

Aphthona nigriscutis (Foundras)

INVASIVE SPECIES ATTACKED: Leafy spurge (*Euphorbia esula* L.)
Cypress spurge (*E. cyparissiae* L.)

TYPE OF AGENT: Root feeding flea beetle

COLLECTABILITY: Mass

ORIGIN: Hungary

DESCRIPTION AND LIFE CYCLE

Adult:

Adults are brown coloured, oval shaped, and 3-4 mm long. Their unique feature, the black gap at the top of the wing covers, distinguishes them from other *Aphthona*. Adults begin to emerge in mid-June through July and feed on the upper margins of leaves. As with all *Aphthona* species, adults appear to congregate for feeding, mating and egg-laying. Adults will breed almost immediately and begin to lay eggs within one week. Eggs are deposited slightly underground near spurge roots in clusters of 20 to 30 every three to five days. Each female will lay 200 - 300 eggs. *Aphthona nigriscutis* appears to have a shorter oviposition period than *A. cyparissiae*. Intensive egg laying lasts for two months before it slows over the next two months. This species remains high on plants during warm summer days, often taking short flights. On warm days it avoids predation by jumping readily, but, as temperatures drop to 10°C or less, they move less and are more susceptible to animal grazing.



Fig. 1. *A. nigriscutis* adult (credit: Powell et al. 1994)

Egg:

Eggs measure 0.7mm x 0.4mm. During the 2-3 week incubation period, the pale coloured eggs darken to brown-yellow.

Larva:

Elongated, white larvae with brown heads maintain a slight 'comma' or 'C' shape through their three instars. Upon emergence, the first instar larvae feed together in small groups in a parallel formation on the youngest roots, avoiding the latex producing layers. The second and third instars no longer avoid the latex and feed on the outer tissues of older roots and freely move between them. The feeding damage initiates new growth the following year, causing the plant to send out new shoots from the attacked locations. This is essential for the insects' survival. These new shoots provide an abundance of young roots for larvae feeding the next year and may subsequently increase the adult population. They will need to feed for about 100 days in an optimal climate to complete this portion of their life cycle; larvae that fail to do so will stop development. Mature larvae will leave the roots to prepare a soil particle pupation chamber. They must undergo a cold period at 10°C or less (tolerating -7°C), for at least four months before they resume development and pupate. Pupation occurs the following spring and takes 28 to 57 days to complete.



Fig. 2. *A. nigriscutis* larvae (credit Powell et al. 1994)

Pupa:

Pupation occurs in the spring and takes 28 to 57 days to complete.

Overwintering stage:

Mature larvae overwinter in a prepared pupal chamber within the soil.

EFFECTIVENESS ON HOST PLANT

The larval stage is the main component of control as it feeds on the various roots, disabling the plant's ability to absorb and store nutrients and moisture. This feeding will suppress plant vigour and reproductive ability, delay flowering, and weaken or kill plants.

Adult foliar feeding is quite impressive as they can completely consume small and young leaves, however, larvae provide the majority of control. Adults create "shot-hole" feeding on leaves by scraping the upper leaf surface. Adults feeding on

leaf tissues and new shoots can impede photosynthesis, compounding nutrient starvation. Adults usually remain close to the release location where the effects of attack will be apparent, but tend to disperse after five years.

Visual impacts seen at established treatment sites:

- Reduced number of flowering stems;
- A temporary increase of short, non-flowing stems is common, and will disappear after about four years; and,
- Other vegetation fills voids left from dead spurge.

HABITAT AND DISTRIBUTION

Native:

In Europe *A. nigriscutis* occurs from the Caucasus to central Europe and to Kazakhstan. In its native habitat it feeds on several *Euphorbiae* spp., primarily on cypress spurge and secondarily on leafy spurge.

North America:

The *A. nigriscutis* populations released on the Canadian prairies in 1983 were collected from cypress spurge plants growing in Austria and Hungary. The first release in 1983 was made near Cardston, Alta. From this site, field collections began in 1988. From 1989 through 1994, 140,000 adults were redistributed to 260 releases in Alta., and, an additional 50,000 adults were shipped out of province and into the U.S.A. In Canada, *A. nigriscutis* is considered established in B.C., Alta., Sask., Man., Ont. and N.S.

The releases shipped to the U.S.A. from Canadian colonies began in 1989. *A. nigriscutis* has been released in Calif., Colo., Idaho, Mont., Nev., Oreg., Utah, Wash., and Wyom. At this time, *A. nigriscutis* is considered widespread and abundant in the U.S.A.

A. nigriscutis is commonly found in bunch grassland habitat with needle and thread grass. Preferred locations have low density spurge (less than 60 stems/m²) growing 70 cm tall. They prefer areas near the top of south facing slopes or on knolls with well drained soils. Soil composition usually has 60% or more sand content with minimal organic presence. Mortality increases as moisture levels increase. Optimal sites are open, hot, dry locations where the plants suffer from drought stress during late-July and August. A climate with a 4-month period of temperatures of 10°C or less is required for complete development. They are susceptible to predation from large ant populations. In the sand dunes of Spruce Woods Park, MB, *A. nigriscutis* beetles were found significantly more often on spurge plants growing with porcupine grass as opposed to when the plants were growing with green needle grass.

British Columbia:

A. nigriscutis has been released and found established into the Bunchgrass, Interior Douglas-fir, Ponderosa pine and Sub-boreal spruce biogeoclimatic zones.

BRITISH COLUMBIA RECORD

Origin:

The initial *A. nigriscutis* populations released in B.C. originate from flea beetles released in Cardston, Alta. via Hungary.

History:

The first *A. nigriscutis* release in B.C. occurred in 1986 near Alexis Creek. In recent years this site was revisited and the remaining leafy spurge is significantly reduced and occurs as widely spaced individual plants. In 1994, a population mixed with *A. cyparissiae* was released near Kamloops and flourished within three years. Several thousand adults have been collected from the Kamloops location for redistribution and today the site has significantly less spurge. *A. nigriscutis* and *A. cyparissiae* occur in mixed populations, dispersing freely in B.C. Assisted redistributions are ongoing and coincide with the pattern of the plants' growth cycles.



Fig. 3. Established *A. nigriscutis* release site near Kamloops (Bunchgrass zone)



Fig. 4. Established *A. nigriscutis* release area near Kamloops (Ponderosa pine zone)

Field results:

Past monitoring results found mixed *A. nigriscutis* / *A. cyparissiae* populations established at most of the release sites. It is difficult to separate these two species and, therefore, it is acceptable to consider them as mixed populations in field results. Adult populations drop significantly when the plants become dried in August. When temperatures rise considerably, adults become harder to locate (adults found abundantly in 1998 disappeared quickly after several consecutive, intensely hot days). Various release and dispersal sites in the Kamloops area and the release site northwest of Clinton near Canoe Creek continue to be the main collection sources for the province.

Collection for redistribution:

Sweep for adults through early summer on warm and hot days, and aspirate to clean the collection. During bright, hot days, adults rapidly rise on plants, allowing for repeat sweeping. Sites are usually harvestable by three years following treatment. New treatments provide earlier results when large numbers are released. When treatments are made with small numbers, the resulting populations tend to persist with small numbers, never showing a significant upward surge in population.



Fig. 5. Established *A. nigriscutis* release site north west of Clinton near Canoe Creek (Interior Douglas-fir zone)

NOTES

- *A. cyparissiae* and *A. nigriscutis* are visually similar, and since their habitats overlap identification between the two is difficult.

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