

Community pre-consultation on proposed biological control of the Eucalyptus tortoise beetle

(May 2018)

Protecting our Eucalyptus trees

Eucalyptus plantations are a recognisable part of New Zealand's diversified forestry industry. They provide pulp and timber, with additional benefits in farm forestry, honey production, firewood and carbon sequestration. Eucalypts are also widely used as amenity trees in urban areas.

The eucalyptus tortoise beetle has been a pest of eucalypts in New Zealand for over 100 years. It causes significant damage to shining gum (*Eucalyptus nitens*) as well as other gums such as the coastal grey box (*Eucalyptus bosistoana*), that hold potential for producing ground durable wood.



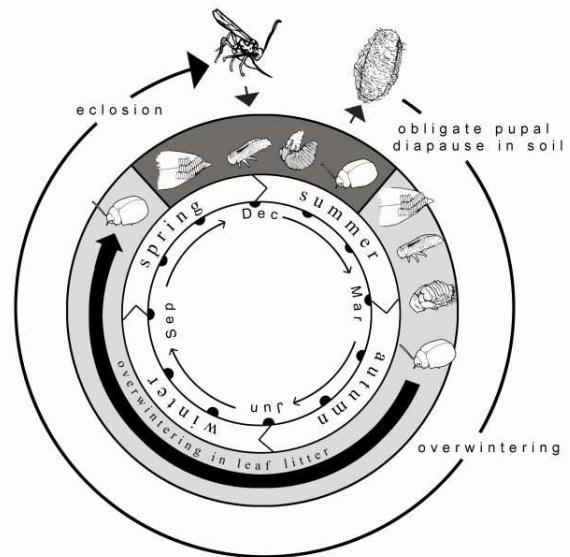
Paropsis charybdis, the eucalyptus tortoise beetle. Photo: Scion

Rapid population growth

There are no native *Paropsis* beetles in New Zealand and therefore no natural enemies here to reduce population growth. The beetle undergoes two generations a year with both larvae and adult beetles destroying eucalypt foliage.

Host-specific biocontrol agents that target the egg stage have been introduced to New Zealand from Australia, but are insufficient to manage the pest in springtime. The beetle feeding damage can completely stop the trees from growing.

Scion scientists have been studying a specialist parasitoid wasp *Eadya daenerys* in their native habitat in Tasmania. These small wasps have evolved to only attack the larval stage of the life cycle. They attack just a few species of eucalypt leaf-feeding beetles, and nothing else. Scion entomologists have imported this parasitoid into a secure containment facility at Scion in Rotorua for safety testing to see if they attack beetle larvae from different species.



Lifecycle diagram showing how *Eadya daenerys* interacts with *Paropsis charybdis*.

What is biological control?

Biological control (often shortened to biocontrol) is an effective and environmentally sustainable method of managing pests. Natural enemies are used to reduce pest populations in countries where they have invaded. It often involves reintroducing a specialist insect parasitoid from the pest's native environment where they have evolved closely together. It is an important alternative to chemical pesticide use.

What is a parasitoid? A parasitoid lives most of its life attached to, or inside a single host. If it cannot find its host, it will die without being able to reproduce.

Sustainable and economic. Successful biocontrol can substantially limit pesticide use, and sometimes removes the need for pesticide application at all. It sometimes takes a few years to see these benefits.

Eadya daenerys wasps (hereafter called *Eadya*) Adult parasitoid wasps are about 10 mm long with a black body and orange head. The parasitoid specifically stings eucalyptus tortoise beetle larvae and lays an egg inside them. Only one parasitoid develops within each larva. The parasitoid larva feeds within the host beetle larva for about 21 days. They then emerge, killing the host, and pupate out of sight, within the soil. After hibernating as a pupa for about ten months, the adult parasitoid hatches in springtime. Only one generation is produced per year.

Eadya hunting for larvae in a choice test in containment. Photo: T. Withers



Evaluating *Eadya* within containment

Host testing

We needed to ensure that *Eadya* will not impact on larvae of any native or beneficial beetles before recommending its release as a biological control agent to New Zealand. This is called host testing.

Importing *Eadya* into containment enabled our entomologists to assess its host specificity against nine other species of similar beetles.

Eadya emerged from approximately half of attacked eucalyptus tortoise beetle larvae, and also at low numbers from another pest beetle from Australia called the small tortoise beetle, *Trachymela sloanei*.

No *Eadya* emerged from any of the other non-target beetles tested, indicating no others are physiological hosts. Although some others did contain *Eadya* inside them that hadn't been able to completely develop. This was in 2 to 5% of cases in some other Chrysomelinae beetles: the broom leaf beetle, the tutsan leaf beetle, and the pest blackwood tortoise beetle.

New Zealand also has around 40 species of precious native beetles in the same subfamily as eucalyptus tortoise beetle. They are uncommon, many are minute, and are thought to live in sub-alpine zones of the south island. One species, *Allocharis tarsalis*, veronica leaf beetle, was found and returned to the

laboratory for testing. It received 8% internal infestation by *Eadya* but they failed to develop.

Scion experts also observed the behaviour of *Eadya* closely during host specificity testing. They saw that *Eadya* sometimes did attack other non-target beetle larvae. This can happen within the artificial confinement of a small petri dish, and does not mean the parasitoid will do this in the wild. *Eadya* were not interested in searching other plants leaves, only gum tree leaves, as they would do in Tasmania.

Results to date show that no healthy *Eadya* offspring were produced from the native veronica leaf beetle or from the beneficial weed biocontrol agent beetles that were exposed to *Eadya*, even though closely related to the eucalyptus tortoise beetle (in the same sub-family). Although *Eadya* will encounter these non-target beetles from time to time, their impact on them should be minimal. We believe the risk to non-target native and beneficial beetles from *Eadya* is low.

Next Steps

Scion will be applying to the Environmental Protection Authority (epa.govt.nz) for permission to release *Eadya daenerys* from containment in mid-2018.

Frequently asked Questions

“The parasitoid is a wasp, so will it sting me?”

Answer: No, the stinger on the *Eadya* parasitoid is designed only to sting a soft little beetle larva and cannot pierce human skin.

“Will this parasitoid wasp become a pest like the german wasp?” **Answer:** No, *Eadya* parasitoids are not that kind of wasp. *Eadya* only feed on *Eucalyptus* leaf beetles and you are unlikely to ever notice them as they do not form colonies.

For more information please contact:

Dr Toni Withers
Forest Entomologist, Scion
Email: toni.withers@scionresearch.com
Phone: +64 7 343 5899

<http://www.scionresearch.com/paropsis>

About Scion

Scion is a Crown research institute that specialises in research, science and technology development for the forestry, wood product, and wood-derived materials sectors.