

Spotted cucumber beetle
***Diabrotica undecimpunctata* Barber**
(Coleoptera: Chrysomelidae)

Distribution:

These insects are native insects in Mexico and Canada. They are most abundant and destructive in their southern range, but usually are not troublesome in areas with sandy soils.

Host Plants:

Cucumber, cantaloupes, winter squash, pumpkin, gourd, summer squash and watermelon are preferred by adult striped cucumber beetles. They also feed on sunflower. Larvae develop on these and related cucurbits.

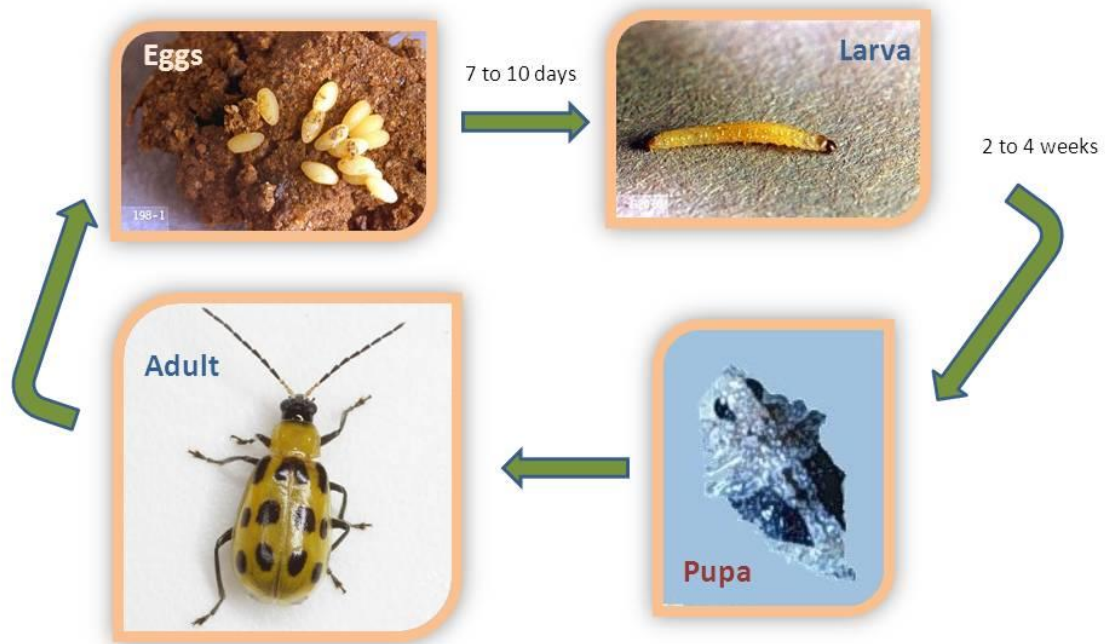
Damage:

These beetles cause agricultural damage by feeding on roots, seedlings, flowers and foliage, and transmitting disease. Adult feeding on cucurbit plants or transplants has been reported to result in wilting and reduced yield. Larvae feed on roots and tunnel through stems. The larvae can cause severe damage to small plants, but less damage to large plants with fully developed root systems. Feeding by larvae may enhance the incidence of *Fusarium* wilt disease. The beetles also damage crops by causing scarring on fruits, which decreases their market value. Larvae cause some injury to surface or rind (skin or scale) of fruits which are in contact with soil. These larvae are sometimes also called “rindworms”.



Life Cycle:

Adults overwinter in neighboring woodlands under leaves and trash or around the bases of plants. Adults leave their winter sites in late March. Before cucurbits are available, the beetles subsist on the pollen and petals of many plants. Females of the overwintering generation lay **eggs** from late April through early June, each female depositing as many as 500 eggs. Depending on temperature, eggs incubate for 7 to 10 days before hatching. **Larvae** feed in the soil on stems and roots for 2 to 4 weeks before **pupating**. First generation adults emerge from late June to early July. Over the next 6 to 9 weeks, the life cycle is repeated, second generation adults being prevalent from September to November.



***Life Cycle of the Diabrotica undecimpunctata* Barber
(Coleoptera: Chrysomelidae)**

Control Methods:

Several **cultural** measures discourage cucumber beetles. First, early plowing-discing removes vegetation and discourages egg-laying. The use of resistant varieties is perhaps the most important control tactic.

A foliar insecticide applied at the cotyledon stage will retard cucumber beetle feeding and encourage plant establishment. Where insects are abundant, additional foliar applications may be needed to prevent beetles from spreading bacterial wilt and squash virus. For recommended insecticides and rates, consult the current *North Carolina Agricultural Chemicals Manual*.

Sunflower Moth
Homoeosoma electellum
(Lepidoptera: Pyralidae)

Distribution:

The range of sunflower moth is from Mexico and Cuba to Canada.

