).

The *Spodoptera* was erected first time on the base of genitalia by Guenee (1852). Later, Hampson (1894) identified one species *Hadena mauritia* Boisduval and classified it as the type species of genus *Spodoptera*. Pogue (2002) described the first-time female genitalia of *Spodoptera*. Srivastava (2002) examined female genitalia of species *Elliptica bryk*
and synonymized two species i.e., Albiceps matsumura and Obscur awileman under the genus Westermannia Hübner.

Rishi et al. (2003) have been worked on the taxonomic studies of Spodoptera litura (Fabricius) and Spodoptera exigua (Hubner) for the identification of both species. The taxonomic characters under their study include; cilia on antennae, wing venation, the orientation of labial palpi, presence or absence of hair on eyes and thorax and genitalia of males and females. They have also done the morphometric analysis of these taxonomic characters such as length and width of head and thorax.

Pouge (2011) studied the genitalia of species Leucochlaena hipparis (Druce) and placed this in genus Spodoptera. He studied on morphological characters of male and female genitalia and they have also illustrated the cladogram that shows the position of Leucochlaena hipparis (Druce) in Spodoptera.

In the present studies, taxonomic studies of one species belonging to the genus Spodoptera were carried out from Pakistan.

Materials and method

The moths belonging to the subfamily Hadeninae and collected by the conical iron light traps from different localities of the District Muzzafargarh, Punjab, Pakistan. These selected localities (Adam Khakhi, Sheher Sultan, Kalar Wali, and Ali Pur) were divided in two main regions i.e. crop and agro-forest area. Light traps (220 Volt, 20 Watt), which is considered one of the preeminent methods of entomology Bahauddin Zakariya University Multan.

Results and discussion

Key of Genus Spodoptera Guenee:

- Clavus present .................................................. 2
- Clavus absent ................................................... 9
- Juxta triangular with narrow base and a pointed process ................................................... 3
- Juxta quadrate with two ventrolateral projections ................................................... 4
- Clavus in the shape of bumb ................. (S. littoralis)
- Ampulla slightly curved ............................... (S. litura)
- Ampulla elongate and curved ......................... 6
- Basal sclerite angular ................................. (S. dolichos)
- Basal sclerite rounded .........................(S. ornithogalli)
- Clavus shape as a hairy toe .......... (S. pulchella)
- Clavus as a club shaped ................................. 7
- Costal process large and ampulla elongate, broad and curved ......................... (S. latifascia)
- Costal process small, narrow, elongate, straight and inclined and ampulla slightly curved ......................... (S. frugiperda)
- Costal process narrow and elongate ...(S. albula)
- Costal process short ........................................ 9
- Ampulla short, curved and with thumb shape process ......................... (S. eridania)
- Ampulla elongate, thin and curved .................. 10
- Large spine on vesica ................................. (S. exigua)
- Spines absent on vesica ......................... (S. hirsutus n.sp)

Genus Spodoptera Guenee

Guenée 1852, Boisduval and Guenée, Hist nat. Insects (Lepid.), 5: 153.

Type species

Holotype was collected from Muzaffargarh with a light trap on 18-07-2016 and deposited in the department of entomology Bahauddin Zakariya University Multan.

Etymology

This species epithet is derived from the host cotton (Gossypium hirsutum).

Remarks

This new species is very close to already known species S. litura but this new species differ from S. litura due to following characters:
(i) Vinculum is round shaped at a base in *S. litura* but vinculum with pointed base in new species i.e. *S. hirsutus*. (ii) Valva fringed with long setae in *S. litura* but the valva of *S. hirsutus* without any long setae. (iii) Juxta of *S. litura* is Y-shaped but juxta of *S. hirsutus* is triangular shaped. (iv) Saccus of *S. litura* is a line like but in *S. hirsutus* no like structure is present. (v) The basis of valva in *S. litura*, a plane but the basis of valva in *S. hirsutus* have prominent nob like structure. (vi) Aedagus of *S. litura* is moderately long with a proximal half tube like and plate-like cornuti but the aedagus of *S. hirsutus* long, plane sclerotic and bulb shape. (vii) Aedagus of *S. litura* yellowish white and plane but the aedagus of *S. hirsutus* has a prominent longitudinal lining. (Fig. 1).

**Male genitalia**

Uncus simple, thin, very long, curved and pointed towards the anterior end; tegumen long, inverted u-shaped, lighty sclerotic throughout its length; scaphium with the tuba analis lightly sclerotic; valva broad, leaf-like, differentiated into costa, cucullus, and valvula; costa well developed and sclerotic; cucullus and valvula moderately sclerotic, without long setae; saccus well-developed; vinculum u shaped with pointed base; saccus thin without line; transtilla well developed; clasper well developed, with broad base, pointed and straight toward tip; juxta triangular-shaped; aedagus moderately long, cylinder-shaped with bulb-like base; ductus ejaculatorius present at the distal end; membranous vesica, long, without lining and proximal tube and cornute, (Fig. 1C, D).

**Female genitalia**

Not found.

**Statement of conflict of interest**

The authors declare there is no conflict of interest.

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