

# Aceria genistae Nalepa

**INVASIVE SPECIES ATTACKED:** Scotch broom (*Cytisus scoparius* (L.))

**TYPE OF AGENT:** Gall mite

**COLLECTABILITY:** Not permitted

**ORIGIN:** Unknown

## DESCRIPTION AND LIFE CYCLE

### Adult:

The majority of *Eriophyids*, which includes *A. genistae*, have four life stages: egg, larva, nymph and adult<sup>7</sup>. *Aceria genistae* adults are light pink coloured and worm-like in appearance<sup>6</sup>. The anterior section of the body includes a complex head called the gnathosoma that includes the mouth and mouthparts<sup>5, 6</sup>. The next section is the prodorsum area that acts as a protective shield to allow the mite to withdraw and tuck in some of its body parts<sup>6, 10</sup>. Lastly, the longer posterior section, called the opisthosoma (the abdomen) is annulated (meaning to appear ring-like or having rings)<sup>5, 7</sup>. As with all *Eriophyids*, *A. genistae* have only two pairs of legs that are located on their underside near their head. The females are larger than the males. The females measure 0.16–0.225 mm long and 0.05 mm wide, whereas the males measure 0.065 mm long and 0.045 mm wide. When mature, the males deposit spermatophore that the females collect on their genital flap. The female will deposit fertilized eggs individually inside the gall she currently occupies, or she may move outside the gall and deposit the eggs into new buds on the same plant, or she may become air borne on wind currents and colonize another plant<sup>7</sup>. During the spring and summer, multiple overlapping generations can occur. When a female transfers to another plant she will seek out an unopened bud that will provide food and shelter for the winter months. In late summer and early fall when the galls begin to senesce, the mites relocate to dormant stem buds and prepare for winter<sup>9</sup>.

### Egg:

*A. genistae* eggs are white, spherical shaped and measure 0.05 mm in diameter<sup>7</sup>.

### Larva/Nymph

Immature mites have two developmental stages, larva and nymph. Both stages are pinkish-white coloured and measure about 0.10–0.12 mm long and both males and females appear identical<sup>7</sup>.

### Overwintering stage:

Mites overwinter in stem buds and on occasion in the previous year's galls<sup>1, 9</sup>.

## EFFECTIVENESS ON HOST PLANT

Spring feeding causes abnormal plant tissue growth and in 8–12 weeks the galls become visible. The mites extract plant sap by inserting their mouthparts (stylet) into plant cells<sup>7</sup>. Gall development coincides with the initial rise in spring temperatures<sup>1</sup>. Early gall development first appears on the buds giving them a distorted and hairy appearance<sup>1, 9</sup>. Over the summer as the galls develop and enlarge they become more hairy in appearance<sup>9</sup>. Galls can greatly vary in size and can measure from 0.5 cm to 3.0 cm in diameter. There is some indication that temperature may influence gall size and cool spring weather may reduce the mite's effect on Scotch broom. Early season galls can be difficult to detect as their grey-green colour camouflages them well on the plant, however, as the summer progresses the galls become more visible. In August, most galls start to dry and they begin to take on a



Fig. 1. Current season green gall



Fig. 2. Dried previous year galls

reddish-green colour. By late fall and into the winter the galls' colour changes to brown-black. *A. genistae* alone may not be able to completely control Scotch broom, but, it can create considerable damage and weaken the plant. *A. genistae* has been found on Scotch broom and gorse, however, the mite appears to only produce galls on Scotch broom<sup>1</sup>.

Early studies on *A. genistae* in the United States have made the following observations:

- The mites appear to reduce Scotch broom seed production and plant biomass.
- When the mites establish at high densities, extensive stem die-back can occur which can be fatal to the plant.
- The mites prefer plants that are three years and older, however, on occasion younger plants are attacked.
- The attack also appears to start with lower, interior branches first. Then as the mite population increases, they move upward on the plant and onto the outer branches<sup>1</sup>.

## HABITAT AND DISTRIBUTION

### Native:

The native distribution of *A. genistae* is recorded to be in Great Britain, Spain, Italy and Central Europe<sup>8</sup>.

### North America:

There is very little information available regarding *A. genistae* in North America. It currently occurs in Wash. Oreg. and Calif<sup>2</sup>. The first recorded occurrences of *A. genistae* in California were in 1994 and in Wash. and Oreg. in 2005<sup>1, 4</sup>. The known range it occupies in North America is from California north to British Columbia<sup>2</sup>.

### British Columbia:

*A. genistae* has established in B.C. on Scotch broom plants occurring in the Coastal Douglas-fir and Coastal western hemlock biogeoclimatic zones. These two zones also contain gorse infestations in B.C. Scotch broom plants in the Kootenays have not been thoroughly investigated for evidence of *A. genistae* galls.

