

Rhinusa tetra (Fabricius 1792)

INVASIVE SPECIES ATTACKED: Mullein (*Verbascum thapsus* L.)

PREVIOUSLY KNOWN AS: *Cleopomiarus tetrum*, *Gymnaetron tetrum*, *Gymnetron tetrum* and *Rhinusa tetrum*

TYPE OF AGENT: Seed feeding weevil

COLLECTABILITY: Not permitted

ORIGIN: Europe and Asia⁵

DESCRIPTION AND LIFE CYCLE

Adult:

Rhinusa tetra adult weevils are broad, round shaped and flattened above² and measure 4.0 mm to 4.8 mm long⁵. Their body is shiny black which is almost completely obscured with a dense layer of yellow-grayish hairs that gives them a brassy metallic appearance^{2, 5}. Their long, straight rostrum is sharply tapered, with its lower half covered in dense hairs. Their femurs are toothed, with the teeth more predominant in the males². The adults emerge from their overwintering locations from mid-May through to early June and their populations usually peak about three weeks after the emergence of the first adults. The adult weevils remain in leaf axils or in central buds until the plants begin to bolt. When the spring temperatures increase and the plants start to bolt, the adults congregate around the buds and flowers and will begin to mate on the inflorescence, near or within the individual flowers. The females lay one to three eggs into a single seed capsule⁵. Adult presence coincides with early developing flowers, however, they can persist throughout the entire flowering period⁶. *R. tetra* produces one generation per year and completes from egg to adult during one season⁵.



Fig 1. *R. tetra* adult on mullein leaf surface

Egg:

R. tetra eggs are 0.2 to 0.3 mm long and are either translucent or creamy white coloured and incubate for seven to 11 days. The egg shape can be variable depending on where they are laid within the seed capsule. Only about 40% of the eggs laid in the field are viable⁵.

Larva:

The larvae are creamy-white coloured, "C" shaped and complete development inside the two chambered seed capsules. The larvae feed on the seeds while they advance through three instars and by the final instar almost all the seeds will be consumed and replaced with frass. The larvae are cannibalistic, therefore, each seed capsule will only produce two adults; one per chamber⁵.

Pupa:

Pupae are 3.5 mm to 5.0 mm long. The pupation cycle occurs within the seed capsule and is complete in 11 to 16 days. Once mature, the new adults emerge by chewing holes through the seed capsule⁵.

Overwintering stage:

The *R. tetra* adults produced as a result of the spring/summer ovipositing period emerge as adults in late summer and prepare to overwinter in cavities within seed capsules⁵.



Fig. 2. *R. tetra* adults on terminal of bolting mullein

EFFECTIVENESS ON HOST PLANT

R. tetra appears to prefer common mullein over moth mullein⁵. Both the adults and larvae feed on the seeds and are capable of reducing seed production by 50%⁷. Adults also feed on mullein leaves but show a preference for seed capsules when they are available⁵. An overseas study identified *R. tetra* to be one of the most effective agents controlling mullein in Europe⁷. In a U.S. study, the weevils destroyed 64% of the lower third of an inflorescence, 68% of the middle third, and 25% of the top third. Seed damage is presumed to increase as the weevil population also increases⁵. The study also showed attack by herbivores, including *R. tetra*, can reduce the plant's height, inflorescence length, and seed

capsule density, which subsequently reduces seed production. It was also observed that insect herbivores preferred larger plants⁸. In Lincoln County Washington, *R. tetra* is considered to be a very successful tool in mullein control⁴.

HABITAT AND DISTRIBUTION

Native:

R. tetra is native to Europe and western Asia and also occurs in western and eastern Siberia^{5,3}. Doganlar and Uremis (2014) record *R. tetra* present in Europe, Siberia, North Africa, Middle East, central Asia and northern India.

North America:

Records indicate *R. tetra* arrived in North America prior to 1876⁶. By 1889, the agent was found to be present in the U.S.A. from Pa. to W. Va., eastern Ohio, N.Y., southern Mich. and also in Canada³. By 2009, the weevil was considered widespread in the eastern half of the U.S.A. Records indicate *R. tetra* was already in Wash. before 1932⁵. In the western half of the U.S.A., *R. tetra* is present in Calif., Idaho, Oreg., Mont., S. Dak., and Wyo. The agent's presence in some of the western states appears to be the result of assisted redistribution⁶.

British Columbia:

Since 2011, work with *R. tetra* in B.C. has been limited. Currently the weevils have been found dispersed within the following biogeoclimatic zones: Bunchgrass, Interior cedar hemlock, Interior Douglas-fir and the Ponderosa pine zones. The weevil has been found in both open hot and dry locations and along forested roads with filtered shade.



Fig. 3. *R. tetra* dispersal area north of Kamloops near Heffley Creek (Ponderosa pine zone)



Fig. 4. *R. tetra* dispersal area near Whitecroft (Interior Douglas-fir zone)

BRITISH COLUMBIA RECORD

Origin:

The origin of the adventive agent population is unknown.

History:

It was not until 2011 that Ministry staff observed *R. tetra* adults near Merritt, B.C. The National Identification Services positively identified the weevil to be *R. tetra* and confirmed it had been present in Canada for many years.

Field results:

The adventive agent is not actively pursued for biocontrol purposes in B.C., however, incidental observations of its presence is recorded for future reference.

NOTES

- Mullein appears to not persist or cause significant problems, therefore, screening for and subsequent releases of agents for biological control has been discouraged until such time loses due to mullein are demonstrated⁷.
- Early records (1889) show *R. tetra* occurs only on mullein (*V. thapsus*)³.
- *R. tetra* is reputed to be host specific and is the only seed feeder that attacks both common and moth mulleins⁴.

REFERENCES

1. Doganlar, M. and I. Uremis. 2014. *Verbascum gallardotii* Boiss. and its natural enemy complex in Hatay Province, Turkey. Mun. Ent. Zool. 9(2): 783-791.
2. Foster Creek Conservation District, Douglas Country, Washington. Undated. Biological controls. Waterville, Washington. http://www.fostercreek.net/biological_controls.htm (Accessed Mar. 5, 3014).
3. Hamilton, J.M.D. 1889. Transactions of the American Entomological Society and proceedings of the entomological section of the Academy of Natural Sciences. In: Philadelphia: Hall of the Academy, Logan Square. Vol. XVI, p. 157.
4. Lincoln County Noxious Weed Control Board. Undated a. Common mullein: Options for control. <http://www.co.lincon.wa.us/WeedBoard/biocontrol/COMMON%20MULLEIN%BROCHURE.pdf> (Accessed Oct. 29, 2014).

5. _____. Undated b. Biocontrols for common mullein.
<http://www.co.lincoln.wa.us/WeedBoard/biocontrol/biocontrolcommonmullein.pdf> (Accessed Oct. 29, 2014).
6. Littlefield, J. and A. deMeij. 2009. A survey of biological weed control agents adventive to the US. Final Report. Montana Development of Agriculture Cooperative Pest Survey Report.
7. Maw, M.G. 1984. Part II, Chap. 44, *Verbascum thapsus* L., common mullein (Scrophulariaceae). In: Biological Cont. Prog. against Insects and Weeds in Canada 1969–1980. J.S. Kelleher and M. A. Hulme, (editors). Commonwealth Agricultural Bureaux.
8. Wilbur, H.D., C. Alba, A.P. Norton, and R.A. Hufbauer. 2013. The effect of insect herbivory on the growth and fitness of introduced *Verbascum thapsus* L. *NeoBiota*, 19: 21–44.