EPPO Datasheet: *Liriomyza huidobrensis*

Last updated: 2024-01-04

IDENTITY

Preferred name: *Liriomyza huidobrensis*
Authority: (Blanchard)
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Diptera: Agromyzidae
Other scientific names: *Agromyza huidobrensis* Blanchard, *Liriomyza cucumifoliae* Blanchard
Common names: South American leaf miner, pea leaf miner, potato leaf miner, serpentine leaf miner
view more common names online...
EPPO Categorization: A2 list
view more categorizations online...
EU Categorization: PZ Quarantine pest ((EU) 2019/2072 Annex III)
EPPO Code: LIRIHU



more photos...

Notes on taxonomy and nomenclature

Liriomyza huidobrensis is morphologically indistinguishable from *L. langei*. However, the distinction between the two species has been confirmed by molecular studies (Scheffer, 2000; Scheffer & Lewis, 2001; Takano *et al*., 2008).

HOSTS

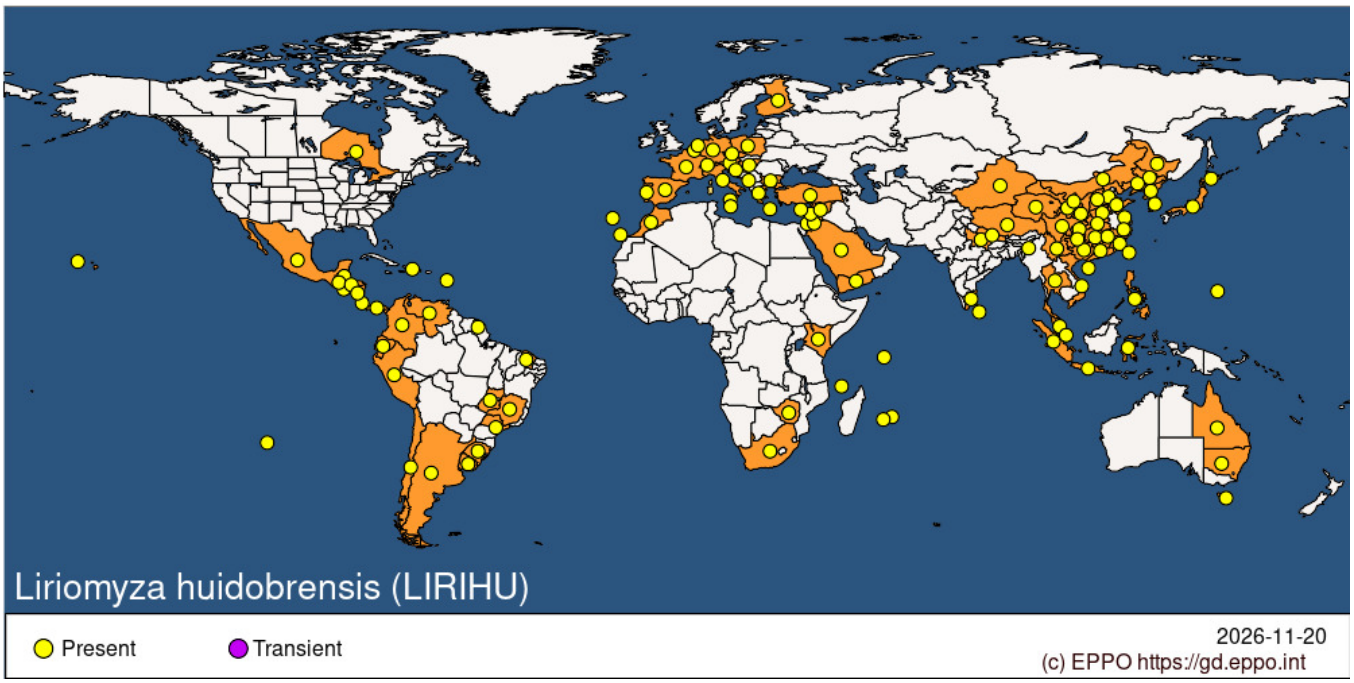
Agromyzidae are usually restricted to a limited number of host plants but a few species are highly polyphagous and have become important pests. *Liriomyza huidobrensis* is one of these species and causes severe damage to vegetable crops and ornamental plants. In a review, Weintraub *et al*. (2017) have recorded 365 host plant species from 49 families. *L. huidobrensis* is a key pest of potato especially in South America. In the EPPO region, *L. huidobrensis* is a major pest of chrysanthemums, *Primula*, *Verbena*, lettuces, *Phaseolus*, cucumbers, celery and *Cucurbita pepo* (ADAS, 1991).

