Dr. Hugh Smith
Valley Laboratory
The Connecticut Agricultural Experiment Station
153 Cook Hill Road
Windsor, CT 06095-0248

Phone: (860) 687-4763
Fax: (860) 683-4987
Email: Hugh.Smith@ct.gov
Website: www.ct.gov/caes

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Leafminer Pests of Connecticut Nurseries

Leafminers are pests of annual flowering plants, perennials, shrubs and trees. The larvae of leafminers spend part or all of their development feeding between the two surfaces of the leaf. Leafmining behavior is found among the larvae of certain moths, sawflies, flies and beetles. The majority of leafminers damaging trees and woody ornamentals are moth larvae; most leafminers attacking herbaceous perennials are fly larvae in the family Agromyzidae.

Moth females whose larvae are leafminers usually lay their eggs on the leaf surface. Females of the azalea leafminer lay eggs individually on the undersides of leaves or along the midrib or vein. All females in the sawfly group of leafminers insert the egg into leaf tissue. These include the birch leafminer and the elm leafminer. The locust leafminer, a chrysomelid beetle, is a pest of black locust. It lays eggs on undersides of leaves; eggs hatch and the larvae burrow into leaf. The eggs of leafmining flies, such as the holly leafminer and the agromyzid leafminers that attack verbena, chrysanthemums and other annual flowering plants, are laid directly into the leaf tissue. Females of the boxwood leafminer, a cecidomyiid fly, cause stippling damage to the underside of the leaf with their ovipositor. Similarly, the serpentine leafminer female causes stippling damage to the surface of the leaf on the herbaceous flowering plants that it attacks. Egg-laying behavior should be kept in mind when targeting ovipositing females, eggs, and hatchling larvae for insecticide treatment.

Leafminers produce two types of mine: linear and blotch mines. Larvae that burrow straight through the tissue of the leaf produce linear mines; winding linear mines are referred to as serpentine mines.

Larvae that feed in a manner that clears a patch of tissue produce blotch mines. There is considerable variation in the form and pattern of mines produced by different leafminer species. Larvae of the birch leafminer initiate several individual linear mines in the leaf which eventually coalesce to form a blotch. Leafmining can combine with gall-making, stem-boring, leaf-rolling and case-bearing damage in some species. For example, the azalea leafminer produces blotch-like mines for the first half of its larval life, then exits the mine and feeds as a leaf-roller or leaf-tier.

Leafmining larvae may pupate in the mine, elsewhere on the plant, or in the ground, depending on species. They may produce one generation per year, such as the boxwood leafminer, or several, as does the serpentine leafminer under greenhouse conditions.

Leafmining larvae are particularly susceptible to parasitism by parasitic wasps, which pass their ovipositor through the leaf surface to lay eggs in the larva as it feeds in the mine. Leafminers often become a problem when applications of broad spectrum insecticides reduce numbers of naturally-occurring parasitoids that otherwise help suppress leafminers. Parasitic wasps in the *Diglyphus* and *Dacnusa* species are commercially available for suppression of the serpentine leafminer and related leafminers. Commercial formulations of insect-killing nematodes are available for suppression of locust leafminer, which is attacked by a range of predators and parasitoids. The birch leafminer has been the target of a successful regional biological control program in the northeastern United States and Canada. Parasitic wasps imported from Europe have helped suppress this leafminer to below economically damaging levels.

Leafminer adults in greenhouse and nursery settings can be monitored using yellow sticky cards. Cards should be checked for the presence of adult flies at least once a week and changed when they become soiled, about every two weeks. Foliage of susceptible plants should be checked at least once a week for evidence of stippling or mines. Mines of the serpentine leafminer usually appear first on the upper surface of the leaf. Leafminer pests of shrubs and trees in landscape settings can also be monitored in some instances with yellow sticky cards. However it is usually more practical to monitor and treat leafmining pests of landscape plants by combining visual examination of foliage with growing degree day (GDD) information and plant phenological indicator (PPI) information for specific pests. For GDD and PPI information related to the management of leafmining and other pests in Connecticut nurseries and landscapes, please see the following references:

Pesticide Guide Toward Integrated Pest Management for Connecticut Nurseries. 2008. Department of Entomology. The Connecticut Agricultural Experiment Station, New Haven, CT, 06504-1106

Pesticide Guide Toward Integrated Pest Management for Connecticut Arborists. 2009. Department of Entomology. The Connecticut Agricultural Experiment Station, New Haven, CT, 06504-1106

Professional management Guide for Insects, Diseases, and Weeds of Trees and Shrubs in New England. 2008. UMass Extension. University of Massachusetts, Amherst, MA 01002.

