Buddleia leaf weevil: 7 years in New Zealand

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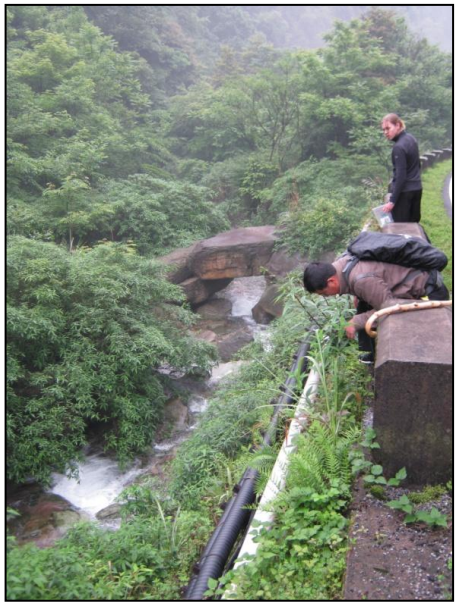
Overview

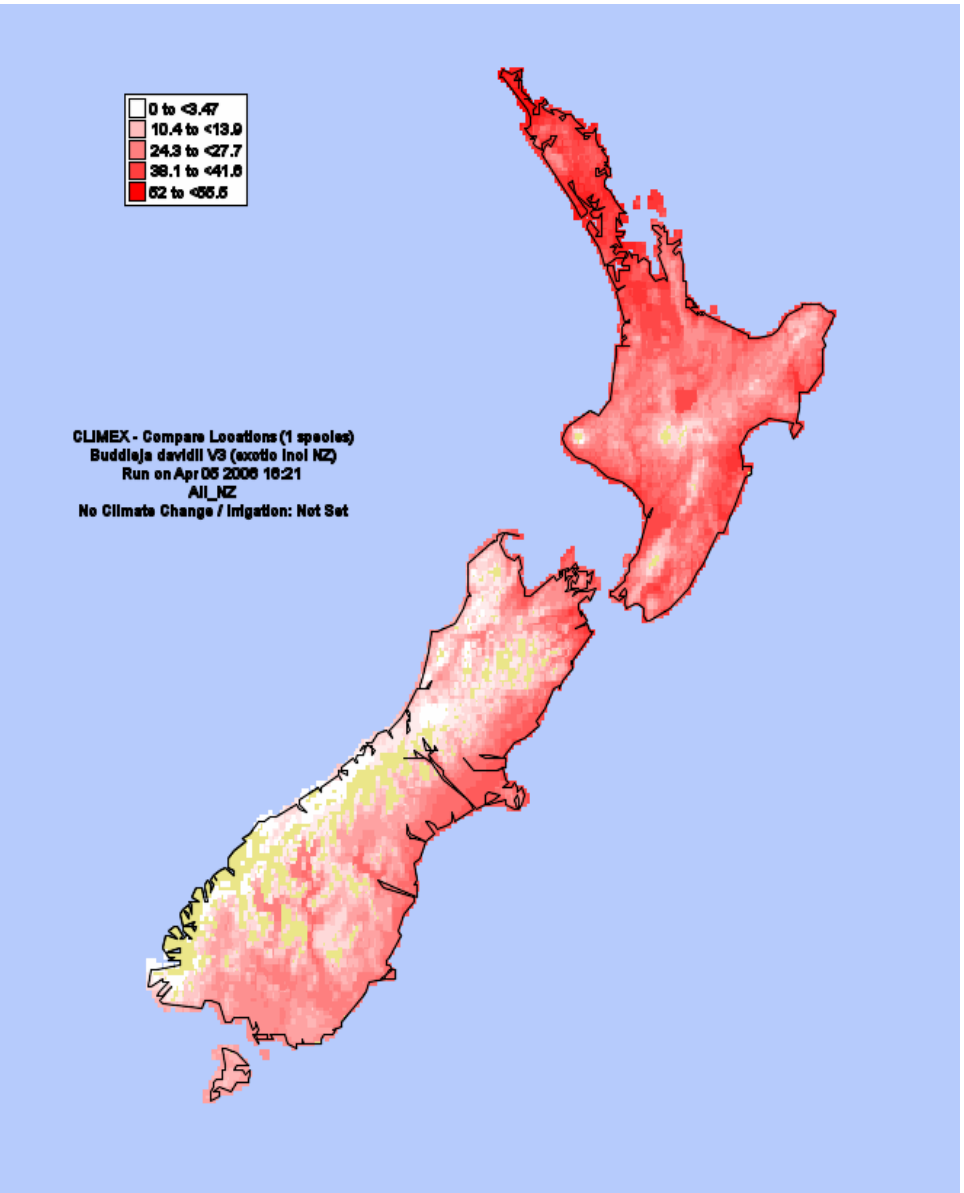
- The weed
  - Buddleia in forestry
  - Buddleia in native forests
- The insect
- Field releases
  - Where?
  - What impact to date?
  - What benefits for forestry?
- How to collect and redistribute the agent



