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First report of *Melanagromyza cuscutae* (Diptera: Agromyzidae) from Poland

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The genus *Cuscuta* L. (Convolvulaceae), commonly known as dodder, includes about 200 obligate stem-parasitic species. Several of these (about 15–20) are aggressive parasitic weeds that have significant impact on economically important crops, especially in temperate and tropical regions of the world (Costea et al. 2015). *Cuscuta lupuliformis* Krock. (Convolvulaceae) occurs from central Asia (Mongolia, China) to western Europe (reaching Germany, Netherlands) (USDA 2019). In Poland, this species is primarily found in valleys of large rivers where it most frequently parasitizes *Salix* spp. (Salicaceae) (Wayda 1999).

Field surveys conducted in Poland from Jul to Sep 2018 revealed the presence of larval *Melanagromyza cuscutae* Hering (Diptera: Agromyzidae) feeding on *C. lupuliformis*. *Melanagromyza cuscutae* is known to be monophagous on *Cuscuta* spp. Specimens (over 100, dominated by females) were collected in 10 localities in the Lesser Poland Uplands, Sandomierz County, in Sandomierz and surrounding areas along the Vistula River valley (50.6514292°N, 21.7278589°E to 50.6840489°N, 21.7874561°E, 137 to 148 masl). Three males and 6 females were deposited in the private collection of the second author. Approximately 10 ha of alluvial forests, scrubs, flood embankments, and wasteland were observed to be infested with thousands of *C. lupuliformis* shoots that parasitized various plant species, especially *Salix* spp. (Fig. 1A, B). *Melanagromyza cuscutae* larvae were observed mining in flowers and fruits of the dodder, but rarely in shoots (Fig. 1C). Numerous larvae also were observed feeding on ovaries, resulting in damage, necrosis, and reduced seed production of this parasitic plant. In these areas, 30 to 60% of the total dodder populations were infested in sample areas from those habitats previously mentioned. Several infested plants with fly pupae were taken to the laboratory and reared in an incubator at 21 to 23 °C, where adults emerged after 2 to 3 wk.

Papp & Černý (2015) provide taxonomic characters and male genital illustrations that allow for differentiation of *M. cuscutae* from other central European Agromyzidae. The principal diagnostic features of *M. cuscutae* are as follows: (a) abdomen with a metallic greenish shine; (b) frons not significantly projected above the eyes; (c) eyes bare; (d) orbital setulae reclinate; (e) presence of 2 anterior and 2 posterior fronto-orbital setae; (f) margin and fringe of squamae black; (g) halter black (Figs. 1, 2).

So far, *M. cuscutae* has been reported from several *Cuscuta* spp., such as *Cuscuta europaea* L., *C. lupuliformis*, *Cuscuta campestris* Yunck, *Cuscuta reflexa* Roxb., *Cuscuta approximata* Bab., *Cuscuta hyalina* Roth, and *Cuscuta planiflora* Ten. (all Convolvulaceae) (Tóth et al. 2004 and references therein). *Melanagromyza cuscutae* occurs in Japan, South Asia (India, Myanmar, Pakistan), Central Asia (Kazakhstan), and Europe (Czech Republic, Germany, Hungary, Slovakia, Italy, Ukraine) (Papp & Černý 2015). To the best of our knowledge, this is the first report of *M. cuscutae* from Poland and north of the Carpathians, a fact that significantly expands its range northward. Previously, the nearest records of *M. cuscutae* in this area are from Germany, Slovakia, and the Czech Republic (Papp & Černý 2015, Tóth et al. 2004).

