

Phytomyza arnicae Hering, 1925 (Diptera, Agromyzidae) in Norway – an agromyzid fly exclusively associated with *Arnica montana* L.

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Hansen, L.O. & Bjureke, K. 2012. *Phytomyza arnicae* Hering, 1925 (Diptera, Agromyzidae) in Norway – an agromyzid fly exclusively associated with *Arnica montana* L. *Norwegian Journal of Entomology* 59, 63–66.

The agromyzid fly *Phytomyza arnicae* Hering, 1925 is reported from Norway for the first time. This species is exclusively associated with *Arnica montana* L., where the larvae are leaf-miners. Mining larvae were collected in June–July 2011 and imagos hatched in April 2012 after hibernation. Successful hatchings were conducted from Kongsberg municipality in Buskerud (BØ) and Tokke municipality in Telemark (TEI). Further notes on distribution and biology are given. The host plant is declining almost all over its distribution area including Norway, and this may cause problems for insect species associated with the plant.

Key words: Agromyzidae, *Phytomyza arnicae*, *Arnica montana*, Asteraceae, Norway.

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Introduction

Arnica montana L. is a long-lived perennial plant species, whose distribution is restricted to Europe (Hultén & Fries 1986). The species is found in extensively managed, acidic and nutrient-poor meadows. *A. montana* is becoming rarer, largely due to increasingly intensive agriculture. Its habitat has been maintained in traditional farming systems, but these are changing due to over-grazing, intensification, abandonment, use of nitrogen fertilizers and reforestation. The plant species has been declining the last five decades. It has, thus, got the status «vulnerable» (VU) on the National Red List (Kålås et al. 2010). The decline of *A. montana* also affects insect species exclusively associated with the plant. Well known examples are the tephritid fly *Tephritis arnicae* (Linnaeus, 1758) and the microlepidoptera

Digitivalva arnicella (Heyden, 1863) (White 1988, Bjureke & Greve 1996, Nieuwerkerken & Koster 1999). An increased focus on these changes has come up recently, and thus, rescue programs have been initiated many places in Europe, including Norway. This study is a part of the Norwegian action plan program.

This paper deals with the first records of the agromyzid fly *Phytomyza arnicae* Hering, 1925 from Norway, another species exclusively associated with *A. montana* (Spencer 1976).

The records

Leaves of *Arnica montana* with mining larvae were picked and placed in plastic bags. These were stored outside during the winter, but moved to a heated room for hatching in March

2012. Successful hatchings were performed from the following localities: **BØ** Kongsberg: Haugsplasseter [S] (N 59.53110 E 9.56452, 515 m a.s.l.) 25 June 2011, 3♂♂ (hatched primo April 2012), leg. Lars Ove Hansen; **TEI** Tokke: Døli (N59.42392 E7.98132, 570 m a.s.l.) 30 June 2011, 1♂ (hatched primo April 2012), leg. Lars Ove Hansen / Kristina Bjureke. All material collected in this study is kept in the collections at the Natural History Museum, University of Oslo.

Biology and distribution

Phytomyza arnicae is exclusively associated with *A. montana* in Norway (Spencer 1976), but it is also reported on *Arnica angustifolia* ssp. *alpina* (Ellis 2011; see discussion below). The larvae develop in mines on the leaves (Spencer 1976),

usually one larva in each. They form a short linear mine which ends up in a large blotch that may occupy almost the whole leaf. The fully grown larvae drop out of the mine and pupates in the ground. The puparium is black with posterior spiracles each with an ellipse of 20 bulbs (Spencer 1976). It seems like the species is univoltine in Norway, because no agromyzid were hatched from the sampled material the same season. Mines, imagines and the habitat in Norway are illustrated in Figures 1–3.

Spencer (1976) reports *P. arnicae* from Sweden and the German Alps, but not from Finland, nor Denmark. In Sweden the distribution stretches from Skåne (Sk) north to Uppland (Up), which roughly follows the distribution of the host plant (Mossberg & Stenberg 2007). There is also a record from Torne Lappmark (T.Lpm.), the northernmost province of Sweden. Martinez



FIGURE 1. Meadow at Haugsplasseter, Kongsberg in Eastern Buskerud (BØ), where *Arnica montana* L. is growing abundantly. Photo: Lars Ove Hansen.

(2011) adds Polen, Czech republic, Switzerland and Austria.

Discussion

The hatching was poor compared to the amount of leaves that was sampled. Many of the mines were certainly empty, and this is a problem when hatching species were the larvae drop out of the mines.

When a species like *A. montana* declines, all monophagous insect species associated with the plant, must be assumed to decline too. In redlist assessments they should then be given a status similar or more acute than that of the host plant. *Digitivalva arnicella* (Heyden) has thus been given the category «endangered» (EN) in the National Red List (Kålås et al. 2010). Families like Agromyzidae and Tephritidae are not treated yet, but we may assume that these families will be treated in the next red-list. A rescue program may then also cover not only the host plant, but also the associates too.

The record from Torne Lappmark (T.Lpm.)



FIGURE 2. The larva of *Phytomyza arnicae* Hering, 1925 forms a linear mine which ends up in a large blotch. Scanning: Lars Ove Hansen.



FIGURE 3. *Phytomyza arnicae* imago ♂, Haugsplasseter, Kongsberg. Photo: Karsten Sund.

given by Spencer (1976) may be dubious because the host plant is not distributed so far north (Mossberg & Stenberg 2007). The record may refer to the closely related *Phytomyza arnicicola* Lindquist 1949, which is associated with *A. angustifolia* (ssp. *alpina*), a northern relative (Spencer 1976). The distribution of the two plant species is not sympatric in N Europe, and the distance between the populations is about 700 km. However, another explanation may be that *P. arnicae* may accept *A. angustifolia* as well, and this sounds likely. A record of *P. arnicae* from UK also lack a probable hostplant (Martinez 2011, Ellis 2011), because neither *A. montana* nor *A. angustifolia* occur in UK.

Vernacular name. «Solblomminérflue» may be a good suggestion for *P. arnicae*.

Acknowledgements. This project was founded economically by The Norwegian Directorate for Nature Management. Thanks to Kirsten Myhr at Haugsplasseter, Kongsberg, who kindly introduced us for this nice locality, and finally thanks to Karsten Sund, Natural History Museum, Oslo, for the photos of the imagines of *Phytomyza arnicae*.

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Received: 20 April 2012

Accepted: 25 May 2012