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NOCTUIDAE - *Spodoptera exigua* (Hübner) *Non-Rep*

Taxonomy

Noctuoidea: Noctuidae: Noctuinae: *Spodoptera exigua* (Hübner)

Common names: beet armyworm, small mottled willow

Synonyms: *Caradrina venosa*, *Laphygma exigua*

Larval diagnosis (Summary)

- Characteristic body coloration (see Figs. 1-7 and Detailed Information)
- Lateral black spot near the SD1 seta on the mesothorax
- Minute sclerotized bar connecting the SD1 setal base to a tonofibrillary platelet on the meso- and metathorax
- Cuticle texture is smooth (at 20X)

Host/origin information

Spodoptera exigua is frequently intercepted from various countries throughout the world, although Mexico is the most common origin, accounting for 75% of the total number of interceptions. Larvae are polyphagous, and approximately 250 hosts are listed in PestID. The most common origin/host combinations are listed here:

Origin	Host(s)
Dominican Republic	*Capsicum*
Hawaii	*Ocimum*
Israel	*Asclepias*, *Gerbera*
Mexico	*Apium*, *Aster*, *Brassica*, *Capsicum*, *Dianthus*, *Gladiolus*, *Helianthus*, *Mentha*, *Ocimum*, *Origanum*, *Portulaca*, *Thymus*
Netherlands	*Asclepias*
Thailand	*Dendrobium*, *Oncidium*

Recorded distribution

A native of Asia, *Spodoptera exigua* has spread worldwide. It is currently found on every continent except Antarctica, although it do not overwinter in far northern regions and it is rare or absent in parts of South America (Pogue 2002).

Identification authority (Summary)

Being highly polyphagous and cosmopolitan, host/origin data does not help identify *S. exigua* most of the time. Larvae are not expected to be associated with dead plant material or woody conifers. Otherwise, most countries and green plants are potential pathways.

Pest characterization

(Based on Cavey 2001, Pogue 2002)

- Taxonomy: **High.** Species identification is often possible.
- Distribution: **Low.** *Spodoptera exigua* is present in the U.S.
- Potential Impact: **High.** *Spodoptera exigua* is a pest species.

This ranking characterizes *S. exigua* as not quarantine significant for the U.S.

Larval diagnosis (Detailed)

The larva of the beet armyworm, *Spodoptera exigua*, was partially described by Crumb (1956: 224), Okumura (1961), Peterson (1962), Pogue (2002), and Beck (1999-2000). The mouthparts


Fig. 1: Late instar, lateral view


Fig. 2: Late instar, lateral view


Fig. 3: Late instar, lateral view


Fig. 4: Late instar, lateral view


Fig. 5: Mid-instar, lateral view


Fig. 6: Late instar, thorax


Fig. 7: Late instar, thorax

were illustrated by Ahola and Silvonen (2005: 510). Dong et al. (1980) photographed the head and thorax of the first instar.

Typical New World interceptions of *S. exigua* are immediately recognized by the characteristic coloration, lateral black spot near the SD1 seta on the mesothorax and a minute sclerotized bar connecting the SD1 setal base to an adjacent ventral muscle attachment (tonofibrillary platelet) on the meso- and metathorax (Weisman 1974, 1986; Passoa 1991). The cuticle texture is smooth (at 20X).

There are two main color forms. The first one has a darkly marked dorsum with either dashes or rectangular bars, but never with a series of triangular markings (Levy and Habeck 1976, Passoa 1991, Beck 1999-2000: B668, Wagner et al. 2011). The second, more common form, varies from light to dark olive green and is marked with a mixture of spots and dashes on the dorsum (Passoa 1991, Wagner et al. 2011). There is often a large contrast between the pale dorsum and darker subdorsal area (Weisman 1986, Beck 1999-2000: B668).

Several issues complicated identification of *S. exigua* in the New World. Larvae resembling *S. exigua*, but without the mesothoracic black spot, are sometimes intercepted. It is unclear if these are *S. exigua* or not. In other cases, specimens are seen with long pointed spinnerets; these cannot be *S. exigua*. Both of these situations are best identified as "sp. of Noctuidae".

