

Rhopalomyia tripleurospermi Skuhrava

INVASIVE SPECIES ATTACKED: Scentless chamomile (*Tripleurospermum perforatum* (Mérat) M. Lainz)

TYPE OF AGENT: Gall forming midge

COLLECTABILITY: Not available for general distribution

ORIGIN: Austria

DESCRIPTION AND LIFE CYCLE

Adult:

Males and females of *Rhopalomyia tripleurospermi*, for the most part, are distinctly different. Males are 2.5-2.6 mm long with 2.3-2.7 mm long wings. Heads and thorax are dark brown, abdomens are grey, and legs are long and slender. Females contain fully developed eggs and their size increases with the quantity of eggs they are carrying. Females are larger than the males, with bright red abdomens measuring 2.6-2.9 mm long. The females' wings are 2.3-2.4 mm and their legs are shorter and thicker. Males and females have the same eye structure, where both eyes are fused together to form a single structure. Adults emerge from the top of galls in the previous year's buds during the spring when temperatures remain above 7.7°C for 125 days. Females deposit eggs into leaf axils or flower buds. On flowering plants the eggs are pushed between florets or beneath bracts. Females deposit an average of 93 eggs, of which 90% are laid when temperatures are 20-25°C. The eggs are deposited individually or in clusters of two to seven. Adults have a short life span, the females live 75 hours at 11°C or 12 hours at 25°C, giving them a life span up to four times longer than the males. In central Alberta there are three generations/year, but two are expected in colder climates. In Switzerland there are four generations. The duration from egg to adult can be achieved in as little as 30 days.

Egg:

Eggs are bright red and measure 0.3 x 0.08 mm. The temperature needs to be maintained above 8°C for eggs to develop. At 25-27°C, hatching occurs in three days, but at 11°C, it takes 13-20 days. An average of 65% of the eggs hatch.



Fig. 3. *R. tripleurospermi* galling at the base of flower

Larva:

Larvae are bright red at first, but change to white when they are mature. There are three larval instars. New larvae enter the bud and feed on the contents. The larvae develop within galls that are produced in the buds. The galls that occur on terminal buds are larger than those in auxiliary buds. All galls are susceptible to parasite attack, but if the larvae can reach the centre of the larger galls, they have a greater chance of survival.

Pupa:

Pupation occurs the following spring. Male pupae are grey and female pupae are dark purple. Both have strong antennae horns.

Overwintering stage:

Partly developed larvae overwinter in galls in rosettes.



Fig. 1. *R. tripleurospermi* adults



Fig. 2. *R. tripleurospermi* galling near base of plant

EFFECTIVENESS ON HOST PLANT

Galls suppress the plant by interrupting normal growth which reduces the plants' vigour and flowering ability. Up to 80 chambers may exist in the galls, with *R. tripleurospermi* present in each. By removing some of the plants' aggressive growth behaviour, it becomes less competitive in the plant community. Attacked winter rosettes develop an increased number of floral stems, but have decreased plant height and number of seeds per floral head. In European studies one third of all shoots had 1-6 galls. In high *R. tripleurospermi* densities, seedlings and rosettes are killed. It is probable that frost, flooding or drought will add to the success of killing target plants.



Fig. 5. *R. tripleurospermi* galling on a small bolting plant



Fig. 4. *R. tripleurospermi* galling on a rosette

HABITAT AND DISTRIBUTION

Native:

R. tripleurospermi is not a common insect in its native geographic range. It was first found in Slovakia in 1972 and has since been located in eastern Austria, northern Hungary and southern Moravia. Unconfirmed sightings have been documented in south Russia.

North America:

Specific *R. tripleurospermi* habitat requirements are unknown at this time. Fertile soils with high moisture are presumed to be optimal. Field depressions and slough edges within a stable stand of the target plant is ideal. It has established in cold climates in all the Canadian Prairie Provinces and in B.C. No treatments have been made east of Man.

