Cryptoblabes gnidiella

Figures 1 & 2. *Cryptoblabes gnidiella* adults (http://pathpiva.wifeo.com/).

Scientific Name

Cryptoblabes gnidiella Millière

Synonyms:
Albinia casazzar Briosi
Albinia gnidiella Millière
Albinia wockiana
Cryptoblabes aliena Swezey
Cryptoblabes wockeana
Ephestia gnidiella Millière

Common Name(s)

Honeydew moth, Christmas berry webworm, citrus pyralid, earhead caterpillar, false blossom moth, and lemon borer moth

Type of Pest

Moth

Taxonomic Position

Class: Insecta, **Order:** Lepidoptera, **Family:** Pyralidae

Reason for Inclusion in Manual

CAPS Target: AHP Prioritized Pest List – 2014 through 2015

Pest Description

Eggs: "Oval, irregularly reticulate; at first white, becoming yellow before hatching" (CABI, 2012).

Larvae: "Measures 12 mm [approx. ½ in] long when fully grown, narrowing towards each end. Head and thoracic plate reddish-brown to black; body yellowish, olivaceous, reddish- or brownish-grey with longitudinal stripes; peritreme of spiracles reddish-brown; setae yellowish-brown; pinacula blackish-brown surrounded by pale ochreous coloration. Thoracic legs reddish-brown to black" (CABI, 2012).

Figure 3. *Cryptoblabes gnidiella* larva (http://pathpiva.wifeo.com/).

Pupae: "Measures 5-6 mm [3/16 to ¼ in] long. At first greenish, becoming reddish-brown. Fine hairs in two dorsal, two lateral, and two ventral rows. Cremaster with two slender prongs terminating in strongly angular hooks. Formed in a slight cocoon" (CABI, 2012).

Figure 4. *Cryptoblabes gnidiella* pupa (http://pathpiva.wifeo.com/).

Adults: "Wingspan 11–20 mm [7/16 to 13/16 in]. Head and thorax greyish-brown. Antennae simple, finely ciliate. Forewing greyish-brown with a variable amount of whitish suffusion, scattered reddish-brown scales give a purplish appearance; postmedian and antemedian fascias pale, indistinct. Hindwing shining white; veins conspicuous, pale greyish-brown. Abdomen shining greyish-white" (CABI, 2012).

Descriptions of the life stages can also be found in Avidov and Harpaz (1969) and Carter (1984). Descriptions of the immature stages can be found in Heckford and Sterling (2004). Description of the adult can be found in Goater (1986).

Biology and Ecology

Adults are active at night (Avidov and Gothilf, 1960) and mate on the same night of emergence; females begin oviposition the following day (Avidov and Harpaz, 1969). Most females mate once, while males have been recorded mating multiple times (Wysoki et al., 1993). Adults are attracted to sweet material, including honeydew excreted by mealybugs and also fruits like grapes and pomegranates that have been injured by other insects (Avidov and Harpaz, 1969). Adults live for about a month during the cold season and 8 to 10 days during the warm season (Avidov and Gothilf, 1960).

Females lay their eggs on fruit, usually singly or in small batches (Avidov and Harpaz, 1969). In mangos, adult females lay eggs on the tender leaves near the main rib, on the fruit, or on the tender branches (MALR, n.d.). In garlic, eggs are laid on the inner surface of the bulb sheath or in the garlic lobe depressions (Salama, 2008). Females live from 1 to 4 weeks and lay an average of 150 eggs during this time (Avidov and Harpaz, 1969).

Eggs hatch after about four days in Brazil (Botton et al., 2003). In Egypt, eggs hatch in 8 to 13 days (MALR, n.d.). Once larvae hatch, they initially feed solely on the honeydew produced by mealybugs and insect remnants. As the larvae mature, they begin nibbling superficially on the skin of fruit (Avidov and Harpaz, 1969). Bagnoli and Lucchi (2001) state that larval diet includes sweet matter, dry flower parts, berry juice, berry stalks, and even healthy grapes. Larval populations can be very high, especially if they are close to a large colony of mealybugs. If no mealybugs are present, larvae can develop on grape berries that are almost ripe. Larvae develop slightly faster on grapes versus citrus fruit with mealybugs (Avidov and Harpaz, 1969). Larvae can be found in sheltered places among the fruit or between fruits and leaves. They are enveloped by webs and waste matter (Avidov and Gothilf, 1960). Larvae go through five instars.