Melanagromyza cuscutae is a fly whose larvae mine the ovaries and stems of its host, and there have been attempts to use this species as a means of biological control in other *Cuscuta* infested areas (Baloch et al. 1967). Papp & Černý (2015) note that *M. cuscutae* have no significant economic importance, but this may not be true because larval feeding causes significant reduction of seed in its invasive host. However, Chalcidoidea wasps have been reported to emerge from *M. cuscutae* pupae in previously parasitized dodder, most of which still await identification (Piwowarczyk et al. unpublished). Spencer (1973) previously noted that wasps reared from this fly include specimens of *Opius* Wesmael, *Dacnusa* Haliday, *Bracon* Fabricius (all Braconidae), Eucilidae, and *Eupelmus* Dalman (Eupelmidae). *Bruchophagus* Ashmead (Eurytomidae) also was listed by Spencer (1973) and earlier by Baloch et al. (1967), but this is a genus of phytophagous species (Burks 1957) and should be excluded as potential parasitoid of *Melanagromyza*. Moreover, Bouček (1961) stated that *Sphegigaster cuscutae* Ferrière (Pteromalidae) is a primary parasitoid of *M. cuscutae*. The high degree of parasitoidism is known to be one of the important factors limiting *M. cuscutae* as a biocontrol agent (Spencer 1973).

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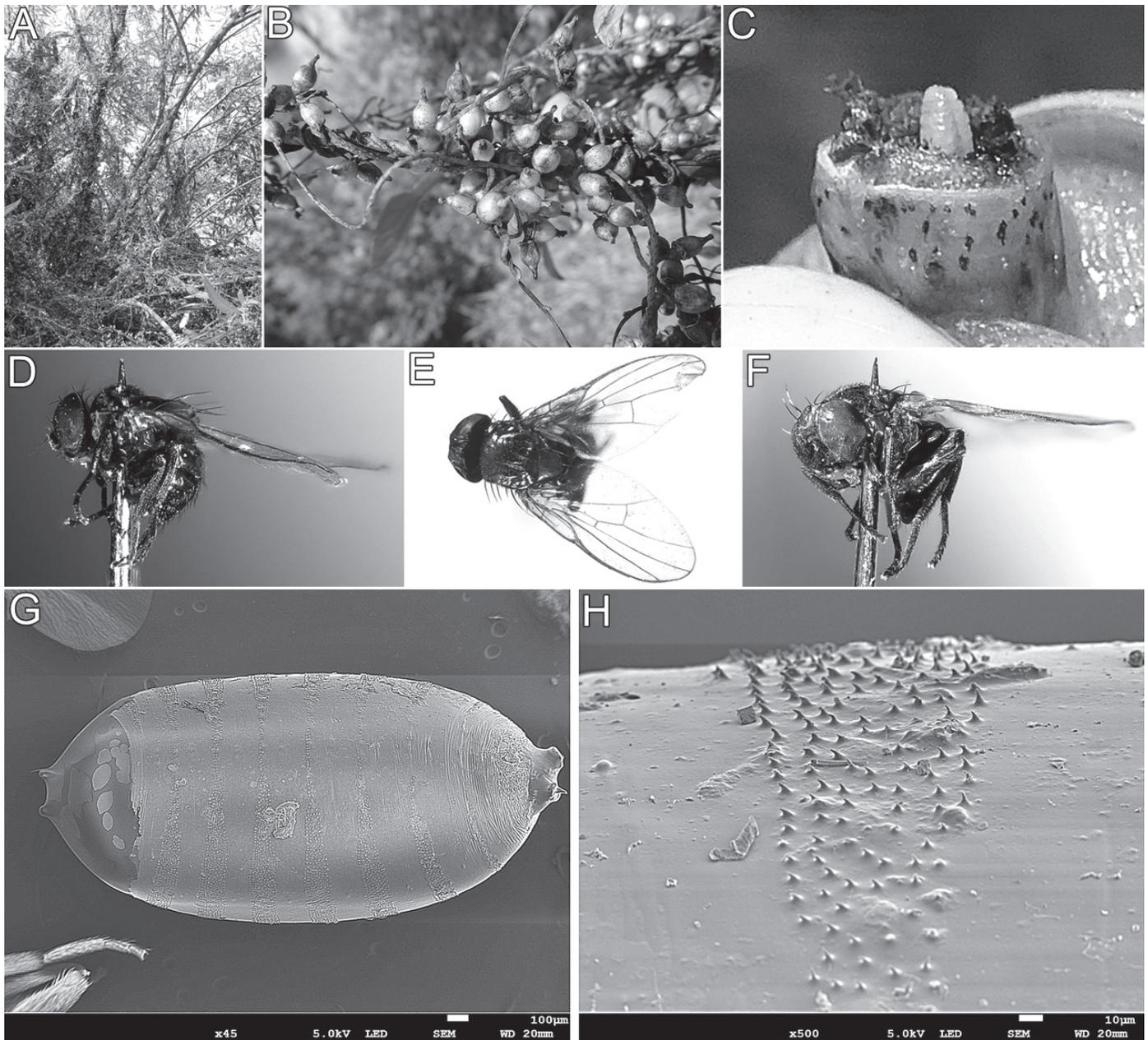