British Columbia:

The earliest releases of *R. tripleurospermi* in the Boreal white and black spruce biogeoclimatic zone have established and are dispersing well in the Peace River area near Fort St. John. The releases made in the Interior cedar hemlock and Montane spruce zones at Sparwood and Creston have shown same year establishment. Long term establishment has not been confirmed at two of the three sites. Releases made in the Sub-boreal spruce and Interior Douglas-fir zones have not shown establishment at this time.

BRITISH COLUMBIA RECORD

Origin:

The *R. tripleurospermi* populations released in B.C. originate from eastern Austria.

History:

The first three *R. tripleurospermi* releases in B.C. were made in 1999 into the northeast portion of the province near Fort St. John and establishment was confirmed the following year. Between 2002 and 2007, eight more releases were obtained from Alberta reared stock and were once again transplanted into northeast agricultural lands near Fort St. John. In 2008, more Alberta reared stock was transplanted into southeast B.C. at three sites, two near Sparwood and one near Creston. The population arriving at Creston was accidentally misplaced by the shipping office and was held up in a warm environment for several days prior to release. In addition, this release was also transplanted along the edge of a hayfield that was later mowed that same year. The survival of the midge at this site is questionable. In 2008, the first field collection in northern B.C. was made and released near Dawson Creek. In 2009, two large field collections were taken from the Peace River area and released into the central interior near Prince George and in the Chilcotin near Alexis Creek. These two releases coincided with an extremely dry summer following several years of similar drought. The most recent attempt to establish a population of *R. tripleurospermi* occurred in 2014 when a shipment of galled plants was again acquired from Alberta and transplanted into an open range



Fig. 6. *R. tripleurospermi* dispersal site near Fort St. John (Boreal white and black spruce zone)

habitat north of Heffley Creek. In 2016, additional agent transfers were made from Alberta stock near Kamloops (Lac Le Jeune) and Prince George.

Field results:

Early monitoring carried out in northeast B.C. saw the midges established and dispersed over 8 km from release locations. Many of the northern (Peace River) sites were revisited in 2008 and long term establishment and dispersal into new locations in the nearby vicinities were confirmed. During this time it was noted that some of the northern B.C. release sites now had few or no plants remaining at the original release point. The decline in plants may partly be due to the combined effectiveness of other biocontrol agents including *Omphalopion hookeri* and/or *Microplontus edentulous*, integrated pest management, and good land management practices. The releases made into the southern half of the province appear slow to develop. The Prince George site was grazed and sprayed with herbicide and within a couple years following release, no plants remained on the site. As of 2018, the status of the 2009 releases (Prince George and Alexis Creek) is still unknown; although there is speculation the drought conditions of the release year may not be suitable for this agent. The Sparwood and Creston sites had same year establishment, but the following year no galls were found. In 2013, one site near Sparwood was monitored and six galls were observed, indicating ongoing establishment in this area. Subsequent monitoring results of this same site showed *R. tripleurospermi* had moved away from the release point where no plants remained, to more than 40 m away (downwind) where the first patches of plants were now occurring. The Lac Le Jeune release was monitored the following year and was found established. Future efforts will focus on monitoring the releases made since 2009 in southern B.C. and developing a local collection site that will provide populations for future releases.



Fig. 7. *R. tripleurospermi* release near Sparwood (Montane spruce zone)

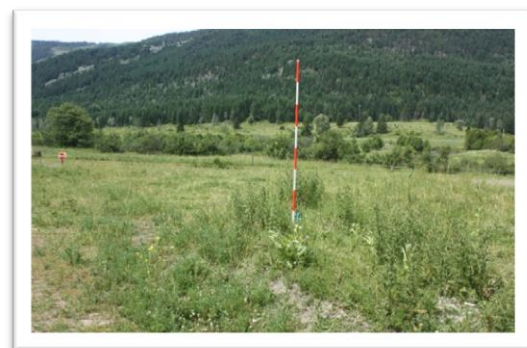


Fig. 8. *R. tripleurospermi* release near Whitcroft (Kamloops) (Interior Douglas-fir zone)

NOTES

- The literature reports that dispersal of the midge averages 5.2 km/year, and three years later galling was widespread and often heavy over a minimum of 400 km².
- Wind may assist with dispersal of these small agents.

REFERENCES

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