Host list: *Abelmoschus esculentus, Ageratum conyzoides, Alcea rosea, Allium ampeloprasum, Allium ascalonicum, Allium cepa, Allium chinense, Allium fistulosum, Allium porrum, Allium sativum, Allium schoenoprasum, Alstroemeria aurea, Alternanthera philoxeroides, Amaranthus blitum, Amaranthus caudatus, Amaranthus hybridus, Amaranthus retroflexus, Amaranthus tricolor, Amaranthus viridis, Apium graveolens var. dulce, Apium graveolens, Arctium lappa, Arctium minus, Argyranthemum frutescens, Argyranthemum sp., Artemisia annua, Artemisia argyi, Asparagus officinalis, Aster sp., Barbarea sp., Basella alba, Bellis perennis, Benincasa hispida, Beta vulgaris subsp. vulgaris var. cicla, Beta vulgaris subsp. vulgaris var. conditiva, Beta vulgaris subsp. vulgaris var. crassa, Beta vulgaris, Bidens pilosa, Brassica juncea, Brassica napus, Brassica oleracea var. alboglabra, Brassica oleracea var. botrytis, Brassica oleracea var. capitata, Brassica oleracea var. italica, Brassica oleracea var. viridis, Brassica oleracea, Brassica rapa subsp. chinensis, Brassica rapa subsp. pekinensis, Brassica rapa subsp. sylvestris, Brassica rapa, Bupleurum sp., Calceolaria crenatiflora, Calendula officinalis, Callistephus chinensis, Calystegia hederacea, Calystegia sepium, Campanula medium, Capsella bursa-pastoris, Capsicum annuum, Capsicum baccatum, Capsicum frutescens, Cardamine hirsuta, Carduus crispus, Carduus nutans, Carthamus tinctorius, Catharanthus roseus, Celosia argentea, Centaurea cyanus, Centella asiatica, Chenopodiastrum murale, Chenopodium album, Chenopodium hircinum, Chenopodium petiolare, Chenopodium quinoa, Chrysanthemum sp., Chrysanthemum x morifolium, Cicer arietinum, Cichorium endivia, Cichorium intybus, Cineraria sp., Citrullus lanatus, Clarkia amoena, Colocasia esculenta, Conyza sp., Coriandrum sativum, Cosmos bipinnatus, Crassocephalum crepidioides, Crassocephalum rubens, Crepis pulchra, Crotalaria longirostrata, Cucumis melo, Cucumis sativus, Cucurbita maxima, Cucurbita moschata, Cucurbita pepo var. styriaca, Cucurbita pepo, Cynara scolymus, Dahlia imperialis, Dahlia pinnata, Dahlia sp., Datura ferox, Datura sp., Datura stramonium, Daucus carota subsp. sativus, Daucus carota, Deeringia amaranthoides, Delphinium grandiflorum, Dianthus barbatus, Dianthus caryophyllus, Dianthus chinensis*

