# Leek Moth

*Acrolepiopsis assectella* (Zeller)

Identification and Management Guide

Cornell University

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Fig. 23
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Figs. 1, 2

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# Introduction

Leek moth *(Acrolepiopsis assectella* Zeller) is a pest of Allium vegetables, including leeks, garlic, onions and shallots. Native to Europe, the moth was first detected in North America in 1993 in Ottawa, Canada, and has expanded its distribution south through the provinces of Ontario and Quebec. Leek moth was first identified in the United States in 2009, in Plattsburgh, New York. As of 2013 it has been found in Clinton, Essex, St. Lawrence and Jefferson Counties in northern New York, and in northern Vermont.

Leek moth larvae feed on leaves, stems, and occasionally bulbs of plants. Although leek moth injury rarely kills the plants, it significantly reduces the marketability of crops; in other words, minor damage can cause significant economic loss to producers of Allium vegetables. There are 2 to 3 generations per year in New York. Injury first appears in June, and following generations increase damage throughout the field through September.

This guide is intended to help farmers, crop consultants, USDA APHIS inspectors and others involved in the Allium vegetable industry learn to identify leek moth and its damage. Also, it provides some insights for the management of this insect in different agricultural scenarios.

# Leek Moth Life Stages

The adult moth is speckled brown, white and black with a distinctive white spot halfway down its outer pair of wings (Fig. 1). It is about 3/8” (10 mm) long and is nocturnal so it will rarely be seen unless trapped.

Larvae are slender, creamy yellow with a brown head capsule (Fig. 2). They have eight small grey spots on each abdominal segment. They develop through five larval stages. When fully mature, larvae are about 1/2” (13 mm) long. The male larva has a orange spot visible in a dorsal view of the body.

The pupa is reddish brown and is covered by an off-white, loose, net-like cocoon (Fig. 3). It is often found on the foliage or stem of the host plant but occasionally is found on the nearby soil surface.

The egg is white, iridescent and tiny, 1/64” (0.4 mm), and is very difficult to detect in the field (Fig. 4).

Egg Larvae Pupa Adult

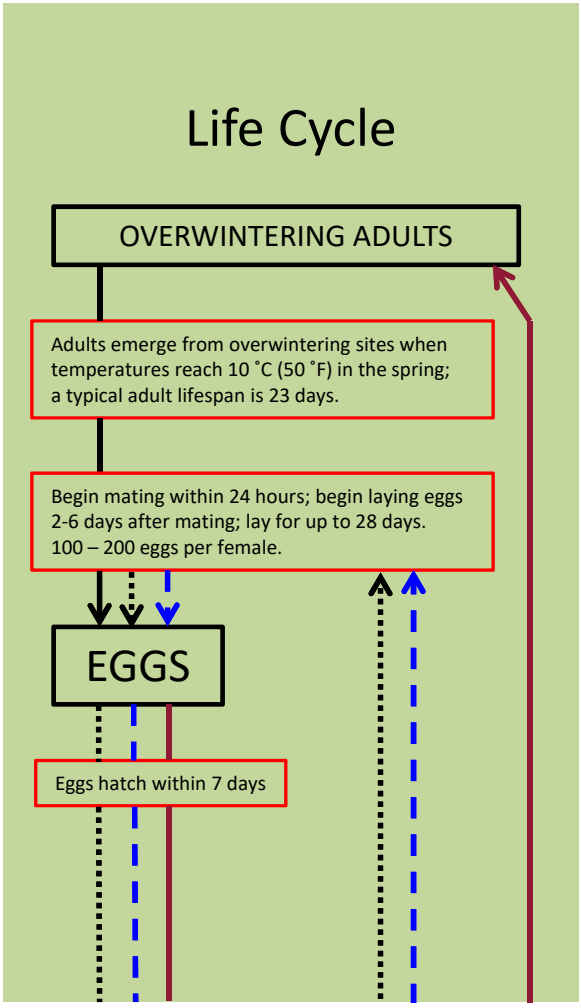
(Silhouettes show the actual sizes of the life stages)

