

# *Metzneria paucipunctella* Zell.

**INVASIVE SPECIES ATTACKED:** Spotted knapweed (*Centaurea biebersteinii*)  
Diffuse knapweed (*C. diffusa*)  
Meadow knapweed (*C. debauxii*)

**TYPE OF AGENT:** Seed feeding moth

**COLLECTABILITY:** Limited

**ORIGIN:** Switzerland

## DESCRIPTION AND LIFE CYCLE

### Adult:

The pale brown moths are 1.0 cm long with large feathered antennae that curl upward over their heads. Their wings are fringed and are held tightly to their sides and over their backs giving them a slender appearance. Forewings are light brown and covered with dark brown specks. Adults emerge from late May to early August. Mating begins immediately and eggs are laid within 2 - 3 days after emergence. Females lay 1 - 3 eggs on the stem below the flower bud or under a floral bract on the bud. Females will oviposit 60 - 100 eggs during their three week lifespan. *Metzneria paucipunctella* does not avoid flower buds already attacked by *Urophora spp.* Adults are rarely seen during the day, becoming active mainly at dusk.

### Egg:

Eggs are oval, elongated and measure 0.75 mm. The exposed areas of the yellow eggs turn reddish coloured in a few days. Eggs incubate for 10 - 12 days at 19 - 21°C and coincide with the opening of the flower bud. Sources indicate, in Europe 20% of eggs become parasitized, but this has not been observed in North America.

### Larva:

Larvae have segmented white bodies with dark brown head capsules and several pairs of legs. When mature, the larvae will measure 4 - 5 mm long. There are six larval instars. Emerging larvae enter the flower and hunt and kill competing *M. paucipunctella* larvae. When only one remains, it feeds on outer florets, moulting near a central floret. The second instar larvae feed on seeds, entering one or two of them before it seals the entry hole into the flower bud with silk. The third instar mines the receptacle. The third through the fifth instars may prey on competing seed feeders notably attacking *Urophora affinis*. The larvae mature at the end of their sixth instar and spin a silk tube where they overwinter. Pupation occurs the following spring inside the seedhead, and the silken tube provides an exit route for the new adults. Larvae absorb and lose moisture, therefore the onset of winter weather may affect their survival rate from year to year. Larvae can withstand six days at -21°C, but high mortality occurs when temperatures drop to -30°C.

### Pupa:

Pupation takes about three weeks which occurs during April and early May. The dark brown pupae casings remain inside seedheads after adults have emerged.

### Overwintering stage:

Mature larvae overwinter in seedheads.

## EFFECTIVENESS ON HOST PLANT

*M. paucipunctella* usually consume 8 - 9 seeds in each head, contributing to 95% of seed destruction (spotted knapweed = 9 - 10 seeds/head). Seed destruction may be less when larvae inhabit extremely productive flowers. It is less effective than the two *Urophora spp.*, but on a site, the combination of all three is more effective than each on their own. The



Fig. 1. *M. paucipunctella* adult (credit Powell et al. 1994)



Fig. 2. *M. paucipunctella* larva (credit Powell et al. 1994)



Fig. 3. *M. paucipunctella* dispersal location at Blind Bay (Interior Douglas-fir zone)

moths' population increases five to ten times each year. In B.C., where *M. paucipunctella* is established, it is noted to attack approximately one third to three quarters of spotted and diffuse knapweed plants.

## HABITAT AND DISTRIBUTION

### Native:

In its native geographic range it inhabits spotted knapweed sites on south slopes along two river systems in central Europe. Along the Danube it occurs from Svishtove, Bulgaria to east Austria with a small local population found at Prague, Czech Republic. In the upper Rhone valley it occurs between Fully to Morel, Switzerland. The lower Rhone valley site is restricted to the La Bessee-Gourdon areas of France. It is also found in Granada, Spain which is outside the spotted knapweed range.

### North America:

Populations were first introduced to Canada in 1973 and made as field releases in Alta. and B.C. In 1981, populations were moved onto diffuse knapweed. *M. paucipunctella* was introduced again in Alta. in 1985. Elsewhere in Canada, *M. paucipunctella* has been released in Sask. (1985) and Ont. (1986). By 2005, *M. paucipunctella* still had not established in Ont. In 1980, populations were collected in Canada and shipped to the U.S.A. In the U.S.A., populations were first released on spotted and diffuse knapweed. In 1983, *M. paucipunctella* was accidentally introduced with *Urophora quadrifasciata* releases in OR on meadow knapweed. In the U.S.A., *M. paucipunctella* has been introduced in Idaho, Mont., Oreg., Wash., and Wyo.

*M. paucipunctella* does not tolerate severe winter temperatures. Favoured sites are south slopes in dry mild winter climates. Snow cover during winter enhances larvae survival. It appears to do best in areas where spotted knapweed flowers early in the season.

