

## A Taxonomic Review of the genus *Liriomyza* (Diptera: Agromyzidae) from Korea

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### ABSTRACT

In this paper, a total of eight species of the genus *Liriomyza* are treated. Among them, three species are reported for the first time from Korea. A key to Korean species, host plants and domestic localities are given. Some illustrations of male genitalic features are included.

Key words: systematics, Diptera, Agromyzidae, Korea

### INTRODUCTION

Most agromyziid flies are leaf-miners of living plants during larval stages, whereas the remainders are stem-borers and seed-feeders. Thus, many species are injurious to cultivated plants.

The genus *Liriomyza* Mik is one of the largest group of the subfamily Pytomyzinae, and comprises over 250 species throughout the world. The generic characteristics are as follows: orbital setulae reclinate; costa extending to vein  $M_{1+2}$ ; the second cross-vein is present; epandrium is armed with a spine on each inner caudodorsal angle.

The first record of this genus from Korea was given by Kor. Soc. Plant Prot. (1986) which listed *Liriomyza congesta* as the pest of Leguminosae. Shortly later, Choi *et al.* (1990) recorded *Liriomyza chinensis* being injurious to the *Allium fistulosum*. After then, Choi *et al.* (1992) gave

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an ecological observation of *Liriomyza* sp. injurious to *Callistephus chinensis*. Subsequently, Ahn *et al.* (1993) reported *Liriomyza bryoniae* attacking to *Raphanus sativus hortensis*. They (1994) also reported the occurrence of *Liriomyza trifolii* on various vegetables in southern Korea. Recently, Choi and Woo (1995) reported *Liriomyza bryoniae* and *L. yasumatsui* from central Korea.

In this paper, we add three species hitherto unrecorded to Korean fauna. As the result, a total of eight species are listed here to be occurred in Korea.

The following abbreviations are used for localities: CN, Chungcheongnam-do; GB, Kyeongsangbuk-do; GG, Kyeonggi-do; GN, Kyeongsangnam-do; JB, Cheollabuk-do, JJ: Cheju-do; JN, Cheollanam-do.

## SYSTEMATICS

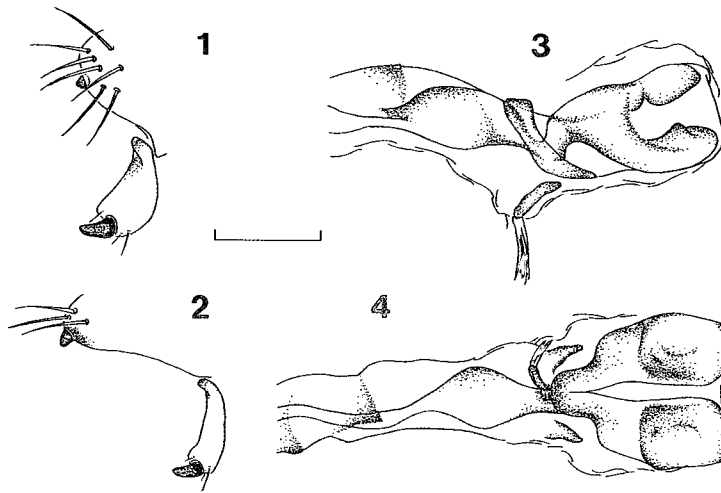
Genus *Liriomyza* Mik, 1894 애잎굴파리 속 (신칭)

*Liriomyza* Mik, 1894, p. 284.

Type-species : *Agromyza urophorina* Mik, 1894 (Sweden).