, Dianthus hybrids, Diascia sp., Dichrocephala auriculata, Diplotaxis muralis, Dysphania ambrosioides, Echinops ritro, Eclipta prostrata, Emilia sonchifolia, Erechtites hieraciifolius, Erigeron bonariensis, Erigeron breviscapus, Erigeron canadensis, Eupatorium caelestinum, Euphorbia marginata, Eustoma russellianum, Freesia refracta, Gaillardia pulchella, Galinsoga parviflora, Galinsoga quadriradiata, Gazania sp., Gerbera jamesonii, Gladiolus hybrids, Glebionis coronaria, Glebionis segetum, Glycine max, Gomphrena globosa, Goniolimon tataricum, Gypsophila elegans, Gypsophila paniculata, Helianthus annuus, Helianthus sp., Helichrysum sp., Hemerocallis fulva , Hemistepta lyrata, Hibiscus trionum, Hirschfeldia sp., Hordeum vulgare, Humulus scandens, Hydrangea macrophylla, Hydrocotyle umbellata, Impatiens balsamina, Ipomoea aquatica, Ipomoea batatas, Kalimeris indica, Lablab purpureus, Lactuca indica, Lactuca sativa var. angustana, Lactuca sativa var. capitata, Lactuca sativa var. crispa, Lactuca sativa var. longifolia, Lactuca sativa, Lagenaria siceraria, Lagenaria sp., Lagurus ovatus, Lathyrus latifolius, Lathyrus odoratus, Launaea intybacea, Leonurus japonicus, Leonurus sibiricus, Leucanthemum vulgare, Levisticum officinale, Lilium davidii, Lilium longiflorum, Lilium sp., Limonium hybrids, Limonium platyphyllum, Linum sp., Linum usitatissimum, Luffa acutangula, Luffa aegyptiaca, Lupinus sp., Lycium chinense, Malva verticillata, Matthiola incana, Medicago minima, Medicago sativa, Melilotus suaveolens, Moluccella laevis, Momordica charantia, Myosotis sylvatica, Nasturtium officinale, Nemesia strumosa, Nicotiana glauca, Nicotiana tabacum, Nigella damascena, Ocimum basilicum, Oenanthe javanica, Oenothera rosea, Osteospermum sp., Oxalis corniculata, Oxalis sp., Papaver rhoeas, Pericallis cruenta, Persicaria amphibia, Persicaria hydropiper, Persicaria nepalensis, Petroselinum sp., Petunia hybrids, Petunia sp., Phaseolus coccineus, Phaseolus lunatus, Phaseolus vulgaris, Phlox drummondii, Physalis angulata, Pisum sativum, Plantago asiatica, Plantago major, Platycodon grandiflorus, Polygonum aviculare, Portulaca oleracea, Primula obconica, Primula vulgaris, Pseudognaphalium affine, Pycnosorus globosus, Ranunculus asiaticus, Ranunculus chinensis, Ranunculus sceleratus , Ranunculus sieboldii, Ranunculus viridis, Raphanus sativus, Rhodanthe chlorocephala subsp. rosea, Ricinus communis, Rorippa indica, Rorippa palustris, Rosa sp., Rumex acetosa, Sagittaria sagittifolia, Salvia splendens, Sambucus sp., Schistocarpha platyphylla, Scilla luciliae, Setaria viridis, Sicyos edulis, Sida sp., Silene gallica, Solanum americanum, Solanum lycopersicum, Solanum melongena, Solanum muricatum, Solanum nigrum, Solanum tuberosum, Solidago sp., Sonchus asper, Sonchus brachyotus, Sonchus oleraceus, Spinacia oleracea, Stachys arvensis, Stellaria media, Stellaria uliginosa, Stellaria yunnanensis, Stephania delavayi, Streptocarpus sp., Synedrella nodiflora, Tagetes erecta, Tagetes patula, Tagetes tenuifolia, Tanacetum cinerariifolium, Tanacetum parthenium, Taraxacum mongolicum, Taraxacum officinale, Trianthema portulacastrum, Trifolium repens, Triticum aestivum subsp. aestivum, Tropaeolum majus, Vaccaria hispanica, Verbena officinalis, Veronica anagallis-aquatica, Vicia faba, Vicia sativa, Vicia tetrasperma, Vigna mungo, Vigna unguiculata subsp. unguiculata, Vigna unguiculata, Viola philippica, Viola tricolor, Viola yezoensis, Xerochrysum bracteatum, Zea mays, Zehneria odorata, Zinnia elegans