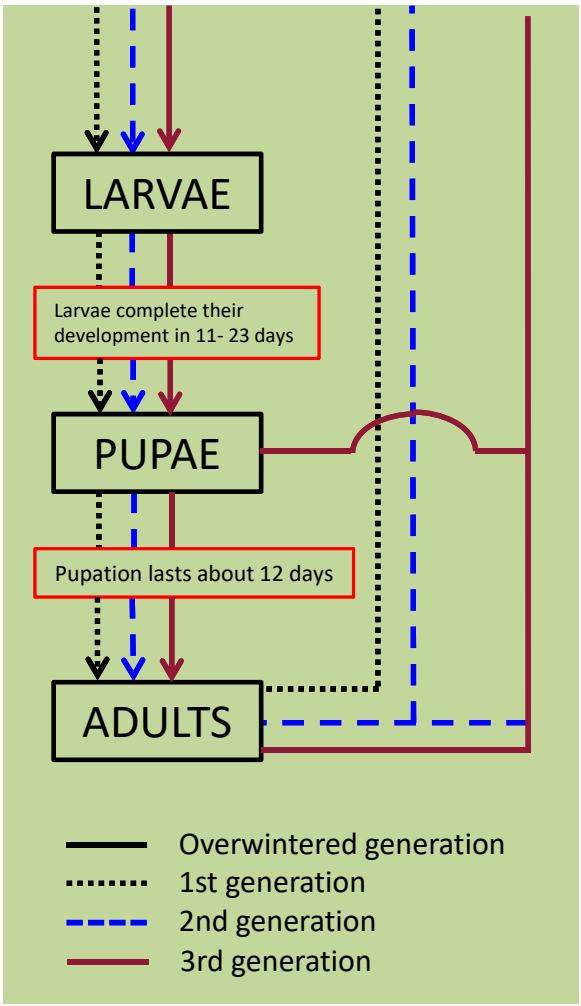
Fig. 1

Fig. 2

Fig. 3

Fig. 4


Life Cycle
OVERWINTERING ADULTS
Adults emerge from overwintering sites when temperatures reach 10 ˚C (50 ˚F) in the spring; a typical adult lifespan is 23 days.
Begin mating within 24 hours; begin laying eggs 2-6 days after mating; lay for up to 28 days. 100 – 200 eggs per female.
EGGS
Eggs hatch within 7 days


LARVAE
Larvae complete their development in 11- 23 days
PUPAE
Pupation lasts about 12 days
ADULTS
Overwintered generation
1st generation
2nd generation
3rd generation

# Life History

In its native habitat, the moth overwinters as an adult or as a pupa in protected areas such as plant debris, hedges and row covers. In New York, we have observed overwintering adults but not pupae in the field.

In the spring when temperatures reach 10 ˚C (50˚F), adults become active and emerge from overwintering sites. They begin to mate within 24 hours and each female lays 100 - 200 eggs over a couple of weeks. Eggs are laid singly on leaf surfaces of host plants and hatch within 7 days. Larvae mine into leaves or bore through folded leaves which provide them protection while they feed on plant tissue. In two or three weeks, larvae complete their development. They spin their cocoons on the leaf surface and adults emerge after about 12 days.

The rate of leek moth development is greatly affected by various environmental factors. Depending on weather conditions, it can take from 30 - 50 days to complete its life cycle.

In New York, there are three flight periods of leek moth per season that can be monitored by pheromone traps. The first flight (the overwintering generation) begins in mid-late April, ending in mid-May. The second flight period (the first generation) begins in mid-June, ending in early to mid-July. The third flight period begins in late July, ending in mid- to late August.

Although leek moth activity slows down after the last flight period, the damage can still develop on remaining Allium vegetables, especially leeks, in the field. These larvae are considered to be the third generation and become the overwintering adults or pupae. The leek moth's reproductive behavior is regulated by the photoperiod (day length). A shorter photoperiod in the fall cues the leek moth to enter its reproductive diapause in preparation for overwintering.

Although a leek moth flight can be observed in the fall, it cannot be monitored with pheromone traps because the reproductively inactive moths do not respond to pheromones at this stage.

# Damage and Detection

The leek moth larva is a small, leaf-mining caterpillar. If leaves are thick enough, they completely burrow into them and make tunnel mines as they feed.