Key to the Korean *Liriomyza* species

1. Scutellum entirely black ..... *L. chinensis*
- Scutellum at least partially yellow ..... 2
2. Outer vertical bristle situated on yellow area ..... 3
- Outer vertical bristle situated on black area ..... 5
3. Mesonotum with two rows of acrostichal bristles ..... *L. congesta*
- Mesonotum with four rows of acrostichal bristles ..... 6
4. Discal cell moderate, last section of vein  $M_{3+4}$  distinctly more than twice as long as penultimate ..... *L. yasumatsui*
- Discal cell large, last section of vein  $M_{3+4}$  about twice as long as penultimate ..... 5
5. Lateral black marking of scutellum narrow; basal scutellar bristle situated on black area ..... *L. bryoniae*
- Lateral black marking of scutellum broad; basal scutellar bristle situated on edge of black area ..... *L. trifolii*
6. Mesopleuron with large triangular patch along lower margin; pteropleuron strongly darkened by irregularly black marking ..... *L. asterivora*
- Mesopleuron with small black patch at middle along lower margin; pteropleuron with small black spot or without black marking ..... 6
7. Third antennal segment darkened distally; distiphallus tightly fused with mesophallus ..... *L. artemisiae*
- Third antennal segment not darkened distally; distiphallus slightly separated from mesophallus ..... *L. pusilla*



**Fig. 1.** Male genitalia of *Liriomyza artemisiae*: 1, epandrium and surstylus, dorsal view; 2, ditto, caudodorsal view; 3, aedeagus, lateral view; 4, ditto, ventral view (scale: 0.05 mm).

**1. *Liriomyza artemisiae* Spencer, 1981 오이풀굴파리 (신칭) (Fig. 1)**

*Liriomyza artemisiae* Spencer, 1981, p. 213.

**Material examined.** 3♂♂, 3♀♀, from larvae, 23 Sep. 1985, Taegu, on *Sanguisorba officinalis*, emerged 11 Oct. 1985, S. J. Suh.

**Locality.** GB: Taegu.

**Description.** Head about 1.7 times as high as long in profile; frons yellow, slightly wider than eye; orbit somewhat paler than frons, with two reclinate upper orbital bristles and two incurved lower orbital bristles; inner vertical bristle situated on edge of yellow area but outer vertical bristle on black area; jowl yellow, somewhat deepened posteriorly, about 1/4 eye height; antenna yellow, third segment darkened distally. Mesonotum shiny black, with four acrostichal bristle rows; humerus yellow with black marking on anterior part; notopleuron with narrow black striation on lower margin; mesopleuron with black patch at middle along lower margin; stenopleuron black with yellow upper margin and stenopleural bristle located on yellow area. Leg with coxae and femora yellow, somewhat variably darkened by irregularly brown or black marking or striation; tibiae and tarsi dark brown. Wing rather dark tinged; calypter and fringe black; halter yellow.

Length. Body: 1.4-1.7 mm; wing: 1.5-1.7 mm.

**Host.** *Artemisia douglasiana* (cf. Spencer, 1976); *Artemisia princeps* (cf. Sasakawa, 1994); *Sanguisorba officinalis*.

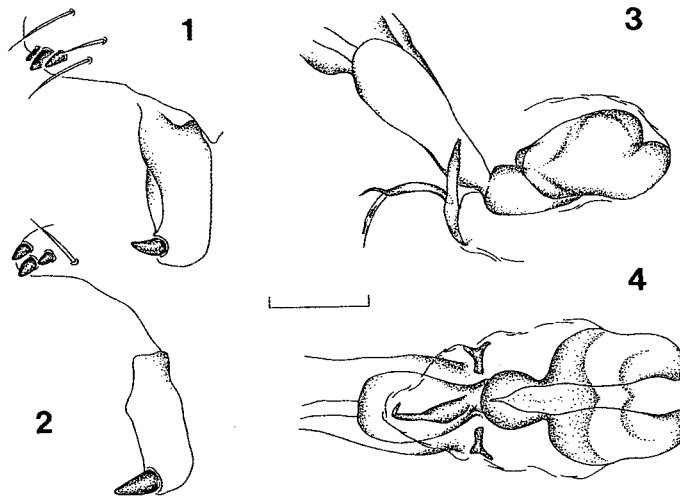
**Distribution.** Korea (South), Japan, USA.

**2. *Liriomyza asterivora* Sasakawa, 1956 썩바귀굴파리 (신칭) (Fig. 2)**

*Liriomyza asterivora* Sasakawa, 1956, p. 127.

