Melonworm, *Diaphania hyalinata* Linnaeus (Insecta: Lepidoptera: Crambidae)[1]

John L. Capinera[2]

The Featured Creatures collection provides in-depth profiles of insects, nematodes, arachnids and other organisms relevant to Florida. These profiles are intended for the use of interested laypersons with some knowledge of biology as well as academic audiences.

Distribution

Melonworm, *Diaphania hyalinata* Linnaeus, occurs throughout most of Central and South America and the Caribbean. It also has been reported from Africa (Mohaned et al. 2013). The United States is the northern limit of its permanent range, and wintertime occurrence generally is limited to south Florida and perhaps south Texas. Melonworm disperses northward annually. Its distribution during the summer months is principally the southeastern states, though occasionally it disperses north to New England and the Great Lakes region.

Life Cycle and Description

The melonworm can complete its life cycle in about 30 days. It is present throughout the year in southern Florida, where it is limited mostly by availability of host plants. It disperses northward annually, usually arriving in northern Florida in June and other southeastern states in July, where no more than three generations normally occur before cold weather kills the host plants.

Egg

Melonworm moths deposit oval, flattened eggs in small clusters, often averaging two to six overlapping eggs per egg mass. Apparently, they are deposited at night on buds, stems, and the underside of leaves. Initially they are white or greenish, but soon become yellow in color. They measure about 0.7 mm (~0.03 in) in length and 0.6 mm (~0.02 in) in width. Hatching occurs after 3–4 days.

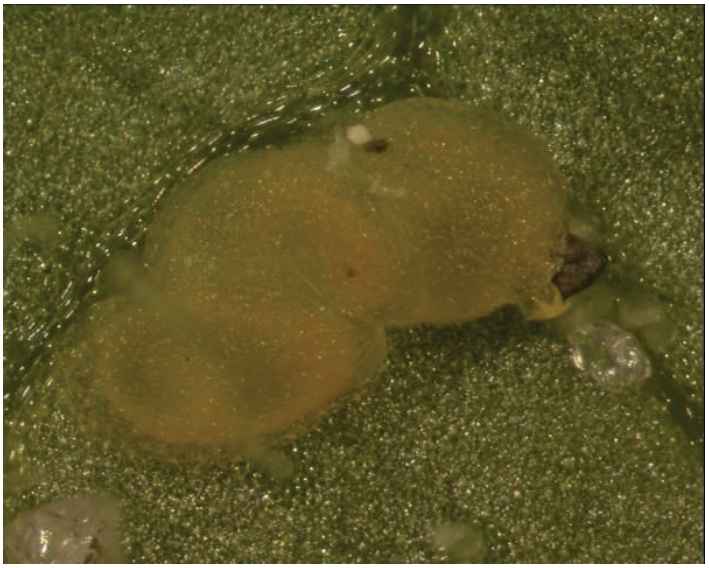

Figure 1. Eggs and newly hatched larva of melonworm, *Diaphania hyalinata* Linnaeus, on foliage.
Credits: Rita Duncan, UF/IFAS

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2. John L. Capinera, professor emeritus, Department of Entomology and Nematology; UF/IFAS Extension, Gainesville, FL 32611.

Larva

There are five instars. Total larval development time is about 14 days, with mean (range) duration of the instars about 2.2 (2–3), 2.2 (2–3), 2.0 (1–3), 2.0 (1–3), and 5.0 (3–8) days, respectively. Head capsule widths are about 0.22 (~0.009 in), 0.37 (~0.01 in), 0.62 (~0.02 in), 1.04 (~0.04 in), and 1.64 mm (~0.06 in), respectively (Smith et al. 1994). Larvae attain lengths of about 1.5, 2.6, 4.5, 10, and 16 mm (~0.06, 0.1, 0.2, 0.4, and 0.6 in) in instars one through five, respectively. Newly hatched larvae are colorless, but by the second instar larvae assume a pale yellow-green color. They construct a loose silken structure under leaves, which serves to shelter them during the daylight hours. In the fifth instar, larvae have two subdorsal white stripes extending the length of the body. The stripes fade or disappear just prior to pupation, but they are the most distinctive characteristic of the larvae.

Figure 2. Mature larva of melonworm, *Diaphania hyalinata* Linnaeus.
Credits: Lyle Buss, UF/IFAS

Pupa

Prior to pupation, larvae spin a loose cocoon on the host plant, often folding a section of the leaf for added shelter. The pupa is 12–15 mm (0.5 to 0.6 in) in length, about 3–4 mm (~0.12 to 0.16 in) in width, and fairly pointed at each end. It is light to dark brown in color. The pupal stage persists for 9–10 days.