Buddleia *(Buddleja davidii)*

- Woody shrub from China
- Rapidly colonises disturbed sites
- Fine, wind-dispersed seed
- Able to flower 1st yr, attain 4m height in 2 yrs!
- Weed of plantation forests and natural areas
- Potential distribution most of NZ

Buddleja davidii New Zealand predicted vs actual distribution



Buddleia in forestry

- Reduces growth of plantation species
- Was no. 1 weed of central Nth Island
- Can't be controlled with FSC approved herbicides
- Cost forestry industry ~$2.9 million/yr control & lost production
- Buddleia control vital 3-5yrs after planting

Pine growth with, and without buddleia shading

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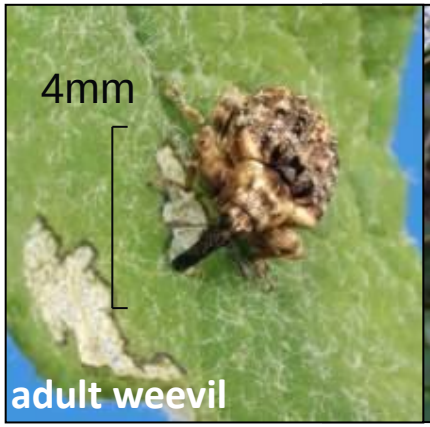
Buddleia in forestry – light and nutrient competition

Buddleia in native forests

- Colonises disturbed sites = stream beds & slip sites, out-competing native colonisers like tutu, rewarewa
- Alters plant communities, blocks access, shades rivers
- e.g. Te Urewera, Kaikoura
- Difficult to control due limited access, rapid growth

Buddleia leaf weevil *(Cleopus japonicus)*

- Leaf feeding weevil from China
- Larvae and adults both damaging plant
- Weevils overwinter as adults
- Weevils have a spring and 2 autumn generations
- Weevils readily fly to new sites
- First released in NZ 2006 by Scion (Forest Research Inst)

