

# *Galerucella pusilla* (Duft.).

**INVASIVE SPECIES ATTACKED:** Purple loosestrife (*Lythrum salicaria* L.)

**TYPE OF AGENT:** Foliar feeding beetle

**COLLECTABILITY:** Mass

**ORIGIN:** Germany

## DESCRIPTION AND LIFE CYCLE

### Adult:

The adults are 3 - 5 mm long, light golden-brown and lack the dark coloured wing margins found on *Galerucella californiensis*. Overwintered adults appear one week later than *G. californiensis*, usually in late May to early June when the plants are 20 cm tall. Adults first feed on young shoots and new budding leaves before feeding on mature leaves. Oviposition starts within one week of adult emergence, beginning in June, peaking around mid-month then slowing after the summer solstice and continuing into July. Repeated mating is necessary for viable eggs. The females usually lay the eggs in masses of three on lower parts of plant stems and cover them with a strip of black faecal material. Egg-laying is heaviest when temperatures are over 25°C. *G. pusilla* is strongly affected by low temperatures during oviposition. Over their life, the females will lay between 300 and 400 eggs. *G. pusilla* disperses less than *G. californiensis* and therefore creates a local dense population before moving to new locations.

The second generation beetles are more prone to dispersal than those that overwinter and emerge in the spring. Adults emerging in July will mate and oviposit within a week and lay eggs for one month. Those that appear later may breed, but will not oviposit before they hibernate. For two months, parent and F1 generation adults are both present, with their oviposition periods overlapping for one month. Adults that emerge in the spring and lay to produce the first generation will die by the end of summer. The duration from egg to adult is 24 days at 25°C. Following pupation, the new adults will remain on the soil or lower stems for two days until their bodies become hardened and then appear on the upper plant parts.

### Egg:

Creamy-white, 1 mm diameter, spherical eggs incubate for 12 days.

### Larva:

The larvae are pale yellow. There are three instars, all are similar and have no obvious distinguishing changes. Upon hatching, new larvae move to the leaf buds and flowers to concentrate their feeding on young foliage before moving onto older leaves. After 14 days the mature larvae will be 3 - 5 mm long and pupation is initiated.

### Pupa:

The pupae are light brown, 3 - 5 mm long, and will complete pupation in seven days in the top 3 cm of soil. However at sites which flood, pupation takes place in the plant stems above the water level.

### Overwintering stage:

Adults overwinter in the soil near the surface. Hibernation is controlled by temperature.

## EFFECTIVENESS ON HOST PLANT

Larvae and adult feeding on buds will stunt plants and reduce seed production. In heavy populations, plants will be destroyed. The spring emerging adults attack early growth, impacting the plants' ability to photosynthesize and restore nutrients. Reduced flowering and seed production is common after several years of attack. Delayed flowering by one month also reduces the number of flowers the plant can produce and later blooming limits pollination. Repeated heavy defoliation and attack will reduce the plants vigour the following growing season. Sites with high larvae densities will cause defoliation by the end of July.

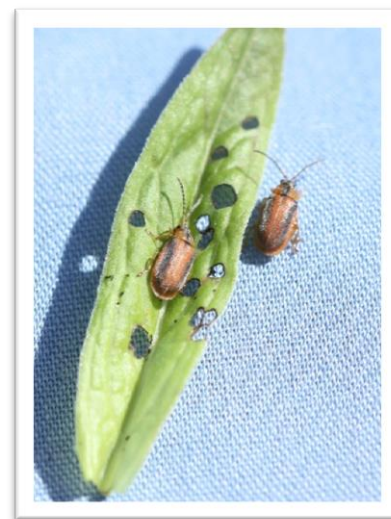


Fig. 1. *Galerucella* spp. adults with foliar feeding on leaf



Fig. 2. *Galerucella* spp. foliar feeding

## HABITAT AND DISTRIBUTION

### Native:

In its native environment, *G. pusilla* occurs in varying climates within wide ranging ecological habitats. Field surveys indicate their range to be in central and north European countries. It is found in south Sweden and Finland and to the south to North Africa, with recorded sightings in Siberia, Kazakhstan and central Asia. When *G. pusilla* and *G. californiensis* habitats overlap, *G. pusilla* occurs when the plants are growing in lower densities.

### North America:

*G. pusilla* tolerates a variety of habitats where purple loosestrife grows. It can tolerate flooding, but continual flooding may not be suitable. For this reason, sites with a moisture gradient will offer alternate locations of choice habitat. They appear to prefer areas on the margins of wet lands. *Galerucella* beetles prefer full sun and, therefore, locations with sun exposure will be preferred over shaded or partially shaded sites.

### British Columbia:

Treatments have been made into Bunchgrass, Coastal Douglas-fir, Coastal western hemlock, and Interior cedar-hemlock biogeoclimatic zones and all zones have shown establishment. Since populations are routinely considered mixed with *G. californiensis*, it is possible both species occur at most sites in B.C., although *G. californiensis* may be the dominant of the two species found.

## BRITISH COLUMBIA RECORD

### Origin:

*G. pusilla* populations released in B.C. originate from Germany.

### History:

The first *G. pusilla* treatment in B.C. was made in 1994 on Vancouver Island. Before its establishment could be confirmed, the site was destroyed by development. Another *G. pusilla* population was later released into the southern interior and adults were located in 2001 and 2002. However at this location the collections are suspected to now be mixed *Galerucella spp.* populations. Populations used for collection are routinely considered mixed and it is possible both species occur at most sites.

### Field results:

Impressive feeding damage can be found within coastal and interior sites from mid-summer onward. On long linear sites, plants are failing to produce flowers near the immediate release point. In the interior, adults can be observed from July into early August, and the seasons' abundant feeding is evident in early September. In the lower mainland, adults and egg masses were seen from mid-May through June. Adults were collected from the lower mainland in June well within the incoming tide level showing their tolerance for wet sites. In B.C., two generations are normal. *Galerucella spp.* treatment sites in the lower mainland now have low plant densities and reduced flowering, which have negatively impacted seed production. This same success is starting to show in the southern interior.

### Collection for redistribution:

Transfers can be successfully done by moving plant material with larvae into new locations or adults can be aspirated from plants during peak periods. When treatments are made with small numbers of beetles released, small populations will usually continue, therefore large releases perform best.



Fig. 3. Established *Galerucella spp.* sites along canal in Penticton (Ponderosa pine zone)



Fig. 4. Established *G. pusilla* mixed *G. californiensis* site at Vaseaux Lake (Bunchgrass zone)



Fig. 5. Established *G. pusilla* release site in Kelowna (Ponderosa pine zone)

## NOTES

- By combining the two *Galerucella spp.*, benefits are gained. *G. californiensis* feeds on early plant growths causing the plants to send out new shoots that then coincide with *G. pusilla's* feeding requirements. Additionally, the two species prefer different densities of plants, therefore, should feed on a wider range of plants in an infestation.
- DNA of these closely related species have been studied and demonstrate a distinct reproductive separation.

## REFERENCES

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