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First report of *Phytomyza orobanchia* (Diptera: Agromyzidae) from Poland and *Chymomyza amoena* (Diptera: Drosophilidae) on *Phelipanche ramosa* (Orobanchaceae)

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Several broomrape (*Orobanche* L. and *Phelipanche* Pomel. [Orobanchaceae]) species are aggressive root-parasitic weeds that have significant impact on important crops, especially in North and East Africa, Southern and Eastern Europe, and the Middle East. At present, over 73 million ha of crops are infested with broomrapes, and losses are estimated at hundreds of millions of dollars annually (Abang et al. 2007). *Phelipanche ramosa* (L.) Pomel is one of the most economically important broomrape weeds, and attacks various crops in the family Solanaceae, especially tomato and tobacco, and also in the families Brassicaceae, Cannabaceae, Fabaceae, Apiaceae and Asteraceae. *Phelipanche ramosa* occurs natively in Eurasia and North Africa, but also has been introduced into Australia and North America. *Phelipanche ramosa* is attacked by the monophagous fly *Phytomyza orobanchia* Kalténbach (Diptera: Agromyzidae). The larvae of *P. orobanchia* feed only on broomrape; the larvae mine the stem, and can reduce seed production by 30 to 90%. For this reason, this fly is 1 of the most effective biological control agents of broomrape. However, its effectiveness may be limited by agricultural practices and parasitoids (Klein & Kroschel 2002).

Field surveys conducted in Poland in Sep and Oct 2017 revealed parasitization of *P. ramosa* by the larvae of *Phytomyza orobanchia*, and a single female of the invasive and alien species of the drosophilid *Chymomyza amoena* (Loew) (Diptera: Drosophilidae). Specimens were collected in 1 locality in the Lesser Poland Uplands, Sandomierz County, near Szewce (50.6166°N, 21.6166°E, 145 masl). *Phelipanche ramosa* in this locality occurred in an approximately 2 ha area of tomato crops, containing about 2,000 shoots. The infestation of broomrape by *Phytomyza orobanchia* was observed in the form of mining in flowers (ovary with seeds), shoots, and tubers (Fig. 1). Numerous larvae were observed feeding on broomrape tissues and seeds, resulting in reduced seed production, and weakened or dead shoots. A single broomrape plant could be parasitized by 1 to 10 larvae, and 70 to 80% of the total broomrape population was infested. Pupae were incubated at a temperature above 20 °C, and after a few d to 2 wk, flies emerged.

The principal morphological features of *Phytomyza orobanchia* were as follows: (a) third segment of antennae rounded-rectangular, elongate, 1.5 times greater than width; (b) frons and parafacial setae raised in profile; (c) orbital setae of equal length; (d) body length 2.6 mm; (e) acrostichals setae in 2 rows; (f) mesonotum entirely gray; (g)

female with a non-retractable ovipositor, visible as a conspicuous conical structure; (h) aedeagus of male genitalia (Fig. 2) (Rodendorf 1970; Spencer 1973).

So far, *P. orobanchia* has been reported from over 20 *Orobanche* spp. (Klein & Kroschel 2002), and is widespread mainly in Southern Europe, Western Asia, and Northeastern Africa. Agromyzidae are a relatively well-studied family of Diptera in Poland, with about 440 species recorded (Michalska 2007). To the best of our knowledge, this is the first report of *P. orobanchia* from Poland, thereby significantly expanding its range northwards. The closest records of *P. orobanchia* are from Hungary (Papp & Černý 2015), Germany, and Ukraine (Spencer 1973). *Chymomyza amoena* is a North American species that was first recorded in Europe in 1975 and spread in central Europe and Russia (Máca & Bächli 1994), and was first recorded in Poland in 1984 (Nowakowski 1991). This is the first report of *Chymomyza amoena* on *Phelipanche ramosa*. Further observations on the potential use of *P. orobanchia* as a natural enemy of *Orobanche* spp. are necessary, although seed reduction, weakness, and necrosis of broomrape have been observed.

Summary

Field surveys conducted in Poland in Sep and Oct 2017 revealed infestations of the parasitic plant *Phelipanche ramosa* (L.) Pomel (Orobanchaceae), also known as branched broomrape, by larvae of the monophagous fly *Phytomyza orobanchia* Kalt. (Diptera: Agromyzidae). A single broomrape plant could be infested by 1 to 10 larvae of *P. orobanchia*, and 70 to 80% of the broomrape population was infested. This fly is one of the most effective biological control agents of broomrape. Also, a single female of an alien species of drosophilid, *Chymomyza amoena* (Loew) (Diptera: Drosophilidae), was observed in 1 locality in Sandomierz County, near Szewce, Poland.