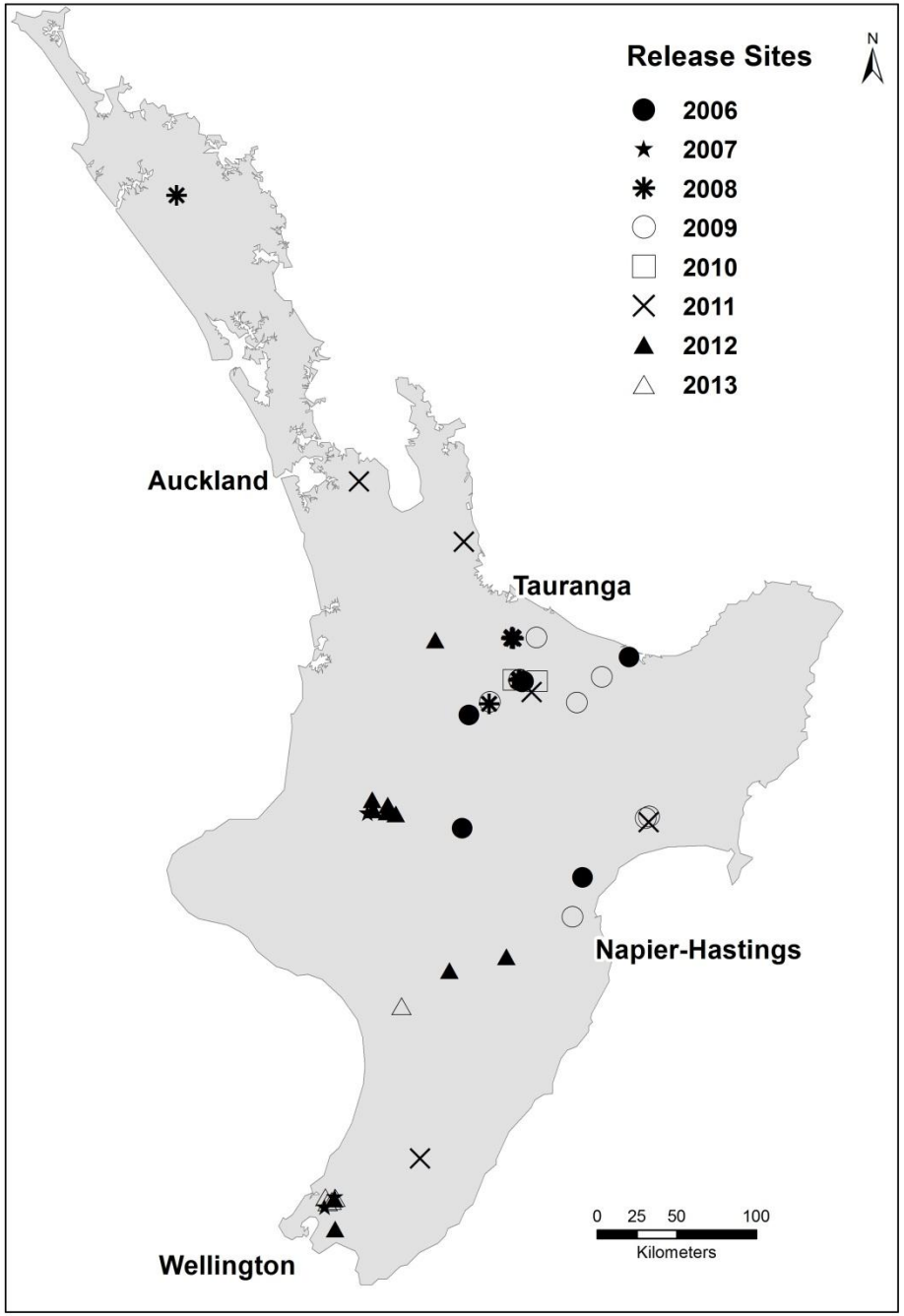


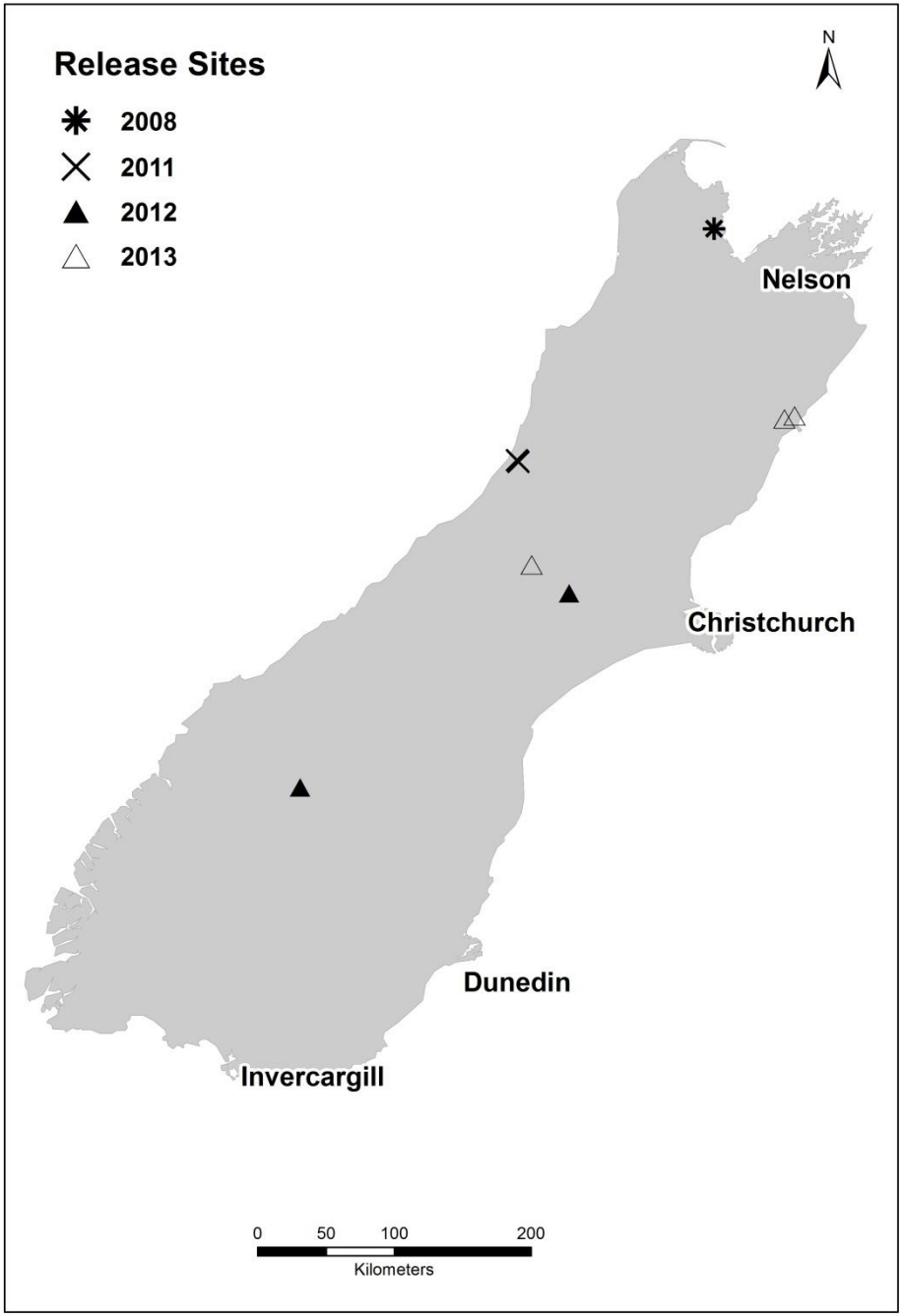
Field releases - where

- Initial releases and monitoring in 5 north is sites
- Revealed an initial slow spread of 65 m/ year
- Established at all release sites
- Adults stop mating & laying eggs at high temps
  - no larvae in January-February

Further releases

- Councils, forestry companies, trusts, community groups etc
- 200-500 weevils per release
- Almost 100% establishment rate
- Still room for more spreading/ releases




Release Sites
2008
2011
2012
2013
N
Nelson
Christchurch
Dunedin
Invercargill
0
50
100
200
Kilometers

