

Urophora stylata F.

INVASIVE SPECIES ATTACKED: Bull thistle (*Cirsium vulgare*)
Canada thistle (*C. arvense*)

TYPE OF AGENT: Seedhead gall producing fly

COLLECTABILITY: Mass

ORIGIN: Switzerland and Germany

DESCRIPTION AND LIFE CYCLE

Adult:

Adults have dark bodies with vaguely-striped, brown thoraxes and yellow dots on their back. Males measure 4 - 5 mm long while females are up to 8 mm long, including their long, black ovipositor. Their clear wings extend beyond their abdomen and are marked with three dark bands (appearing similar to 'I' and 'V'). The flies emerge in early summer, usually by June. The males claim territories by scent marking areas which does not attract females, but rather discourages other males from intruding. Females remain withdrawn and in hiding until the plants set buds suitable for oviposition. Suitable floral buds are 6 - 13+ mm, (90% of eggs are laid in buds 8 - 11 mm) and are those growing on branching terminals. Males seek females on suitable floral buds to mate. Females position themselves horizontally on the thistle spines and deposit the eggs singly or in multiples between bud bracts. The females then leave the bud and move to another where the mating and oviposition procedure is repeated. Other females may use the same bud, however, exact bud size limits this practice and, therefore, avoids potential excessive use of floral buds. Adults live for about two months.

Egg:

The white, 0.7 x 0.2 mm eggs incubate for 5 - 8 days.

Larva:

Typical barrel-shaped larvae are plump, creamy-white, with dark, flat posteriors. When mature, they will be 3 - 5 mm long. The first instars develop within the eggs. The newly hatched second instars consume the egg shells then feed their way toward the developing, enlarging seeds. In mid-summer (late July to early August), the larvae locate themselves below the seeds. Larvae presence promote the plants to develop chambers (one per larva) lined with cells that become food sources for the larvae. The chambers grow into hard woody shells. When multiple larvae are in the same flower head, the chambers fuse to become a large woody gall, with a single larva in each chamber. The third instars fit tightly, face down in their chambers and using their hard anal plate to block the exit, they overwinter. In late April to early May the larvae turn to face the exit and prepare to pupate. Three to 20 larvae may be present in each head.

Pupa:

The pupation period occurs between late April to early May and continues through into June. A brown cocoon develops around each larva and pupation completes in June.

Overwintering stage:

Overwintering stage: Larvae overwinter in their third instar in woody galls inside flower heads.



Fig. 1. *U. stylata* adult (credit Powell et al. 1994)



Fig. 2. *U. stylata* larva (credit Powell et al. 1994)



Fig. 3. *U. stylata* larvae



Fig. 4. *U. stylata* pupae and woody gall with feeding "chambers"

EFFECTIVENESS ON HOST PLANT

Larvae presence in flower heads cause decreased seed production. The gall formation strains plant nutrients, causing fewer flower heads and reduces plant vigour. Seeds directly above the gall become enlarged and non-viable and most seeds beyond the gall also fail to develop. Studies indicate 60 - 90% of seedheads are attacked, where 90% of the seed is reduced.

HABITAT AND DISTRIBUTION

Native:

Its native distribution is from Atlantic Europe to western Siberia and Kazakhstan and south to the Mediterranean, Afghanistan and west Pakistan. It is most common in the west and central parts of Northern Europe where bull thistle is most abundant.

North America:

Urophora stylata is relatively common and is found in a variety of bull thistle habitats. It requires large, dense stands to ensure its survival. As vegetation replaces bull thistle, the fly density decreases. Grazing or mowing will limit its success. In Canada, *U. stylata* has successfully established in B.C., N.S., and Que., but not in Ont.

British Columbia:

U. stylata have been released and found established and / or dispersed in the Coastal Douglas-fir, Coastal western hemlock, Interior cedar hemlock, Interior Douglas-fir, Montane spruce, Ponderosa pine and Sub-boreal spruce biogeoclimatic zones. They have also been released, but not monitored in the Bunchgrass, Boreal white and black spruce and Engelmann spruce-subalpine fir zones.



Fig. 5. *U. stylata* oviposition evidence and larvae presence evidence on flower (center) versus the surrounding buds with no attack



Fig. 6. Bull thistle bud with *U. stylata* attack (left) versus one with no attack (right)

BRITISH COLUMBIA RECORD

Origin:

The *U. stylata* populations released in B.C. originate from the Swiss Jura and upper Rhine Valley, Germany.

History:

In 1973, the first *U. stylata* releases were made on Vancouver Island and into the Fraser Valley. The flies easily established and field collections began shortly after. Mass redistribution of the flies continued until 1996 when the demand for bull thistle control appeared to subside. In 2001, there was a renewed interest to redistribute the agent. The last recorded assisted redistribution effort occurred in 2006.

Field results:

U. stylata have been found at all the initial treated sites and at substantial distances from known release locations. When sites were monitored in 2002 and 2003 many sites had no plants or few plants remaining. Rarely have bull thistle infestations been found without *U. stylata* attack. In one B.C. study, the average seed reduction was about 60%. The larvae of both *U. stylata* and *Rhinocyllus conicus* have been found occupying the same bull thistle seedhead. In 1994, experts from Agriculture and Agri-Food Canada (Lethbridge) confirmed *U. stylata* was present on *C. arvensis* at a site in B.C. In 2011, *U. stylata* was again found and recorded to be attacking *C. arvensis*. In Europe there is a strain of *U. stylata* that does attack both *C. vulgare* and *C. arvensis*.

Collection for redistribution:

Galled heads can be collected from the field from late August to November. Attacked heads are easily detected by their misshapen indentations and when squeezed they are hard, whereas vacant seedheads are soft. Redistribute collections on the ground at new locations in the fall, winter or early the following spring. Clipped seedheads can also be held overwinter at 4°C, keeping refrigerated galls moist while not allowing them to become mouldy. The following spring, the galls can be scattered at the new site, allowing adults to exit and disperse on their own. Overwintered galls must be scattered early enough to allow for the tissue of the woody gall to break down to allow the adults to emerge. New colonies can develop from 20 - 50 galled seed heads.

NOTES

- Competing *Rhinocyllus conicus* also attacks bull thistle. The beneficial contribution the two make together outweighs competition effects.

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