The larvae pass through a prepupal stage in which they stop feeding and become sluggish. Larvae then secrete a thin silk cocoon before molting into a pupa (Salama, 2008). Pupation occurs close to the larval feeding site (Avidov and Harpaz, 1969), either on the host plant or on the ground. Overwintering can occur in either the larval or pupal stage (Carter, 1984).

Complete development can range from five weeks during the summer, to five months during the winter. In Israel, five to six generations occur per year on citrus. If the host cycle also includes grapes, then six to seven generations may occur per year (Avidov and Harpaz, 1969). Carter (1984) states that this species has three to four generations a year in southern Europe and up to five in North Africa. The number of generations per year is highly dependent on the climate and host plants utilized. The generations can move between different host plants depending on what is available at the time.

In Mediterranean climates, this species has three to four periods of adult flight activity: May to June, July, and August to October (Bagnoli and Lucchi, 2001). Avidov and Gothilf (1960) report the temperature threshold for this species is 13°C (55.4°F). One generation requires 455 degree days (Avidov and Gothilf, 1960). MALR (n.d.) states that the optimum temperature for this species is 25 to 30°C (77 to 86°F) with 65 to 67% relative humidity.

Damage

Larvae of this species may be found as early as August in Israel; however, damage to fruit usually occurs only from late October onwards (Avidov and Harpaz, 1969). Symptoms include presence of eggs or larvae on the fruits, silk webbing produced by the larvae, and molds which can develop on the attacked fruits (MALR, n.d.). This species is attracted to the honeydew of coccids, especially *Pseudococcus citriculus* (Zhang, 1994).

On avocado: Severe injury can be caused by *C. gnidiella*'s superficial feeding on the skin of the avocado fruit. This can occur even in the absence of honeydew-producing Homoptera (Ben Yehuda et al., 1991).

On citrus: On lemons, eggs are laid on young fruit. After hatching, larvae penetrate the underside of the egg into the fruit. Larvae do not usually go further than the flavedo (the outer part of the rind). This can cause the fruit to gum, resulting in necrotic blotches on mature fruit (Moore, 2003). In sweet orange, feeding by the larvae leads to fruit piercing and gallery formation on the fruit exocarp and endocarp. This can result in gum-exudation, yellowing of the fruit, and premature fruit drop (Silva and Mexia, 1999).

On grape: Young larvae enter the fruit at the junction between the fruit and stalk (Avidov and Harpaz, 1969). Botton et al. (2003) state that the larvae feed on the stems when the grapes are green, causing wilting and grape fall. When attacked close to harvesting, juice leakage can lead to rot by secondary pathogens which can reduce wine quality (Botton et al., 2003). Larvae produce dense webbing spun around the host stalk (Carter, 1984).

On loquat: This species has been recorded destroying large quantities of loquat flowers (reviewed in Avidov and Harpaz, 1969).

This species is usually associated with other pests like scale insects or mealybugs and their honeydew (Ben Yehuda et al., 1991). In Israel, this species coexists with *Lobesia botrana* in grapevines (Harari et al., 2007). In avocado, this species can be found with *Pseudococcus longispinus* (long-tailed mealybug).

Pest Importance

This species is a pest of avocado, citrus, grape, loquat, and pomegranate in Israel (Ascher et al., 1983). Losses associated with this species are not well quantified in the literature (CABI, 2012). This is likely due to the fact that this species is usually associated with a variety of other pests in host crops, including birds, bacteria and fungi, and insects (including aphids, mealybugs, and *Lobesia botrana*) (reviewed in Silva and Mexia, 1999). Many sources state that this species is not a serious pest; however, there are records of this species causing damage on certain hosts.

