Breeding lucerne for the Australian environment

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Lucerne was first introduced into Australia at the beginning of the 19th century. Since then it has become an extremely valuable hay and grazing species. By 1976-77, there were 870,000 ha of pure lucerne and at least 1.6 million ha of lucerne-based pasture.

Despite lucerne's use from the subtropics of Queensland to the Mediterranean type climate of southern Australia, one cultivar, Hunter River, has been used

to the virtual exclusion of all others. A number of locally-bred and introduced cultivars have been evaluated during this period. These varied from creeping-rooted material to winter-active, erect hay types, but they made very little impact on the importance of Hunter River as Australia's premier lucerne. Long term productivity and persistence under grazing appeared to be the major reason for the maintained popularity of this land race.

Despite its general acceptance, however, Hunter River was also deficient in a number of aspects. These included an unsatisfactory growth pattern in some lucerne-growing areas, a lack of tolerance to temperature extremes and to soil factors such as waterlogging, acidity and salinity, lack of persistence under continuous heavy grazing, bloat-inducement and susceptibility to root and crown rots and foliar diseases. There was some suggestion that the persistent, winter-active cultivar Paravivo was gradually being accepted in South Australia. More recently, the semi-dormant cultivar, Falkiner, with tolerance to waterlogging and its associated diseases, had shown increasing popularity in New South Wales. However, the potential impact of these two cultivars on the lucerne industry was negated by the arrival of three lucerne aphids from 1977.

The chance introduction of these aphids has lead to a major upheaval in the Australian lucerne industry. Aphid-resistant Australian and U.S.A. cultivars have been sown to replace the extremely aphid-susceptible Hunter River. This change has led to an increasing awareness of the need for further change. Resistance to diseases such as Phytophthora, Colletotrichum and bacterial wilt and to nematodes is available in U.S.A. material, and is also being incorporated into new Australian cultivars. More detailed information is required regarding the range and relative importance of other diseases such as Stagonospora crown rot and Rhizoctonia root canker to give the Australian breeders better-defined targets. In the future it is likely that more emphasis will be given to the development of new cultivars with tolerance to the problems of specific lucerne growing regions, rather than to the development of an all-purpose Hunter River type lucerne. Such a trend should ensure that no one cultivar dominates the Australian scene to the extent that Hunter River did in the past.

Attempts are also being made to develop lucernes with tolerance to a wider range of edaphic factors. Selections are being made to increase the salt tolerance of lucerne in light of increasing problems arising from secondary salinization of land. Likewise, the area of pasture on soils with a pH less than 5.5 is steadily increasing. Attempts are therefore being made to improve the adaptation of lucerne to such acid soils. Research is also continuing into further ways of improving the lucerne plant. A lucerne with tannins in its leaves is being sought as a means of controlling bloat, while there is also a need to examine the possibility of reducing the photoperiod sensitivity of lucerne to increase winter growth without affecting grazing resistance characteristics.

In essence, the lucerne aphids disrupted what was probably an unsatisfactory complacency in the Australian lucerne industry. The likely development of a range of more specifically adapted lucerne cultivars should ensure that lucerne becomes ever more valuable and widespread than in pre-aphid Hunter River times.