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NOCTUIDAE - *Spodoptera littoralis* (Boisduval)

Taxonomy

Noctuoidea: Noctuidae: Noctuinae: *Spodoptera littoralis* (Boisduval)

Common names: Egyptian cottonworm, African cotton leaf worm, Mediterranean brocade moth, Egyptian cotton leaf worm

Synonyms: *Prodenia littoralis*, *Hadena retina*, *Prodenia testaceoides*

Larval diagnosis (Summary)

- Mandible with scissorial teeth resulting in a serrate cutting edge
- Ground color a shade of chocolate brown to steel gray to dark olive green
- Subdorsal area usually strongly contrasting with paler dorsum
- Middorsal line usually faint or absent
- Spiracular stripe not interrupted on A1 by a black band or spot
- Dorsal triangles, if present, usually lack an apical white dot
- Sometimes a white spot is present posterior to the abdominal spiracles, more rarely with a dorsal black dot
- From Europe to Africa to the Middle East on a wide range of hosts

Host/origin information

Spodoptera littoralis is occasionally intercepted from Europe on a variety of hosts. It is likely encountered more frequently but not identified to species. The most common host/origin combinations are listed here:

Origin	Host(s)
Israel	*Eustoma*, *Gerbera*
Netherlands	various

Recorded distribution

Spodoptera littoralis is widely distributed from southern Europe and Africa east to the Middle East and western Asia (including Arabian Peninsula, Iran, Iraq, and Pakistan). It is also present on several islands in the Indian Ocean (Pogue 2002).

Identification authority (Summary)

Accurate identification of *S. littoralis* involves origin, morphology, and color pattern. *Spodoptera littoralis* occurs in Europe, parts of Africa, and the Middle East. Because this pest is polyphagous, the hostplant offers few clues. See the Detailed Information tab for descriptions of larval morphology and coloration.

Pest characterization

(Based on Cavey 2001, Pogue 2002)

- Taxonomy: **High.** Species identification is possible in late instars.
- Distribution: **High.** *Spodoptera littoralis* does not occur in the U.S.
- Potential Impact: **High.** *Spodoptera littoralis* is a serious pest.

This ranking characterizes *Spodoptera littoralis* as quarantine significant for the U.S.

Larval diagnosis (Detailed)

The larva of *S. littoralis*, usually called the Egyptian Cottonworm (USDA 1982), was at least partially described by Weisman (1974), Brown and Dewhurst (1975), Sannino and Espinosa


Fig. 1: Late instar, lateral view


Fig. 2: Late instar, lateral view


Fig. 3: Late instar, lateral view


Fig. 4: Late instar, dorsal view


Fig. 5: Crochets


Fig. 6: Head


Fig. 7: Hypo. complex

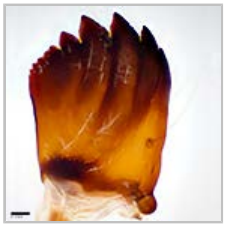


Fig. 8: Mandible


Fig. 9: Hypopharyngeal complex, dorsal view

(1999), Amate et al. (1998, Beck (1999-2000), Gomez de Aizpurua (1987, 2002), Pogue (2002), Ahola and Silvonen [2008], and Passoa (2011). Color illustrations of *S. littoralis* were published by Porter (1997), Beck (1999-2000), Gomez de Aizpurua (1987, 2002), Ahola and Silvonen [2008], and Wagner et al. (2011).

Weisman (1986) did not include *S. littoralis* in his key. However, this species was studied by Brown and Dewhurst (1975) in their revision of African *Spodoptera*. Beck (1999-2000) published a key to the Noctuidae of Europe, whereas Ahola and Silvonen [2008] focused on northern European noctuid species. Both authors included *S. littoralis* and provided detailed descriptions of the mouthparts. These faunal studies make identification of *S. littoralis* more accurate than Asian or South American species of *Spodoptera* assuming the origin is known with certainty and the color pattern is typical. As a result, we do not feel a complete literature review of larval descriptions of *S. littoralis* is needed, but we do summarize a few of the above publications.

Weisman (1974) defined a "*Prodenia* group" that included *S. littoralis* and other species of *Spodoptera*. He mentioned a broad and flat spinneret, almost equal in length to the labial palpus, with a middorsal groove and two small projections at the apex. The SD setae are off the prothoracic shield and SD1 of the mesothorax [and metathorax] are connected to the associated tonofibrillary platelet by a minute sclerotized bar. The mandible has no retinaculum.

Brown and Dewhurst (1975) separated *S. littoralis* and *S. exigua* from other African species by the spacing of the P setae, relative size of the front to the epicrania, and the presence of teeth on the mandible (thus a serrate cutting edge). Other related species of African *Spodoptera* lacked mandibular teeth and thus the mandible has a smooth cutting edge. This was the easiest character to separate the two groups.