Fig. 1. *Melanagromyza cuscutae* Hering parasitizing *Cuscuta lupuliformis* Krock; *C. lupuliformis* extensively infecting host, *Salix* sp. (A), fruits of *C. lupuliformis* (B); *Melanagromyza cuscutae*: larva in fruit of *C. lupuliformis* (C), lateral view (D), dorsal view (E), anterolateral view (F), pupae in SEM (G, H).

Summary

Field surveys of the parasitic plant *Cuscuta lupuliformis* (Convolvulaceae) conducted in Poland in 2018 revealed extensive infestations by larvae of the monophagous fly *Melanagromyza cuscutae* (Diptera: Agromyzidae). Thirty to 60% of dodder populations were infested in sample areas from alluvial forests, scrubs, flood embankments, and wasteland habitats. This is the first report of *M. cuscutae* from Poland and north of the Carpathians, significantly expanding its range northwards. This fly has potential as a biological control agent of dodders, because of larval feeding resulting in damage, necrosis, and reduced seed production of this parasitic plant.

Key Words: hop dodder; biocontrol agents; parasitic plant

Sumario

Los estudios de campo de la planta parásita cuscuta, *Cuscuta lupuliformis* (Convolvulaceae), realizada en Polonia en el 2018 revelaron infestaciones extensas por larvas de la mosca monófaga *Melanagromyza cuscutae* (Diptera: Agromyzidae). Treinta a 60% de las poblaciones de cuscuta estaban infestadas en las áreas de muestreo de bosques aluviales, matorrales, terraplenes de inundación y hábitats de tierras baldías. Este es el primer informe de la presencia de *M. cuscutae* en Polonia y el norte de los Cárpatos, ampliando significativamente su área de distribución hacia el norte. Esta mosca tiene potencial como agente de control biológico de cuscutas, debido a que la alimentación de las larvas resulta en daños, necrosis y reducción de la producción de semillas de esta planta parásita.

Palabras Clave: cuscuta; agentes de biocontrol; planta parásita

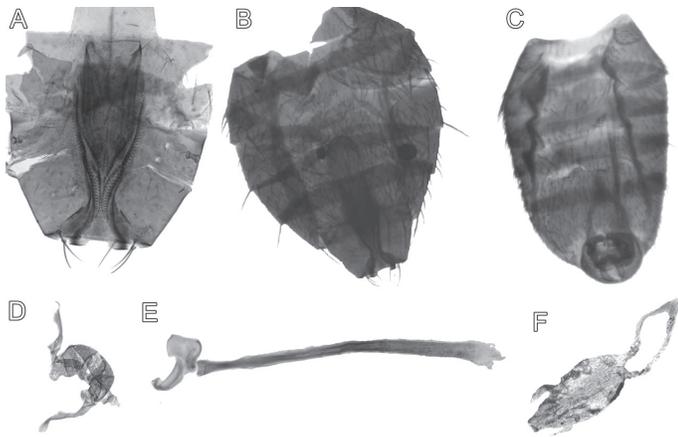


Fig. 2. *Melanagromyza cuscatae* details: female ovipositor sheath (A); female sternites, ventral (B); male sternites, ventral (C); male genitalia (D); male phallopodeme genitalia (E); male phallus, ventral genitalia (F).

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