

Adaptation of biological control agents: should we be worried?

JUDITH H. MYERS

Zoology and Plant Sciences, University of British Columbia, Vancouver, B.C., V6T 1Z4 Canada

Biodiversity worldwide is being influenced to an increasing extent by exotic species of plants and animals. In British Columbia, Canada, 21% of the vascular plant species are of foreign origin. The only possible solution in many situations is to reduce the impact of introduced weeds through making further introductions of exotics: in this case herbivorous insects. Foreign weeds have potential and realized impacts on the native flora, but how safe is the introduction of new herbivores? While there are examples of host-switching by pest insects, evidence for major shifts of introduced biological control agents is lacking. There are few examples of adaptations of introduced biological control agents, and the stability of these agents increases the safety of biological control of weeds. The costs and benefits of biological control of weeds were assessed by evaluation of the threats of unexpected impacts of introduced herbivorous insects.

Cactoblastis cactorum* in the United States of America: an immigrant biological control agent or an introduction of the nursery industry?

ROBERT W. PEMBERTON

Aquatic Plant Management Lab, USDA-ARS, 3205 College Avenue, Fort Lauderdale, Florida, 33314 USA

Cactoblastis cactorum was detected in Florida in 1989. It has been assumed that the moth spread north to Florida from the Caribbean where it was introduced for the control of cacti during the 1950s. In Florida, the moth is attacking a rare *Opuntia* species, and it could easily spread and harm many other native *Opuntia* species. This moth, famous for its dramatic control of opuntias in Australia, has become a menace in a drama that some see as biological control gone wrong. After learning about infestations of the moth at a commercial cactus nursery near Miami, I examined the Miami Plant Inspection Station (through which commercial plant imports from the Caribbean normally enter) records of pest interceptions. From 1981-1986, there were 13 interceptions of *C. cactorum*, all of larvae inside opuntia pads originating from a Dominican Republic (D.R.) nursery owned by the Florida nursery importing the cacti. The moth has been a problem for this company's nurseries in both the D.R. and in Florida. All of the interceptions of the moth were in small air shipments, yet most of the >300 000 opuntia plants entering Miami from the D.R. each year during the 1980s were in large marine shipments. It seems very likely that *C. cactorum* was introduced through these under-inspected imports of opuntias.

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