

Orijinal araştırma (Original article)

Contributions to the Turkish Agromyzidae (Diptera) fauna with ten new records

OktaY DURSUN^{1*} Ata ESKİN¹ Tuğçe ATAHAN¹

Summary

This study was carried out between 2007- 2009 in some province of Turkey. Specimens of leafminers were collected on cultured and non-cultured plants during 3 year. In this study 10 new records belonging to 6 genera are found for the Turkish fauna. These specimens are; *Agromyza alunulata* (Hendel, 1931), *Agromyza nigrella* (Rondani, 1875), *Ophiomyia nasuta* (Melander, 1913), *Liriomyza puella* (Meigen, 1830), *Napomyza hirticornis* Hendel, 1932, *Phytomyza dalmatiensis* (Spencer, 1961), *Phytomyza hirsuta* Spencer, 1976, *Phytomyza pullula* Zetterstedt, 1848, *Phytomyza rhabdophora* Griffiths, 1964, *Pseudonapomyza balkanensis* Spencer, 1973.

With this study the number of leafminer species were updated to 175 species that was previously 165 species. Also *A. nigrella* is economically important species. This species feed with economically important plants i.e. *Avena sativa* L. (Poaceae) (Oats), *Triticum aestivum* L. (Poaceae) (Wheat), *Secale cereale* L. (Poaceae) (Rye), *Hordeum vulgare* L. (Poaceae) (Barley).

Key words: Agromyzidae, leafminers, new records, Turkey

Anahtar sözcükler: Agromyzidae, Galerisineği, yeni kayıt, Türkiye

Introduction

Agromyzidae (leafminer flies) is one of the largest fly family, with more than 2790 valid species belonging to 27 genera worldwide (Spencer, 1989; Gu et al., 1991; Pakalniskis, 1992, 1994, 1996, 2000; Woodley & Janzen, 1995; Sasakawa, 1997, Cerny, 2001, 2004 a, b, 2007 a, b; Çıkman & Sasakawa, 2008). From this family, about 1171 species have been identified in the Palearctic region (Scheirs et al, 1999; Pakalniskis, 2000; Cerny, 2004 b; Cerny & Merz, 2006; Çıkman & Sasakawa, 2008).

¹ Muğla University, Art and Science Faculty, Biology Department, 48170 Kötekli, Muğla- Turkey

* Sorumlu yazar (Corresponding author) e-mail: oktaydursun48@yahoo.com

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Agromyzids are typically phytophagous as their larvae live in tissues of living plants. Larvae of most leaf miners feed with the leaf parenchyma. Most species are miners in leaves where they produce a characteristic form of mine, in most of the cases a substantial aid in identifying the agromyzid. Some species are stem-borers or develop in roots, seeds or galls. One genus develops exclusively in the cambium of young and old trees. Most species are monophagous, a considerable number are oligophagous, and while very few are truly polyphagous (Spencer, 1972). Common characteristic of 150 species are known as feeding regularly on cultivated plants. Normally, most of these species do not reach high population levels, but occasional outbreaks can occur. Some species are serious pests of cultivated plants such as *Liriomyza* spp. (Cerny et al., 2001; Spencer, 1973). Direct damage given by larval feeding on palisade parenchyma tissue can reduce the photosynthetic capacity of the plant up to 62 % (Johnson et al., 1983) and several infested leaves may fall (Anonymous, 2001). Indirect injury occurs when both adult males and adult females feed. Also when females lay eggs, they may act as vectors for the disease (Matteoni & Broadbent, 1988; Zitter & Tsai, 1977).

Agromyzidae is one of the most important fly families in Turkey, because of their pest status especially on vegetable and ornamental plants in the greenhouses. The Turkish agromyzid fauna is poorly known. Until now, only 165 species have been identified in Turkey (Civelek et al., 2009).

The aim of this study was to contribute to the knowledge of the leaf miner fauna of Turkey. Also, this study will provide a base for future researchers regarding the fauna of leafminer species.