Host Plants:

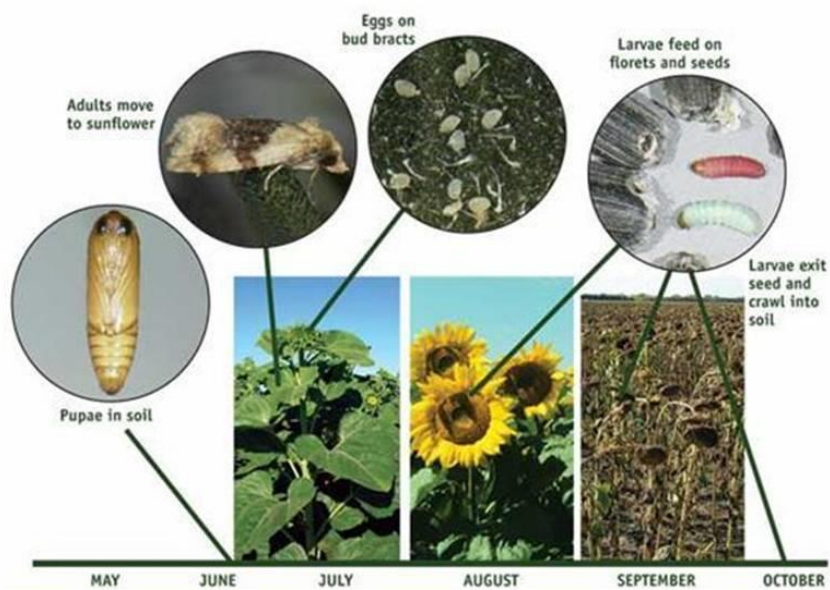
It is usually found in all regions where wild or domesticated sunflowers (*Helianthus*) grow.

Damage:

Larvae of sunflower moth injure sunflowers by feeding in the sunflower receptacle, where they damage ovaries and developing seed. First instars eat mostly pollen, and second instars feed on pollen and on the corollas on the sunflower head surface. Feeding by third instars can sever the style and stop fertilization of the ovary. The third through fifth instars feed on ovaries, and they are most damaging. One larva can damage between 8.2 and 22.8 seeds and 10–95 florets during the course of their feeding.

Life Cycle:

The basic life cycle of the sunflower moth is as follows: **Egg** - hatch within 3-5 days; **Larva** (4-5 instars) with the 1st being 4 days, the 2nd = 3-5 days, the 3rd = 5 days, the 4th = 1-3 days, and the 5th = 10-12 days; **Pupa** pupate in soil for 6-7 days, and the **Adult** lives a couple of weeks. Diapause depends on both temperature and photoperiod and is induced more readily at 21 °C with less than 10 hrs light.



Life Cycle of the Homoeosoma electellum
(Lepidoptera: Pyralidae)

Control Methods:

Cultural Control: Planting date studies in Texas, and Georgia showed that early planted sunflowers had smaller infestations of sunflower moth. A study found that delaying planting until the middle of June reduced sunflower moth infestations and with no significant loss in yield.

number of sunflower moth-resistant varieties are presently available.

sunflower resistance to feeding damage by the larva due to the presence of a phytomelanin layer in the seedcoat.

Biological control: Sunflower moth has many natural enemies They include hymenopterous parasitoids and predaceous insects that inhabit sunflower fields, parasitoids from five wasp families recorded(Braconidae, Eulophidae, Bethylidae, Perilampidae, and Ichneumonidae) and one fly family (Tachinidae).

Insects of Industrial Crop (Tobacco Insects)

The Insects of Tobacco:

Tinbac Leaf Miner (Potato tube moth)

Phthorimaea operculella (Zeller)

(Lepidoptera: Gelechiidae)

Distribution:

The potato tuber moth originated in tropical mountainous regions of South America. Today it has a worldwide distribution and is considered the most damaging potato pest in the developing world. It is present in almost all tropical and subtropical regions of the world, in North, Central and South America, Africa, Asia, Australia, and Europe.

Host Plants:

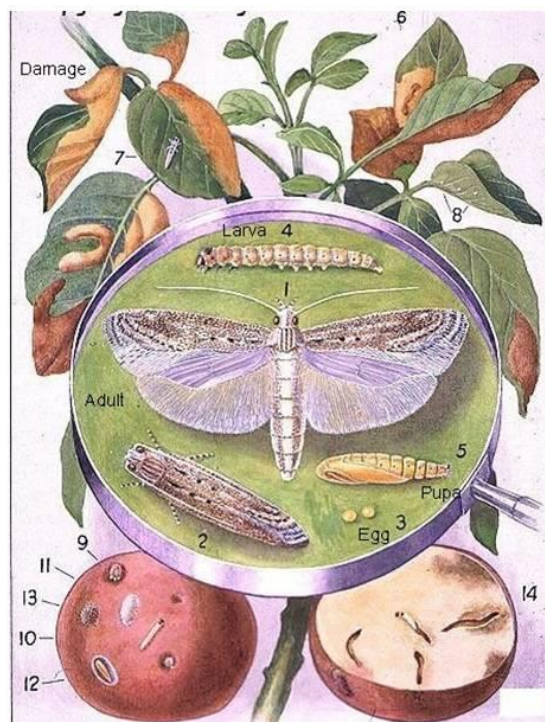
(Main) Tinbac, (Alternative) Potato, Egg-plant, and Pepper.