**Material examined.** 4♂♂, 6♀♀, from larvae 29 Oct. 1985, on *Ixeris dentata*, Taegu, emerged 16 Nov. 1985, S. J. Suh.

**Locality.** GB: Taegu.



**Fig. 2.** Male genitalia of *Liriomyza asterivora*: 1, epandrium and surstylus, dorsal view; 2, ditto, caudodosal view; 3, aedeagus, lateral view; 4, ditto, ventral view (scale: 0.05 mm).

**Description.** Head about 1.7-1.8 times as high as long in profile; frons yellow; orbit somewhat paler than frons, with two reclinate upper orbital bristles, two or three incurved lower orbital bristles and some setulae; inner vertical bristle arising from edge of yellow area, outer vertical bristle from black area; jowl yellow, about 1/3 eye height; antenna yellow or brownish yellow. Mesonotum shiny black, with four acrostichal bristle rows; humerus yellow with black marking on anterior part; notopleuron yellow with narrow black striation on lower margin; mesopleuron with dark triangular marking along lower margin; pteropleuron strongly darkened by irregularly brown or black marking; stenopleuron black with yellow upper margin and stenopleural bristle situated on yellow area. Leg with coxae and femora yellow; tibiae and tarsi dark brown.

**Length.** Body: 1.7-1.9 mm; wing: 1.7-1.9 mm.

**Host.** *Aster indicus*, *Synedrella undiflora* (cf. Sasakawa, 1960); *Ixeris dentata*.

**Distribution.** Korea (South), Japan, Malaysia.

### 3. *Liriomyza bryoniae* (Kaltenbach, 1858) 오이굴파리

*Agromyza bryoniae* Kaltenbach, 1858, p. 158.

*Liriomyza solani* Hering, 1927, p. 181.

*Liriomyza mercurialis* Hering, 1932, p. 165.

*Liriomyza citrulli* Rohdendorfi, 1950, p. 82.

*Liriomyza bryoniae*: Ahn *et al.*, 1993, p. 822<sup>1</sup>.

*Liriomyza bryoniae*: Ahn *et al.*, 1994, p. 882.

**Locality.** GG: Suwon<sup>1</sup>.

**Host.** Solanaceae, Scrophulariaceae, Labiatae, Umbelliferae, Compositae (cf. Sasakawa, 1960); *Solanum tuberosum* (cf. Spencer, 1976), *Raphanus sativus hortensis* (cf. Ahn *et al.*, 1993), *Apium graveolens* (cf. Ahn *et al.*, 1994).

**Distribution.** Korea (Central), Japan, Europe, N. Africa.

**4. *Liriomyza chinensis* (Kato, 1949) 파굴파리**

*Dizygomyza cepae chinensis* Kato, 1949, p. 12.

*Liriomyza chinensis*: Choi *et al.*, 1990, p. 91<sup>1-2</sup>.

*Liriomyza chinensis*: Ahn *et al.*, 1991, p. 66<sup>2-15</sup>.

**Locality.** GB: Taegu, JB: Cheonbuk<sup>1</sup>, Kimje<sup>3</sup>, Puan (=Buan<sup>4</sup>), Kochang (=Gochang<sup>5</sup>), Namweon (=Namwon<sup>6</sup>), Imsil<sup>7</sup>, Wanju<sup>8</sup>, JN: Cheonnam<sup>2</sup>, Naju<sup>9</sup>, Yöngam (=Yeongam<sup>10</sup>), Posöng (=Boseong<sup>11</sup>), Süngju (=Seungju<sup>12</sup>), Kokseong (=Gogseong<sup>13</sup>).

**Host.** *Allium fistulosum*, *A. ascalonicum* (cf. Choi *et al.*, 1990; Ahn *et al.*, 1991).

**Distribution.** Korea (Central, South), Japan, China, Malaysia, Singapore.

**5. *Liriomyza congesta* (Becker, 1903) 콩잎굴파리**

*Agromyza congesta* Becker, 1903, p. 2.

*Liriomyza minima* Hendel, 1931, p. 233.

*Liriomyza parva* Hendel, 1931, p. 240.

*Liriomyza centaureana* Hering, 1936, p. 175.

*Liriomyza nigripleura* Rydén, 1956, p. 195.

*Liriomyza congesta*: Spencer, 1973, p. 94.

