
INSECTS

CYSTIPHORA SONCHI AND *C. TARAXACI* (DIPTERA: CECIDOMYIIDAE) - SISTER SPECIES WITH SIMILAR MORPHOLOGY BUT DIFFERENT POPULATION DYNAMICS

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Introduction

The purpose of this paper is to report on the population development of the midge *Cystiphora sonchi* as compared to that of the *Cystiphora taraxaci*. As far as I know these insects do not have an official common name, and I will call them “sow-thistle midge” and “dandelion midge” respectively.

The sow-thistle midge oviposits only on sow-thistle (*Sonchus*) species.¹ Females oviposit into leaves via the stomatal openings of the lower epidermis.²

(Figure 1). The larvae produce slightly raised, round, yellowish-green or reddish to red blister galls, about five millimeters in diameter. (Figures 2, 3) From the underside, they appear light grey in the early stage of development, and contain one or two whitish larvae which may be seen through a thin layer of cells that lack chlorophyll (Figure 4). Female sow-thistle midges produce single-sexed broods.³

Originally imported from Europe by Agriculture Canada, the sow-thistle midge was released as a biological control agent to help



Figure 1. Sow-thistle midge laying an egg through stomatal opening on the underside of leaf of perennial sow-thistle. -R. DeClerck-Floate



Figure 2. Yellowish-green blister galls on top surface of a leaf of the perennial sow-thistle produced by the larvae of the sow-thistle midge (see inside front cover for close-up colour image)
-D. Peschken



Figure 3. Reddish blister galls on top of a leaf of the perennial sow-thistle produced by the larvae of the sow-thistle midge. (see inside front cover for close-up colour image)
D. Peschken

control weedy sow-thistle species in British Columbia, Alberta,

Saskatchewan, Manitoba, Quebec and Nova Scotia starting in 1981.^{4,5} The insect spread rapidly and is now very widely distributed in the three prairie provinces. It is also established in Nova Scotia, maybe in New Brunswick but not in British Columbia and Quebec. It has spread into Minnesota (personal observation).

In 1987, at Outlook, Saskatchewan, leaves could be found that were completely covered with galls. Up to 700 were counted on one leaf but with many galls coalescing that an accurate count could not be made (Peschken unpublished). This level of infestation could not be found in subsequent years. For example,

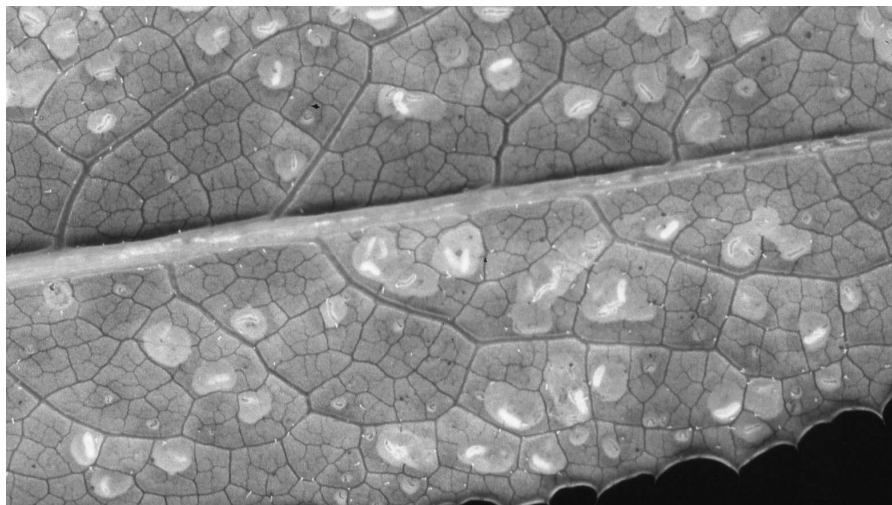


Figure 4. Blister galls of the sow-thistle midge as seen on the underside of a leaf of the perennial sow-thistle. - D. Peschken

in 1991, the maximum count on one leaf was 265 and the average was much less. A similar midge population collapse occurred in Alberta.⁵ Perennial sow-thistle was not controlled anywhere in Canada.

