Pelochrista medullana (Stgr.)

INVASIVE SPECIES ATTACKED: Diffuse knapweed (*Centaurea diffusa* Lam.)
Spotted knapweed (*C. beibersteinii* auct.)

TYPE OF AGENT: Root feeding moth

COLLECTABILITY: Not established

ORIGIN: Austria

DESCRIPTION AND LIFE CYCLE

Adult:

Pelochrista medullana adult moths are grey and mottled-brown, small, 14-21 mm long, and closely resemble the knapweed flower bracts. Males and females emerge together at a near even ratio from mid-June to the end of July and peak during mid-July (in B.C. adults continue to emerge into August). They mate within 24 hours, usually at dusk when daily temperatures are 18-30^{0}C. Oviposition begins two to three days after mating and lasts for about 10 days. Females lay eggs singly, or in clusters up to three, onto leaves, preferring rosettes. When temperatures are optimal, the females will lay 42-120 eggs each. The number of eggs laid declines to 10 each during cool wet weather. The females die one day after they complete oviposition. In the lab, males lived 12.4 days, and females survived only one day longer.

Fig. 1. *P. medullana* adult (credit Powell et al. 1994)

Egg:

The oval, somewhat flattened, 0.03 x 0.35 mm, eggs have a strong outer shell with distinct ribs. The white eggs gradually turn to dark yellow during incubation. When the temperature is constantly at 35^{0}C, they hatch in 7-9 days.

Larva:

The segmented larvae are whitish-yellow with brown head capsules. New larvae move from the leaf into the rosette centre and mine towards the root crown. Larvae develop through six instars and head capsule measurements are used to define each. The first moult occurs in eight days. The next three instars develop in 3-4 weeks. The final instar is present eight weeks after hatching. Normally, two larvae develop within a root, but up to four can be present on exceptionally large roots. Larvae that feed on flowering plants roots are poorly developed. Webbed tubes are produced along feeding tracks which may be irregular, downward or spiralling. Larvae overwinter and resume feeding for a brief time the following spring before they pupate.

Pupa:

Pupation occurs within the webbing inside the root the following spring.

Overwintering stage:

Immature larvae overwinter in roots and resume feeding the following spring.

EFFECTIVENESS ON HOST PLANT

Larvae feed on roots causing significant damage to the plants. They feed on the outer layers of the roots, reducing the plants' ability to store nutrients and making the plants more susceptible to infection. Plants which survive the first year of attack go on to produce fewer flowerheads the following year.

HABITAT AND DISTRIBUTION

Native:

The native geographic range of *P. medullana* is in eastern Romania and eastern Austria. It is also expected to be present in south-eastern Russia.

North America:

P. medullana is best suited for the dry to moist sites within the diffuse knapweed range. It prefers high density diffuse knapweed. Plants growing in poor, coarse or gravelly soils are ideal. *P. medullana* prefers diffuse knapweed over spotted

knapweed. In 2010, invasive plant cooperators from the U.S.A. indicated that *P. medullana* was barely maintaining a population.

British Columbia:
All open field releases occurred on diffuse knapweed within the Bunchgrass biogeoclimatic zone. The releases into rearing tents were on diffuse and spotted knapweeds also in the Bunchgrass zone.

BRITISH COLUMBIA RECORD

Origin:
P. medullana released in B.C. originate from Austria.

History:
In 1982, the first *P. medullana* field release was made in Pritchard with an unknown quantity of larvae released into a diffuse knapweed infestation. Three releases were made in Summerland between 1983 and 1987, two of which were released into field cages while one remained an open release. Additional rearing attempts continued from 1988 to 1997 at Castlegar on spotted knapweed and in Kamloops on mixed spotted and diffuse knapweeds. The existence of *P. medullana* in B.C. is not confirmed.

Propagation results:
In 1984, a population of *P. medullana* was released into diffuse knapweed rearing cages at the Summerland Research Station. In 1987, a supplement population was added to the cages. In both instances, the quantities released into the cage are unknown. In 1988, 18 adults were released into spotted knapweed propagation cages at the Selkirk College. There are no records indicating the moth successfully established at either Summerland or Selkirk. Further attempts to develop a population were taken between 1986 and 1997 at the Kamloops Propagation Facility. During this time egg, larva, and adult transfers were made into rearing tents planted with spotted and diffuse knapweeds. A small population persisted for a couple years, but after several years with no adults observed, the rearing plots were dismantled.

Field results:
P. medullana larvae and its feeding damage is identical to the wide spread *A. zoegana*, making identification by evidence alone difficult at field sites. Root sampling from release locations in Pritchard and Summerland resulted in subsequent emergence of only *A. zoegana* and *Pterolonche inspersa* adult moths. While monitoring the earliest release site near Pritchard, a diffuse knapweed plant had feeding similar to *A. zoegana*, however, the larva had a distinct dark marking behind its head. The larva did not successfully re-enter the root and subsequently perished. Future efforts will continue to focus on dispersal monitoring on preferred host plants in the general vicinity of the two open field releases.

NOTES

- The larvae and feeding damage of *P. medullana* and *A. zoegana* appear almost identical.
- As well, *P. inspersa* larvae also may be confused with *P. medullana* too, but it feeds in a different location on the root.
- Mature *P. inspersa* larvae have been observed to be distinguishable from *P. medullana* and *A. zoegana* by its opalescent colour and distinct segmentation.

REFERENCES

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