Predicted distribution of buddleia leaf weevil by climate

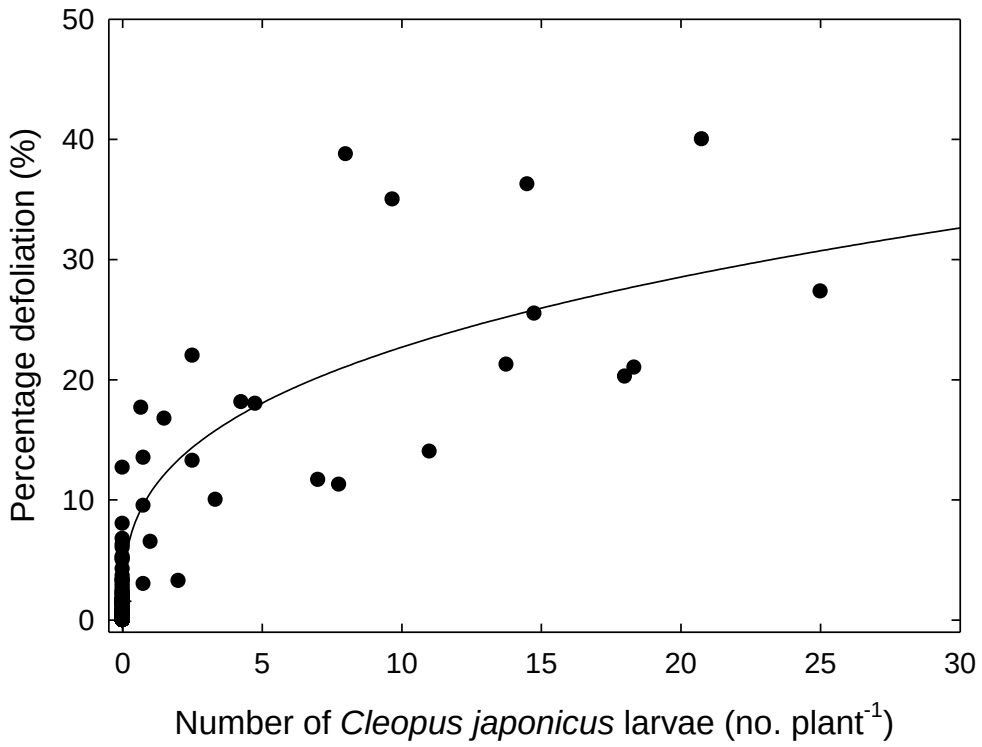
- CLIMEX modelling predicted the following distribution of weevil

- Should see a wider geographic range in the future as weevil spreads

What impact to date?

- Some damage visible in spring-time
- Massive damage & defoliation in autumn
- Must reduce plants' ability to sequester energy in roots
- Delays in re-foliation/ re-sprouting in following spring (instead of September, leaves appear later)

Number larvae correlated with damage



$y = 10.62\ x\ 0.33$

$R2$ of 0.810

*Treatment level averages, by distance, for all days after release.