Amate et al. (1998) noted that the prothoracic SD setae of *S. littoralis* are in a horizontal line and the abdominal spiracles are brownish with a black border. In their key to tobacco feeding Lepidoptera of Italy, Sannino and Espinosa (1999: 35, plate 17) called attention to the pattern of the dorsal triangles and the presence of a shield on the abdominal prolegs.

The world *Spodoptera* key in Pogue (2002) defined *S. littoralis* by the large dorsal triangles on A7 and A8, compared to A1-6, and presence of a light spot in the middle of the border between the abdominal dorsal and subdorsal areas. Like *S. litura*, there is a light spot posterior of the spiracle, although it can be faint. He compared *S. exigua* to *S. littoralis*; the former species has a stripe on the prothoracic shield lacking in *S. littoralis*.

Like *S. litura*, *S. littoralis* has a rather unspecialized morphology. The genus *Spodoptera* keys out in the last couplet of Amate et al. (1998), only after all the other species are eliminated. Beck (1999-2000) has made the most progress in emphasizing morphological differences among the taxa. He defined the tribe Prodeniini (Beck 1999-2000: 381) by having a median notch at the tip of the tip of the spinneret (sometimes with projections) and "peaked fringe" on the upper lip of the silk pore that appears as paired projections or a fringe of spines (Beck 1999-2000: 381, fig. 903a). The head markings are pale and the "AF charact". This likely refers to the pale adfrontal areas forming an inverted "Y" in most of the color forms of *Spodoptera* (see Wagner et al. 2011). Beck (1999-2000: 635) then recognized *Spodoptera*, *Laphygma* and *Prodenia* as valid genera, each with a single species. *Spodoptera* (based on cilium) has blades ("serrula" see Beck 1999-2000: fig. 16a) on the hypopharyngeal complex. These are lacking in *Spodoptera* (*Laphygma*) *exigua* and *Spodoptera* (*Prodenia*) *littoralis*. Aside from differences in coloration, separation of *Laphygma* and *Prodenia* involves the position of the SV setae and crochet number. Ahola and Silvonen [2008: 30, 31] used these same characters, but they called the blades "lateral teeth" and placed all three European species in *Spodoptera*. This character set has not been tested outside the European fauna but Crumb (1929:21) and Passoa (1991) did show blunt blades without teeth on the hypopharyngeal complex of some North American *Spodoptera*. Our illustration of the hypophargngeal complex of *S. littoralis* shows four broad blunt blades when examined in lateral view. The exact distribution of the blades in *Spodoptera* has not been documented, but this character has promise for identification of species or at least recognition of the genus.

From the above studies, and those related to *S. exigua* and *S. litura*, we suggest the following morphological characters to recognize *Spodoptera*: head with an inverted "Y" because the adfrontal areas are outlined in white; spinneret with a median notch and often projections at the silk pore; mandible with four scissorial teeth and no retinaculum; SD1 on T2 and T3 connected to the associated tonofibrillary platelet by a minute sclerotized bar; SV group bisetose on A1; SD1 dorsad of the spiracle on A8; and the body setae short, most not much longer than the vertical height of the spiracle on A8. Passoa (1991) listed nine general characters to separate *Spodoptera* from other economic noctuids in Honduras, a few of these not mentioned above are applicable to *S. littoralis*, for example, four [pairs of] abdominal prolegs present (larva not a looper), lateral spot may be present on the first abdominal segment (this spot is a practical method of recognizing *Spodoptera* larvae in the field), hypopharyngeal complex with coarsely spined posterior portion lacking a dense brush of stout bristles, and cuticle smooth under low magnification. There appears to be variation in the spinneret of *S. littoralis* based on the figures of Beck (1999-2000: figs. 903a on 345, 346). *Spodoptera littoralis* has SD1 hairlike on the mesothothorax, metathorax and A9.

Passoa (2011) compared *S. littoralis* to other North American *Spodoptera* as part of a screening key to allow more rapid recognition of these exotic species if ever introduced to North America. For typical specimens of *S. littoralis*, the ground color is a shade of chocolate brown to steel gray to dark olive green, only rarely is it light green. The subdorsal area is usually strongly contrasting with the paler dorsum, a middorsal line is usually faint or absent, the spiracular stripe not interrupted on A1 by a black band or spot and dorsal triangles, if present, are on all abdominal segments, A1 and A8, A7 and A8, or just A8. They nearly always lack an apical white dot. Sometimes a white spot is present posterior to the abdominal spiracles, more rarely there is also a dorsal black dot. Heavily marked later instars often have subdorsal white spots on the mesothorax and metathorax.

We have chosen the most common states in both morphology and color based on United States port interceptions. Exceptions to the above diagnosis are known and might be expected.