In the field, *C. gnidiella* mostly appears on grape bunches that have previously been damaged by grape berry moth. However, experiments have shown that this species can develop on healthy grapes as well (Avidov and Harpaz, 1969). Bagnoli and Lucchi (2001) state that this species is a frequent and harmful pest on grapes in Tuscany, Italy as this species does well in areas with Mediterranean conditions. They state that this species is only faintly destructive (Bagnoli and Lucchi, 2001). Bisotto-de-Oliveira et al. (2007) state that this species is an important pest of grapevine orchards in Rio Grande do Sul, Brazil. In addition, Sellanes et al. (2010) state that this species is an economically important pest of vineyards in Brazil and Uruguay.

Avidov and Harpaz (1969) state that larval infestation of citrus is not considered serious; while Gentry (1965) states that this species is regarded as a secondary feeder causing no serious primary damage. This species can cause occasional fruit drop as a result of infestation (Gentry, 1965). Damage on grapevine in Israel is considered secondary (Avidov and Harpaz, 1969). Larvae have been recorded on pomegranates which were previously infested by the pomegranate butterfly (Avidov and Harpaz, 1969).

Akanbi (1973) states that this species is found in association with trees in the Meliaceae family in Nigeria; while Chandel et al. (2010) state that this species is a serious pest of hybrid sorghum and bajra (pearl millet) crops. In Egypt, this species is considered one of the most important insect pests of stored garlic (El-Zemaity et al., 2009); it is also prevalent in damaged corn ears in Egypt (Gentry, 1965). Hashem et al. (1997) state that this species is a serious pest of fruit orchards and vegetable and field crops. EPPO (2004) states that this species can cause severe damage to oranges (cultivars Navel and Navelina) by causing premature fruit fall. Fruit remaining on the tree change color on the lowest part of the tree but remain green elsewhere on the tree (EPPO, 2004). Ben Yehuda et al. (1991) state that this species can also infest avocado as a primary pest. In South Africa, this species has been recorded causing up to 5% crop reduction in lemon on the Eastern Cape and up to 50% fruit damage on the Western Cape (Moore, 2003). Özturk and Ulusoy (2009) state that this species is a pest of pomegranate in Turkey. This species has been recorded causing damage to *Macadamia ternifolia* in Israel (Wysoki, 1986). Larvae have also been found on cotton bolls after a primary infestation by cotton pests (Avidov and Harpaz, 1969). Outside of Israel, this species has been recorded on previously injured fig and peach. Damage to other hosts, including wheat, corn, millet, and castor bean are usually light (Avidov and Harpaz, 1969).

This species is usually associated with other pests of host plants like scale insects or mealybugs and their honeydew (Ben Yehuda et al., 1991). In Israel, this species coexists with *Lobesia botrana* in grapevines. Harari et al. (2007) state that damage caused by *C. gnidiella* and *L. botrana* in Israel is twofold: direct damage to grape clusters when both *L. botrana* and *C. gnidiella* are present and indirect damage when the injured berries are damaged by fungal infestation.

Known Hosts

In Israel, *C. gnidiella* is only recorded on seven plant species: citrus, corn, cotton, grape, loquat, pomegranate, and sorghum (Avidov and Harpaz, 1969). In Brazil, this species has also been found on avocado, banana, and coffee (Botton et al., 2003). Carter (1984) also lists plum, peach, and apple as hosts.

Major hosts

Citrus spp. (including orange, grapefruit, lemon*), *Persea americana* (avocado), *Punica* spp., *Punica granatum* (pomegranate), and *Vitis* spp. (grape) (reviewed in CABI, 2012).