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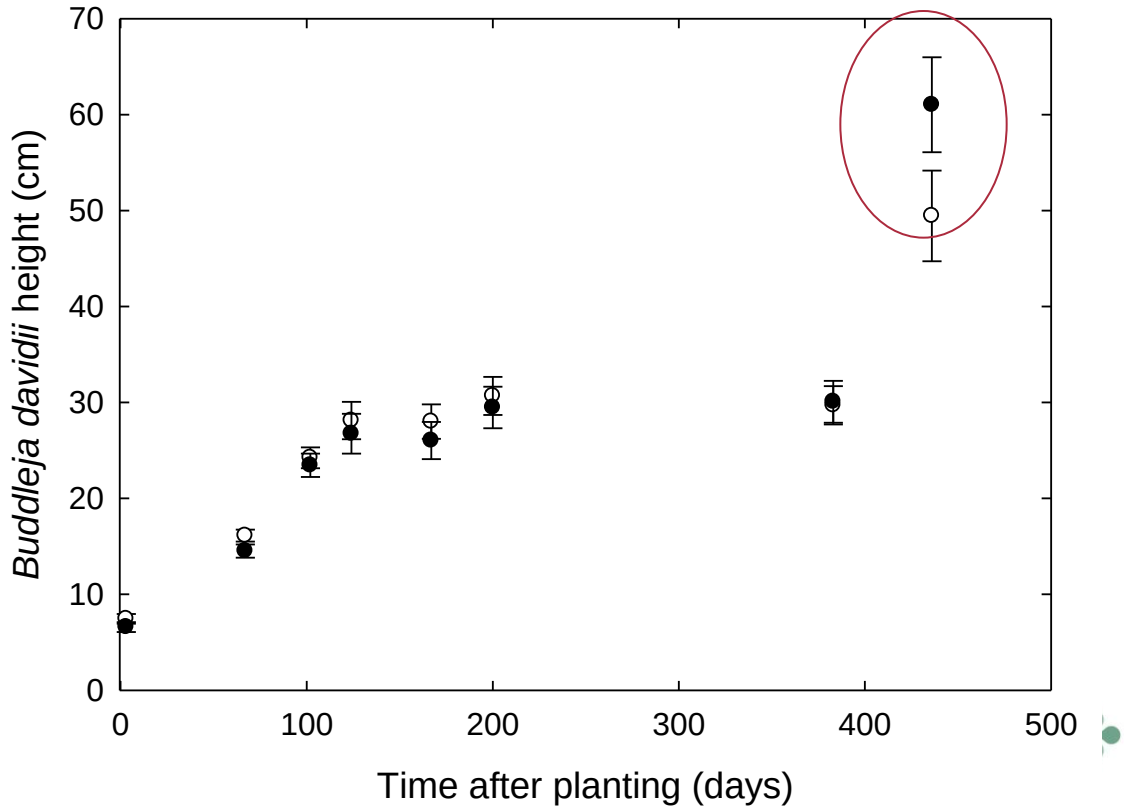
Buddleia height is reduced

- End year 2 = significant reduction in growth compared to insecticide-treated (control) plants