Material and Methods

This study was carried out between 2007- 2009 in some provinces of Turkey. The leaf miner specimens were collected from both cultured and non-cultured plants during 3 years. A GPS (Global Positioning System) was used while the samples are collected and their GPS and altitude data were noted. Specimens were collected by using sweeping net and malaise trap. Since the male genitalia are important characters for identification of leaf miners, slide preparations were made. The following general procedures were applied: The abdomen of each male was boiled in 10% KOH, transferred into 5% glacial acetic acid for 5 minutes and subsequently transferred to 96% alcohol for 5 minutes. Then the abdomen was further dissected under a stereoscopic microscope. The male genitalia were transferred into euparal on a micro mount pinned under the individual specimen in order to preserve the material perpetually. Identifications of the species were made by using Spencer (1972, 1973, 1976, 1989, 1990), Cerny (2001, 2004 a, b, 2007 a, b) by Dr. Hasan Sungur CIVELEK and Oktay DURSUN. Representative specimens are stored in Entomology Laboratory in Biology Department, the Faculty of Science and Arts, Mugla University, Turkey.

Results

With this work, 10 agromyzid species were reported for the first time in Turkey. These species are presented alphabetically with their distribution and hosts. Their collecting style given in the paranthesis as sweeping material (SM) and Malaise trap (MT).

Agromyzinae

Agromyza alunulata (Hendel, 1931)

Material examined: Malatya, Arguvan (38° 46' 28.90" N/ 38° 16' 12.90" E), 1092m, 06.VII.2008, 4♂♂11♀♀(SM)

Hosts: *Glyceria maxima* (Hartm.) Holmb. (Poaceae) (Spencer, 1976).

Distribution: Denmark, England, Finland, Germany (Spencer, 1976).

Agromyza nigrella (Rondani, 1875)

Material examined: Kırklareli, City Centre, Şeytan Valley, (41°42.642/ 27°15.765 E), 45m, 18.V.2007, 1♂ (SM); Muğla, Fethiye (36°37'25.31"N/ 29 °07'04.48"E), 5m, 08.IV.2007, 1♂(SM); Hatay, Belen (36° 26' 01.09N/ 36°22'12.18"E), 166m, 10.V.07, 12♂♂ 2♀♀ (MT); Hatay, Samandağ (36° 05' 17.52N/ 35°58'42.93"E), 4m, 01.V.07, 2♂♂ (MT); Hatay, Yayladağ, (36° 26' 01.09N/ 36°22'12.18"E) 166m, 21.IV.2007, 8♂♂ 2♀♀(MT).

Hosts: *Avena sativa* L., *Dactylis*, *Festuca*, *Glyceria*, *Holcus* sp., *Hordeum vulgare* L., *Secale cereale* L., *Setaria* sp., *Triticum aestivum* L., *Trisetum* sp., *Lolium* sp., *Phleum* sp., *Poa* sp., (Poaceae) (Dempewolf, 2004; Spencer, 1976).

Distribution: Denmark, Finland, Korea, Norway, Sweden, (Dempewolf, 2004; Spencer, 1976).

Ophiomyia nasuta (Melander, 1913)

Material examined: Hatay, Samandağ (36° 05' 17.52"N/35°58'42.93"E), 40m, 05.VI.2008, 2♀♀ (SM); Kars, City Centre (40° 36'.33.84" N/ 43° 05'44.88"E), 1757m, 08.VII.2008, 1♂ (SM); Kastamonu, Azdavay (41° 37'54.2270N/ 33° 17'14.24"E), 886m, 25.VII.2008, 1♂1♀ (SM); Muğla, Ortaca (36°49'53.57"N/ 28°45'56.15"E), 28m, 10.V.2008, 1♂(SM). Van, Erciş (39° 01'55.08N/ 43° 21'26.63" E), 1695m, 07.VII.2008, 1♂3♀♀ (SM)

Hosts: *Taraxacum* spp. (Asteraceae) (Spencer, 1976).

Distribution: Austria, Canada, Czeck Republic, Denmark, Finland, Germany, Japan, Russia, Sweden, U.S.A. (Spencer, 1976).

Phytomyzinae

Liriomyza puella (Meigen, 1830)

Material examined: Trabzon, Maçka, Sümela (40° 41.388.599' N/ 39° 39.422' E), 1180m, 20.VIII.2007, 1♂(SM).

Hosts: *Lapsana communis* L., *Prenanthes purpurea* L. (Asteraceae) (Spencer, 1976).