Spodoptera praefica has a rectangular, somewhat obscure, black spot on the mesothorax. This is a western United States species with coloration totally unlike *S. exigua* (see Pogue 2002:185). Some green forms of *S. frugiperda* resemble *S. exigua* if the pinacula are very pale (Passoa 1991). Crumb (1956) separated these two species, in part, by the position of a line connecting the P1 setae. The line is above the apex if the front in *S. frugiperda* but below the apex in *S. exigua* (see illustrations in Okumura 1961).

More serious is the fact that *S. exigua* is easily confused with early instars of *Copitarsia decolora* and possibly other species of *Copitarsia* as well. The fastest way to seperate these two taxa is by counting the number of thoracic SD sclerotized bars. Spodoptera exigua has only one bar near SD1 whereas *Copitarsia* has two bars, one on SD1 and one on SD2 (Weisman 1986). In addition, the spinneret and labial palpi are different (see data sheet on *Copitarsia* for details).

Weisman (1974) grouped *S. exigua* with two other Old World relatives, *S. exempta* and *S. mauritia*, because all three species have a mesothoracic spot near SD1, no spot on A1 and muscle attachments between the prolegs on A3-6 that form a "Y". The mesothoracic spot on *S. exempta* appears to be absent or obscure at least in some color forms (SPIC). *Spodoptera mauritia* does have a small light brown mesothoracic marking near SD1 (Beardsley 1982). Fortunately, these three species have completely different color patterns and should not be confused with each other. However, it shows that one cannot focus just on a mesothoracic spot to identify *S. exigua* from the Old World.

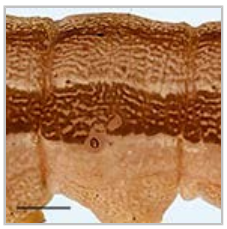


Fig. 8: Abdomen

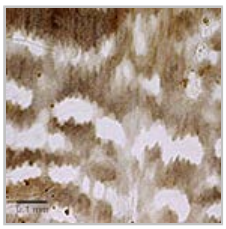


Fig. 9: Smooth cuticle

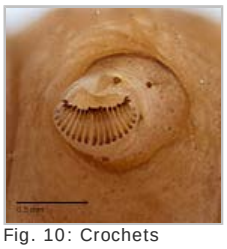


Fig. 10: Crochets


Fig. 11: Head


Fig. 12: Hypo. complex


Fig. 13: Mandible

Identification authority (Detailed)

Being highly polyphagous and cosmopolitan, host/origin data usually does not help identify *S. exigua*. Larvae are not expected to be associated with dead plant material or woody conifers. Most countries and green plants are potential pathways, although in South America it is only reported from Bolivia, Brazil, Peru, and Chile (Zheng et al. 2011).

Specimens preserved in alcohol sometimes lose their color and are very pale. If a lateral mesothoracic spot is discernible, a few backup characters will help confirm *S. exigua*. These include presence of a minute sclerotized bar connecting the SD1 setal base to a ventral muscle attachment on the meso- and metathorax, a bisetose SV group on A1, a smooth cuticle (at 20X) and the muscle attachments between the prolegs on A3-6 forming a short stemmed Y (Passoa 1991). The mandible has no inner teeth or retinaculum. However, none of the morphological characters that define *S. exigua* are very distinctive, and all expected to occur in other noctuid larvae, so specimens with atypical coloration from hosts other than economically important plants need to be examined very carefully. For example, Crumb (1956: couplets 1, 6) listed a few "Amphipyrinae group 7" and "Hadeninae with an open apical silk pore [of the spinneret]" as two taxa with a sclerotized bar on SD1 of the mesothorax. Early instars of *S. exigua* often show the black mesothoracic spot. If other characters fit, these can be identified to species.