Values - least square means & standard errors

Treated plants ●

Untreated plants ○



Faster rate of dispersal than initially observed

- Mass-migration of weevils observed following exhaustion of local resource

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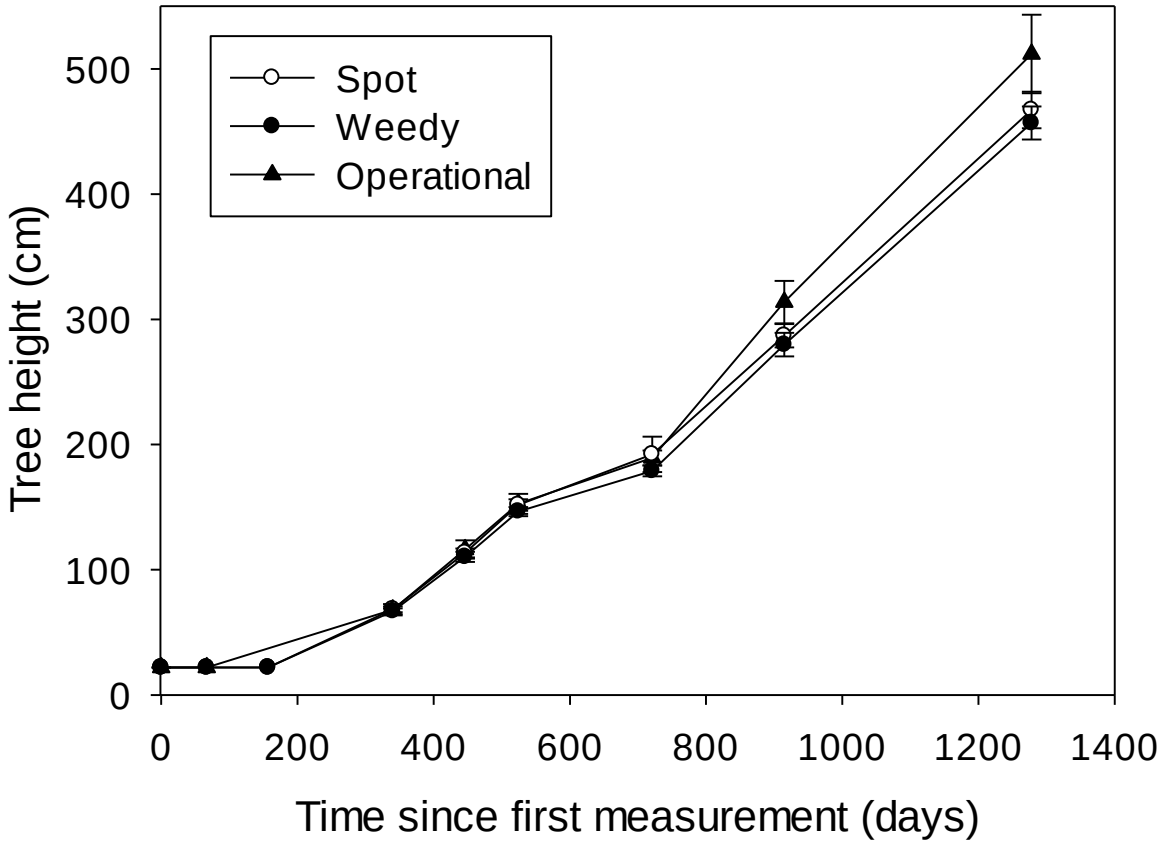
Can we quantify the impact?

- Spectacular defoliation, but quantified impacts from insecticide exclusion trials marginal to date
- Only most potent insecticides kept plants weevil-free
- Difficult maintaining high weevil levels in plots

Kaingaroa Forest herbicide & exclusion 3 yr trial

Significant reduction in weed height, but not pine tree height (yet)



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What benefits for forestry?

- *C. japonicus* will only be an **economically** successful buddleia control option in forestry if:
  - disperses rapidly
  - reduces growth of buddleia over entire stands
  - effective within the first 3-5 yrs

- However, benefits suggested from buddleia control > 3yrs
  - easier for pruning & thinning
  - roadside buddleia less vigorous
  - reduced seed production?

What we know about the agent

- Microclimate
  - Preference for gullies
  - Sunny, open areas

- Often exhaust their resource – new adults forced to seek new host plants to survive winter

- BUT, doesn't appear to colonise newly planted forests quickly enough, to benefit forestry

What we know about the agent cont.

- Results indicate *C. japonicus* has the ability to suppress growth of buddleia seedlings
- At first this is close to the source population
- Repeated defoliation between & within years can be expected

Summary – no $ benefits yet

- To date forestry companies have NOT been able to reduce pre and post-plant herbicide treatments
- Mainly due to other weeds still need to be controlled
- If buddleia can be reduced to very low densities, then FSC-approved herbicides can be used for remaining weeds
- To date some companies have been able to reduce road-side sprays, and speed up thinning operations

Help spread this agent

- Adults most robust life stage
- Best collected in spring and autumn
- Collect by beating buddleia whilst holding a beat sheet, tarp, or upside-down umbrella
- Keep adults out of the sun in a ventilated container with buddleia stems
- Release ~20-50 adults on a clump of plants
- Contact Scion for advice on collection sites and to help us track releases made

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Big thanks to …

- Funding by FRST & Better Border Biosecurity (B3) program
- Forestry companies:
  - Rayonier, Hancock F.M., Timberlands, Pan Pac, Lake Taupo Forest Trust /NZ Forest Managers, Tempest & Associates Forestry, PF Olsen, et al.
- The Conservation Company
- Other forestry companies and Councils with releases
- Scion Forest Protection group

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