

Liriomyza huidobrensis (Blanchard), a Newly Invaded Insect of Economic Importance to Taiwan (Diptera: Agromyzidae)

Shiuh-Feng Shiao* and Wen-Jer Wu

Department of Entomology, National Taiwan University, Taipei, Taiwan, ROC

(Accepted for publication: Aug. 5, 2000)

ABSTRACT

Shiao S. F.* and Wu W. J. 2000. *Liriomyza huidobrensis* (Blanchard), a Newly Invaded Insect of Economic Importance to Taiwan (Diptera: Agromyzidae). Plant Prot. Bull. 42: 249 - 254

Liriomyza huidobrensis (Blanchard) was first found causing damage in Taiwan in early 1999, and is now believed to be a widespread and dominant pest species on some vegetable crops, Cucurbitaceae, legumes and composites. This note focuses on the taxonomic and morphological descriptions of this pest species in order to assist for further diagnostic discrimination; including the redescriptions in more detail of external morphology, male and female terminalia, and some larval characters.

(Key words: *Liriomyza huidobrensis*, Agromyzidae, quarantine, new record)

American leaf miner, *Liriomyza huidobrensis* (Blanchard), is herein recorded as new to Taiwan. The recent collecting records showed that this pest species already caused damage on vegetable crops, legumes and composites from early 1999 to the present; and is now widespread around Taiwan in merely one year. The invasion of this species into Taiwan is no doubt by human-mediated and probably due to quarantine failure or plant smuggling; but the exact dispersal route and its source is still unknown. *L. huidobrensis* is a highly polyphagous species that attacks wide range of crops, and it is now also on the latest A2 lists of quarantine pests of EPPO Standards (European and Mediterranean Plant Protection Organization,

*Corresponding author. E-mail: sfshiao@ccms.ntu.edu.tw

September 2000). Spencer⁽¹⁴⁾ noted its host range was then known as wide as in 14 plant families. The important crops attacked by *L. huidobrensis* are beet, spinach, peas and beans, potatoes and gypsophila flowers, and sometimes rarely found on carnations and chrysanthemum⁽¹³⁾. This new record also brings the Taiwanese *Liriomyza* fauna up to 15 species^(7, 8, 9, 10).

***Liriomyza huidobrensis* (Blanchard, 1926)**

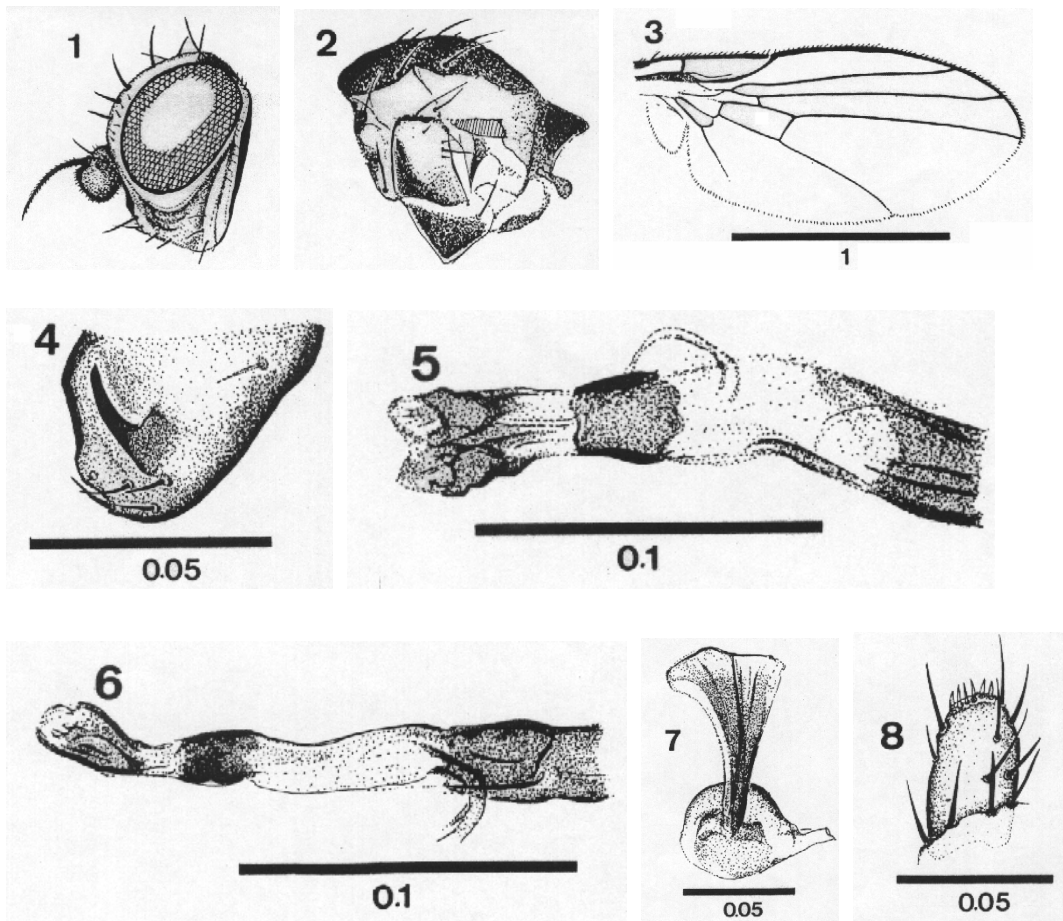
Agromyza huidobrensis Blanchard⁽¹⁾, 1926: 10-11.