Other hosts

Acacia karroo (karroothorn), *Acacia nilotica* (gum arabic tree), *Actinidia deliciosa* (kiwi), *Allium* spp., *Allium cepa* (garden onion), *Allium sativum* (garlic), *Annona muricata* (soursop), *Azolla* spp. (mosquitofern), *Azolla anabaena* (water fern), *Azolla pinnata* (feathered mosquitofern), *Ceratoniae siliqua* (fig), *Chaenomeles japonica* (Maule's quince), *Coffea* spp. (coffee), *Coffea arabica* (Arabian coffee), *Cyanea procera* (Molokai cyanea), *Cydonia oblonga* (quince), *Cyperus rotundus* (nutgrass), *Daphne gnidium*, *Daphne mezereum* (paradise plant), *Daucus carota* (Queen Anne's lace), *Eleusine coracana* (finger millet), *Eriobotrya japonica* (loquat), *Feijoa sellowiana* (feijoa), *Ficus* spp. (fig), *Ficus carica* (edible fig), *Ficus macrophylla* (Moreton Bay Fig), *Gossypium* spp. (cotton), *Gossypium arboreum* (tree cotton), *Gossypium thurberi* (Thurber's cotton), *Khaya senegalensis*, *Lantana* spp. (lantana), *Lythrum* spp. (loosestrife), *Lythrum salicaria* (purple loosestrife), *Macadamia* spp. (macadamia), *Malus* spp. (apple), *Malus pumila* (paradise apple), *Mangifera indica* (mango), *Mespilus* spp. (medlar), *Mespilus germanica* (medlar), *Morus alba* (mora), *Morus nigra* (black mulberry), *Musa* spp. (banana), *Musa acuminata* (edible banana), *Nephelium* *lappaceum* (rambutan), *Nerium oleander* (oleander), *Olinia* spp., *Oryza sativa* (rice), *Osmanthus* spp. (devilwood), *Paspalum dilatatum* (dallisgrass), *Pelargonium* spp. (geranium), *Pennisetum americanum* (pearl millet), *Pennisetum glaucum* (=*P. typhoideum*) (bulrush millet), *Phaseolus* spp. (beans), *Phaseolus vulgaris* (kidney bean), *Philodendron* spp. (philodendron), *Plectroniella* spp., *Prosopis* spp. (mesquite), *Prunus* spp. (plums, peaches), *Psidium* spp. (guava), *Pyrus* spp. (pear), *Pyrus communis* (common pear), *Ricinus* spp., *Ricinus communis* (castor bean), *Rosa* spp. (rose), *Saccharum* spp. (sugarcane), *Saccharum officinarum* (sugarcane), *Samanea saman* (=*Albizia saman*) (raintree), *Schinus* spp. (pepper tree), *Schinus terebinthifolius* (Brazilian pepper tree), *Sorghum* spp., *Sorghum bicolor* (=*S. vulgare*) (sorghum), *Swietenia* spp. (mahogany), *Tamarix* spp. (tamarisk), *Triticum aestivum* (wheat), *Vaccinium* spp. (blueberry), and *Zea mays* (corn) (Gough, 1913; Akanbi, 1973; Gubbaiah, 1984; Zhang, 1994; Molina, 1998; reviewed in Silva and Mexia, 1999; McQuate et al., 2000; Zheng et al., 2006; Robinson et al., 2010; reviewed in CABI, 2012).

Ben Yehuda et al. (1991) give a host list for this species.

Interestingly, this species has also been recorded as a predator of whiteflies and other Homoptera, including *Aleurocanthus woglumi* and *Stictococcus* spp. (Clausen, 1940; Zhang, 1994). It is also capable of developing on honeydew alone (McQuate et al., 2000).

*Moore (2003) states that *Cryptoblabes gnidiella* does not complete its lifecycle on lemon.

Pathogens or Associated Organisms Vectored

Cryptoblabes gnidiella is associated with different mealybug species including the citrus mealybug (*Planococcus citri)* and Green's mealybug (Avidov and Harpaz, 1969). In grapes, this species usually attacks fruit following attacks by the European grapevine moth (*Lobesia botrana*) (Carter, 1984).

When grapes are attacked by larvae close to harvesting, juice leakage can lead to rot by secondary pathogens which can reduce wine quality (Botton et al., 2003). Grape grey mold can increase with high population densities of *C. gnidiella* on grape (reviewed in Silva and Mexia, 1999).

On dallisgrass (*Paspalum dilatatum*) this species is associated with the ergot fungus *Claviceps paspali*, which produces honeydew-like secretions on the host (Ben Yehuda et al., 1991).