GEOGRAPHICAL DISTRIBUTION

L. huidobrensis originates in Central and South America and was absent from other continents until the 1980s. It was first detected in the EPPO region in 1987 in the Netherlands where it was found on glasshouse lettuces. It has since spread to several other European countries, Asia, Africa, North America and Oceania.



EPPO Region: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Finland, France (mainland), Germany, Greece (mainland, Kriti), Hungary, Israel, Italy (mainland, Sicilia), Jordan, Malta, Montenegro, Morocco, Netherlands, Poland, Portugal (mainland, Madeira), Spain (mainland, Islas Canárias), Switzerland, Türkiye
Africa: Comoros, Kenya, Mauritius, Morocco, Reunion, Seychelles, South Africa, Zimbabwe
Asia: China (Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Neimenggu, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizhang, Yunnan, Zhejiang), India (Manipur, Tamil Nadu, Uttar Pradesh), Indonesia (Java, Sulawesi, Sumatra), Israel, Japan (Hokkaido, Honshu), Jordan, Korea, Democratic People's Republic of, Korea, Republic of, Lebanon, Malaysia (West), Nepal, Philippines, Saudi Arabia, Singapore, Sri Lanka, Syrian Arab Republic, Taiwan, Thailand, Vietnam, Yemen
North America: Canada (Ontario), Mexico, United States of America (Hawaii)
Central America and Caribbean: Belize, Costa Rica, Dominican Republic, El Salvador, Guadeloupe, Guatemala, Honduras, Nicaragua, Panama
South America: Argentina, Brazil (Ceara, Goias, Minas Gerais, Rio Grande do Sul, Sao Paulo), Chile (Easter Island), Colombia, Ecuador, French Guiana, Peru, Uruguay, Venezuela
Oceania: Australia (New South Wales, Queensland, Tasmania), Guam

BIOLOGY

The principal biological characteristics which make certain *Liriomyza* spp. particularly successful pests are their rapid population growth and their ability to attack a wide range of different host plants (Reitz *et al.* 2013).

Details about the life history of *Liriomyza huidobrensis* are summarized from Lanzoni *et al.* (2002), Parrella (1987), Spencer (1973), Videla *et al*. (2006) and Weintraub & Horowitz (1995).

After mating female flies puncture the leaf surface of the host plants with their ovipositor causing wounds which serve as sites for feeding or oviposition. Females can make up to 277 punctures per day but eggs are laid in only 5 to 10% of them. Males can also take advantage of these feeding sites as they are less well equipped for puncturing plant tissue. Females can live for 18 days but males for only up to 6 days. Eggs are inserted in the lower surface of leaves. The duration of the egg stage varies from 1.5 to 5 days depending on the temperature and host plant. Females lay an average of 8 to 14 eggs per day.

There are three larval stages which, in total, last 3.6-14 days depending on the temperature and host plant. Larval feeding forms irregular linear mines. Just before pupation, mature larvae cut semi-circular exit slits in the upper surface of the leaves. After a short period, larvae drop to the ground and then burrow just below the surface of the

soil or in crop debris before pupating. The pupal stage lasts from 8 to 24 days depending on the temperature and host plant.

In Northern Europe, *L. huidobrensis* is mainly a glasshouse pest, but a proportion of puparia can survive outdoors during an average Dutch winter (Van der Linden, 1993). However, in Southern Ontario *L. huidobrensis* seemed unable to overwinter (Martin *et al*., 2005).