### British Columbia:

*M. paucipunctella* was imported from European populations in 1973 and 1994. It was thought the population did not establish. Efforts to continue were put on hold until 1981. *M. paucipunctella* has subsequently been released and found established and/or dispersed in the Bunchgrass, Coastal Douglas-fir, Coastal western hemlock, Engelmann spruce sub-alpine fir, Interior Cedar Hemlock, Interior Douglas-fir, Montane spruce, Ponderosa Pine and Sub-boreal spruce biogeoclimatic zones. No establishment has been found at releases put in the Engelmann spruce-subalpine fir zones. Today, *M. paucipunctella* widely inhabits the knapweed communities in the southern interior. Its northern limit is not known. In previous years the most northern established release site was Vavenby, however, in 2016 seedhead sampling determined *M. paucipunctella* was at least as far north as Quesnel.

## BRITISH COLUMBIA RECORD

### Origin:

*M. paucipunctella* populations in B.C. originate from the Upper Rhone Valley, Switzerland.

### History:

The first field releases of *M. paucipunctella* occurred in 1973 at Castlegar and Westwold. At Westwold, 73 moths were released in 1973 followed by a supplemental population of 76 in 1974. It is not known how many moths were released at Castlegar, however, it was noted to be slightly less than what was released at Westwold. Shortly after the release was made at Castlegar the flowering plants were mowed and subsequently no establishment was found. Due to the poor survival rate of *M. paucipunctella* in the 1970s there was little effort expended on the

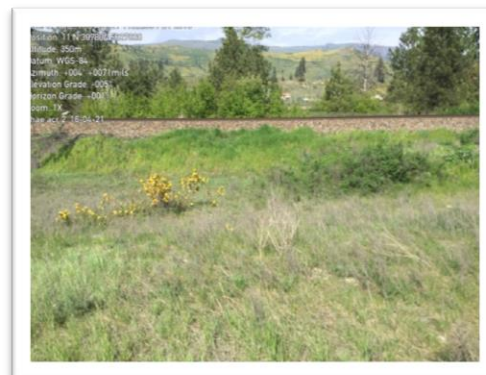


Fig. 4. *M. paucipunctella* dispersal location near Chase (Ponderosa pine zone)



Fig. 5. *M. paucipunctella* dispersal location at Malakwa (Interior cedar hemlock zone)



Fig. 6. *M. paucipunctella* dispersal location near Salmon Arm on meadow knapweed (Interior Douglas-fir zone)

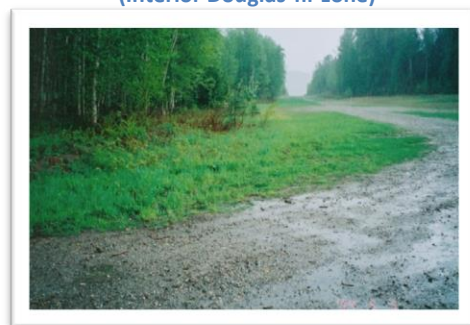


Fig. 7. *M. paucipunctella* dispersal location at Seymour Arm on Meadow knapweed (Interior cedar hemlock zone)

agent until the 1981. *M. paucipunctella* populations were released from field collections since the 1980s.

### Field results:

At Westwold, initial sampling indicated low populations which at the time were thought due to a lack of insulating snow during winter months. Intermittent sampling from 1974 to 1980 began to show a gradual increase and by 1981 it had dispersed 0.5 km (in seven years) from the site. Dispersal in the central Kootenay regions is reported to have achieved 40 km in 12 years. *M. paucipunctella* has also been reported to disperse itself 100 km in 15 years. Incidental monitoring over the past several years has shown that *M. paucipunctella* is quite widespread on spotted knapweed in the southern interior. In recent years the highest populations have occurred at sites where the plant density was <1 bolted plants/m<sup>2</sup>.

On rare occasions, larvae have been found in diffuse knapweed seedheads growing among spotted knapweed plants. *M. paucipunctella* larvae were also found developing within meadow knapweed seedheads in the Shuswap area. At these sites, meadow knapweed is established in a mixed stand of brown, black and short-fringe knapweed species. It is not known at this time if *M. paucipunctella* has also moved onto these *Centaurea* species as well.

### Collection for redistribution:

Larvae/pupae can be collected by clipping stem bouquets with intact seedheads in late summer, early fall, or early April. The infested seedheads are tied to a stake, tree, or lodged within knapweed plants at the new location. The native predatory mite, *Pynotes spp.*, will rapidly spread through plant material stored in bulk quantities.



Fig. 8. General area of established *M. paucipunctella* release at Walhachin (Bunchgrass zone)



Fig. 9. *M. paucipunctella* dispersal area at Yale (Coastal western hemlock zone)

## NOTES

- *M. paucipunctella* attacks the buds after the *Urophora* species which will have completed their feeding, therefore, adding to the seed consumption and knapweed control. Its predation on *Urophora* does not appear to be a concern as both populations continue to thrive. *M. paucipunctella* is not competitive against *Larinus spp.*

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