



CROP PEST:

Leafminers

DESCRIPTION:

Leafminers belong to several different genera of insects such as beetles, flies, and moths. It is simple to identify a leafminer as they 'mine' through the leaf and cause damage that is fairly unmistakable. As larvae tunnel their way through the leaf layers eating chlorophyll and other plant juices, they leave a white winding trail behind. Scouting can be done during the day when there is light to see these symptoms. Although leafminers rarely kill a host outright, they can ultimately weaken the plant's ability to photosynthesize, which can result in stunted growth, discoloration, or even open a wound for which disease can enter. Also, in the case of leafy greens such as lettuce and spinach, leafminer damage can cause the crop to become less profitable.



Photo courtesy of University of Wisconsin

TARGET CROPS:

A variety of vegetable crops, but can be particularly harmful to leafy greens such as spinach, lettuce, etc. They also tend to enjoy *Aquilegia spp.*, which is also mentioned below for its utility as a trap plant.

LIFE CYCLE:

Females lay eggs underneath the plant's epidermal layer on the leaves. Larvae hatch and burrow through the leaf tissue feeding on chlorophyll. After 2-3 weeks they are ready to pupate and burrow into the soil where they will emerge roughly two weeks later as adults. Multiple generations can occur each year.

BENEFICIAL INSECT CONTROL:

Steinernema feltiae is a beneficial nematode species that can be an effective biocontrol. These parasites can be applied to the soil to infect and help control an array of soil-dwelling pests. Leafminers overwinter in the soil as pupae, giving nematodes the opportunity to pounce, while not harming other beneficial inhabitants in the soil.

Introduction Rates and Release Information

There are a variety of nematode products, which will state an array of application rates, Make sure that you follow the manufacturers recommended rates.

For Sierra Biological: Generally, 1 million nematodes per 1000 square feet of soil medium. For each square foot you will need 0.66 gallons of water as a carrier to saturate a potting medium or soil 2" deep. Unless using your nematodes immediately, store in a refrigerator. Do not freeze! When applying, use cool water, and do not apply during hot dry conditions.

Diglyphus isaea is a parasitic wasp that stings and paralyzes the leafminer larva while it is feeding in the leaves. *Diglyphus* spp. lay their eggs alongside the host, and after the eggs hatch they feed off the fluids of the still alive but paralyzed larva. Each female wasp can kill over 300 leafminer larvae!

Introduction Rates and Release Information

Generally, 0.25-0.5 predators per 10 square feet provides effective coverage. With two back-to-back introductions over a 2-week period recommended. To release, hold the bottle horizontally and remove the lid. Release the parasites by gently tapping the opened bottle while walking through the crop. Leave the open bottle upright in the infested area for a few hours to allow any remaining parasites to escape. In hot sunny weather, release early or late in the day. Do not cold store adults for more than 18 hours, holding in darkness at 55-60F.

INSECTIDE OPTIONS:

Products where Neem oil is listed as the main ingredient are great for spray applications.

(Other product labels that target leafminers include):

Grandevo, Azatin O, PyGanic, Molt-X, PFR-97, Preferal, and Venerate XC

FURTHER CONSIDERATIONS:

To encourage *Diglyphus isaea* in your system, plant flowers such as dill and yarrow, which are rich in pollen and nectar, giving the wasps an accessible food source.

CULTURAL CONTROL TIPS:

- Leafminers tend to enjoy *Aquilegia* spp., so consider utilizing these 'trap' plants in adjacent areas to the field in order to draw leafminers away from vegetable crops.