Known Distribution

Asia: India, Indonesia, Israel, Lebanon, Malaysia, Pakistan, Russia, Thailand, and Turkey; **Africa:** Congo, Egypt, Liberia, Malawi, Morocco, Nigeria, Sierra Leone, South Africa, and Zaire; **Caribbean:** Bermuda; **Europe:** Austria, Cyprus, France, Gibraltar, Greece, Italy (including Sardinia and Sicily), Malta, Portugal (including Azores and

Madeira), and Spain (Canary Islands), and Ukraine; **Oceania:** Fiji, Hawaii, and New Zealand; **South America:** Brazil and Uruguay (reviewed in Wysoki, 1986; Zhang, 1994; reviewed in Silva and Mexia, 1999; Nuss et al., 2011; reviewed in CABI, 2012; Evenhuis, 2013).

This species is likely more widespread than reported in the literature as many interceptions at U.S. ports of entry have originated on material from countries not reported to have the pest, including: Albania, Bosnia and Herzegovina, Cote D'Ivoire, Croatia, Cuba, Dominican Republic, Eritrea, Georgia, Germany, Haiti, Iran, Iraq, Jordan, Kuwait, Mexico, Netherlands, Qatar, Romania, Saudi Arabia, South Korea, Syrian Arab Republic, Tunisia, United Kingdom*, Venezuela, former Yugoslavia (AQAS, 2013; queried March 8, 2013).

*According to Carter (1974), this species is not established in the United Kingdom as it cannot survive; it is likely a transient species.

Pathway

Although this species is native to the Mediterranean region, it has been introduced into Malaysia, New Zealand, Hawaii, and parts of tropical and subtropical America. It is sometimes found in imported material in the British Isles (Beirne, 1952; Carter, 1984). Mau and Kessing (1992) state that this species most likely dispersed throughout Europe on infested fruit.

This species has been intercepted at U.S. ports of entry over 450 times. Almost all interceptions occurred on plant material, including: *Punica granatum* (319), *Citrus* sp. including *C. sinensis* (50), *Psidium guajava* (32), and *Ananas* sp. (8). Most interceptions occurred in baggage (394), with the rest occurring on general cargo (38), permit cargo (11), and other (13). Intercepted material has originated from many different countries around the world, including: Italy (57), Jordan (55), Greece (49), Israel (48), Spain (33), Iran (30), former Yugoslavia (19), and Portugal (17) among others (AQAS, 2013; queried March 8, 2013).

Potential Distribution within the United States

If introduced into the United States, this species is most likely to be found wherever associated coccids are found. *Cryptoblabes gnidiella* is associated with many commercial crops found in the United States, including: citrus, corn, cotton, and grape. These hosts are found throughout most of the United States.

Survey

CAPS-Approved Method*:

The CAPS-approved method is a trap and lure combination. Both the wing trap and plastic bucket trap are approved traps for this species. The wing trap is available in a plastic or paper version; either type may be used for this target. The lure is effective for 28 days.

Any of the following Trap Product Names in the IPHIS Survey Supply Ordering System may be used for this target:

1) Wing Trap Kit, Paper
2) Wing Trap Kit, Plastic
3) Plastic Bucket Trap

The Lure Product Name is “*Cryptoblabes gnidiella* Lure.”

IMPORTANT: Do not include lures for other target species in the trap when trapping for this target.

Trap spacing: When trapping for more than one species of moth, separate traps for different moth species by at least 20 meters (65 feet).

*For the most up-to-date methods for survey and identification, see Approved Methods on the CAPS Resource and Collaboration Site, at https://caps.ceris.purdue.edu/node/223.

Survey Site Selection:
This species has a wide host range that includes citrus, corn, cotton, grapevine, loquat, pomegranate, and sorghum (Avidov and Harpaz, 1969). Surveys should be focused on areas where host plants are present. These can include field crops, nurseries, and even some residential areas.

Time of year to survey:
In Israel, males begin appearing in pheromone traps in low numbers in early spring. The number of adult males captured greatly increases from June to October (Harari et al., 2007). Ben Yehuda et al. (1991) trapped moths from March through December. The percentage of the total moths caught over this time period was: March to April (5% of total moths captured), June to September (75%), and October to December (20%).

In Portugal, moths are trapped from March until late May (overwintering population) and trap catches increase again from early June until late August (first generation population). Moths are trapped until late November/early December (Silva and Mexia, 1999).