Table 1. Leafminer Pests of Trees and Woody Ornamentals in Connecticut			
apple leafminer	*Lyonetia prunifoliella*	Lepidoptera: Lyonetiidae	*Malus*
apple leaf trumpet miner	*Tischeria malifoliella*	Lepidoptera: Tischeriidae	*Malus*
arborvitae leafminer	*Argyresthia* spp.	Lepidoptera:Argyresthiidae	*Arborvitae, Juniperus virginiana, Juniperus*
azalea leafminer	*Caloptilia azaleella*	Lepidoptera: Gracillariidae	*Azalea*
birch leafminer	*Fenusa pusilla*	Hymenoptera: Tenthredinidae	*Betula*
blackberry leaf miner	*Metallus rubi*	Hymenoptera: Tenthredinidae	*Rubus*
boxwood leafminer	*Monarthropalpus flavus*	Diptera: Cecidomyiidae	*Buxus*
catalpa leafminer	*Agromyza clara*	Diptera: Agromyzidae	*Catalpa*
cherry and hawthorn leafminer	*Profenusa canadensis*	Hymenoptera: Tenthredinidae	*Crataegus*
elm leafminer	*Fenusa ulmi*	Hymenoptera: Tenthredinidae	*Ulmus*
holly leafminer	*Phytomyza ilicis*	Diptera: Agromyzidae	*Ilex*
leafminer	*Bedellia somnulentella*	Lepidoptera: Bedelliidae	*Ipomoea*
leafminer	*Agromyza melampyga*	Diptera: Agromyzidae	*Philadelphus*
locust leafminer	*Odontota dorsalis*	Coleoptera: Chrysomelidae	*Fagus, Betula, Prunus, Ulmus, Crataegus, Syringa, Quercus*
lilac leafminer	*Caloptilia syringella*	Lepidoptera: Gracillariidae	*Euonymus, Syringa, Ligustrum*
native holly leafminer	*Phytomyza ilicicola*	Diptera: Agromyzidae	*Ilex*
oak blotch leafminer	*Cameraria spp.*	Lepidoptera: Gracillariidae	*Quercus*
rhododendron leafminer	*Lyonetia latistrigella*	Lepidoptera: Lyonetiidae	*Rhododendron, Azalea, Kalmia latifolia, Rosa*
spotted tentiform leafminer	*Phyllonorycter blancardella*	Lepidoptera: Gracillariidae	*Crataegus*
tentiform leafminer	*Phyllonorycter spp.*	Lepidoptera: Gracillariidae	*Malus, Crataegus*

white blotch leafminer	*Lithocolletis hamadryadella*; others on oak: *L. fitchella, L. tubeiferella.*	Lepidoptera: Tineidae	*Quercus*
Leafminer Pests of Herbaceous Plants in Connecticut			
leafminers	*Agromyza platyptera, A. posticata, Liriomyza trifolii, Phytomyza albiceps*	Diptera: Agromyzidae	*Aster*
verbena leaf miner	*Agromyza artemisiae*	Diptera: Agromyzidae	*Verbena*
chrysanthemum leafminer	*Chromatomyia syngenesiae, Liriomyza trifolii*	Diptera: Agromyzidae	*Chrysanthemum*
columbine leafminers	*Phytomyza aquilegivora, P. acquilegiana*	Diptera: Agromyzidae	*Aquilegia*/Columbine
larkspur leafminer	*Phytomyza delphiniae*	Diptera: Agromyzidae	*Delphinium*
leafminer	*Liriomyza pusilla*	Diptera: Agromyzidae	*Nasturtium*
Table 2. Options for Use of Insecticides to Control Leafminer Pests in Connecticut Nurseries **N = Nursery Registration, L = Landscape Registration; R = Restricted Use, G =General Use**			
Active ingredient	**Insecticide Group**	**Examples**	**Remarks and cautions**
Abamectin	Avermectin	Avid, Quali-Pro Abamectin 0.15 EC, Abamectin E-Pro 0.15 EC (N,L) G	Check label for species controlled.
		Abacide 2 (L) R	
		Abasol (N, L) R	
		Aracinate Tree Injection (N, L), G	
Acephate	Organophosphate	Acephate Pro 75 (N, L), Orthene T, T and O Spray (N, L) G	Check label for species controlled and plants that can be treated.
		Ace-Jet (L) G	Trees, shrubs, evergreens, conifers, Christmas tree plantations & palms.
Acetamiprid	Neonicotinoid	TriStar 70 WSP (N, L), G	
Azadirachtin	Azadirachtin	Azatin (N, L), Azatrol(N,L), Ornazin 3 EC (N) G	
		Adept	
Bifenthrin	Pyrethroid	Talstar (L), R	Only suitable for targeting leafminer adults before egg deposition.
Carbaryl	Carbamate	Carbaryl 4L (N, L), G	Check label for species controlled and plants that can be treated.
Chlorantraniliprole	Anthranilic diamide	Acelepryn (L), G	Birch leafminer only
Chlorpyrifos	Organophosphate	Chlorpyrifos E Pro 4 (N), Chlorpyrifos 4 E (N, Christmas trees), R	Leafminers and needleminers of ornamentals.

