CONFLICTS OF INTEREST

Problems can arise when a plant is considered a dreadful weed by some but a highly useful resource by others. Serious conflicts of interest can cause major delays to biocontrol programmes or even prevent them from getting underway at all. Potential conflicts are usually identified early on when the feasibility of a biocontrol programme is being evaluated and typically there is opposition from at least one industry group.

Economic protests

Often conflicts associated with biocontrol of weeds involve money. When an industry (typically beekeepers, horticulturalists, farmers, or foresters) stands to lose money if a weed is controlled then not surprisingly they object. Sometimes one industry is pitted against another, e.g. beekeepers were opposed to biocontrol of nodding thistle (*Carduus nutans*) while farmers supported it. Sometimes there can be divisions within a single industry, for example, Paterson's curse (*Echium plantagineum*) was disliked by most farmers in Australia, except for graziers in drought-prone areas who called the plant 'Salvation Jane'as stock could feed on it. These graziers banded together with beekeepers to oppose biocontrol, resulting in a hold up of nearly a decade.

Perceptions and values change over time so economic conflicts can also arise further down the track, especially with the development of new industries. St John's wort (*Hypericum perforatum*) was one of the top four weeds in New Zealand at the turn of the century but is now gaining popularity in the natural pharmaceutical industry as an antidepressant and is even being grown as a crop in some regions. Potential crops that might be grown in future are now considered when the feasibility of a biocontrol programme is being studied.

Non-target worries

Trouble also arises when people suspect there is a possibility of biocontrol agents attacking beneficial non-target plants. A biocontrol programme for sweet briar (*Rosa rubiginosa*) was abandoned in the 1960s because of strong opposition from the rose-growing industry who were worried about possible non-target damage. Serious delays to our biocontrol of broom (*Cytisus scoparius*) programme have occurred due to non-target conflicts. Two biological control agents have been released but an application to release a third, the broom leaf beetle (*Gonioctena olivacea*), was declined on the grounds that it attacked tagasaste (*Chamaecytisus palmensis*). There was insufficient information presented at the time on the value of this plant (which is promoted as a fodder crop, food source for native pigeons, and a nurse plant, but is also seen as a roadside weed by others) relative to the broom problem, and the actual risk the agent posed to tagasaste. This information has now been collected and another application to release this agent will be made in due course.

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Troublesome natives

In parts of the world, the densities of some native plant species have increased substantially due to changes in land use and overgrazing, which has resulted in them now being considered weeds, e.g. bracken (*Pteridium aquilinum*), in Great Britain. Many native 'weeds' in the south-western United States and in Canada have been proposed targets for biological control. Where a native plant species is targeted for biocontrol, the conflicts are often even more difficult to resolve since their benefits are more numerous, the ecological effects complex, and the general public may have difficulty viewing native species as villains. Making changes to land use and more efforts to restore the original vegetation may be more appropriate in these situations than attempting biocontrol of native 'weeds'.

In New Zealand mānuka (*Leptospermum scoparium*) is sometimes seen as a weed by farmers of marginal land when it encroaches onto their pasture. However, this native plant is important in preventing erosion on steep hill country. It also plays a significant role in the regeneration of native forest, provides habitat for native fauna, and is a highly valued source of nectar. Recently it has been confirmed that mānuka honey has useful antiseptic properties. Large areas of mānuka began dying during the 1940s after a scale insect (*Eriococcus orariensis*) arrived from Australia. Conflict arose when farmers distributed infected plant material until the scale insect was widespread. Control of mānuka by the scale insect was extremely effective for some years until in turn a fungus (*Myrangium thwaitesi*) arrived which attacked the scale insect.

Ecological questions

As native vegetation is cleared or taken over by invasive plants, then native animals increasingly turn to weeds for food and places to live. People worry that successful biocontrol could leave wildlife, including endangered or iconic species, without essential resources. However, species that use inasive weeds are usually common generalists that would not be driven to extinction by reducing or eradicating a weed. Exotic weed species are not usually as good as native plants when it comes to providing resources for native animals. Even if a few native species are found to benefit from the presence of a weed species, overall biodiversity losses are still higher if weeds

Mahoenui giant wētā

are allowed to continue to replace native vegetation.

There are some cases where threatened species have come to depend on weeds. For example the Mahoenui giant wētā (*Deinacrida mahoenui*) was found to be using goat-grazed gorse (*Ulex europaeus*) near Te Kuiti to escape predation by rats. However, in cases like this management techniques such as predator control, supplementary feeding, and providing nest boxes can be used to ensure the survival of threatened species.