Liriomyza huidobrensis Blanchard^(2, 3), 1938: 356; 1954: 32.

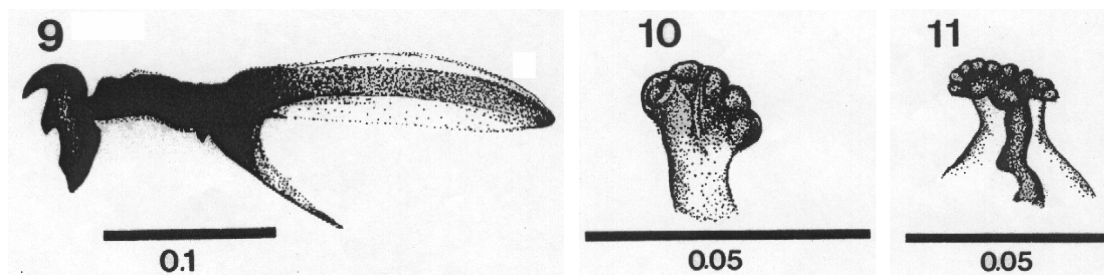
Liriomyza cucumifoliae Blanchard⁽²⁾, 1938: 352. (Synonymy established by Spencer⁽¹¹⁾, 1973: 216)

Liriomyza langei Frick⁽⁵⁾, 1951: 81. (Synonymy established by Spencer⁽¹¹⁾, 1973: 216)

Liriomyza dianthi Frick⁽⁶⁾, 1958: 1-5. (Synonymy established by Spencer⁽¹¹⁾, 1973: 216)



Figs. 1-8. *Liriomyza huidobrensis* (Blanchard), adult; 1, head of male, lateral view; 2, thorax of male, lateral view; 3, wing of male; 4, surstylus, posteroventral view; 5, phallus, ventral view; 6, phallus, lateral view; 7, sperm pump; 8, cercus of female with marginal part of 9th tergite. (scale unit = mm)



Figs. 9-11. *Liriomyza huidobrensis* (Blanchard), larva; 9, cephalopharyngeal sclerites, lateral view; 10, anterior spiracle, lateral view; 11, posterior spiracle, lateral view. (scale unit = mm)

Description:

Adult: Medium-sized species; wing length 1.7 mm in male, 2.0 mm in female. Frons yellow, about 1.5 times as wide as eye. Gena and postgena bright yellow; vertical angle, ocellar triangle, and occiput dark brown to black. Antenna yellow with 3rd segment rounded laterally, arista dark brown and pubescent. Orbital bristles 4 pairs; upper 2 pairs directed upwards, lower 2 pairs obviously inclinate. Both inner and outer vertical bristles on brown ground. Dorsocentral bristles 1 + 3 type. Acrostichals in about 4 irregular rows. Halter yellow. Costa extending to M_{1+2} ; M_{1+2} near to wing tip; proportion of 2nd to 4th costal sections, 5.2: 1: 1.3. Squama brown with long dark fringes. Male terminalia: Surstylus bearing 1 stout spine and 4-5 sensory hairs on posteroventral tip. Cercus covered with long hairs. Sperm pump elongated with larger basal bulb. Phallus length about 0.17 mm; distiphallus paired and sac-shaped from ventral view, mesophallus well-developed with obvious long membranous process, membranous area obviously divide the distiphallus and mesophallus, basiphallus short but highly sclerotized. Female terminalia: 9th sternite with 4 pairs of marginal setae. Cercus with 7 setae and 6 tactile sensilla.

Larva: Fully-developed third instar about 2.5 mm in length. Mandible with 2 teeth. Posterior spiracle with 6 to 9 pores; anterior spiracle with 5 pores.

Material examined: see Table 1.

Distribution: (widespread or restricted distribution in the following countries (areas))^(4, 13)

Western Hemisphere: Argentina, Belize, Brazil (Minas Gerais, São Paulo), Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, French Guiana, Guadeloupe, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, USA (California, Florida, Hawaii, Utah, Virginia), Venezuela.