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

Origin records

Spodoptera exigua has been intercepted from the following locations:

Argentina, Brazil, Canada, Chile, China, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, France, Guadeloupe, Guatemala, Haiti, Hawaii, Honduras, India, Israel, Italy, Jamaica, Japan, Kenya, Lebanon, Malaysia, Mexico, Micronesia, Netherlands, Nigeria, Palestinian Territory, Peru, Saudi Arabia, Singapore, South Korea, Spain, St. Lucia, St. Vincent and the Grenadines, Tanzania, Thailand, Trinidad and Tobago, Turkey

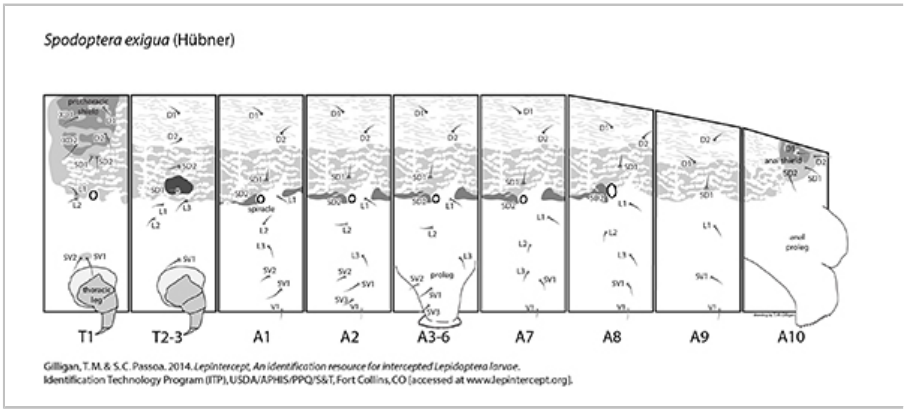
Host records

Spodoptera exigua has been intercepted on the following hosts:

Achillea sp., *Aconitum* sp., *Agapanthus* sp., *Alchemilla* sp., *Allium ascalonicum*, *Allium cepa*, *Allium fistulosum*, *Allium porrum*, *Allium sativum*, *Allium schoenoprasum*, *Allium* sp., *Allium tuberosum*, *Alocasia* sp., *Alstroemeria aurantiaca*, *Alstroemeria* sp., *Amaranthus caudatus*, *Amaranthus hybridus*, *Amaranthus* sp., *Amaranthus spinosus*, *Ammi majus*, *Ananas comosus*, *Anemone* sp., *Anethum graveolens*, *Anethum* sp., *Anigozanthus* sp., *Antirrhinum majus*, *Antirrhinum* sp.,