Another issue complicating the release of biocontrol agents for broom has been whether kererū (*Hemiphaga novaeseelandiae*) rely on the plant for food, particularly where there has been extensive clearing of native vegetation. Although our native pigeons do consume broom leaves and buds, they eat lots of different plants. Also feeding low to the ground appears to be energetically more expensive than feeding up high in trees because of the need for increased vigilance and flights back to the trees between foraging bouts. Such feeding also increases the risk of being killed by stoats, or cars (where roadside broom infestations are involved). A reduction in broom density is therefore unlikely to have serious adverse consequences for kererū.

Nurse or curse?

In some situations, exotic plants can help native forest regeneration, particularly on highly degraded sites. Gorse and broom have been touted as good nurse crop species although there has been considerable disagreement as to their effectiveness in all situations. More recently, research has shown that although these weeds may facilitate forest restoration, successional pathways can be altered and you might not end up with the canopy tree species you are wanting. More research is needed to quantify the benefits

Gorse at Hinewai, Banks Peninsula, where it is being used as a nurse crop for native plants

of using weeds as nurse plants, and their role in ecological processes.

Conflict resolution

Where conflict is thought to be likely, communication is the key to finding a way forward. It is vital to have full stakeholder participation from the beginning of a project and to maintain contact and information flow throughout. A challenge for the future is to try to find ways of improving consultation without making it too onerous. Often the most important point to convey is that biocontrol agents are very unlikely to eradicate the weed, that they will instead hopefully make it less invasive, and that this is not going to happen overnight. Sometimes exotic plants can still be utilised even where biocontrol has been overwhelmingly successful, such as when trees are controlled by seed feeders. If need be insecticides can be used to protect useful plants from highly effective seed-eating agents.

Cost–benefit analyses are also an important part of resolving conflicts of interest, particularly between two economic groups where monetary value can be estimated for the gains and losses to each party as a result of biocontrol. Decision makers often find arguments couched in monetary terms to be more convincing. It can be difficult, however, to quantify the environmental and/or social benefits of biocontrol on natural communities.

For countries involved in biocontrol host specificity testing and risk assessment is now very time consuming and results in agents coming on stream more slowly. If regulatory requirements make biocontrol too difficult, expensive, or slow, there is a danger that individuals or groups who are suffering economic losses from weeds may act outside the law. This situation has already occurred in Australia with the illegal release of blackberry rust (*Phragmidium violaceum*), and enormously increases the risk of undesirable side effects occurring. If it becomes necessary to assess subtle 'ripple' impacts of biocontrol agents in native ecosystems, then biocontrol programmes could cease because the research required would be prohibitively time consuming and expensive.

Biocontrol often remains the only safe, practical and economically feasible method of weed control that is sustainable in the long term. It is important to resolve conflicts of interest promptly and minimise possible negative effects from biocontrol agents. Any serious delays or impediments could result in escalating weeds whose impacts are far worse than the risk biocontrol agents pose to the environment.

Table 1: Some economic biocontrol conflicts of interest in New Zealand

Weed	Possible adverse effects	Outcome
Carduus nutans **Nodding thistle**	Apiarists – valuable nectar source.	Biocontrol briefly delayed then agents released. Nectar production more likely to be reduced by herbicide than biocontrol.
Cytisus scoparius **Scotch broom**	Horticulture – ornamental plant. Apiarists – pollen. Farmers – fodder. Non-targets – e.g. tagasaste (*Cytisus proliferus*) affected by some agents.	Two biological control agents released but more detailed investigation of costs and benefits required before release of any further agents in NZ.
Pennisetum clandestinum **Kikuyu grass**	Farmers – forage in some regions.	Investigation abandoned in Hawai'i because of agricultural value. In NZ feasibility of biocontrol in early stages – likely to be opposed if taken further.
Pinus spp. **Wilding pines**	Wood industry – timber. Pines also commonly used as shelter belts and ornamentals	More research into the safety and usefulness of biocontrol is needed for NZ. Programme against *P. pinaster* is underway in South Africa.
Rubus fruticosus **Blackberry**	Horticulture – risk of damage to other berries. Apiarists – nectar useful	Rust fungus blocked for several years in Australia, illegally released in 1984, and arrived here in 1990. Investigations into additional strains of the rust are continuing.
Salix spp. **Willow**	Stabilisation, erosion and river control, shelter belts. Recreation – promoted as trout habitat. People like the look of them.	Biocontrol being considered, but opposition likely to be great. Several species (including crack willow) are still being planted.
Ulex europaeus **Gorse**	Apiarist – valuable pollen source. Farmers – hedge, shelter plant, forage plant.	Considerable delay in revisiting the project in the 1980s, mostly due to apiarists. Six agents have been released since 1989.

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