Clothianidin	Neonicotinoid	Arena 50 WDG (L), G	Leafminers on ornamentals, landscape only
Cyromazine	Cyromazine	Citation75 WP (N, L) G	Dipterous leafminer larvae
Diflubenzaron	Benzoyl urea IGR	Adept (GH, Interiorscapes) G	
Dimethoate	Organophosphate	Dimate 4EC (N, L), Dimethoate 267 (N, outdoor only), G	Check label for species controlled and plants that can be treated.
Dinotefuran	Neonicotinoid	Safari 20 SG (N, L)	
Cyfluthrin and imidacloprid	Pyrethroid + Neonicotinoid	Discus (N) G	Only suitable for targeting leafminer adults before egg deposition.
Fenpropathrin	Pyrethroid	Tame 2.4 EC (N, L) R	Only suitable for targeting leafminer adults before egg deposition.
Horticultural oil	Paraffinic oil	Ultrafine oil (N, L), G	Larvae only.
Imidacloprid	Neonicotinoid	Marathon 1G, Marathon 60 WP, Marathon II (N) G	
		Ima-Jet (L), G	
Lambda cyhalothrin	Pyrethroid	Scimitar CS (L), R; Scimitar GC (N, L), R; Warrior (N), R	Check label for species controlled. Only suitable for targeting leafminer adults before egg deposition
Malathion	Organophosphate	Malathion 5 EC (N, L), G	For birch leafminer and boxwood leafminer only. Only suitable for targeting leafminer adults before egg deposition.
Naled	Organophosphate	Dibrom 8 Emulsive (N), R	Only suitable for targeting leafminer adults before egg deposition.
Novaluron	Benzoylurea	Pedestal (N), G	Suppression of leafminers
Permethrin	Pyrethroid	Ambush 25 W (N), R; Astro (N, L)	Only suitable for targeting adults before egg deposition
Phosmet	Organophosphate	Imidan 70-W (N, L), G	Check label for species controlled and plants that can be treated. Only suitable for targeting adults before egg deposition
Pyrethrin and piperonyl butoxide	Pyrethrin	Pyrenone Crop Spray (N, L), G	
Spinosad	Spinosyn	Conserve SC (N, L, Christmas trees), G	Dipterous leafminers

Mention of a chemical or product is for informational purposes only and does not constitute an endorsement by The Connecticut Agricultural Experiment Station

This fact sheet is not a substitute for the pesticide label. The applicator assumes all responsibility for the proper use of any pesticide and must always thoroughly read, understand, and follow all label directions.

Leafminer Pests

Liriomyzid leafminer adult on pea. Note stippling damage on leaf edge. Hugh Smith

Arborvitae leafminer larva. John Weidhass, Virginia Tech., Bugwood.org

Boxwood leafminer larvae. Brian Kunkel, University of Delaware. Bugwood.org

Holly leafminer damage. Gy. Csoka, Hungarian Forest Research Institute. Bugwood.org

Arborvitae leafminer damage. Chris Maier. CT. Agricultural Experiment Station. Bugwood.org

Lilac leafminer damage.Gy. Csoka, Hungarian Forest Research Institute. Bugwood.org

Phyllocnistis sp. mine on sweet bay magnolia. Daniel Potter, University of Kentucky.

Adult locust leafminer. B. Kauffman, University of Tennessee. Bugwood.org.

Locust leafminer damage. John Weidhass. Virginia Tech. Bugwood.org