Lobesia euphorbiana (Freyer)

INVASIVE SPECIES ATTACKED: Leafy spurge (*Euphorbia esula* L.)
Cypress spurge (*E. cyparissias* L.)

TYPE OF AGENT: Leaf tying moth

COLLECTABILITY: Not available for general distribution

ORIGIN: Italy

DESCRIPTION AND LIFE CYCLE

Adult:

Lobesia euphorbiana adults are mottled yellow, brown and reddish coloured. Wingspan is 10-14 mm. First generation adults begin to appear in the field by mid-June. Mating and egg-laying begins immediately, occurring mainly at dusk and dawn. There are two generations per year, and possibly three in southern Ontario. Females lay an average of 55 eggs each, which are placed individually onto lower leaf surfaces. Adults live 3-7 days.

Fig1. *L. euphorbiana* adult (credit Powell et al. 1994)

Egg:

Eggs are translucent yellow and measure 0.77 x 0.62 mm. Eggs are highly fertile and very few fail to hatch.

Larva:

Young larvae are pale green, and when mature, are almost black. There are normally four instars, head capsule measurements are used to determine each. Up to five instars can occur when food sources are low. Newly hatched larvae move towards terminal leaf tips and tightly tie leaves with silky webbing. Terminal ties yield larger larvae/pupae than leaf ties on the lower stems. Larvae also develop slower on lower lateral shoots than on the terminals. Several larvae can begin in one tie, however only one completes development. The others are either killed or forced out where they will develop slower with five instars. However, larvae and pupae can exist together in a single tie. When the ties are opened the larvae agitate easily and lose vigour. They are not cannibalistic unless they become short of food. Larvae prepare for pupation by moving to the leaf tip where they spin a thick web.

Fig. 2. *L. euphorbiana* larva in leaf tie webbing (credit Powell et al. 1994)

Pupa:

Pupal development occurs in the ties. Early pupae are pale green, changing to brown just before emerging. At 21-24^{0}C and 16 hours of daylight, pupation is completed in 26 days; therefore, the first generation development from egg to adult is completed in 36 days.

Overwintering stage:

The second generation pupae overwinter within folded leaves in soil litter.

Fig. 3. Variations of *L. euphorbiana* ties

EFFECTIVENESS ON HOST PLANT

Larvae enclose themselves inside tied terminal leaves where they consume the bud and prevent flowering. Repeated heavy attack eventually kills the plant. Vacated ties attract thrips and aphids, creating preferred locations for secondary attack.

HABITAT AND DISTRIBUTION

Native:

The native range of *L. euphorbiana* is from south and central Europe to the Ukraine.

North America:
L. euphorbiana prefers sites which are warm to hot during the summer. Complete development requires high temperatures. It inhabits fringe forested areas, tolerating shade. They require active growing plants with high nutrient quality usually found growing in mesic conditions. They do not do well on weak stands growing in poor soils. It commonly establishes near water.

British Columbia:
L. euphorbiana has been released into and found established in the Bunchgrass, Interior Douglas-fir and Ponderosa pine biogeoclimatic zones. The moths appear to be dispersing well in the southern interior within the Bunchgrass zone.

Fig. 4. Suitable *L. euphorbiana* habitat at Campbell Creek in Kamloops (Bunchgrass zone)

BRITISH COLUMBIA RECORD

Origin:
L. euphorbiana released in B.C. originate from populations collected from the host plants *Euphorbia lucida* and *E. seguierana* in Italy.

History:
In 1990, the first field release was made near Kamloops (Campbell Creek) with 170 larvae contained in leaf ties. This site established and collections commenced from it in 1993. This same site is still used for collection and is the population source for all the subsequent releases redistributed in B.C. Collections have been taken from this site and released near Alexis Creek, Spallumcheen, Cache Creek, Invermere and Barnhartvale (Kamloops), north east of Clinton, and the Princeton areas. To date, establishment and dispersal from has only been confirmed at the 1990 Campbell Creek (Kamloops) and 1994 Spallumcheen and Barnhartvale sites. The low rate of successful establishment at some sites may be attributed to the small quantity of larvae released or the possibility that collections and subsequent releases were made with empty ties.

Propagation results:
No propagation plots were established. However, in 1987, an attempt was made to propagate *L. euphorbiana* in greenhouses at Surrey as part of a propagation experiment, but it was not successful.

Field results:
Larvae ties have been located in the field from late May to early August and persist after the adults vacate. The quantity of ties found on a single plant at the established sites appear to fluctuate with the plants' density and vigour, with more robust plants supporting more ties on the main and lateral stems.

Fig. 5. Decline of leafy spurge at established *L. euphorbiana* and *Aphthona spp*. at Campbell Creek site in Kamloops (Bunchgrass zone)

The 1990 Kamloops site continues to be the only collection source for the province. The Spallumcheen and Barnhartvale sites produced a few generations for several years after the releases were made, but the quantity of ties slowly declined until no more were found for several years. The decline of ties found at these two sites may be attributed, among other factors, to the plant density, fluctuating environmental changes, or site disturbance. No sites in the Invermere area have shown establishment. Landscape dispersal monitoring has been carried out in the Kamloops area and the moth has been found present over three km from the 1990 release on the most eastern patch of spurge in this area. *L. euphorbiana* leaf ties have also recently been found dispersed in the Spallumcheen area. The most recent releases made near Clinton (2015), Invermere (supplemental 2016), and Princeton (2017) were made while testing a new release technique. The sites near Clinton and Princeton were inspected later in the season and had same year establishment, however, it is not known if the sites have maintained long term establishment and if the new release method increased the success of establishment. Future efforts will focus on additional collections for redistribution in B.C. and dispersal monitoring in the areas that have shown establishment.

NOTES

- Sometimes gall terminals made by *Spurgia esulae* will be used by *L. euphorbiana*.
- *L. euphorbiana* ties have been found sharing host plants with *Aphthona species.*

REFERENCES

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