Adult

The moth's wingspan is about 2.5 cm (1 in). The wings are pearly white centrally, and slightly iridescent, but are edged with a broad band of dark brown. Moths frequently display brushy hairpencils at the tip of the abdomen when at rest. Melonworm moths remain in the crop during the daylight hours. While they are generally inactive during the day, they will fly short distances when disturbed. Smith (1911) provides a detailed account of melonworm biology.

Figure 3. Pupa after cocoon has been cut to reveal the developing moth.
Credits: Lyle Buss, UF/IFAS

Figure 4. Adult melonworm moth, *Diaphania hyalinata* Linnaeus.
Credits: John L. Capinera, UF/IFAS

Damage

Melonworm feeds principally on foliage, especially if foliage of a favored host plant such as summer or winter squash is available. Usually, the leaf veins are left intact, resulting in lace-like plant remains. However, if the available foliage is exhausted, or the plant is a less preferred species such as cantaloupe, then the larva may feed on the surface of the fruit, or even burrow into the fruit. Growers sometimes refer to these insects as "rindworms" because they cause scars on the surface of melons. Interestingly, Pathi et al. (2016) found that although adults tended to avoid depositing eggs on watermelon, this plant was actually quite a good host. In a study of melonworm damage potential to summer squash conducted in south Florida, melonworm caused a 23% yield loss due to foliage damage (indirect loss) and a 9 to 10% yield reduction due to fruit damage (direct loss) (McSorley and Waddill 1982). Kelsheimer (1949) considered this insect to be the most important pest of cucurbits in Florida.

Figure 5. Defoliation of young squash plant (bottom) by larvae of the melonworm, *Diaphania hyalinata* Linnaeus, compared with a healthy plant (top).
Credits: John L. Capinera, UF/IFAS

Natural Enemies

Among the common natural enemies of melonworm are *Apanteles* sp., *Hypomicrogaster diaphaniae* (Muesebeck), *Pristomerus spinator* (Fabricius) (all Hymenoptera: Braconidae), *Casinaria infesta* (Cresson), *Temelucha* sp. (both Hymenoptera: Ichneumonidae), and undetermined trichogrammatids (Hymenoptera: Trichogrammatidae) (Pena et al. 1987b, Capinera 1994). However, additional species parasitized melonworm, including *Gambrus ultimus* (Cresson), *Agathis texana* (Cresson) (both Hymenoptera: Ichneumonidae) and an undetermined fly (Hymenoptera: Tachinidae). The tachinids known from melonworm are *Nemorilla pyste* (Walker) and *Stomatodexia cothurnata* (Wiedemann). Studies conducted in Puerto Rico (Medina-Gaud et al. 1989) reported levels of parasitism reaching 24%. Generalist predators such as *Calosoma* spp. and *Harpalus* (both Coleoptera: Carabidae), the soldier beetle *Chauliognathus pennsylvanicus* DeGeer (Coleoptera: Cantharidae), and the red imported fire ant *Solenopsis invicta* Buren (Hymenoptera: Formicidae) have also been reported to be mortality factors.

Management

Sampling

Pheromone production by female moths peaks at about sunset (Valles and Capinera 1992). The sex pheromone has been identified (Raina et al. 1986, Cabezas and Oehlschlager 1999) but is not available commercially. Moths are not attracted to light traps. Therefore, checking plants for early stages of leaf damage and the presence of larvae are the most effective ways to monitor crops.

Insecticides

Historically, melonworm was considered to be a very damaging pest, but because it feeds preferentially on foliage it is easy to control with a variety of insecticides. In temperate areas, and especially in commercial vegetable production areas, it is treated as only a minor pest. In insecticide-free cucurbit production and in home gardens, melonworm can cause serious damage. In addition to conventional synthetic insecticides, the botanical material neem and the biological insecticide *Bacillus thuringiensis* are effective for melonworm control.

Pollinators, particularly bees, are very important in cucurbit production, and insecticide application can interfere with pollination by killing honeybees. If insecticides are to be applied when blossoms are present, it is advisable to use insecticides with little residual activity, and to apply insecticides late in the day, when bee activity is minimal.

Biological Control

In addition to chemical insecticides, the bacterial insecticide *Bacillus thuringiensis* is commonly recommended for suppression. The entomopathogenic nematode *Steinernema carpocapsae* provides only moderate suppression because the nematodes do not survive long on the foliage, where larvae are found resting and feeding (Shannag and Capinera 1995).

Cultural Practices

Row covers can be used effectively to exclude melonworm adults (Webb and Linda 1992). Intercropping of corn and beans with squash was shown to reduce damage by melonworm (Letourneau 1986). Because melonworm prefers squash to most other cucurbits, trap cropping has been suggested. Also, destruction of crop residue, which may contain melonworm pupae, is recommended (Smith 1911). Early plantings, except in tropical areas where melonworm overwinters, often escape serious damage.

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