The larvae of the sow-thistle midge have been commonly parasitized by the parasitic wasps *Aprostocetus* sp. near *atticus* and to a lesser extent by 3 other parasitic wasps, *Neochrysocharis formosa* (Westwood), *Chrysotomyia* sp. (Hymenoptera: Eulophidae) and *Zatropis* sp. near *justica* (Hymenoptera: Pteromalidae) in Alberta and Saskatchewan.⁵ *A.* sp. near *atticus* and *Chrysotomyia* sp. also parasitize the larvae of

the dandelion midge.⁶

In July 1980, Murray Maw (formerly at the Regina Research Station, Agriculture Canada) collected blister galls from dandelion (*Taraxacum officinale*) at Holbein, Saskatchewan. Adults that emerged from these galls were identified as *Cystiphora* sp., possibly *canadensis*. In 1989, I discovered numerous blister galls on dandelion near Nipawin, Saskatchewan (Figure 5), very similar to those on perennial sow-thistle. Females reared from these galls could not be differentiated from those of the sow-thistle midge.^{4,7} By means of the male genitalia, the midge was identified as the dandelion midge, which had not been reported in Canada.⁶ It is assumed to have



Figure 5. Reddish-green blister galls on a dandelion leaf produced by the dandelion midge. D. Peschken

been accidentally introduced into Canada from abroad.

The dandelion midge occurs widely in Europe and was found in Kashmir.⁶ It oviposits only on species of the genus *Taraxacum*.^{6, 7, 8} The sow-thistle and dandelion midges both produce several generations per year.

In 1989 and 1992, the distribution of the dandelion midge was surveyed by searching for galls on dandelions at intervals of 20-30 km along roadways in north-central Saskatchewan.⁶ The survey was limited to the area from Carrot River in the E to Prince Albert in the W, and S

to Humboldt and Tisdale. Galls were found on 17 out of 31 sites. The insect may have occurred over a larger area to the N, E and W, although no galls were found S of Tisdale. To determine any population change, I conducted further surveys in 2007 and 2012.

Method

On 11 and 12 Aug 2007, six sites along Highway six between the Qu'Appelle River and Melfort, two sites up to 50 km south of Tisdale, and 12 sites in an area defined by Melfort, Choiceland, White Fox, Nipawin and Tisdale were surveyed, roughly in the same survey area as in 1989 and 1992. On 20-22 July 2012, 32 sites in the area defined by