Distribution: Austria, Denmark, Germany, Norway, Romania, Russia, Sweden, (Spencer, 1976).

***Napomyza hirticornis* Hendel 1932**

Material examined: Muğla, Köyceğiz, Toparlar Waterfall (36° 49.627' N/ 28°36.713'E), 105m, 26.IV.2008, 1♂(MT); Muğla, Köyceğiz, Toparlar Waterfall (36°49.627' N/ 28°36.713'E), 105m, 10.VIII.2008, 1♂(SM); Kastamonu, Çatalzeytin (41° 57'06.90"N/ 34° 12'549.90" E), 81m, 26.VII.2008, 3♂(SM); Afyonkarahisar, Karamık, 38 ° 27'N/ 30 ° 53'E), 1022m, 08.VI.2008, 1♂1♀(SM); Hatay (36°23'15.77"N/ 36°17'57.77"E), 81m, 21.V.07, 27♂♂ 12♀♀ (MT).

Hosts: *Jasione montana* L. (Asteraceae) (Spencer, 1976).

Distribution: Austria, Czeck Republic, Denmark, England, Estonia, France, Germany, Hungary, Latvia, Poland, Slovakia, Spain, Swetzerland, Ukrain (Anonymous, 2007, Spencer, 1976).

***Phytomyza dalmatiensis* (Spencer, 1961)**

Material examined: Hatay, Samandağ (36° 05' 17.52 "N/35°58'42.93" E), 40 m, 05.VI.2008, 1♂ (SM).

Hosts: *Clematis flammula* L. (Ranunculaceae) (Spencer, 1990).

Distribution: Dalmatia, France (Anonymus, 2007)

***Phytomyza hirsuta* Spencer, 1976**

Material examined: Muğla, Köyceğiz, Toparlar Waterfall (36° 49.627' N/ 2836.713'E), 105m, 26.IV.2008, 5♂♂ 4♀♀ (MT).

Hosts: Unknown (Spencer, 1976).

Distribution: Finland, Norway, Russia (Spencer, 1976).

***Phytomyza pullula* Zetterstedt, 1848**

Material examined: Trabzon, Maçka, Sümela Monastery (40° 41.388.599' N/ 39° 39.422' E), 1180m, 20. VIII.2007, 1♂ (SM).

Hosts: *Achillea* sp., *Anthemis* sp., *Crhysanthemum vulgare* (L.) Bernh, *Matricaria* sp., mostly *Matricaria inodora*, *Tanasetum vulgaris* L., (Asteraceae) (Spencer, 1976).

Distribution: Canada, Denmark, Europea, Finland, Norway, Sweden (Spencer, 1976).

***Phytomyza rhabdophora* Griffiths, 1964**

Material examined: Kars, City Centre, (40° 36'.33.84" N/43° 05'44.88"E) 1757m, 08.VII.2008, 1♂ (SM).

Hosts: *Leontodon* sp. (Asteraceae) (Spencer, 1976).

Distribution: Denmark, England, Finland, Germany, Ireland, Poland (Spencer, 1976).

***Pseudonapomyza balkanensis* Spencer, 1973**

Material examined: Artvin, City Centre, Hatila Valley (41° 10.53.76 N/ 41° 49.12.00E), 548m, 09.VII.2008, 1♂(SM); Iğdır, City Centre (39°56.822N/043°58.830E), 864m, 08.VII.2008, 1♂1♀ (SM).

Hosts: Unknown (Spencer, 1973).

Distribution: Czeck Republic, France, Germany, Hungary, Macedonia, Poland, Switzerland, Former Yugoslavia (Anonymus, 2007, Spencer, 1973;).

Conclusion

With this study, the number of leaf miner species was updated to 175 species that was previously 165 species.

Also *Agromyza nigrella* is one of the economically important species among leafminer species (Spencer, 1973; Dempewolf, 2004). This species feed with economically important plats i.e. *Agromyza sativa* (Oats), *T. aestivum* (Wheat), *S. cereale* (Rye), *H. vulgare* (Barley). A substantial mine is formed by the larva of this species, wich can lead to the blanching and wilting of the leaves. The flag leaf is frequently affected and as this is important in the translocation of food to the developing grain, damage to the flag leaves could affect the ultimate yield (Duthoit, 1968). In Northamptonshire, Leicestershire, Nottinghamshire, Rutland and the Kesteven and Lindsey divisions of Lincolnshire in Britain foliage diseases were of little importance during the years 1963–1965, but in most seasons a number of crops were attacked by the wheat leaf miner *Agromyza nigrella*. In some crops up to half the photosynthetic area of the top flag leaf was destroyed by this pest by late june/early july (Rosser & Chadburn, 1968).

