Longitarsus quadriguttatus (Pont)

INVASIVE SPECIES ATTACKED: Hound's-tongue (*Cynoglossum officinale* L.)

TYPE OF AGENT: Root feeding flea beetle

COLLECTABILITY: Not available for general distribution

ORIGIN: Austria and Hungary

DESCRIPTION AND LIFE CYCLE

Adult:

Longitarsus quadriguttatus adults are 2.4-3.0 mm long, shiny black flea beetles with long antennae. Each wing cover has two reddish spots, which vary in size and shape. Adults are capable of jumping great distances and do so when disturbed. Adults begin to emerge from the soil in late spring and can be present all summer into the fall, however, the average life span is 41 days for males and 67 days for females. Weather does not appear to alter their emergence period. Adults feed, mate and oviposit 4-7 days after emergence. Each female lays an average 280 eggs, depositing them at petiole bases, on root crowns, or into the soil within 2 cm from first year rosettes.

Fig. 1. *L. quadriguttatus* adult (credit Harvey, Essex Field Club). See notes.

Egg:

Eggs are yellow to light orange coloured, elliptical and measure 0.6 x 0.2 mm. Incubation takes up to 14 days.

Larva:

Larvae emerge and begin feeding on secondary roots and the cortex of the main tap root. There are three larvae instars that are distinguished only by head capsule size. By 35-40 days after hatching, 40% will be in the second instar and 60% will be in the third instar. Larvae prepare for winter hibernation by emptying their gut. Feeding and development resumes the following spring. Larvae do not appear to transfer to other roots, therefore, first year rosettes are necessary for complete development. Mature larvae exit the roots in April and prepare to pupate.

Pupa:

Pupae develop in the soil in April and pupation takes about four weeks to complete. The new adults begin to emerge in late May.

Overwintering stage:

Immature larvae overwinter in plant roots.

Fig. 2. *L. quadriguttatus* adults on upper left leaf surface and pinhole feeding evidence on all leaves at field site near Oliver

EFFECTIVENESS ON HOST PLANT

Larvae control the invasive plant by mining roots, showing a preference for the secondary roots of small rosettes. In European rearing facilities, no plants survived larvae feeding and the number of plants in B.C. rearing tents was significantly reduced. Adults feed on foliage, making pin-prick like holes over the entire leaf.

HABITAT AND DISTRIBUTION

Native:

The *L. quadriguttatus* native geographic range occurs in central Europe where hound's-tongue is established. The flea beetle is absent in Scandinavia, the Netherlands and Britain.

North America:

L. quadriguttatus releases are limited to Canada, as no populations have been introduced into the U.S.A. The preferred *L. quadriguttatus* habitat is currently being studied and shows a preference for hot sites. Its expected range is restricted to areas with a mild continental climate, limiting it to the southern regions of B.C., Alta., and Ont.

British Columbia:

L. quadriguttatus populations were tent-reared in the Bunchgrass biogeoclimatic zone and field releases have been restricted to hot dry sites located in the Interior Douglas-fir and Ponderosa pine zones. At the hottest south Okanagan

locations, sites with filtered shade have shown better establishment than those in the open. Releases made in the Interior Douglas-fir zone may be best placed in open hot sites whereas releases made in the Ponderosa pine and Bunchgrass zones may need filtered, shaded sites.

Fig. 2. *L. quadriguttatus* release near Osprey Lake (Interior Douglas-fir zone)

Fig. 3. *L. quadriguttatus* release near Oliver (Ponderosa pine zone)

Fig. 4. *L. quadriguttatus* release in not site with filtered shade near Oliver (Ponderosa pine zone)

BRITISH COLUMBIA RECORD

Origin:

L. quadriguttatus populations released in B.C. were propagated in Agriculture and Agri-Food Canada, Lethbridge lab from populations that originate from Austria and Hungary.

History:

In 1998, the first lab reared populations of *L. quadriguttatus* were released in B.C. Two hundred of the first shipment of 315 adults was released at the open field site located between Princeton and Summerland and the remaining adults were put into a propagation tent. Between 1999 and 2000, an additional 1238 adults were produced in the lab and released into field sites near Kamloops, Westwold, Oliver, and Merritt. During this time the Kamloops propagation plots began to produce enough populations to sustain the provincial requirements and no further lab-reared *L. quadriguttatus* were obtained. Collections were made from the Kamloops propagation tents from 2000 to 2002 and were released near Merritt and Princeton, often supplementing existing releases that had not yet shown good establishment. However, due to the success of the root feeding beetle (weevil) *Mogulones crucifer* (formerly known as *M. cruciger*) also released to control hound's-tongue, no further flea beetle propagation nor field collections have been necessary.

Propagation results:

In 1998, one propagation plot at the Kamloops facility was established with 115 adults. The next year a second propagation plot was established with 196 adults. In 2000, sufficient populations were raised in the propagation tents to allow for collections to be made. In 2002, the tents were completely cleared of all remaining *L. quadriguttatus* and dismantled. During the lifetime of the plots, 2573 adults were collected and released into four field sites in B.C.

Fig. 5. *L. quadriguttatus* adult pinhole feeding evidence in tented propagation tents at Kamloops.

Field results:

Most *L. quadriguttatus* adults have been observed in the field when the burrs have started ripening and changing from green to reddish-purple. As there is a similar native flea beetle present with identical feeding evidence, adults must be carefully examined to confirm establishment of *L. quadriguttatus*. In recent years, sites once heavily populated with *L. quadriguttatus* adults have not had any adult sightings. Recently, *M. crucifer* have been found self-dispersed onto many of the *L. quadriguttatus* release sites and between the two agents have depleted the host plant supply. *L. quadriguttatus* persists at dispersal locations found in the same geographic areas of the releases and is often found where plant density is relatively low. Open field site assessments are ongoing.

NOTES

- Native flea beetles are smaller and lack red spots on wing covers.
- In Hungary and Serbia, *L. quadriguttatus* exists alongside *M. crucifer*, and prefer to feed on different parts of the root.
- *L. quadriguttatus* is considered to be a large flea beetle.
- Figure 1 has been cited according to the contributor's specified requirements as of 2015-03-12.

REFERENCES

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3. Harvey, P. Undated. *Longitarsus quadriguttatus*. Essex Field Club, England United Kingdom. http://www.essexfieldclub.org.uk/portal/p/Picture/s/Longitarsus+quadriguttatus (Accessed April 8, 2015)
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