



Leafminer Fly:

Liriomyza huidobrensis

Technical Bulletin

By: Ann R. Braun and Merle Shepard

The International Potato Center
and
The Clemson University Palawija IPM Project

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***Liriomyza huidobrensis*, the leafminer fly**

Area of Origin

The Americas; originally described from Argentina

Principal hosts

potato, beans, snapbeans, alfalfa, spinach, artichoke, lettuce, watermelon, pumpkin, melon, crucifers, peas, tomatoes, tomato, celery, onions, carrots, chilis, ornamentals, many common weeds;

Most susceptible hosts

potato, celery, beet, lettuce

Damage

- mines formed by larvae tunneling through leaves
- feeding punctures made by adult females
- oviposition punctures made by adult females, these represent 10-15% of the punctures made by the female



Description

head of the adult is yellow with reddish eyes. The thorax and abdomen are black and yellow



Life stages

egg laid in leaf tissue, 3 larval instars completed within leaf tissue, pupa (in the ground),
adult fly





Life cycle

depends on temperature

Table 1: Life cycle data

Duration (days)	14.6°C 88.4 %RH	17.3°C 88.0 %RH	20.3°C 82.1 %RH	27°C 74 %RH
egg stage	6.0	2.9	3.2	3.1
larval stage	13.0	10.7	9.1	6.0
pupal stage	21.1	11.6	7.4	8.2
male longevity				
no food	2.1	3.3	3.4	4.2
honey/water	13.6	15.1	13.4	
potato/water	4.1	7.1	4.8	
female longevity				
no food	5	4.1	3.5	5.9
honey/water	32.6	31.4	18.8	
potato/water	18.0	23.7	19.4	
preoviposition	3.9	2.2	4.5	1
oviposition	11.3	19.9	10.9	3.3
Total eggs/female	45	252	42	21
No. feeding punctures/female	1875	3055	3473	--
peak oviposition (days after adult emergence)	8	5	14	

Activity

diurnal, most active between 7-11 a.m.

Feeding

The adult female fly feeds by perforating the plant tissue with her ovipositor and feeding on the plant sap that oozes out. Feeding punctures are circular and have diameter of about 1 mm. They are usually made on the upper surface of leaves.

Egg laying

Mating occurs 6-7 hrs after the adults emerge from their puparia. Females prefer to lay eggs in the intermediate and lower leaves of most hosts and prefer the undersurface of the leaves although eggs are laid on both surfaces. Virus T and Y may be transmitted by LMF.

Why LMF has become a pest

This insect is a recent immigrant to several countries and regions including Indonesia, Malaysia and Sri Lanka, Israel and Europe. The community of natural enemies of LMF in newly colonized areas may be limited. In Indonesia, for example, a survey of parasitoid species associated with LMF in Indonesia has identified only one species, *Hemiptarsenus varicornis* (Hymenoptera: Eulophidae). *Liriomyza* species tend to be resistant to commonly used pesticides. Pesticide applications may not control LMF adequately, and will lead to heavier infestations in subsequent seasons as the small complex of natural enemies is decimated.



Natural enemies

40 species of larval and pupal parasites have been reported from *Liriomyza* species. This diverse complex of natural enemies explains why leafminers are usually At least 11 species of parasites are known from *L. huidobrensis*. Under natural conditions parasitism is low in the early stages of crop development and increases gradually during the course of the season. Applications of insecticides, often made to control other species such as thrips, aphids or mites eliminate beneficial insects and contribute to outbreaks of LMF.

Parasites may be endoparasites or ectoparasites. Ectoparasites lay their eggs on the bodies of the larvae, feed by puncturing the larval epidermis and abandon the host larva (which then dies) to pupate within the mines. Endoparasites lay eggs within the larvae and their adults emerge from the puparium of the host.

Weeds play an essential role in the biology of some parasites because their flowers provide the nectar necessary for adult fertility and longevity.

Parasites can be detected by collecting 100 leaves with mines from a field. The leaves must be held in paper bags or envelopes made of newspaper for the formation of pupae. Since no soil is available the miners will pupate on the surface of the leaves. The leaves should not be packed tightly otherwise they will rot. To determine the % parasitism, the number of pupal cases should be counted. Then the number of parasites and adult leaf miner flies should be tabulated. If the number of parasite adults plus the number of LMF adults exceeds the total number of pupae in the sample, this

indicates the presence of ectoparasites that kill the larval stage and pupate within the mines.

Dragonflies, Chrysopids, spiders, ants, true bugs are predators of LMF.

Cultural Control

Potato can withstand significant defoliation, especially if it occurs after the crop establishment stage (planting through hilling up: 1-45 Days After Planting). In an artificial defoliation experiment the following results were obtained:

% Defoliation	Yield (t/ha)
0	55
33	51
66	46
100	34

Leafminer in potato produces little damage on the young leaves because of the high density of glandular trichomes present on the surface of these. Leaf miner populations are highest in the lower and intermediate leaves and build up over the season reaching a peak at around 60-70 DAP (under Peruvian conditions). If pesticide use, particularly of broad spectrum products, can be avoided during this early period, and cultural practices can be used instead (trapping with yellow sticky traps; dusting with plant ash) natural enemies can have a chance to build up. We should also work to introduce additional species since results in Hawaii indicate that multiple species of parasites are more effective against LMF than single species.

The most specific chemical product effective against LMF is Trigard (Cyromazine), an insect growth regulator that disrupts the life cycle by interfering with the larval stage. The dose used in Panama is 100 cc/ha applied every 20-25 days. NOTE: this product can be toxic to potato foliage if applied too frequently.

Some specific cultural practices:

Destruction of plant residues from previous crops that were attacked. These can be burned or turned under the soil.

Flowering weeds around the borders of the fields act as a reservoir for parasites, providing them with nectar needed for oviposition and longevity. These weeds should not be eliminated.

Some host crops such as carrots and beets which are only slightly affected by LMF tend to harbour more parasites than other crops, probably because they are sprayed less frequently. These can be used in rotations or intercropped with susceptible crops such as potato.

Use of sticky traps:

Management of LMF flies with traps has given results comparable to those obtained with pesticides. Yellow plastic gallon containers mounted upside down on stakes should be coated with transparent automobile grease (eg. Penzoil 7070L) or used motor oil. About 2/3 more flies are captured if automobile grease is used. They should be placed in and around the borders of the fields at about 10 cm above the foliage. More traps should be introduced in areas where the highest numbers of flies are being captured. Traps should be cleaned and regreased when they become covered with flies. White or green containers also attract flies but are less attractive than yellow traps. Traps capture more males than females.

Yellow Plastic trapping sheets: a 2 m long x 75 cm wide yellow plastic sheet coated with used motor oil and attached at each end to a pair of wooden poles is carried through the field to mass capture flies. The sheet is held by two workers walking on either side of potato rows

Plant Ash:

Ashes prepared from dried plants of *Lantana camara* or from wood shavings may be applied as dusts from plastic talcum powder bottles. In Peru good results were obtained by making the first application immediately after transplanting of TPS or when plants grown from tubers reached the 2-3 leaf stage. Eight applications were made on TPS and six on crops grown from tubers. Hymenopterous parasites were more common on dusted plants compared to the non-dusted control plants.

On the plants grown from tubers, wood ash significantly reduced the number of feeding punctures. On plants grown from TPS, wood and *Lantana camara* ash significantly reduced the number of feeding punctures.

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