Apiaceae, *Apium graveolens*, *Apium graveolens* var. *dulce*, *Apium* sp., *Aranthera* sp., *Artemisia dracunculus*, *Artemisia* sp., *Artemisia tridentata*, *Asclepias* sp., *Asclepias tuberosa*, *Asparagus officinalis*, *Asparagus* sp., *Asparagus sprengeri*, *Aster ericoides*, *Aster* sp., Asteraceae, *Astilbe* sp., *Bacopa* sp., *Basella* sp., *Bergera koenigii*, *Beta vulgaris* var. *cicla*, *Beta vulgaris* var. *vulgaris*, *Brassica campestris*, *Brassica chinensis*, *Brassica juncea*, *Brassica napus*, *Brassica oleracea*, *Brassica oleracea* var. *acephala*, *Brassica oleracea* var. *alboglabra*, *Brassica oleracea* var. *botrytis*, *Brassica oleracea* var. *capitata*, *Brassica oleracea* var. *italica*, *Brassica pekinensis*, *Brassica rapa*, *Brassica rapa* ssp. *chinensis*, *Brassica rapa* ssp. *pekinensis*, *Brassica rapa* var. *parachinensis*, *Brassica* sp., *Bupleurum* sp., *Calendula officinalis*, *Calendula* sp., *Callistephus chinensis*, *Callistephus* sp., *Capsicum annuum*, *Capsicum* sp., *Carthamus* sp., *Carthamus tinctorius*, *Celosia argentea*, *Celosia* sp., *Chamaemelum* sp., *Chenopodium album*, *Chenopodium berlandieri* ssp *nuttalliae*, *Chenopodium berlandieri* ssp. *nuttalliae*, *Chenopodium* sp., *Chlorophytum* sp., *Chrysanthemum* sp., *Cicer arietinum*, *Cichorium endivia*, *Cinnamomum verum*, *Citrus* sp., *Clematis* sp., *Codiaeum variegatum*, *Colocasia esculenta*, *Coriandrum sativum*, *Cucurbita maxima*, *Cucurbita* sp., *Cyathea* sp., *Cynara scolymus*, *Dahlia* sp., *Daucus* sp., *Davallia* sp., *Delphinium* sp., *Dendrobium* sp., *Dianthus barbatus*, *Dianthus caryophyllus*, *Dianthus* sp., *Dysphania ambrosioides*, *Echeveria* sp., *Echinodorus* sp., *Eremurus* sp., Ericaceae, *Eruca sativa*, *Eruca* sp., *Eryngium* sp., *Eucalyptus* sp., *Euphorbia* sp., *Eustoma grandiflorum*, *Eustoma* sp., *Fragaria ananassa*, *Fragaria* sp., *Genista* sp., *Gerbera* sp., *Gladiolus* sp., *Grevillea* sp., *Gymnocoronis spilanthoides*, *Gypsophila elegans*, *Gypsophila* sp., *Helianthus annuus*, *Helianthus* sp., *Helichrysum* sp., *Heliconia psittacorum*, *Heliconia* sp., *Hydrangea* sp., *Ipomoea batatas*, *Iris* sp., *Lactuca sativa*, *Lactuca sativa* var. *capitata*, *Lactuca sativa* var. *longifolia*, *Lactuca* sp., *Lilium* sp., *Limonium perezii*, *Limonium sinuatum*, *Limonium* sp., *Lippia* sp., *Lisianthus* sp., *Luffa acutangula*, *Luffa* sp., *Lycopersicon esculentum*, Malvaceae, *Matthiola incana*, *Matthiola* sp., *Mentha arvensis*, *Mentha longifolia*, *Mentha officinalis*, *Mentha piperita*, *Mentha* sp., *Mokara* sp., *Moluccella laevis*, *Moluccella* sp., *Momordica balsamina*, *Momordica charantia*, *Momordica* sp., *Musa* sp., *Nephelium lappaceum*, *Nephelium* sp., *Ocimum basilicum*, *Ocimum* sp., *Oncidium basilicum*, *Oncidium* sp., *Opuntia* sp., Orchidaceae, *Origanum majorana*, *Origanum* sp., *Origanum vulgare*, *Peperomia* sp., *Perilla* sp., *Petroselinum crispum*, *Petroselinum* sp., *Phaseolus* sp., *Phaseolus vulgaris*, *Philodendron* sp., *Phlox* sp., *Physalis philadelphica*, *Physalis pubescens*, *Physalis* sp., *Pisum sativum*, *Pisum sativum* var. *macrocarpon*, *Pisum* sp., *Pithecellobium dulce*, *Polianthes* sp., *Polianthes tuberosa*, *Porophyllum tagetoides*, *Portulaca oleracea*, *Portulaca* sp., *Psidium* sp., *Ranunculus* sp., *Raphanus sativus*, *Rosa* sp., *Rosmarinus officinalis*, *Rubus* sp., *Rumex acetosa*, *Ruscus* sp., *Saccharum officinarum*, *Salvia officinalis*, *Salvia* sp., *Sechium edule*, *Solanum lycopersicum* var *lycopersicum*, *Solanum* sp., *Solidago* sp., *Solidaster* sp., *Spinacia oleracea*, *Spinacia* sp., *Suaeda* sp., *Symphoricarpos* sp., *Tagetes erecta*, *Tagetes* sp., *Thymus caespititius*, *Thymus citriodorus*, *Thymus* sp., *Thymus vulgaris*, *Trachelium* sp., *Tulipa* sp., *Vaccinium angustifolium*, *Vaccinium corymbosum*, *Vaccinium* sp., *Veronica* sp., *Viburnum* sp., *Vigna sesquipedalis*, *Vigna* sp., *Vigna unguiculata*, *Xanthosoma hastifolium*, *Zea mays*, *Zingiber officinale*

Setal map



Spodoptera exigua setal map

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