BIOLOGICAL CONTROL OF PLANTS OF POTENTIAL WEED STATUS

K.L.S. Harley
CSIRO Division of Entomology, Brisbane, Queensland

Many of Australia's most serious weeds are imported plants which after a period as inocuous elements in gardens, fields, or pastures undergo what may be termed a population explosion. The factors contributing to this apparent increase in plant aggressiveness undoubtedly vary from species to species but must always be associated with a high level of reproduction. It would appear that only after attaining a level of population, and hence reproductive potential, peculiar to itself can a plant cross that ill-defined line that places it in the pest category.

Usually it is impossible to predict with any degree of certainty which imported plants will ultimately assume weed status. By and large, little is known of their biology, especially their reproductive potential, seed dormancy, and the ability of seed to survive for long periods of time. Status of the plant in its indigenous range does not give any indication; for example, mist-flower (*Eupatorium riparium*), which is a very serious threat to pastures in Hawaii and an increasing problem in Australia, appears to be a rare plant in its indigenous range.

However, for a minority of plants an indication of their potential for assuming weed status may be derived from observations in other countries where they are established. For example, a comparison of the status of broadleaf pepper tree (*Schinus terebinthifolius*) in Australia and Hawaii indicates that this vigorous woody plant may become an extremely serious weed in much of coastal Queensland. At present its status in south-eastern Queensland and north-eastern New South Wales is that of a common horticultural and semi-wild plant in urban and rural areas. In recent years it has been planted in wet tropical areas of Queensland, and it is perhaps in this region that it could pose the greatest problem. In Hawaii, *S. terebinthifolius* has formed vast impenetrable thickets. In many areas chemical or mechanical controls are ineffective or uneconomic. A search has been made for organisms for biological control and although a seed-destroying beetle, *Bruchus atronotatus*, and a leaf-webbing moth, *Episimus* sp., have been established, insects of these types are unlikely to exercise effective control over infestations of such magnitude.

The question is should biological control be considered for imported plants that have not so far attained weed status in Australia, but which are serious weeds in other countries?

Clearly, priority must be allocated to the many serious weed problems that already exist in Australia. However, where there is *prima facie* evidence that a plant could become a serious weed and, as in the case of *S. terebinthifolius*, a biological control organism that reduces reproduction by the plant is already known and readily available, consideration should be given to importing the organism for study in quarantine and possible liberation against the potential weed. Overseas investigations within the indigenous range of the plant should be considered only if the work can be appended to investigations being implemented for biological control of some other plant with a similar indigenous range.

BIOLOGICAL CONTROL OF WEEDS BY PLANT PATHOGENIC BACTERIA

D.C. Sands* and A.D. Rovira
CSIRO Division of Soils, Glen Osmond, South Australia

Plant pathogens have been studied almost exclusively for their effects on plants grown commercially with little or no record of the interactions between pathogens and weed plants. An exception is where the weed becomes important to agriculture as a reservoir of infection or plays a part in the life cycle of certain fungal pathogens.

The concept of studying the pathogens of weeds has not yet been developed within Departments of Plant Pathology, but a better understanding of the diseases that attack weeds of economic importance could open up a completely new method of controlling weeds.

Wilson (1969) stated: 'Effective plant pathogens would have at least three advantages over chemical herbicides.
(a) They can be specific to the weed, (b) Residue and toxicity problems would be reduced or eliminated altogether, and
(c) There would be no accumulation of the herbicide in the soil and underground water.'

Considering the potential for weed control via bacterial pathogens, we isolated in July 1969, from a single sying plant of Paterson's curse, or Salvation Jane (*Echium plantagineum*)