Damage:

Larvae feed on potato leaves, stems, petioles, and more importantly potato tubers in the field and in storage. The newly hatched larvae create mines on leaves by feeding on leaf tissue while leaving the upper and lower epidermis of the leaf intact. They prefer feeding on young foliage. Typical damage results from larvae boring tunnels in tubers. Larvae depositing their excreta make tubers unfit for consumption. Potato tuber eyes become pink due to deposition of silk and excrement by potato tuberworm infestation. Severe infestations result in yield and quality losses during storage where previously infested tubers are stored with healthy potato tubers. This generally destroys the entire crop of stored potatoes.

Life Cycle:

The life cycle is completed in about a month in summer and there are several generations per year. Each moth can lay up to 100 **eggs** in 2 weeks. Minute white eggs are deposited on the leaves (under surface) or tubers. The incubation period for eggs is between one and several weeks depending upon the season. The **larval** stage lasts for at least 2 weeks depending upon the season. The mature larva leaves the plant / tuber and shelters amongst the leaf litter on the ground where it spins a **cocoon**. The **moth** emerges after 1-2 weeks.



Life Cycle of the Phthorimaea operculella (Zeller)
(Lepidoptera: Gelechiidae)

Control Methods:

Before the advent of insecticides, a number of **cultural** practices were used to reduce the impact of potato tuber moth. These included crop rotation, deeper planting of seed. Farmers tend to revert to the use of highly toxic **chemicals** to control this pest. However, it has been

shown that, with the implementation of integrated pest management, the problem can be economically reduced, in both field and store, in an environmentally friendly way.

Host plant resistance enables plants to avoid, tolerate or recover from pest infestations.

Biological control

Natural enemies of potato tuber moth can be used as a part of an IPM program. The parasitoids, *Bracon gelechiae* (Hymenoptera: Braconidae) used with some success in South America and Australia

Small White Butterfly *Pieris rapae* (L.) (Lepidoptera: Pieridae)

Distribution:

This species is widespread throughout Europe and much of Asia, and N. Africa, now introduced into Australia, New Zealand, Hawaii, Canada, USA and Mexico.

Host Plants:

(Main) Cabbage, (Alternative) Tobacco.

Damage:

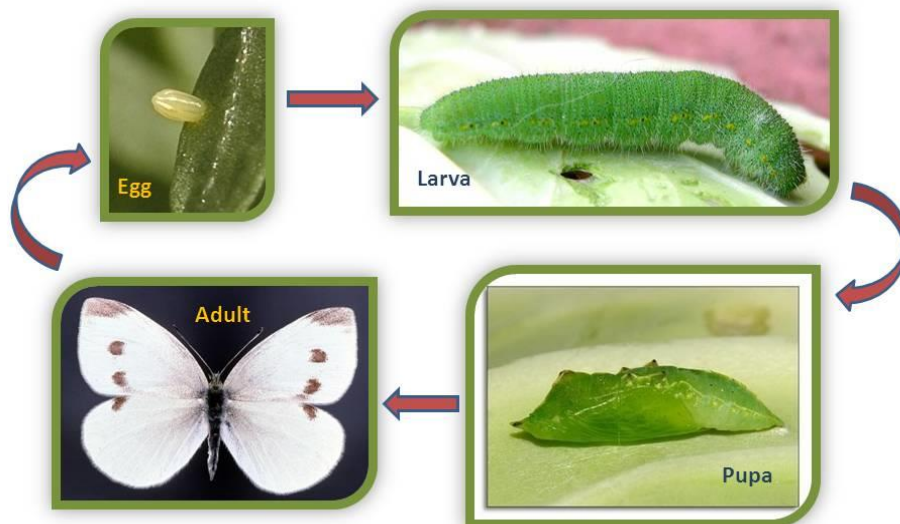
The *P. rapae* larva is voracious. Once it hatches from the egg, it eats its own eggshell and then moves to eat the leaves of the host plant. It bores into the interior of the cabbage, feeding on the new sprouts

Larvae are shown to feed mostly during the day. They move around the plant mostly spending their time feeding.

Cabbage loopers are leaf feeders, and in the first three instars they confine their feeding to the lower leaf surface, leaving the upper surface intact. The fourth and fifth instars chew large holes.

Life Cycle:

Adults of the spring generation occur mainly in March and April, and are very active in sunny weather. They deposit their **eggs** singly on both sides of the leaves of host plants. **Larvae** of the first generation eventually **pupate** to produce a second generation of adults in mid-summer. Their larvae, which feed in late summer and early autumn, are usually more numerous than those of the earlier generation, especially if a summer immigration of adults has occurred.



Life Cycle of the Pieris rapae (L.), (Lepidoptera: Pieridae)

Control Methods:

As for *Pieris brassicae*; also heavily parasitized by *Apanteles glomeratus* and *Pteromalus puparum*, and the braconid *Meteorus versicolor*, so care has to be taken when applying insecticides.