

## CASE STUDY

# Biological Control of Weeds

### Why worry about controlling weeds?

Invasive plants (weeds) pose a serious and increasing threat to most ecosystems. If not controlled weeds can affect the viability of primary production, as well as have serious harmful impacts on biodiversity. Weeds can alter hydrological regimes, energy and nutrient cycles, and change the structure and composition of communities. The costs of weeds are enormous, and once widespread the only cost-effective, practical and sustainable method of managing them is by using biological control (biocontrol).

### What is biocontrol?

Biocontrol is where one living organism (usually insects or fungi) is used to control another. The natural enemies of weeds in their native range are carefully studied to see if they can be safely reunited with their host plant in its introduced range. If international best practice protocols are followed biocontrol of weeds can be highly successful with minimal risk of any unwanted side effects. Biocontrol is less harmful than many conventional control techniques.

Biocontrol agents do not eliminate weeds, because they can never find or kill every plant. Rather, a successful biocontrol attack is likely to result in smaller, weaker plants that are less likely to spread and can be more easily outcompeted by other plants. Infestations may be reduced to a level that we can live with, or eliminate effectively and economically by other means. Biocontrol is rarely a "quick fix" because it takes many years, or even decades, for suitable agents to be found, tested, approved, reared, released and established, and then for them to spread and become common and achieve damaging levels.

The impact of biocontrol agents will often vary from place to place and from year to year, and usually several biocontrol agents are required to have a significant impact on a weed. Biocontrol has the greatest impact when used in conjunction with good land management practices.

### What is happening in New Zealand?

Biocontrol of weeds has been practiced in New Zealand since the 1920s. Weeds whose abundance and vigour have been reduced by this method include: alligator weed (*Alternanthera philoxeroides*), blackberry (*Rubus fruitcosus* agg.), bridal creeper (*Asparagus asparagoides*), broom (*Cytisus scoparius*), heather (*Calluna vulgaris*), Mexican devil weed (*Ageratina adenophora*), mist flower (*Ageratina riparia*), nodding thistle (*Carduus nutans*), ragwort (*Jacobaea vulgaris*), and St John's wort (*Hypericum perforatum*).

Landcare Research is currently working to develop biocontrol measures for banana passionfruit (*Passiflora* spp.), boneseed (*Chrysanthemoides monilifera monilifera*), Chilean needle grass (*Nassella neesiana*), Darwin's barberry (*Berberis darwinii*), Japanese honeysuckle (*Lonicera japonica*), lantana (*Lantana camara*), moth plant (*Araujia hortorum*), pampas (*Cortaderia* spp.), tradescantia (*Tradescantia fluminensis*), tutsan (*Hypericum androsaemum*), wild ginger (*Hedychium* spp.), and woolly nightshade (*Solanum mauritianum*).

## How can Landcare Research assist other countries?

Through Invasive Species International Landcare Research is able to assist with all aspects of developing a weed biocontrol programme including:

- Assessing the feasibility and cost of a biocontrol programme
- Advising which species are likely to be the best targets
- Undertaking native and introduced range surveys
- Identifying organisms, including molecular studies
- Short-listing the most promising potential agents
- Preparing test plant lists and appropriate test protocols
- Undertaking host-range testing
- Making a case to import and release a biocontrol agent
- Demonstrating an agent in containment is safe to release
- Mass rearing agents
- Preparing release and establishment strategies
- Assessing the impact of biocontrol
- Training people in biocontrol methods

## Examples of projects undertaken by Landcare Research specialists for other countries

- Host-range tested gorse agents for Australia and Hawaii
- Provided colonies of broom, gorse and thistle agents to Australia, and hawkweed (*Pilosella* spp.) agents to Chile
- Developed a tool to identify best weed biocontrol targets for Australia
- Assessed the suitability of Pacific weeds as biocontrol targets for the US Forest Service in Hawaii
- Hosted a workshop on biocontrol in the Pacific for the US Forest Service and Secretariat of the Pacific Community
- Reviewed the feasibility of biocontrol of *Merremia peltata* for the Critical Ecosystem Partnership Fund
- Advised Samoa how to make a case to release an agent and evaluate that case
- Scoping a weed biocontrol programme for the Cook Islands.

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See also: [www.landcareresearch.co.nz/research/biocons/weeds/](http://www.landcareresearch.co.nz/research/biocons/weeds/)



Mist flower (*Ageratina riparia*) infestation before and 2 years after the release of a highly damaging white smut (*Entyloma ageratinae*).