Table 1. Data sheet of specimen examined of *Liriomyza huidobrensis* from Taiwan

| Date | Host plant | Collecting locality | Collector | Specimen no. |
|-------------|--|---------------------------------|-------------|--------------|
| 17-I-1999 | <i>Lactuca sativa</i> L. var. <i>intybeca</i> Hort. (Compositae) | Taichung Hsien: Wufeng (霧峰) | L. Y. Chou | 4 ♂♂ , 2 ♀♀ |
| 17-I-1999 | <i>Lactuca sativa</i> L. var. <i>intybeca</i> Hort. | Taichung Hsien: Wufeng | L. Y. Chou | 3 ♂♂ , 1 ♀ |
| 26-II-1999 | <i>Lactuca sativa</i> L. var. <i>intybeca</i> Hort. | Nantou Hsien: Mingchien (名間) | L. Y. Chou | 1 ♂ |
| 26-III-1999 | <i>Capsicum annum</i> L. (Solanaceae) | Nantou Hsien: Puli (埔里) | L. Y. Chou | 1 ♂ , 2 ♀♀ |
| 02-III-1999 | <i>Beta vulgaris</i> var. <i>rubra</i> (L.) Mag.(Chenopodiaceae) | Yunlin Hsien: Tounan (斗南) | L. Y. Chou | 1 ♂ , 2 ♀♀ |
| 09-III-1999 | <i>Crassocephalum rabens</i> (Juss. ex Jacq.) S. Moore. (Compositae) | Miaoli Hsien: Tahu (大湖) | L. Y. Chou | 1 ♂ |
| 12-III-1999 | <i>Beta vulgaris</i> var. <i>rubra</i> (L.) Mag. | Yunlin Hsien: Tounan | L. Y. Chou | 1 ♂ |
| 14-IV-1999 | <i>Luffa cylindrica</i> (L.) M. Roem (Cucurbitaceae) | Nantou Hsien: Nantou (內轆) | S. J. Chang | 2 ♂♂ |
| 5-V-1999 | <i>Amaranthus viridis</i> L. (Amaranthaceae) | Taichung Hsien: Tantzü (潭子) | L. Y. Chou | 1 ♂ , 1 ♀ |
| 5-V-1999 | <i>Phaseolus vulgaris</i> L. (Leguminosae) | Taichung Hsien: Tantzü | L. Y. Chou | 2 ♂♂ |
| 5-V-1999 | <i>Kalimeris indica</i> (L.) Schultz.-Bip. (Compositae) | Taichung Hsien: Tantzü | L. Y. Chou | 1 ♂ |
| 5-V-1999 | <i>Cucumis sativus</i> L. (Cucurbitaceae) | Taichung Hsien: Tantzü | L. Y. Chou | 1 ♂ , 2 ♀♀ |
| 8-V-1999 | <i>Lagenaria</i> sp. (Cucurbitaceae) | Ilan Hsien: Chuangwei (壯圍) | Y. C. Chiu | 1 ♂ |
| 18-II-2000 | <i>Barbarea</i> sp. (Cruciferae) | Ilan Hsien: Sanhsing (三星) | Y. C. Chiu | 1 ♂ , 1 ♀ |
| 18-II-2000 | <i>Allium fistulosum</i> L. (Liliaceae) | Ilan Hsien: Chuangwei | Y. C. Chiu | 1 ♂ , 2 ♀♀ |
| 18-II-2000 | <i>Crassocephalum rabens</i> (Juss. ex Jacq.) S. Moore. | Ilan Hsien: Sanhsing | Y. C. Chiu | 1 ♂ |
| 28-VI-2000 | unknown | Taichung Hsien: Wufeng | C. C. Chien | 3 ♂♂ , 2 ♀♀ |

Europe: Austria, Belgium, Czech Rep., Denmark, Finland, France, Germany, Greece (Crete), Ireland, Italy (Sicily), Malta, the Netherlands, Norway, Portugal, Spain (Canary Islands), Sweden, Switzerland, United Kingdom (England, Northern Ireland, Scotland).

Africa: Kenya, Mauritius, Reunion, Seychelles.

Asia: China (Guizhou, Hebei, Peking, Qinghai, Shandong, Sichuan, Yunnan), Cyprus, India (Uttar Pradesh), Indonesia (Java, Sumatra), Israel, Jordan, Lebanon, Malaysia, Singapore, Sri Lanka, Syria, Thailand, Turkey, **New to Taiwan**.