Key Words: broomrape fly; branched broomrape; holoparasitic plant

Sumario

Los sondeos de campo realizados en Polonia en septiembre y octubre del 2017 revelaron infestaciones de la planta parásita *Phelipanche*

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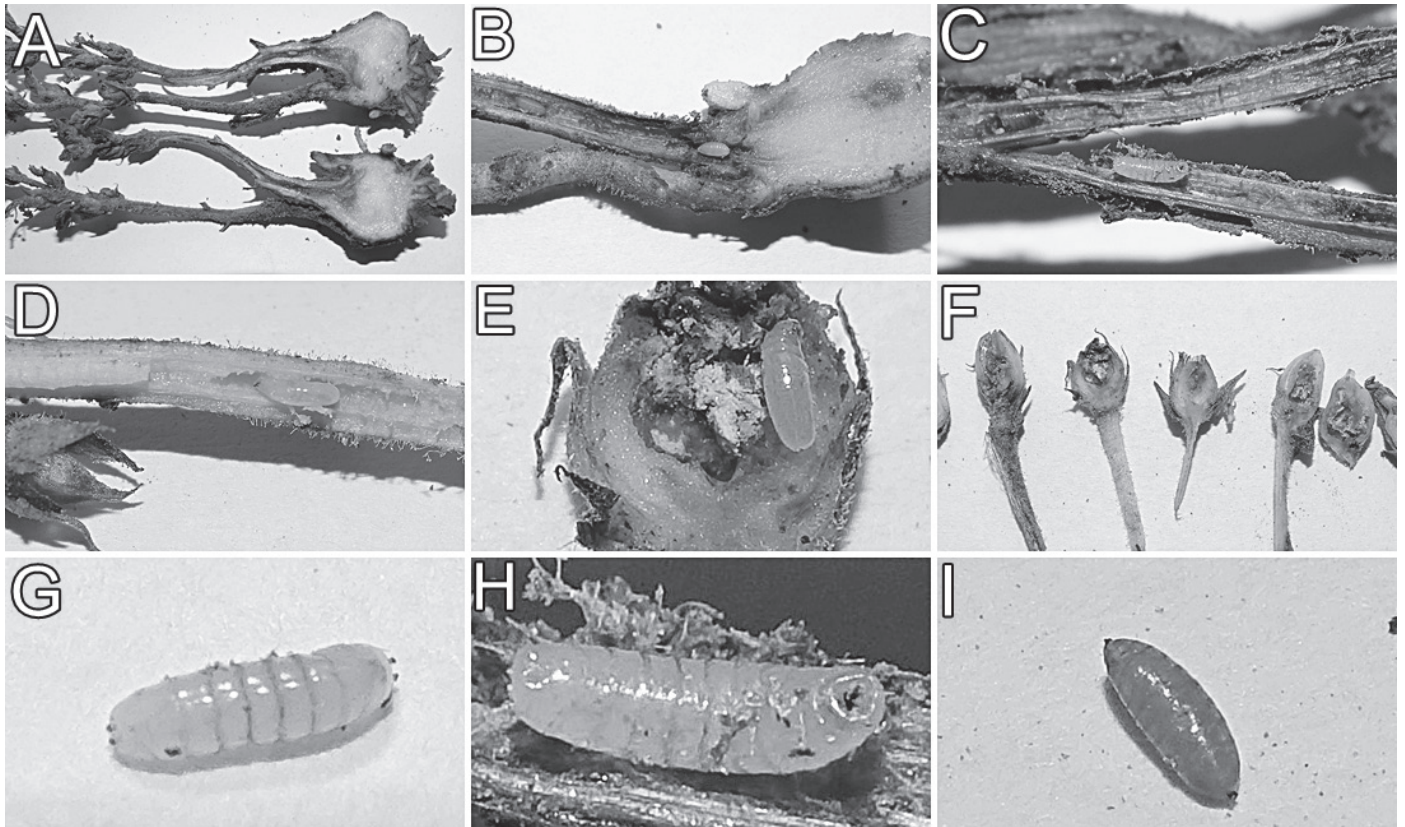


Fig. 1. *Phytomyza orobanchia* larvae parasitize *Phelipanche ramosa* tuber (A, B), shoots (C, D), ovary with seeds (E, F), and general habit of fly larvae and pupae (G, H, I).