DETECTION AND IDENTIFICATION

Symptoms

The most important damage caused by *Liriomyza* spp. is due to larval mining in the leaf tissue. As for the feeding and oviposition punctures, larval mining reduces the aesthetic value of ornamentals, decreases the photosynthetic capacity of leaves and can ultimately cause defoliation in severe cases (Spencer 1973). Mines are irregular linear structures in the leaf tissue. They are off-white with trails of dark frass in their margins.

Liriomyza spp. adults cause two main types of damage to their host plants, feeding and oviposition punctures (Minkeberg & van Lenteren 1986; Reitz *et al*. 2013). Adult feeding and oviposition punctures reduce the aesthetic value of ornamental plants and can lead to death of young plants by reducing photosynthetic capacity. Punctures can also be invaded by fungi and bacteria causing additional damage to host plants. Feeding punctures appear as uneven rounded white speckles on the leaf surface whereas oviposition punctures are smaller and more rounded. These symptoms are not used as a diagnostic character as there is no variation between *Liriomyza* spp.

Morphology

Detailed description of the morphology of immature and adult *L. huidobrensis* is given in Spencer (1973). The main diagnostic characters of the four regulated *Liriomyza* spp. (*L. bryoniae*, *L. huidobrensis*, *L. sativae* and *L. trifolii*) can be found in the IPPC diagnostic protocol for the genus *Liriomyza* (IPPC, 2017) and the EPPO Standard on diagnostics PM 7/53 (2) *Liriomyza* spp. (EPPO, 2022a). The following sections summarize this information.

Eggs

Oval and white, 0.25 mm long.

Larva

There are three larval stages that range from 0.5 mm in length for the first instar to 3.25 mm for the last one. Their shape is cylindrical and tapering towards the head. The anterior and posterior spiracles are located on projections and the posterior spiracles are composed of an ellipse of 6 to 9 pores. *L. huidobrensis* larvae are cream-colored except in the last stage where a yellow-orange patch appears dorsally at the anterior end.

Puparium

Oval cylinder in shape of about 2.0 mm, yellowish- or reddish-brown or almost black. The spiracles are still visible in the pupal stage.

Adult

Small 1-3 mm long mostly black flies, with a yellow-orange frons and yellow scutellum. The orbital setulae are reclinate, the costa extends to vein M_{1+2} and the femora are predominantly yellow. Male genitalia are characteristic of the genus.

Detection and inspection methods

There are more than 400 species of *Liriomyza* (GBIF, 2023) and their morphological identification relies on the male

genitalia. Adult females can only be used for genus level identification. Likewise, there are no keys available for species level identification of the immature stages. *L. huidobrensis* males can thus be separated from the very similar *L. bryoniae, L. trifolii, L. sativae* and *L. strigata* by the structure of their distiphallus (terminal part of the intromittent organ) which has a pair of distal bulbs with spiraled rims. The bulbs meet in the midline only at their rims. *L. huidobrensis* is morphologically indistinguishable from *L. langei* (EPPO, 2022a; IPPC 2017).

The mines caused by larval feeding can also be useful for detection but this character should be used in combination with other characters as mine pattern is influenced by environmental factors (EPPO, 2022a). Other flies as well as some Lepidoptera are known to have leaf-mining larvae and can potentially be confused with Agromyzidae. Nonetheless, the characteristic feeding punctures of *Liriomyza* spp. allows diagnosticians to differentiate them from other leafminers.

In the absence of male adults for morphological identification, the following molecular tests can be used for *L. huidobrensis* species identification: PCR RFLP targeting the COII gene (Kox *et al*., 2005), conventional multiplex PCR targeting the COI gene (Nakamura *et al*., 2013), an on-site LAMP test, multiplex real-time PCR (Sooda *et al.* 2017), and DNA barcoding based on the COI gene (EPPO, 2021). These molecular techniques are summarized in the EPPO and the IPPC diagnostic protocols for regulated *Liriomyza* species. Recently, molecular identification based on next generation sequencing techniques are also being developed (Frey *et al*., 2022).

