

Biocontrol Recognized as a Management Approach To Control Plant Aliens in Protected Natural Areas

The VIII International Symposium on Biological Control of Weeds was held Feb. 1-7, 1992 at Lincoln University, Canterbury, New Zealand; in attendance were several biocontrol practitioners from Hawaii. Because of the many disruptive introduced species present in Hawaii and the vulnerability of island ecosystems to alien encroachment (Mueller-Dombois and Loope 1990), Hawaii is a uniquely important region for biocontrol research and its application.

The symposium included 68 formal paper and poster presentations on weed biocontrol with insect agents, 32 with plant disease agents through the classical approach, 26 on theory and general application of biocontrol, and 5 on biocontrol with mycoherbicides.

The number of presentations on plant pathogens, both in classical and bioherbicide applications, is evidence of the growing emphasis on the use of plant diseases in weed control. The science of biocontrol had its development largely in the field of entomology, with potentially effective disease agents sometimes overlooked. However, plant pathogens, particularly certain groups of fungi such as the rusts, are frequently highly host specific and sufficiently virulent to offer promise as biocontrol agents. The production of resistant spores by certain pathogenic fungi enables development of mycoherbicides, consisting of mass-produced fungal propagules combined with an inert carrier and applied to weed infestations in much the same manner as are chemical herbicides. Success in the development and registration of mycoherbicides as commercial products was reported at the New Zealand symposium.

Whereas traditionally biocontrol falls within the purview of agriculture, it is particularly significant that the New Zealand symposium included a section on biocontrol of weeds in protected natural areas. National Parks with alien plant problems are turning increasingly to biocontrol as an alternative to the conventional approaches of mechanical removal or use of chemical herbicides (Gardner 1990). In fact, weed invasion is so severe in some parks, such as those of Hawaii and New Zealand, that resource managers look to biocontrol as the only feasible solution to degradation of native habitats by certain widespread weeds.

Classical biocontrol, the approach currently applicable to most alien plant problems in natural areas, involves introduction of foreign insects or pathogens, after pre-release testing has shown their host specificity and virulence to be suitable for biocontrol. Symposium discussions indicated that weed biocontrol in national parks of other countries, such as New Zealand, is currently hampered by policy prohibiting introduction of alien organisms into natural areas for any purpose, including biocontrol. According to one paper, government solicitors in New Zealand are investigating the possibility of obtaining a policy exception to allow introduction of foreign biocontrol agents to these areas.

U.S. NPS policy, while generally prohibiting introduction of alien species, recognizes biocontrol as an acceptable approach and already permits excep-

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tions to the policy for this purpose (U.S.D.I. NPS 1988). The operation of a foreign insect quarantine facility by Hawaii Volcanoes NP (Gardner and Smith 1985) indicates the growing commitment of NPS to act directly in addressing weed problems of concern in natural areas. The NPS biocontrol program in Hawaii represents a significant departure from the usual practice of land managing agencies of borrowing biocontrol approaches already developed primarily for agricultural applications.

The New Zealand symposium provided expression to an international audience of the NPS commitment to alien species control for preservation of natural areas. Likewise, we became aware of biocontrol research directed at weed problems similar to ours elsewhere, and were able to make personal acquaintance with the scientists doing the work. Several research programs in Europe, Africa, and South America had direct bearing on high priority Hawaiian weed problems, as well as those in protected natural areas of the continental U.S., such as with tansy ragwort (*Senecio jacobaea*) and paperbark tree (*Melaleuca quinquenervia*).

Biocontrol, because of the alien origins of target species, depends on national and international contact and cooperation perhaps to a greater extent than does other NPS-sponsored research. As illustration, NPS scientists and those working on behalf of Hawaiian parks and other natural areas have established cooperative relationships with scientists in Brazil, Venezuela, Chile, Colombia, New Zealand, Portugal, Spain, and the United Kingdom. They also have corresponded with researchers in

India, Britain, Australia, Ecuador, and Peru and in other states and territories of the U.S. concerning biocontrol possibilities.

Some invasive weeds, such as gorse (*Ulex europaeus*), are widespread problems and provide researchers opportunities to cooperate on an international basis in progressive biocontrol programs against this species. Gorse biocontrol research consequently shows perhaps the most promise of the several projects currently under investigation in the Hawaii Volcanoes NP quarantine facility.

Aside from the biological factors influencing the success of biocontrol (i.e., availability of suitable agents), political considerations, those involving conflicting purposes among various interests, are a major concern. For example, several alien species of grass are disruptive invaders of native ecosystems in Hawaii and would be candidates for biocontrol, but the grasses also are valued pasture species. Furthermore, because of perceived threats to sugarcane, Hawaii's most important crop, targeting of any grass for biocontrol is not currently practical.

Presentations at the New Zealand symposium indicated that the opposite situation also occurs; biocontrol agents are host-range screened for their effects on economic species, but often little attention has been given to their possible detrimental effects on native species. Significantly, this was the subject of an evening workshop titled "Should we use agents that attack native and other non-target plants?" Some participants stressed economic profitability as the only important consideration to biocontrol application, whereas others were prepared to consider other values. Expanded host-range testing to satisfy environmental concerns was viewed as unnecessarily cumbersome by many of the participants. While this position was disturbing, the fact that this topic was selected at all for discussion represents an important upward step in environmental awareness at biocontrol meetings.

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A controversial issue of particular relevance to NPS objectives is the direct targeting for biocontrol of native plants considered agricultural weeds in the continental U.S. Work under way against several such species was discussed in a paper by a USDA scientist. Whereas in the past native plant control efforts were perhaps of little concern, increasing public environmental awareness may soon call such practices into question. The USDA-Animal and Plant Health Inspection Service (APHIS:), which oversees U.S. biocontrol research, chairs the Technical Advisory Group (TAG). Through TAG, NPS representatives now have opportunity to review biocontrol proposals for environmental acceptability, thereby providing a healthy balance with economic interests.

A proposed reorganization of USDA-APHIS would establish the National Biological Control Institute, through which evaluation of biocontrol programs would be hastened by clearly stating the

scope of host screening necessary for each proposal. Public review of proposed biocontrol projects through publication in the **Federal Register** also is under consideration.

Biocontrol clearly is assuming a new and more expanded role in weed management. As illustrated by the New Zealand symposium, this approach, while not without pitfalls, offers increasing promise for application in protected natural areas.

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