On Alliums with flat leaves, such as leeks and garlic, larvae feed on top of young leaves and on the tissue inside folded leaves (Figs. 5 & 8). They can tunnel through folded leaves (Figs. 9 & 11). As they move toward the center of the plant, they leave a series of holes in the inner leaves. They occasionally continue mining down to the base of the plants. In garlic, larvae preferably feed on the scape in June (Figs. 10 & 12) and then later on bulbs.

On Alliums with hollow leaves, such as onions, chives and shallots, leek moth larvae tunnel their way into the plant and feed internally. They leave the outer membrane of the leaf intact which causes the characteristic windowpane damage (Figs. 13 & 14). Larvae occasionally feed on bulbs as well.

To find larvae, unfold or split open damaged leaves and look for larvae or frass (excrement) and debris (Fig. 11). Even after the larvae have left to pupate, the telltale debris remains visible. Check the newest leaves as well.


Fig. 5. Leeks heavily damaged by leek moth


Fig. 6. Larva found in the onion leaf

# Damage in leek


Fig. 7. Typical leek moth damage in leek

Fig. 8

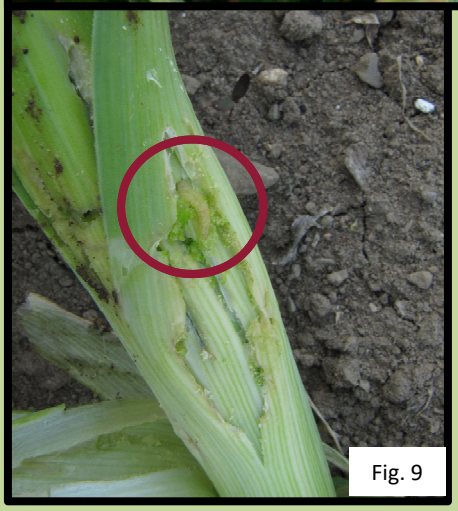


Fig. 9

# Damage in Garlic

Fig. 10


Fig. 11. Leek moth frass (excrement) and debris

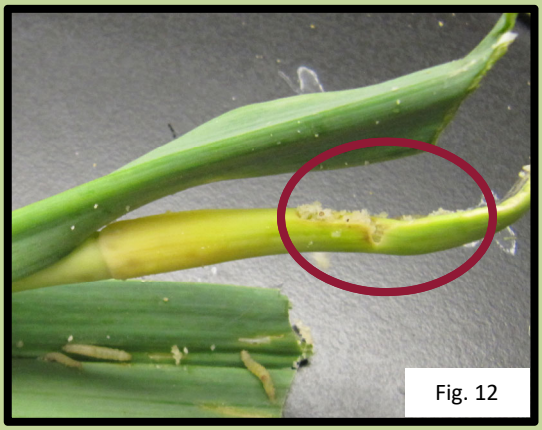



Fig. 12. Leek moth damage to garlic scape

# Damage in Onion


Fig. 13. Windowpane damage by leek moth


Fig. 14. Larva feeding inside the onion leaf

# Look-alike damage

Leek moth do not feed on the outer layer of hollow leaves. Such damage is likely caused by saltmarsh caterpillar, *Estigmena acrea* (Drury) (Fig. 15) or snails.


Fig. 15. Saltmarsh caterpillar feeding on onion leaf

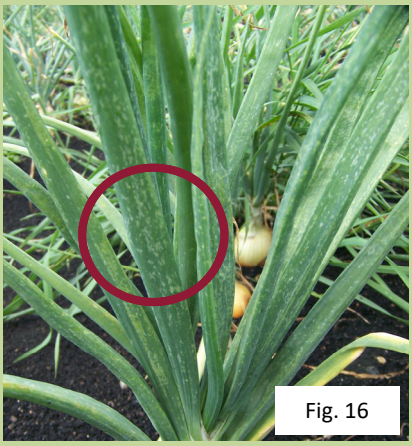


Fig. 16

Onion thrips damage (Fig. 16) and Botrytis leaf blight (Fig. 17) on onions are also often confused with leek moth damage.

Fig. 17

# Monitoring

Adult leek moth presence and activity can be monitored using a commercially available pheromone trapping system (Fig. 18). Pheromone lures are placed on a sticky card installed inside Delta traps. Traps should be set around the field edge by mid-April. One to two traps per acre of field should be enough. To maximize the trap catch of the moth, it is recommended to place the trap on the upwind side of the crop and set the trap at the canopy height of the crop in the field.

