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

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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*) in the Adelaide Hills two *Pseudomonas* spp. isolates that are typical of Group 1 pathogens (Sands, Schroth, and Hildebrand, 1970) except that the cultures have a slight oxidase positive reaction (similar to *P. pisi*) and slightly yellow colonies. No other plants were seen dying in the winter period when plants were growing rapidly, but in late spring, after plants of *Echium* had flowered and the leaves were senescing, bacteria were isolated which appeared to be less virulent forms of the original pathogen. This indicated to us that the weed is living in harmony with pathogens of *Pseudomonas* spp. with a range of virulence from being virtually saphrophytic through to the two pathogenic isolates we obtained.

We inoculated a suspension of the original pathogens into the interveined areas of leaves, kept the tops enclosed in polythene bags, and placed them in controlled-environment cabinets at 21°C and 12 hours day and 15°C night. Disease symptoms appeared and the pathogen could be isolated from the lesions and could be transferred to uninfected seedlings of *E. plantagineum*. In some experiments inoculated plants were killed, but in these instances the roots were infected with the fungal pathogens, *Fusarium* spp. and *Rhizoctonia* spp. This interaction between pathogens resulting in the complete collapse of the plant was more marked at higher temperatures. This result illustrates the significance of interactions between pathogens in inflicting damage to plants and this concept may be of value in developing mixtures of pathogens as weed control agents.

Although these results were obtained under laboratory conditions, and have not been tried in the field, they indicate the potential of this technique as a means of weed control. With bacterial pathogens one can develop strains of high virulence and host specificity. These bacteria could be sprayed onto the weeds at the appropriate time of the year. Bacterial pathogens with high virulence and specificity do not survive for long in soil so there is no problem of residues affecting secceeding crops.

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