*Liriomyza congesta*: Kor. Soc. Plant Prot., 1986, p. 247.

*Liriomyza congesta*: Ent. Soc. Kor. and Kor. Soc. Appl. Ent., 1994, p. 296 (Korea).

**Locality.** GB: Suwon.

**Host.** Leguminosae (cf. Spencer, 1976; Kor. Soc. Plant Prot., 1986).

**Distribution.** Korea (South), Japan, Europe, N. Africa.

**Remarks.** The Korean species name, 'Kongipgulpari', was originally referred to *Japanagromyza variihalterata* Malloch (= *J. tristella* Thomson) by Rural Dev. Adm. (1978). However, the name has been transferred to *Liriomyza congesta* Becker due to the economic importance of the pest status since the amendment by Kor. Plnat Prot. Soc. (1986).

**6. *Liriomyza pusilla* (Meigen, 1830) 과꽃굴파리 (신칭) (Fig. 3)**

*Agromyza pusilla* Meigen, 1830, p. 185.

*Agromyza fasciola* Meigen, 1838, p. 204.

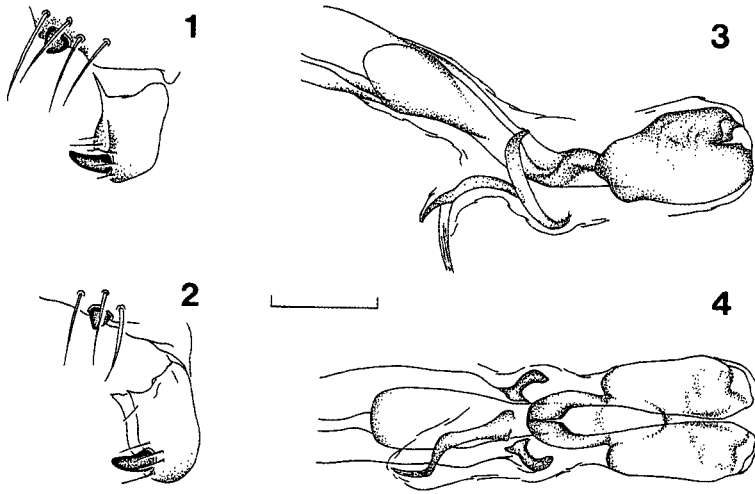
*Liriomyza pusilla*: Spencer, 1976, p. 266.

*Liriomyza* sp.: Choi *et al.*, 1990, p. 31.

**Material examined.** 11 ♂♂, 4 ♀♀, from larvae, 19 Jul. 1998 on *Callistephus chinensis*, Taegu, emerged 29 Jul. 1998, S. J. Suh.

**Locality.** GB: Taegu.

**Description.** Head about 1.6 times as high as long in profile; frons yellow or brownish yellow, slightly wider than eye; orbit with two reclinate upper orbital bristles, two incurved lower orbital bristles and some setulae; inner vertical bristle situated on edge of yellow area but outer vertical bristle on black area; jowl yellow, somewhat deepened posteriorly, about 1/3-1/4 eye height; antenna yellow or brownish yellow. Mesonotum shiny black, with four acrostichal bristle rows; humerus with black marking on anterior part; notopleuron with narrow black stripe on lower margin; mesopleuron with black patch at middle along lower margin; stenopleuron black with



**Fig. 3.** Male genitalia of *Liriomyza pusilla*: 1, epandrium and surstylus, dorsal view; 2, ditto, caudodorsal view; 3, aedeagus, lateral view; 4, ditto, ventral view (scale: 0.05 mm).

yellow upper margin, stenopleural bristle located on yellow area. Leg with coxae and femora yellow; tibiae and tarsi dark brown. Wing rather dark tinged; calypter and fringe dark brown; halter yellow.

**Length.** Body: 1.7-1.9 mm; wing: 1.7-1.9 mm.

**Host.** *Bellis*, *Aster*, *Solidago* (cf. Spencer, 1976); *Kalimeris yomena*, *Artemisia princeps*, *Aster* sp. (cf. Sasakawa, 1994); *Callistephus chinensis* (Choi *et al.*, 1992).