Leek moth pheromone trap systems can be purchased from AgBio, Inc. (www.agbio-inc.com)


Fig. 18. Leek moth pheromone trap system with Delta Trap

# Management

## ~Cultural control~

Several cultural controls have been recommended for control of leek moth. They include row covers, crop rotation, delayed planting, removal of larvae from the plant, destroying pupae or larvae, and early harvesting.

Row covers can be an effective way to protect Allium crops from leek moth infestation. It is important to have the row cover in place over the crop before the moths emerge from their overwintering sites in spring. If the planting will not take place until after the spring emergence of the moth, the row cover needs to be installed on the day of planting before sunset, which is when the moth starts to fly. Row covers can be put over garlic beds in the fall when there is no top growth or in the very early spring before moths emerge. Moths may emerge extremely early during warm spells in March so it is important to have the crop covered before this occurs.

Delayed planting to avoid the first emergence may also be effective.

Fig. 19

Fig. 20

Figs. 19 & 20 Row covers w/o and w/ hoops

# Management

## ~Chemical control~

For an insecticide to be registered in the United States, the product must be labeled for the crop and the insect pest. When the insect was detected in New York, Dr. A. M. Shelton from Cornell was able to get special registrations in 2010 for several insecticides using a registration called FIFRA 2(ee) which essentially expands the crop label to include another pest. Justification for registering these insecticides was based on them already being labeled for other insect pests on these crops and their probable effectiveness against leek moth in New York. These insecticides need to be tested for their effectiveness under field conditions.

The following insecticides are able to be legally applied in New York, but the applicator must have a copy of the 2(ee) label . Entrust and DiPel are OMRI approved materials for organic production, while all five insecticides can be used in conventional production. Laboratory studies indicated that all but DiPel significantly reduced leek moth larval populations.

## Pesticide Name and EPA Registration No.

1. Warrior ll with Zeon Technology (EPA Reg. No. 100-1295)
2. Radiant SC (EPA Reg. No. 62719-545)
3. Lannate LV Insecticide (EPA Reg. No. 352-384)
4. Entrust (EPA Reg. No. 62719-282)
5. DiPel DF Dry Flowable Biological Insecticide (EPA Reg. No. 73049-39)

## Timing of application

Canadian research has consistently found that pheromone traps alone can be used to properly time insecticide applications. Insecticide applications made 7-10 days following a peak flight of leek moth adults (determined through the use of the pheromone trap system) greatly reduce the leek moth population and amount of damage it causes. Growers in the northeast can follow this direction as a guideline until field efficacy trials are conducted in the US.

# Management ~Biological control~

There is considerable interest in finding biological control agents that can be effective in controlling leek moth. In Europe, a number of organisms are reported as predators, parasites and pathogens that attack the leek moth larvae and pupae.

Parasitoids, *Conura albifrons* (Walsh) (Fig. 21) and *Scumbus* spp. (Fig. 22), were recovered from leek moth collected in NY.

One parasitoid, *Diadromus pulchellus* (Fig. 23), from Europe has been released in Canada and Agriculture and Agri-Food Canada researchers are evaluating its efficacy.

Spanish research has shown the foliar application of nematodes, *Steinernema feltiae*, is effective for the curative control of leek moth in leek fields. The efficacy is unknown for other Allium vegetables.


Fig. 21. *Conura albifrons*

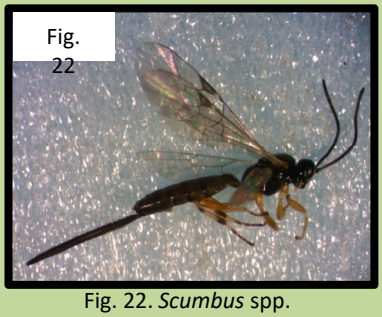



Fig. 22. *Scumbus* spp.


Fig. 23. *Diadromus pulchellus*

For more information and a free pdf version of this pocket guide, go to:

Leek Moth: Information Center for the US
http://web.entomology.cornell.edu/shelton/leek-moth/

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