

The Armyworm

(*Spodoptera frugiperda*) (Lepidoptera: Noctuidae)

Host plant: This species seemingly displays a very wide host range, with over 80 plants recorded, but clearly prefers grasses. The most frequently consumed plants are field corn and sweet corn, sorghum

Distribution: The fall armyworm is widely distributed in eastern and central North America and in South America. It cannot survive freezing temperatures

Economic importance:

Its name is derived from its feeding habits. Native to the Americas, these caterpillars mainly attack maize crops. They eat everything in an area, and once the food supply is exhausted, the entire "army" will move to the next available food source. The larva causing damage to the plant by their chewing mouthparts

Life cycle:

The life cycle is completed in about 30 days during the summer, but 60 days in the spring and autumn, and 80 to 90 days during the winter. The number of generations occurring in an area varies with the appearance of the dispersing adults. The ability to diapause is not present in this species. In Minnesota and New York, where fall armyworm moths do not appear until August, there may be but a single generation. The number of generations is reported to be one to two in Kansas

There usually are six instars in fall armyworm

Control methods:

Cultural techniques: The most important cultural practice, employed widely in southern states, is early planting and/or early maturing varieties. Early harvest allows many corn ears to escape the higher armyworm densities that develop later in the season

Biological control: Although several pathogens have been shown experimentally to reduce the abundance of fall armyworm larvae in corn, only *Bacillus thuringiensis* presently is feasible, and success depends on having the product on the foliage when the larvae first appear



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Potato Leafhopper

Empoasca fabae (Homoptera: Cicadellidae)

Description:

The adult potato leafhopper is a tiny, yellowish-green, wedge-shaped insect, about 1/8 inch (3 mm) long. The nymphal stage closely resembles the adult, except that the nymph is smaller, wingless, and brighter yellow. Both adults and nymphs are extremely active. The

nymphs, which cannot fly, walk diagonally at a rapid pace when disturbed. Adults will either fly or jump when disturbed

Host plant:

it is capable of successful reproduction on over 200 plants species in 25 different families, including alfalfa, potatoes, beans, peanuts, and woody ornamentals. Potato leafhopper is a transient pest of apples, grapes.

Damage:

Potato leafhoppers are known for their ability to jump long distances, they feed on plant leaves and cause injury by sucking sap out of leaves and injecting toxic saliva into the plant. This feeding destroys plant cells and blocks the transport of fluids within the leaves. Early symptoms of PLH feeding include yellowing near the leaf tip, which is referred to as "hopperburn."

In heavy infestations, leaves become yellow or reddish in color, curl, and eventually fall off. Plants may also be stunted. PLH injury can be exacerbated under drought conditions.

Young plants are more susceptible to feeding injury because they lack the pubescence (leaf hairs), which deter PLH feeding and egg laying.

Both potato leafhopper adults and nymphs feed on alfalfa, but the most serious damage is caused by the nymphs. Potato leafhopper uses its piercing-sucking mouthparts to remove plant juices. As it feeds, it injects a toxin, also, potato leafhoppers can also transmit plant diseases resulting in a decrease in the plant nutritional quality.



Control methods:

1. Cultural Practices:
 - Early Planting: Planting crops early can help avoid peak leafhopper populations.
 - Mowing: Regular mowing of alfalfa fields can help reduce leafhopper populations by removing their habitat.
2. Resistant Varieties: Planting resistant varieties of crops, such as alfalfa, can help reduce the impact of leafhoppers.
3. Biological Control:
 - Predators: Natural enemies of leafhoppers, such as lady beetles and spiders, can help keep populations in check.
 - Parasitic Wasps: Some parasitic wasps lay their eggs in leafhopper eggs, reducing their numbers.
4. Chemical Control:
 - Systemic Insecticides: These are applied to the soil and taken up by the plant, making it toxic to leafhoppers when they feed.
5. Integrated Pest Management (IPM): IPM combines multiple control methods to manage pest populations effectively while minimizing environmental impact.

The Western corn rootworm

***Diabrotica virgifera virgifera* (Coleoptera: Chrysomelidae)**

Diabrotica virgifera, is one of the most devastating corn rootworm species in North America, especially in the Midwestern corn-growing areas such as Iowa. A related species, the Northern corn rootworm

Corn rootworm larvae can destroy significant percentages of corn if left untreated.

Life Cycle

There are many similarities in the life cycles of the northern and western corn rootworm. Both overwinter in the egg stage in the soil. Eggs, which are deposited in the soil during the summer, are American football-shaped, white,

Corn rootworms go through three larval instars, pupate in the soil and emerge as adults in July and August. One generation emerges each year. Larvae have brown heads and a brown marking on the top of the last abdominal segment, giving them a double-headed appearance. Larvae have three pairs of legs, but these are not usually visible without magnification. After feeding for several weeks, the larvae dig a cell in the soil and molt into the pupal stage.

Timing of egg hatch varies from year to year due to temperature differences and location. Males begin to emerge before females. Emergence often continues for a month or more.

Females mate soon after emergence. Western corn rootworm females need to feed for about two weeks before they can lay eggs. Temperature and food quality influence the pre-oviposition period. Females typically lay eggs in the top 8 inches (200 mm) of soil, although they may be laid more than 12 inches (300 mm) deep, particularly if the soil surface is dry.

Feeding Damage:

Most of the damage to corn is caused by larval feeding. Hatchlings locate roots and begin feeding on the fine root hairs, burrowing into root tips. As larvae grow, they feed on and tunnel into primary roots. Severe root injury interferes with the roots' ability to transport water and nutrients, reduces growth and results in reduced grain production. Severe root injury may result in lodging of corn plants, making harvest more difficult. Silk feeding by adults can result in pruning at the ear tip, commonly called silk clipping. In field corn, beetle populations are occasionally high enough to cause severe silk clipping during pollen shed, which may interfere with pollination



Control methods:

1. **Crop Rotation:** Rotating corn with a non-host crop, such as soybeans, can help reduce rootworm populations.
2. **Biological Control:**
 - **Parasitic Nematodes:** Certain species of parasitic nematodes can infect and kill rootworm larvae.
 - **Predators:** Natural enemies such as ground beetles and birds can also help reducing rootworm populations.
3. **Chemical Control:**
 - **Insecticides:** Insecticides can be applied to the soil or to the foliage to control rootworm populations.
 - **Seed Treatments:** Some seed treatments can protect corn roots from rootworm damage.
4. **Genetically Modified (GM) Crops:** Some corn varieties have been genetically modified to produce proteins toxic to rootworms, providing an effective control measure.
5. **Trap Cropping:** Planting a trap crop that is more attractive to rootworms can help divert them away from the main crop.
6. **Cultural Practices:**
 - **Tillage:** Deep tillage can disrupt rootworm eggs and larvae in the soil.
 - **Planting Date:** Planting corn later in the season can help avoid peak rootworm egg-laying periods.