Finally, making ten new records of agromyzid fly have been important in terms of showing the biodiversity of Turkey and having knowledge about this species in Turkey have been important in agricultural production.

Özet

On yeni kayıt ile Türkiye Agromyzidae faunasına katkılar

Bu çalışma 2007- 2009 yılları arasında Türkiye'de bazı illerde gerçekleştirilmiştir. Galerisineği örnekleri 3 yıl boyunca kültürü yapılan ve yapılmayan bitkiler üzerinden toplanmıştır. Çalışma sonucunda Türkiye faunasına 10 adet tür eklenmiştir. Bu türler:

Agromyza alunulata (Hendel, 1931), *Agromyza nigrella* (Rondani, 1875), *Ophiomyia nasuta* (Melander, 1913), *Liriomyza puella* (Meigen, 1830), *Napomyza hirticornis* Hendel 1932, *Phytomyza dalmatiensis* (Spencer, 1961), *Phytomyza hirsuta* Spencer, 1976, *Phytomyza pullula* Zetterstedt, 1848, *Phytomyza rhabdophora* Griffiths, 1964, *Pseudonapomyza balkanensis* Spencer, 1973'dir.

Bu çalışmayla birlikte 165 olarak bilinen galerisinekleri tür sayısı 175'e yükselmiştir. Ayrıca elde ettiğimiz türlerden *Agromyza nigrella* türünün ülkemizde de ekonomik olarak kültürü yapılan *Avena sativa* (Yulaf), *Triticum aestivum* (Buğday), *Secale cereale* (Çavdar), *Hordeum vulgare* (Arpa) gibi bitkilerde zarara neden olmasından dolayı ülkemizde de bulunması dikkate değerdir.

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References

- Anonymus, 2001. CAB International, 2001. Crop Protection Compendium, 2001 Edition. [CD-ROM]. CAB International, Wallingford.
- Anonymous, 2009. Fauna Europea, <http://www.faunaeur.org> (November, 2009).
- Cerny, M. 2001. *Phytobia bohemia* sp. n. from the Czeck Republic (Diptera: Agromyzidae). **Folia Heyrovskyana**, **9**: 53- 67.
- Cerny, M., 2004 a. *Amauromyza (Amauromyza) maltensis* sp. nov. (Diptera: Agromyzidae) with account of agromyzid mining flies from the Republic of Malta. **Folia Heyrovskyana**, **12**: 85- 104.
- Cerny, M., 2004 b. A new species of *Pseudonapomyza* from Egypt, with notes on distribution of some other Palearctic species of the genus (Diptera: Agromyzidae). **Folia Facultates Scientiarium Naturalium Universitates Masarykianae Brunensis Biology**, **109**: 95-100.
- Cerny, M., 2007 a. Description of eight new species of Agromyzidae (Diptera) from North Korea, including new records. **Studia dipterologica**, **14**: 209- 229.
- Cerny, M., 2007 b. New faunistic records of Agromyzidae (Diptera) from Andorra including descriptions of three new species. **Boletín Sociedad Entomológica Aragonesa**, **41**: 43–51.
- Cerny, M., M. Vala, & M. Bartak, 2001. Agromyzidae. Folia Fac. Sci Nat. Univ. Masaryk. **Catalog of the Diptera of the Australasian and Oceanian Regions**, **105**: 349- 364.
- Cerny, M. & B. Merz, 2006. New records of Agromyzidae (Diptera) from the Palaearctic Region. **Mitteilungen Der Schweizerischen Entomologischen Gesellschaft**, **79**: 77–106.
- Civelek, H. S., E. Çıkman & O. Dursun, 2009. Revised checklist of Turkish Agromyzidae (Diptera) fauna of Turkey with 29 new records. **Turkish Journal of Zoology**, **33**: 349- 358