Remarks: *L. huidobrensis* is easily confused with *L. bryoniae*, not only from external morphology but also from male genitalia. *L. bryoniae* used to be a dominant pest species in Taiwan from 1980's to early 1990's, but the population number was greatly declined during these years, and its dominant status was sequentially substituted by other species such as *L. trifolii* and the recent invaded *L. huidobrensis*. However, we could find several *Liriomyza* species attack the same crop in the same field simultaneously; at this moment, the only reliable character to distinguish them is the male genitalia^(12, 15). In general, *L. huidobrensis* adults have larger body size and darker body color when compared with other *Liriomyza* pests; but the male genitalia, especially the phallus, is undoubtedly the most characteristic. Nevertheless, the careful examination of male genitalia is needed, both from lateral and ventral aspects, to prevent mistaking some similar closely related species.

ACKNOWLEDGMENT

The authors wish to thank Liang-Yih Chou and Ching-Chin Chien, Taiwan Agricultural Research Institute; Yi-Chung Chiu, National Taiwan University, for their generous loan of materials and assistances; and Akeo Iwasaki, Kitami Agricultural Experiment Station, Japan, for suggestions on Agromyzidae taxonomy and providing bibliography. This work was supported by the National Science Council, Republic of China (NSC-89-2313-B-002-029) and Bureau of Animal and Plant Health Inspection and Quarantine, Council of Agriculture, Republic of China (89-ST- 6.2-BQ-62(01)).

LITERATURE CITED

1. Blanchard, E. 1926. A dipterous leaf-miner on *Cinernria*, new to science. *Revta Soc. Entomol. Argent.* 1: 10-11.
2. Blanchard, E. 1938. Descripciones y anotaciones de dipteros argentinos. Agromyzidae. *Ann. Soc. Cient. Argent.* 126: 352-359.
3. Blanchard, E. 1954. Sinopsis de los Agromyzidos argentinos (Diptera, Agromyzidae). *Min. Agric. Ganaderia (A)* 56: 1-50.
4. CABI. 1999. Crop Protection Compendium, Global module. CAB International, Wallingford, UK.
5. Frick, K. E. 1951. *Liriomyza langei*, a new species of leaf-miner of economic importance in California. *Pan-Pacific Entomol.* 21: 81.
6. Frick, K. E. 1958. *Liriomyza dianthi* n. sp., a new pest of carnations in California. *Proc. Entomol. Soc. Wash.* 60: 1-5.
7. Sasakawa, M. 1972. Formosan Agromyzidae (Diptera). *Sci. Rep. Kyoto Pref. Univ.*,

- Agric. 24: 43-82.
8. Shiao, S. F. 1991. Systematic studies on *Liriomyza* species in Taiwan (Diptera: Agromyzidae). Master's thesis, National Taiwan University. 129 pp.
 9. Shiao, S. F., and Wu, W. J. 1989. Four new records of *Liriomyza* leaf-miners (Diptera: Agromyzidae) from Taiwan. J. Taiwan Mus. 42: 15-23.
 10. Shiao, S. F., and Wu, W. J. 1995. A new *Liriomyza* species from Taiwan (Diptera: Agromyzidae). Pan- Pacific Entomol. 71: 161-168.
 11. Spencer, K. A. 1973. Agromyzidae (Diptera) of Economic Importance. Dr. W. Junk B. V. Publishers, The Hague. 418 pp.
 12. Spencer, K. A. 1987. Agromyzidae. Ch. 73. pp. 869-879. In: J. F. McAlpine, ed. Manual of Nearctic Diptera. Vol. 2. Research Branch, Agriculture Canada, Monograph No. 32.
 13. Spencer, K. A. 1989. Leaf miner. Ch. 5. pp. 77-98. In: R. P. Kahn, ed. Plant Protection and Quarantine, Vol. 2, Selected Pests and Pathogens of Quarantine Significance. CRC Press, Inc.
 14. Spencer, K. A. 1990. Host Specialization in the World Agromyzidae (Diptera). Kluwer Academic Publishers, The Netherlands. 444 pp.
 15. Spencer, K. A., and Steyskal, G. C. 1986. Manual of the Agromyzidae (Diptera) of the United States. U. S. Dep. Agric., A. R. S., Agriculture Handbook No. 638. 478 pp.

摘 要

蕭山峰*、吳文哲 2000 南美斑潛蠅(雙翅目:潛蠅科)——種新侵入臺灣之經濟重要性害蟲 植保會刊 42: 249 - 254. (臺北市 國立臺灣大學昆蟲學系)

南美斑潛蠅於 1999 年首次被發現在臺灣地區造成為害，目前已是廣泛分布且優勢的主要害蟲種類之一；主要記錄為害蔬菜、瓜類、豆科及菊科植物。本文主要著重其分類學及形態學之描述，以提供將來對物種區辨之參考；文中較詳細地重新描述包括外部形態特徵、雌雄外生殖器特徵及幼蟲特徵等。

(關鍵詞：南美斑潛蠅、潛蠅科、檢疫、新記錄)

*通訊作者。E-mail: sfshiao@ccms.ntu.edu.tw