Literature-Based Methods:
Trapping: Early work on pheromones for this species found that the synthetic compounds: *Z*11-16:Ald, *E*l 1-16:Ald, *Z*13-18:Ald, and *E*13-18:Ald in 100:10:100:10 proportions was more attractive to adult males than virgin females (Bjostad et al., 1981).

Field work by Anshelevich et al. (1993) found that “at dosages of 2 or 0.2 mg, a binary blend containing (Z)-I 1-hexadecenal (Z11-16:Ald) and (Z)-13-octadecenal (Z13-18:Ald) (1:1) was as effective in attracting males as a quaternary blend containing Z11-16:Ald, (E)-11-hexadecenal (E11-16:Ald), Z13-18:Ald and (E)-13-octadecenal (E13-18:Ald), (10:1:10:1).” The suggested replacement rate of the lure was two to three weeks.

Anshelevich et al. (1993) found that the nonsticky IPS trap was as effective in capturing *C. gnidiella* adult males as the sticky Pherocon 1C trap.

Pheromones have been used in certain countries, including Israel, to develop mating disruption techniques against this species (Gordon et al., 2003).

Ben Yehuda et al. (1991) used delta traps placed trees at a height of 1.5 m when surveying for this species in avocado. Silva and Mexia (1999) used one funnel trap per grove when trapping for this species in Portugal. Traps contained pheromone dispensers (replaced every four weeks) and an insecticidal strip (replaced every week).

Not recommended: This species is attracted to light (Goater, 1986); however, this survey method is not species-specific.

Key Diagnostics/Identification

CAPS-Approved Method*:

Confirmation of *C. gnidiella* is by morphological identification. Adults of *C. gnidiella* are easily confused with many North American species; genitalia must be examined for confirmation. Mature larvae and adults can be identified. A screening aid for CAPS target Pyraloidea (males), including *C. gnidiella*, can be found in Passoa (2009). A description of this species is found in Neunzig (1986).

Passoa, S. 2009. Screening key for CAPS target Pyraloidea in the Eastern and Midwestern United States (males). https://caps.ceris.purdue.edu/dmm/95

*For the most up-to-date methods for survey and identification, see Approved Methods on the CAPS Resource and Collaboration Site, at https://caps.ceris.purdue.edu/node/223.

Easily Confused Pests

Larvae could be confused with larvae of the carob moth (*Ectomyelois ceratoniae*) which is present in parts of the United States (Nay and Perring, 2008). This species also attacks citrus fruit but can cause much more extensive fruit drop than *C. gnidiella* (Avidov and Gothilf, 1960; Avidov and Harpaz, 1969). A diagnostic comparison between the two pests can be found in Avidov and Gothilf (1960).

Pre-imaginal stages of *Lobesia botrana* and *C. gnidiella* can look similar. Both can occur simultaneously on grapevines (CABI, 2012). Tio et al. (1994) give characteristics to distinguish the two larval species.

A key to Pyraloidea larvae (including *Cryptoblabes* spp.) is provided in Solis (2006).

Commonly Encountered Non-targets

In Italy, Bagnoli and Lucchi (2001) caught the following species when trapping for *Cryptoblabes gnidiella* using the 4-component pheromone lure. However, CAPS surveyors will use the 2-component lure, so it is unknown if these species will be attracted.

Duponchelia fovealis Zeller (Pyralidae, Pyraustinae)*,
Grapholita funebrana (=*Cydia funebrana*) Treitschke (Tortricidae, Olethreutinae),
Hoplodrina ambigua (Den. & Schiff.) (Noctuidae, Amphipyrinae)
Mamestra dysodea (Den. & Schiff.) (Noctuidae, Hadeninae),
Mythimna vitellina (Hübner) (Noctuidae, Hadeninae),
Pammene inquilina Fletcher (Tortricidae).

*This species is present in the United States (Stocks and Hodges, 2013).

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Revisions

October 2014

1) Updated datasheet format.
2) Revised the **Survey** section.
3) Revised the **Key Diagnostics/Identification** section. Added Passoa (2009).

July 2016

1) NAPPFAST maps removed.
2) Screening aids links updated.