

# *Omphalapion hookeri* Kirby

**INVASIVE SPECIES ATTACKED:** Scentless chamomile (*Tripleurospermum perforatum* (Mérat) M. Lainz)

**PREVIOUSLY KNOWN AS:** *Apion hookeri* Kirby

**TYPE OF AGENT:** Seedhead feeding beetle (weevil)

**COLLECTABILITY:** Limited

**ORIGIN:** Germany and Nova Scotia

## DESCRIPTION AND LIFE CYCLE

### Adult:

*Omphalapion hookeri* weevil males and females have different colouring. The males are black, measuring 1.6-2.0 mm long. Females are metallic blue, blue-green or purple, 1.9-2.4 mm long. Both have rounded bodies, tapered rostrums (noses), and bulging eyes. Wing covers have no pattern. Fertile females appear in spring, begin feeding on plants and oviposit in June as the flower buds begin to open. Females will deposit 1-2 eggs into the tubular flowers nearest the top of the plant at a rate of 2 each day. Multiple females will lay into the same head

which creates egg masses. The optimal period for oviposition lasts 6-10 weeks (maximum 13 weeks). The summer generation appears and mates in late summer, August to September, but the females do not oviposit, and will overwinter with fertile eggs. The males die after mating ends and females move into the soil or within plant litter where they hibernate. The duration from egg to adult takes 42 days in Alberta.

### Egg:

Eggs measure 0.4 x 0.3 mm long and change from white to brown during incubation.

### Larva:

The white "C" shaped larvae develop through three instars over 4-6 weeks. They first begin feeding on floret tubes then work their way downward to where the final instar feeds on the seeds.

### Pupa:

Pupation occurs in a seedhead chamber constructed from chewed plant pieces. The new adults emerge within 7-14 days.

### Overwintering stage:

Fertile females overwinter in the soil and in plant litter, males do not overwinter.



Fig. 1. *O. hookeri* adults on flower

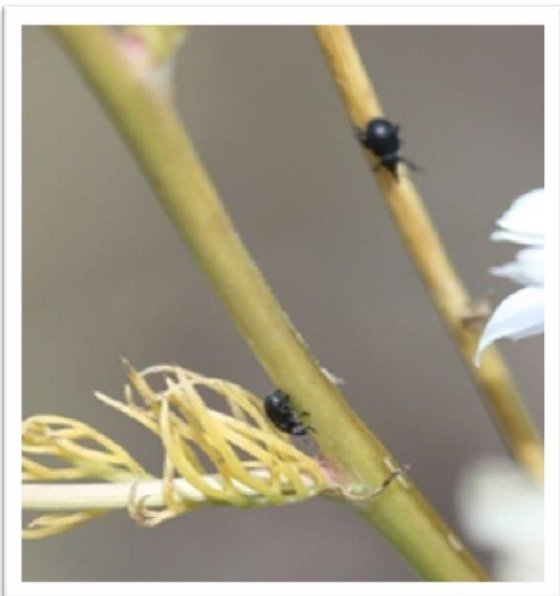


Fig. 2. *O. hookeri* adults on plant stem



Fig. 4. *O. hookeri* larvae and pupae in seedhead



Fig. 3. *O. hookeri* larva

## EFFECTIVENESS ON HOST PLANT

Larvae feeding in developing flowers consume seeds, therefore, reduces seed production. Each flower can produce 171 seeds, which is reduced when multiple larvae feed within each head. In Europe, 53-71% of seedheads are attacked by *O. hookeri*, but in Canada it first achieved only 5% seedhead attack before it increased to 40%. Best results come from Saskatchewan where four year old releases had 31% of the seedheads attacked and these contained 13 or more weevils, while 12% of the seedheads had five or more weevils. In B.C., at a 5-year old release site in the Chilcotin, 1500 seedheads collected in 2015 contained 6215 weevils, equal to an average of 4.13 adult weevils per head. Potentially there could be more present, however, larvae were not counted during the exercise. Complete seed destruction requires the presence of 15 larvae. In Canadian field plot studies, a single larva consumes 12 seeds (21 seeds are consumed per larvae in Europe).

## HABITAT AND DISTRIBUTION

### Native:

*O. hookeri*'s native European range occurs from North Africa to Scandinavia and east to Archangel, the Caucasus Mountains, Tomsk and Syria.

### North America:

*O. hookeri* prefers cold, dry, continental climates. It is expected to establish throughout the scentless chamomile sites in western Canada.

In Canada, it does not appear to be limited to specific habitats and the climate in the western provinces is favourable to its cycle. The plant in western Canada occurs within the same climate conditions of its geographic European range. However, it does not do well in the Maritime Provinces. It has good host seeking abilities and can locate individual plants.