Identification authority (Detailed)

Because the genus *Spodoptera* is hard to define as larvae, care must be taken to be sure the

specimen is in this genus. The thoracic bar on SD1 occurs in many noctuids, it is not an indication of *Spodoptera* by itself. Morphological characters were described in detail above to help with doubtful cases. Both the morphology and color must match *Spodoptera*. If either is not correct, it is better to stay at family Noctuidae.

Accurate identification of *S. littoralis* involves origin, morphology, and color pattern. *Spodoptera littoralis* occurs in Europe, parts of Africa, and the Middle East (Pogue 2002). Because this pest is polyphagous, the hostplant offers few clues. There are only three species of *Spodoptera* in Europe, and *S. littoralis* does not look like either *S. exigua* or *S. cilium*. *Spodoptera exigua* has a dark lateral mesothoracic spot that is absent in *S. littoralis*. The mandible of *S. cilium* normally lacks teeth (Brown and Dewhurst 1975, Pogue 2002) (but small teeth are shown by Beck (1999-2000) and again by Ahola and Silvonen [2008]) and the hosts are grasses. Teeth are present in *S. littoralis* and the host is usually not grasses. The presence of mandibular teeth separates *S. littoralis* from all African species except *S. exigua* according to Brown and Dewhurst (1975). Thus, middle to late instar larvae of *S. littoralis* with a typical color pattern can be identified in Europe, Africa and the Middle East to Israel. Because *S. littoralis* occurs in Europe naturally, it is common on cut flowers from the Netherlands.

Early instars of *S. littoralis* have a slightly swollen thorax and usually either a band or a large black spot on A1. It might be possible to name young larvae from Europe if the mandible is dissected. Early instars from Africa and the Middle East should be left at genus. Preserved large larvae of *S. littoralis* often lose their color pattern leaving a row of contrasting and obvious black spiracles.

Unless the color pattern is unambiguous, specimens from Israel to Pakistan should be left at genus because of an overlap and possible confusion with *S. litura*.

Key to recognizing *Spodoptera litura*/*littoralis* intercepted at U.S. ports of entry

Origin records

Spodoptera littoralis has been intercepted from the following locations:

France, Israel, Italy, Kenya, Netherlands, Palestinian Territory, Spain, Tanzania, Zimbabwe

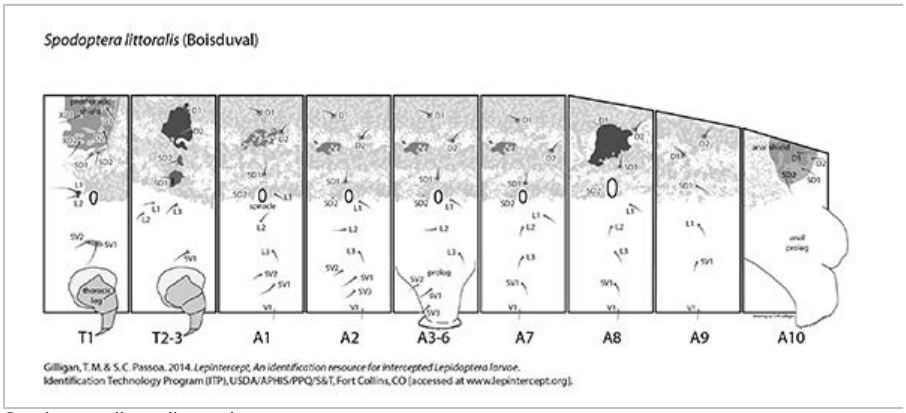
Interception records from Thailand are likely misidentifications of *S. litura*.

Host records

Spodoptera littoralis has been intercepted on the following hosts:

Anemone sp., *Anethum graveolens*, *Apium graveolens*, *Artemisia dracunculus*, *Asclepias* sp., *Asclepias tuberosa*, *Begonia* sp., *Bupleurum griffithii*, *Bupleurum* sp., *Capsicum annuum*, *Capsicum frutescens*, *Celosia* sp., *Coriandrum sativum*, *Delphinium* sp., *Eryngium* sp., *Eustoma grandiflorum*, *Eustoma* sp., *Gerbera* sp., *Lisianthus* sp., *Mentha longifolia*, *Mentha* sp., *Ocimum basilicum*, *Oncidium* sp., *Origanum majorana*, *Origanum vulgare*, *Ornithogalum* sp., *Phlox* sp., *Ranunculus* sp., *Rosa* sp., *Rosmarinus officinalis*, *Rumex* sp., *Thymus citriodorus*, *Thymus* sp., *Thymus vulgaris*, *Tulipa* sp.

Setal map



Spodoptera littoralis setal map

Click here to download a full-size printable PDF of this larval setal map