

Spurgia esulae Gagne

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

TYPE OF AGENT: Bud gall forming midge

COLLECTABILITY: Not established

ORIGIN: Italy

DESCRIPTION AND LIFE CYCLE

Adult:

Spurgia esula adult midges are delicate and measure 1.9 mm long. The female abdomen tapers into an ovipositor, while the male's abdomen ends with a clasping appendage. Adults emerge in April. Mating and egg-laying begins immediately, occurring during calm, cool periods near early dawn and dusk. Each female lays about 140 eggs. The adults seek refuge from heat in shady areas. Adults are short-lived, surviving only 1-2 days. Depending on climate, they can produce 3-5 generations/year.

Egg:

Eggs are red, 0.35 mm long, and tapered. They hatch in 4-5 days.



Fig. 2. *S. esulae* eggs (credit USDA ARS, Sidney MT, www.mtwow.org). See notes.

Larva:

Larvae are white and when mature are 2.5 mm x 0.6 mm. Multiple larvae emerge and feed entirely within the growing bud, resulting in a gall in 8-15 days. The gall remains green on the exterior while 2-3 leaves with expanded bases wrap around the swelling bud. In 12-13 days the mature larvae prepares a white cocoon. The cocoon is constructed inside the galls when the plant is actively growing. However, during dry weather after the onset of drought, the larvae will drop to the soil and prepare the cocoon in the soil. Larvae may be attacked by *Zaptopis nigroaenus*, a native parasite which can reduce larvae by 50%.



Fig. 1. *S. esulae* adults (credit USDA ARS Sidney MT, www.mtwow.org). See notes.

Pupa:

The puparium is light red coloured. Pupation occurs inside a 2-3 mm long cocoon either inside the gall or in the soil. New adults emerge in 3-5 days.

Overwintering stage:

Mature larvae overwinter in the soil.

EFFECTIVENESS ON HOST PLANT

Leafy spurge

First generation larvae feeding in terminal galls initiate the formation of lateral growing branches which are then used by future generations. Galls enclose over buds, reducing floral and seed development.

Cypress spurge

In moist sites it can eliminate cypress spurge where most shoots and lateral branching growth is galled. Repeated heavy attack can kill plants as they try to compensate for the gall development by sending nutrients to the area.



Fig. 3. *S. esulae* larva (credit USDA ARS, Sidney MT, www.mtwow.org). See notes.

HABITAT AND DISTRIBUTION

Native:

It is known to exist in Italy where it establishes on leafy spurge.

North America:

S. esulae prefers dense stands of spurge growing on south slopes. It prefers cooler climates, away from rivers and bodies of water. Decreased survival near water suggests a possibility of heavy predation by birds which feed on the galls. Successful populations establish best in non-windy or wooded locations. In windy areas establishment occurs downwind from shelter belts.

British Columbia:

S. esulae has been released into the Bunchgrass and the Interior Douglas-fir biogeoclimatic zones. No establishment has been confirmed at any of the sites.

BRITISH COLUMBIA RECORD

Origin:

The *S. esulae* populations released in B.C. originate from San Rossore, Italy.

History:

The first *S. esulae* release consisting of 35 galls infested with about 175 larvae and pupae, was made in B.C. in 1990 near Kamloops. In 1993, three more releases of potentially 400 larvae and pupae each were made in the southern interior, two near Rock Creek and the third northwest of Clinton. No establishment is confirmed at any of the sites and no additional releases have been made. At the time of release, all the spurge infestations were large.

Field results:

Despite repeated visits to the sites, positive establishment has not been determined. In 2003, a few vacated silken cocoons were found at the Kamloops site. The cocoons were located in a small round shaped, short tie on terminal leaves, but the results remain inconclusive. Each of the three 1993 releases have been sprayed intermittently with herbicide over several years and two of them have few to no plants remaining at the release locations. It is possible that *S. esulae* may have established and dispersed to nearby scattered leafy spurge patches before the herbicide was applied. There is also the chance that a low population may have established, but has remained undetected at any of the release sites. Monitoring is ongoing at this time.



Fig. 4. *S. esulae* gall on leafy spurge (credit USDA ARS, Sidney MT, www.mtwow.org). See notes.

NOTES

- Same year reproduction and recovery was found at an Alberta site. The following June fewer galls were found than the previous summer. There has been no further evidence of survival at this location which is now largely consumed by *Aphthona nigricutis*.
- *S. esulae* may be more effective on cypress spurge than leafy spurge.
- Integrated control with some herbicides indicates that the number of galls is reduced but the number of larvae remains constant.
- Figures 1 through 4 have been cited according to the contributor's specified requirements as of 2015-03-04.

REFERENCES

1. Harris, P. 2003. Classical biological control of weeds established biocontrol agent *Spurgia capitigena* (Bremi) and *S. esulae* Gagne. Bud-gall midges. Agriculture and Agri-Food Canada. Updated April 11, 2003. http://res2.agr.ca/lethbridge/weedbio/agents/aspucap_e.htm (Accessed may 20, 2003).
2. Helling, C. and M. Shaw. 2008. *Spurgia esulae* leafy spurge tip gall midge (Diptera: Cecidomiidae). Montana War on Weeds. Updated March 14, 2008. <http://mtwow.org/Spurgia-esula.htm> (Accessed April 10, 2015)
3. Lym, R. and R. Carlson. 1994. Effect of herbicide treatment on leafy spurge gall midge (*Spurgia esulae*) population. Weed Technology, 8: 285-288.
4. McClay, A.S., D E. Cole, P. Harris, C.J. Richardson. 1995. Biological control of leafy spurge in Alberta: progress and prospects. AB Environmental Centre, Vegreville, AB.

5. Powell, G.W., A. Sturko, B. Wikeem and P. Harris. 1994. Field guide to the biological control of weeds in British Columbia. Min. For. Res. Program.
6. Rees, N.E., N.R. Spencer, L.K. Knutson, L. Fornasari, P.C. Quimby, Jr., R.W. Pemberton and R.M. Nowierski. 1996. *Spurgia esulae*. Sect. II, The Spurges, Leafy spurge. In: Biological control of weeds in the west. N.E. Rees, P.C. Quimby Jr., G.L.Piper, E.M. Coombs, C.E. Turner, N.R. Spencer, and L.V. Knutson, (editors). Western Soc. Weed Sci.