**Distribution.** Korea (South), Japan, Europe, Taiwan.

### 7. *Liriomyza trifolii* (Burgess, 1880) 아메리카잎굴파리

*Oscinis trifolii* Burgess, 1880, p. 201.

*Liriomyza alliovora* Frick, 1955, p. 88.

*Liriomyza trifolii*: Ahn *et al.* 1994, p. 881<sup>1-3</sup>.

*Liriomyza trifolii*: Han *et al.* 1996, p. 309<sup>1,3-26</sup>.

**Locality.** CN: Seosan<sup>4</sup>, Taean<sup>5</sup>; GB: Taegu; GG: Icheon<sup>6</sup>, Koyang<sup>7</sup>, Yongin<sup>8</sup>; GN: Chinju<sup>1</sup>, Chinyang<sup>9</sup>, Hamyang<sup>10</sup>, Kangseogu<sup>11</sup>, Kimhae<sup>12</sup>, Masan<sup>13</sup>, Sancheong<sup>14</sup>; JB: Iksan<sup>15</sup>, Wanju<sup>16</sup>; JJ: Cheju<sup>17</sup>, Namjeju<sup>18</sup>, Pukjeju<sup>19</sup>, Seoguipo<sup>20</sup>; JN: Hwasun<sup>2</sup>, Kogseong<sup>21</sup>, Kurye<sup>22</sup>, Kwangsan-gu<sup>3</sup>, Poseong<sup>23</sup>, Suncheon<sup>24</sup>, Seongju<sup>25</sup>, Tonggwangyang<sup>26</sup>.

**Host.** Chenopodiaceae, Compositae, Cucurbitaceae, Leguminosae, Liliaceae, Malvaceae, Solanaceae, Umbelliferae (cf. Spencer, 1973; Ahn *et al.*, 1994; Han *et al.*, 1996).

**Distribution.** Korea (Central, South), Japan, Taiwan, Philippines, Europe, Canada, U.S.A., Bahamas, Barbados, Guyana, Venezuela, .

### 8. *Liriomyza yasumatsui* Sasakawa, 1972 쓱굴파리 (신칭)

*Liriomyza yasumatsui* Sasakawa, 1972, p. 69.

*Liriomyza yasumatsui*: Choi and Woo, 1995, p. 414.