PATHWAYS FOR MOVEMENT

Adults are capable of limited flight and can be dispersed by wind currents (see Malipatil *et al.* 2016 for references), but are unlikely to spread over long distances. The high degree of polyphagy of *L. huidobrensis* as well as the concealed lifestyle of its larvae make its dissemination through the movement of plant material the most likely mean of colonizing new countries (EFSA, 2012; Parrela, 1987, Reitz *et al.*, 2013). *L. huidobrensis* is regularly intercepted in trade, in particular on leafy vegetables and cut flowers (Europhyt, 2023).

PEST SIGNIFICANCE

Economic impact

Liriomyza spp. are highly polyphagous and invasive and cause severe damage to vegetable crops and ornamentals through adult feeding, oviposition and larval mining. *L. huidobrensis* originates from Central and South America and has spread to Europe, Asia, Africa, North America and Oceania (CABI, 2021). It is a key pest of potato especially in South America and can cause yield losses of 50% to 100% depending on the year, country and infestation level (Kwon *et al*., 2018; Mujica & Kroschel, 2013; Rauf *et al*., 2000, Shepard *et al*., 1998). In Northern Europe, *L. huidobrensis* is primarily a glasshouse pest but since it has spread to Mediterranean countries, it has appeared on outdoor crops such as lettuce and beet (Echevarria *et al*., 1994). In Israel, it was found to be a much more serious pest than *L. trifolii* (Weintraub & Horowitz, 1995).

Control

The most common control strategy for *Liriomyza* spp. is the extensive use of chemical control methods. However, *Liriomyza* spp. are known to readily develop insecticide resistance (Reitz *et al*. 2013), unlike their local parasitoids, and thus causing serious leafminer outbreaks. Some insecticides are effective against *Liriomyza* spp. (Schuster & Everett, 1983). These are translaminar and target the larvae inside the leafmines. Biological control methods are increasingly being used in horticultural industries and commercial vegetable production (Liu *et al*., 2009). There are more than 140 described species of *Liriomyza* parasitoids and these are the primary agents used in biological control strategies. In open fields, integrated pest management strategies promoting local parasitoid diversity are commonly used to control *Liriomyza* spp. In the more controlled greenhouse environments, commercially available parasitoids, such as species in the genus *Diglyphus*, are also reported to successfully regulate *Liriomyza* infestations. Predators and entomopathogenic nematodes and fungi are also known but there are a limited number of species and they are not considered as efficient control agents.

Phytosanitary risk

Liriomyza huidobrensis is a highly polyphagous species present in Europe essentially in the Mediterranean region. The main dispersal mechanism is through the trade related movement of plant material hosting the immature stages of *L. huidobrensis* (EFSA, 2012). The latter are cryptic and can easily go undetected in plants for planting, soil, fruit and vegetables, cut flowers and branches with foliage.

PHYTOSANITARY MEASURES

It can be recommended that host plants for planting from countries where *L. huidobrensis* is present are inspected over three months at regular intervals before export can take place, to verify the absence the pest itself or any signs of its presence. General guidance on how to conduct inspections of places producing vegetable plants for planting under protected conditions can be found in the EPPO Standard PM 3/77 (EPPO, 2022b). In the European Union, specific measures are taken to protect areas that are still free from *L. huidobrensis* (Protected Zones), which means that plant material should respect a list of established rules (Commission implementing regulation (EU) 2021/2285) before being cleared for import into the Protected Zones.

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EPPO (2026) *Liriomyza huidobrensis*. EPPO datasheets on pests recommended for regulation. Available online. https://gd.eppo.int

Datasheet history

This datasheet was first published in the first edition of 'Quarantine Pests for Europe' in 1992 and revised in its second edition in 1997, as well as in 2024. It is now maintained in an electronic format in the EPPO Global Database. The sections on 'Identity', ‘Hosts’, and 'Geographical distribution' are automatically updated from the database. For other sections, the date of last revision is indicated on the right.

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