

A progress report on lucerne breeding in south Australia

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The four major avenues of selection in the lucerne breeding in South Australia are tolerance to insects and mites, persistence under grazing in drought tolerant lucernes, adaptation to winter-wet soils and resistance to root, crown and foliar diseases.

Tolerance to insects and mites

In recent years the three pasture aphids, spotted alfalfa aphid (*Therioaphis maculata*), blue-green aphid (*Acyrtosiphon kondoi*) and pea aphid (*Acyrtosiphon pisum*) have been the focus of pest resistance in Australian agriculture. However other pests are

serious in lucerne such as redlegged earth mite (*Halotydeus destructor*), lucerne flea (*Sminthurus viridis*), Sitona weevil (*Sitona discoideus*) and wingless grasshopper (*Phaulacridium* sp.). Since 1979 plants with very high tolerance levels to all these pests have been identified. Wingless grasshopper tolerance was detected in heavily attacked lucerne near Esperance, Western Australia, by M. Grimm. M. Holland and I. Gaehne. Mature plant resistance to redlegged earth mite was first detected by Mr. R.K. Harkness, Tintinara. S.A. in an experimental lucerne in 1981. Seedling tolerance to earth mite, lucerne flea and sitona weevil have also been found.

An extensive crossing programme involves these sources of resistance and aphid resistance. In 1983 field plots of some hybrids persisted unprotected from attack by aphid, earth mites, lucerne flea and sitona weevil while all varieties, other than Sheffield, were killed.

Resistance to Grazing in Dryland Lucerne

Selection for persistence under intense continuous grazing and drought tolerance at Tintinara and Marrabel, S.A. and Esperance. W.A. (bolland and Grimm) has identified a number of lines with good persistence. Their progeny are now in test under three grazing intensities; continuous, 3 weeks grazing/3 weeks rest and 1 week grazing/5 weeks rest. The most promising lines trace to wild Spanish and Middle Eastern parents. Sheffield. Hunter River and some winter dormant varieties which may be evading grazing in winter.

Adaptation to winter-wet soils

A new project has been commenced to integrate selection for tolerance to waterlogging, field selection for persistence in winter-wet soils, resistance to *Phytophthora* root rot and other root-damaging pathogens and tolerance to soil salinity. This project has been developed in association with Dr. G. Reed Hamilton, who has identified tolerance to winter-wet soil in 'Falkiner' and other varieties.

Resistance to diseases

Selection for resistance to *Phytophthora* megasperma and *Colletotrichum trifolii* (anthracnose) is an integral part of our programme. Selection programmes are being developed for seedling resistance to *Stemphyllum botryosum* (Stemphyllum leaf spot), *Leptosphaerulina* sp. (pepperspot) and *Stagonospora* sp. (Stagonospora crown rot).

In addition field selection is being conducted for tolerance to these five diseases and others including Ditylenchus dipsaci (stem nematode), Meloidogyne spp. and Corynebacterium insidiosum (bacterial wilt). Field selection is arguably as important as glasshouse screening.