## BRITISH COLUMBIA RECORD

### Origin:

The origin of the *A. genistae* population found in B.C. is unknown. It is possible the mites found in B.C. spread north from the United States where it was accidentally introduced.

### History:

Ministry of Forests, Lands and Natural Resource Operations staff began observing galls on Scotch broom in 2007. The following year galls were collected from Vancouver Island for identification, but the mites perished before they could be prepared and shipped. In 2009, a second collection was made and prepared immediately at the collection site and shipped to experts for identification. This collection confirmed the mites to be *A. genistae* which was also the first record of *A. genistae* in Canada. Studies based out of Washington State University are ongoing to determine the host specificity of *A. genistae*. B.C. and Canada are providing services to assist with the identification of the mite and gall samples collected for the research project.

### Field results:

The study of *A. genistae* in B.C. is still in the early stages. Samples collected from Scotch broom in B.C. and examined in 2009 had multiple species found within the galls, however, *A. genistae* quantities were most dominant<sup>2</sup>. No *A. genistae*



Fig. 3. Previous year dried galls showing stem die back



Fig. 4. *A. genistae* dispersal location near Nanoose Bay on Vancouver Island (Coastal Douglas-fir)

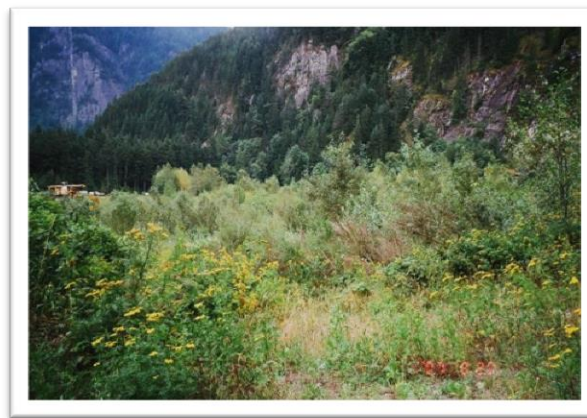


Fig. 5. *A. genistae* dispersal location near Hope in the Fraser Valley (Coastal western hemlock zone)

specimens have been collected from gorse for positive identification at this time. On Vancouver Island, gorse and *A. genistae* attacked Scotch broom grow adjacent to each other on several sites.

## NOTES

- In 2009, *A. genistae* was released in Tasmania<sup>9</sup>.
- *A. genistae* has been introduced for biocontrol purposes in New Zealand<sup>2</sup>.
- *A. genistae* released in New Zealand came from field sites collected from the Montpellier region in France<sup>3</sup>.

## REFERENCES

1. Andreas, J. Undated. *Aceria genistae*: assessing the host-specificity of the accidentally introduced Scotch broom gall mite. <http://www.ou.edu/cas/botany-micro/ben/ben429> (Accessed Nov. 10, 2010).
2. Beaulieu, F. and K.W. Wu., Unpublished data, 2009. Agriculture and Agri-Food Canada, Identification Record, Ottawa, ON. (F. Beaulieu pers. comm., Apr. 6, 2010).
3. Canterbury Broom Group. 1996. Release from containment of *Aceria genistae*, *Agonopterix assimilella* and *Gonictena olivacea*, three biological control agents for broom. D. Rutherford and R. Hill, Waiau, North Canterbury, New Zealand. ER-AF-NOCR-1-11/03, form NOCR, Environmental Risk Management Authority, New Zealand.
4. Clements, D.R., D.J. Peterson and R. Prasad. 2000. The biology of Canadian weeds. 112. *Ulex europaeus* L. Can. J. of Plant Sci., pp. 325–337
5. Ramel, G. Undated. Gordon's Entomological Glossary. <http://www.earthlife.net/insects/glossary.html> (Accessed Nov. 10. 2010).
6. Sagliocco, J-L. 2008. Biological control of English broom with the broom gall mite. Landcare note. Updated 2009. <http://www.depi.vic.gov.au/> (Accessed Sep. 2, 2010).
7. Sanders, F.H., R.A. Norton. 2003. Anatomy and function of the ptychoid defensive mechanism in the mite *Euphthiracarus cooki* (Acari: Oribatida). J. Morphology, 259(2004):119-154.
8. Smith Meyer, M.K.P. 1996. Chap. 3.2.11, Ornamental flowering plants. In Eriophyoid mites: their biology, natural enemies, and control. E.E. Linnquist, M.W. Sabelis and J. Bruin (editors). Elsevier Sci. Pub., Amsterdam, The Netherlands.
9. Tasmanian Institute of Agricultural Research (TIAR). 2009. Biological control of English broom: broom gall mite. Agric. Res. Information Bulletin, Weed Biological Control Pamphlet, Oct. 2009.