- Çikman, E. & M. Sasakawa, 2008. The Turkish Agromyzidae (Diptera), with descriptions of four new species. **Entomological Science** **11**: 81- 86.
- Dempewolf, M., 2004. Arthropods of Economic Importance. <http://ip30.eti.uva.nl/bis/agromyzidae.php?menuentry=inleiding>, (May, 2004)
- Duthoit, C. M. G., 1968. Cereal Leaf Miner in the south- east Region. **Plant Pathology**, **17**: 61- 63
- Gu, X., Z. Fan & M. Sasakawa, 1991. Agromyzidae Diptera new species China. **Japanese Journal of Entomology**, **59**: 331- 342.
- Johnson, M. W., C. Welter, N. C. Toscano, I. P. Ting & J. T. Trumble, 1983. Reduction of tomato leaflet photosynthesis rates by mining activity of *Liriomyza sativae* (Diptera: Agromyridae). **Journal of Economic Entomology**, **76**: 1061- 1063.
- Matteoni, J. A. & A. B. Broadbent, 1988. Wounds caused by *Liriomyza trifolii* (Diptera: Agromyzidae) as sites for infection of Chrysanthemum by *Pseudomonas cichorii*. **Canadian Journal of Plant Pathology** **10**: 47- 52.
- Pakalniskis, S., 1992. Notes on Lithuanian Agromyzidae (Diptera) with the description of three species new to science. In New and Rare for Lithuania Insect Species. Records and descriptions of 1992. **Vilnius**, 47- 55.
- Pakalniskis, S., 1994. The Lithuanian Agromyzidae (Diptera). Descriptions of 6 new species and other notes. **Acta Entomologica Lituanica**, **12**: 5–34.
- Pakalniskis, S., 1996. The Lithuanian Agromyzidae (Diptera). Descriptions of 4 new species and other notes. In Lietuvos entomologø darbai, **Vilnius**, 17- 34.
- Pakalniskis, S., 2000. New data on the bionomics and distribution of Agromyzidae (Diptera) with the description of a new species. **Acta Zoologica Lituanica**, **10**: 1- 59.
- Rosser, W. R. & B. L. Chadburn, 1968. Cereal diseases and their effects on intensive wheat cropping in the East Midland Region, 1963-65, **Plant Pathology**, **17**, 51-60.
- Sasakawa, M. 1997. Lauxaniidae and Agromyzidae (Diptera) of the Ryukyus. **Esakia**, **(37)**: 141- 148.
- Scheirs, J., L. De Bruyn & M. Von Tschirnhaus, 1999. Agromyzidae (Diptera) of the nature reserve "Etang de Virelles": faunistics and life-history aspects. **Bulletin de la Société royale belge d'entomologie = Bulletin van de Koninklijke Belgische Vereniging voor Entomologie**, **135**: 152- 158.
- Spencer, K. A., 1972. Diptera Agromyzidae. Handbooks for the Identification of British Insects. **Royal entomological society of London**, **10**: 1- 136.
- Spencer, K. A., 1973. Agromyzidae (Diptera) of Economic Importance. Dr. W. Junk, The Hague, The Netherlands. Series Entomologica, 9: 1-405.
- Spencer, K. A., 1976. The Agromyzidae (Diptera) of Fennoscandia and Denmark. **Fauna Entomologica Scandinavica**, **5**: 1- 606.
- Spencer, K. A., 1989. 71. Family Agromyzidae. In: Catalog of the Diptera of the Australasian and Oceanian regions. (ed. N.L. Evenhuis), Bishop Museum Special Publication, Honolulu, p. 538-547.
- Spencer, K. A., 1990. Host Specialization in the world Agromyzidae (Diptera). Kluwer Academic Publishers, Dordrecht, The Netherlands. Series Entomologica, 45: 1-444.

- Woodley, N. E. & D. H. Janzen, 1995. A new species of *Melanagromyza* (Diptera: Agromyzidae) mining leaves of *Bromelia pinguin* (Bromeliaceae) in a dry forest in Costa Rica. **Journal of Natural History**, **29**: 1329-1337.
- Zitter, T. A. & J. H. Tsai, 1977. Transmission of three potyviruses by the leafminer *Liriomyza sativae* (Diptera: Agromyzidae). **Plant Disease Report**, **61**: 1025- 1029.