### British Columbia:

*O. hookeri* has been released and found established in the Boreal white and black spruce, Interior cedar hemlock, Interior Douglas-fir, Montane spruce and Sub-boreal pine-spruce biogeoclimatic zones. The release made in the Sub-boreal spruce zone was not found established prior to the site being destroyed. The northern B.C. releases made in the Fort St. John area are the oldest in the province, have had long term establishment and dispersal of the weevil appears to be widespread. The weevil's ability to endure cold climates is evident with its ongoing establishment in some of the more extreme climates of B.C.

## BRITISH COLUMBIA RECORD

### Origin:

*O. hookeri* releases in B.C. originate from Bayreuth, Germany and an adventive population from Nova Scotia.

### History:

In 1992, *O. hookeri* was first introduced into two sites located in the northeast part of B.C. near Fort St. John (Peace River). Releases continued to 2002 when an estimated 3,000 adult *O. hookeri* weevils was released into northeastern B.C. in the Fort St. John and Hudson Hope areas. By that time the agent was found established at two original sites. In 2008, four releases were obtained from Alberta field populations and released in B.C.'s southern interior near Creston and Sparwood and quickly established. Also in 2008, the first B.C. field collection occurred from a Fort St. John site and a small quantity of adults was released near Dawson Creek. In 2009, large quantities of adults were collected from the Peace River area and released into the central interior and the Chilcotin near Prince George and Alexis Creek, respectively. In 2010, adults were obtained from Alberta field sites and released further west on the Chilcotin plateau near Kleena Kleene. In 2014,



Fig. 5. *O. hookeri* release site at Sparwood (Montane spruce zone)



Fig. 6. *O. hookeri* release site near Kleena Kleene (Sub-boreal pine-spruce zone)



Fig. 7. *O. hookeri* release site near Fort St. John (Boreal white and black spruce zone)

nine adults were found (although more may have been present) in a *Microplontus edentulous* shipment from Alberta and both species were released at the same location near Savona (Tunkwa Lake). In 2015, field collections made at the Kleena Kleene site were released near Savona and Creston.

### Field results:

Many of the northern sites were revisited in 2008 and establishment was confirmed throughout the area. Some sites had few or no plants remaining at the original release point. Property owners at one location indicated there were substantially fewer plants now present than there were prior to the release. The releases in the southern interior at Creston and Sparwood showed same year establishment having produced a generation by August. In 2014, one Sparwood site was monitored again and was found to be well established and the weevil dispersing. The Prince George site was heavily grazed the year after the release and was also sprayed with herbicides and by 2013 no plants could be relocated at the site or in the immediate vicinity. The Chilcotin sites quickly established and the weevils are dispersing. In 2014, all the Chilcotin sites were intensely monitored for agent presence. During the monitoring process the weevils were found to have dispersed >700 m away from the release point in four years, however, cattle trampling and plant browsing may have inhibited the weevils' potential to disperse further than recorded. The most recent releases made near Savona and Creston in 2015 have subsequently been found established. In 2017, *O. hookeri* was found dispersed at several locations near Prince George. It is not known how it arrived at these locations considering the nearest releases occur at Dawson Creek, Alexis Creek, and in the province of Alta. Based on the quantities found and distribution of the weevils in this area, it is likely they were present in this area for some time. Monitoring results to date indicate *O. hookeri* easily adapts to a wide variety of different habitats. Future efforts may include introducing the weevil to areas it has not yet been found within such as the Fraser Valley, Vancouver Island or west coast environments to see if the agent will establish in habitat types reported to be less preferred but where the plants persist.

### NOTES

- An unknown pest present in many of the seedheads examined in the Chilcotin appeared to cause significant mortalities to larvae and pupae.
- In 1990, an adventive population was located in Nova Scotia.
- After 10 years in Alberta, the weevil had dispersed at a rate of 2.8 km/year and was found spread over 116 km<sup>2</sup>.

### REFERENCES

1. Harris, P., unpublished data, 2008, Agriculture and Agri-Food Canada, Lethbridge, AB (P. Harris, pers. comm., July 2008).
2. Harris, P. and A. McClay. 2003. Classical biological control of weeds established biocontrol agent *Omphalapion hookeri* Kirby. Seed-head weevil. Agriculture and Agri-Food Canada. Updated December 9, 2003. [http://res2.agr.ca/lethbridge/weedbio/aomophoo\\_e.htm](http://res2.agr.ca/lethbridge/weedbio/aomophoo_e.htm) (Accessed February 15, 2007).
3. McClay, A. and R. De Clerck-Floate. 1999. Establishment and early effects of *Omphalapion hookeri* (Kirby) (Coleoptera: Apionidae) as a biological control agent for scentless chamomile, *Matricaria perforata* Merat (Asteraceae). Biological Control 14, 1999, pp. 85-95.



Fig. 8. *O. hookeri* release site near Alexis Creek (Interior Douglas-fir zone)



Fig. 9. *O. hookeri* dispersal location in Prince George area (Sub-boreal spruce zone)