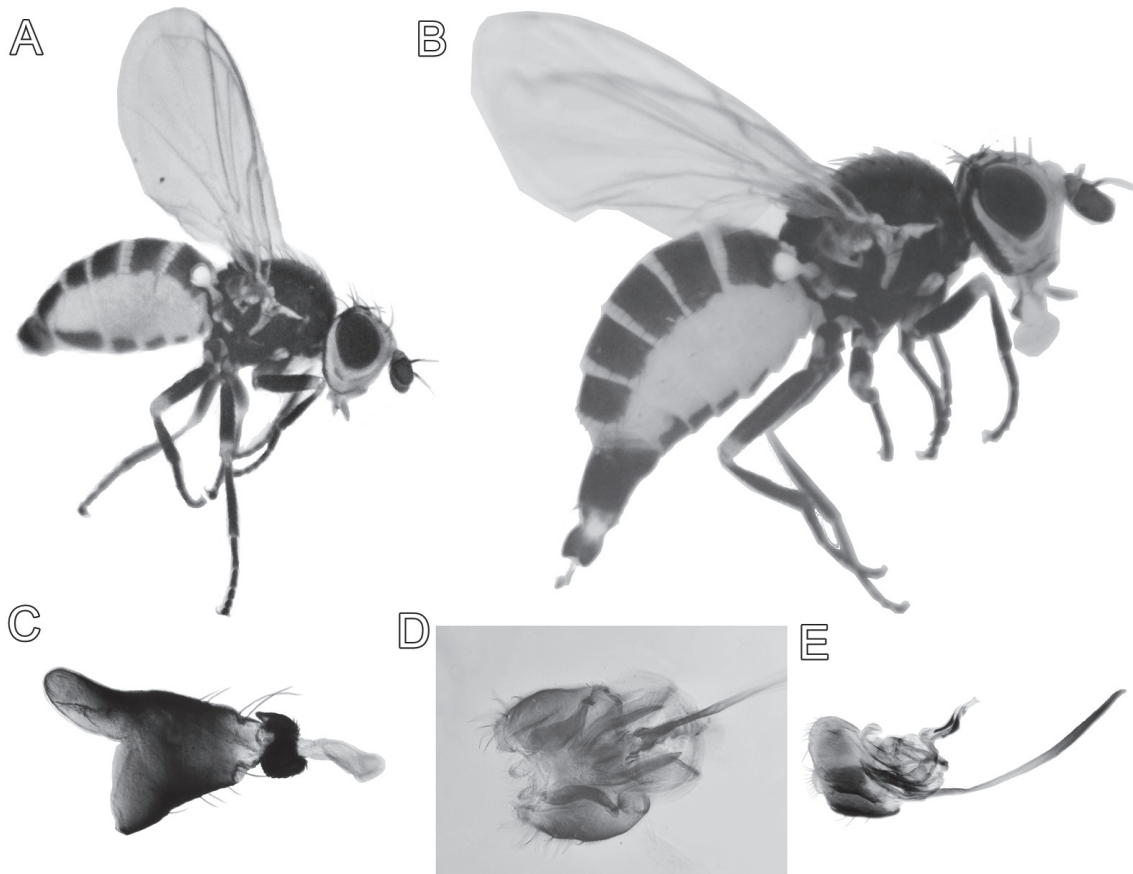


Fig. 2. *Phytomyza orobanchia*: lateral view of adults male (A) and female (B), female ovipositor sheath (C), male genitalia ventrally (D), and laterally (E).

ramosa (L.) Pomel (Orobanchaceae), también conocida como la flor azul, por las larvas de la mosca monofácea *Phytomyza orobanchia* Kalt. (Diptera: Agromyzidae). Una sola planta de la flor azul podría estar infestada por 1 a 10 larvas de *P. orobanchia* y el 70 a 80% de la población de la flor azul estaba infestada. Esta mosca es uno de los agentes de control biológico más efectivos de la flor azul. Además, se observó una sola hembra de una especie exótica de drosophilid, *Chymomyza amoena* (Loew) (Diptera: Drosophilidae) en una localidad del condado de Sandomierz, cerca de Szewce, Polonia.

Palabras Clave: mosca de la flor azul; flor azul; planta holoparasitaria

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