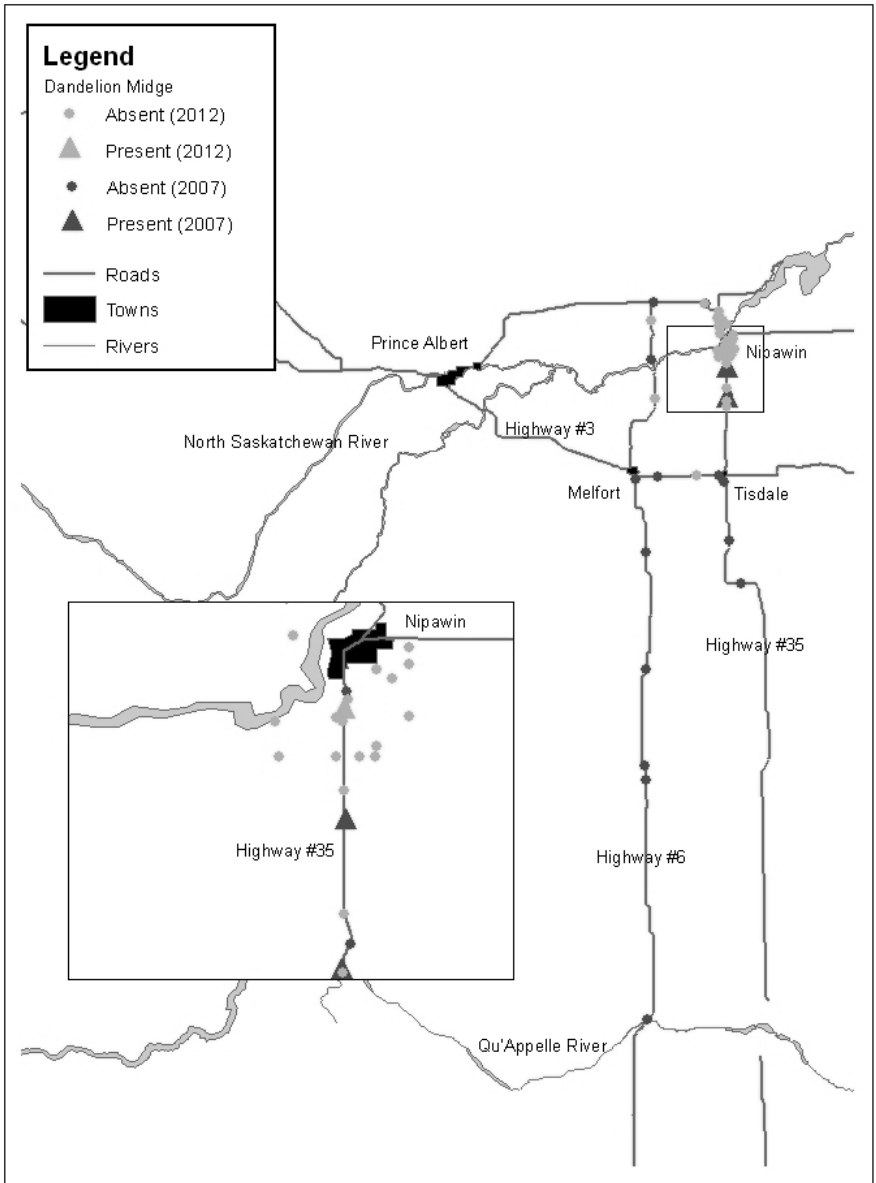


Figure 6. Sites surveyed in 2007 and 2012, indicating the presence or absence of the dandelion midge.

Melfort, Choiceland, White Fox, Nipawin and Tisdale were again surveyed. The sites were located along highways or gravel roads.

I surveyed each site for five - ten minutes for consistency. The presence of perennial sow-thistle and galls was also noted and

served as an indication that use of insecticides did not cause the absence of galls of the dandelion midge.

Results and Discussion

In 2007, galls of the dandelion midge were found on only one dandelion plant on each of two sites, with 16 and 38 galls, 21 and 24 km south Nipawin respectively (Figure 6). Galls of the sow-thistle midge were found on all sites. In 2012, galls of the dandelion midge were found on only one site, on two dandelion plants, with 15 and eight galls respectively, 3.9 km south of Nipawin. Perennial sow-thistle occurred on 30 of the 32 sites, and galls of the sow-thistle midge, often quite numerous, on 26 sites. Thus, the low incidence of the dandelion midge is not due to insecticides.

The two midges are sister species. They are morphologically almost identical. Both midges occur over wide regions in Europe and Asia and their host plants are frequent weeds in the Canadian prairie provinces. But the two midge species differ in their population dynamics. According to previous surveys, the sow-thistle midge spread rapidly in the three western provinces since its release. But the dandelion midge seems to

have decreased, at least in the area that was surveyed. Thus, this might be an example that the population of an accidentally introduced biological organism remained at a low density or even declined.

One reason for the different population dynamics might be the difference in plant architectures of the two host plants species. Dandelion leaves form a relatively low and dense basal rosette, while perennial sow-thistle has an open growth form and becomes 30 - 150 cm high. It is possible that the low-growing dandelion is the preferred micro-habitat for the parasitic wasps that prey on both midges, and that the dandelion midge is therefore more vulnerable to parasitic attack.

Acknowledgments

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Blister galls on perennial sow-thistle.
- D. Peschken