**Locality.** GB: Sobaeksan.

**Host.** *Artemisia princeps* (cf. Sasakawa, 1994).

**Distribution.** Korea (Central, South), Japan, Taiwan.

## REFERENCES

- Ahn, S.B., S.B. Lee and W.S. Cho, 1991. Leaf feeding insect pests and their damages on welsh onion and shallot fields in Chonrabukdo and Chonranamdo Districts. Res. Rept. RDA (C.P), **33**(1): 66-73 (In Korean).
- Ahn, S.B., S.H. Lee, J.Y. Choi, M.J. Han and K.M. Choi, 1993. Investigation on the insect pests of new profitable crops in Korea. Ann. Rep. Agr. Sci. Ins. RDA, **1993**: 815-838.
- Ahn, S.B., S.H. Lee, J.Y. Choi, M.J. Han and K.M. Choi, 1994. Investigation on the insect pests of new profitable crops in Korea. Ann. Rep. Agr. Sci. Ins. RDA, **1993**: 881-913.
- Becker, T., 1903. Ägyptische Dipteren. Mitt. zool. Mus. Berl., **2**: 1-195.
- Burgess, E., 1880. The clover *Oscinis* (*Oscinis trifolii*, Burgess n.sp.). Rep. U.S. Dep. Agric., **1879**: 200-201.
- Choi, H.T. and K.S. Woo, 1995. 4 unrecorded species of the family Agromyzidae from Korea. Korean J. Appl. Entomol., **34**: 414.
- Choi, K.M., M.J. Han, S.B. Ahn, S.H. Lee and D.R. Choi, 1992. Colored illustrations of ecology and control of flower insect pests. 224pp (In Korean).
- Choi, K.M., S.C. Han, M.H. Lee, W.S. Cho, S.B. Ahn and S.H. Lee, 1990. Colored illustrations of ecology and control of vegetable insect pests. 224pp (In Korean).
- Frick, K.E., 1955. Nearctic species in the *Liriomyza pusilla* complex, No.3. *L. alliouora*, new name for the Iowa onion miner. J. Kansas Ent. Soc., **28**(3): 88-92.
- Han, M.J., S.H. Lee, J.Y. Choi, S.B. Ahn and M.H. Lee, 1996. Newly introduced insect pest, American serpentine leafminer, *Liriomyza trifolii* (Burgess) (Diptera: Agromyzidae) in Korea. Korean J. Appl. Entomol., **35**(4): 309-314.
- Hendel, F., 1931. Agromyzidae, in Lindner. Flig. Pal. Reg., **59**: 1-570.
- Hering, M., 1927. Beiträge zur Kenntnis der Ökologie und Systematik blattminierender Insekten (Minenstudien VIII). Z. angew. Ent., **13**: 156-198.
- Hering, M., 1932. Minenstudien XI. Z. wiss. Insekt. Biol., **26**: 157-182.
- Hering, M., 1936. Die Blattminen Mittel- und Nordeuropas. Lief., **2, 3**: 113-336.
- Kaltenbach, J.H., 1858. Die Phytophagen aus der Klasse der Insekten (B). Verh. naturh. Ver. preuss Rheinl., **15**: 77-161.
- Kato, S., 1949. A preliminary report on a survey of agricultural insect pests in Chahar, Shiyuan and northern Shansi. Bull. nat. Hist. Peking **18**(1): 11-36.
- Kor. Soc. Plant Prot., 1986. A list of plant diseases, insect pest, and weeds in Korea. 2nd ed. 633pp (In Korean).
- Ent. Soc. Kor. and Kor. Soc. App. Ent., 1994. Check list of insects from Korea, Kon-Kuk Univ. Press, Seoul, 744pp.
- Meigen, J.W., 1830. Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, **6**: 1-401.

- Meigen, J.W., 1838. Systematische Beschreibung der bekannten europ ischen zweiflügeligen Insekten, **7**: 1-434.
- Mik, J., 1894. Ueber eine neue Agromyza, deren Larven in den Blütenknospen von *Lilium martagon* leben. Wien. ent. Ztg., **13**: 284-290.
- Rohdendorf, B.B., 1950. A new pest of water-melon - the mining fly *Liriomyza citrullii* Rohdendorf, sp. n. (Diptera, Agromyzidae). Ent. Obozr., **31**: 82-84.
- Rydén, N.S., 1956. Zur Kenntnis schwedischer Minierer XVIII. Opusc. ent. **21**: 191-200.
- Sasakawa, M., 1956. New Agromyzidae from Japan VII. Scient. Rep. Saikyo Univ. Agr., **8**: 124-131.
- Sasakawa, M., 1960. A study of the Japanese Agromyzidae (Diptera), part 2. Pac. Ins., **3**(2-3): 307-472.
- Sasakawa, M., 1972. Formosan Agromyzidae (Diptera). Scient. Rept. Kyoto pref. Univ. Agr., **24**: 43-82.
- Sasakawa, M., 1994. Notes on the Japanese Agromyzidae (Diptera), 3 *Liriomyza*-miners on *Artemisia* spp. (Asteraceae). Jpn. J. Ent., **62**(1): 55-64.
- Spencer, K.A., 1973. Agromyzidae (Diptera) of economic importance. Series Ent. **9**: 1-405.
- Spencer, K.A., 1976. The Agromyzidae (Diptera) of Fennoscandia and Denmark. Fauna Ent. Scand., **5**: 1-606.
- Spencer, K.A., 1981. A revisionary study of the leaf-mining flies (Agromyzidae) of California. Univ. Calif. Div. Agr. Sci. Spec. Pub., **3273**: 1-489.

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## 한국산 애잎굴파리 속의 분류 (파리 목: 굴파리 과)

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## 요 약

한국산 애잎굴파리 속을 분류 동정한 결과, 모두 8종으로 정리되었으며, 그 중에서 3종은 한국 미기록종으로 처음 보고된다. 국내 분포종에 대한 검색표를 작성하였으며, 기주식물 및 채집지를 정리하였다.