Alfalfa in Australia & New Zealand

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The objective of this paper is to provide an overview of the production systems of alfalfa (*Medicago sativa*) in Australia and New Zealand, including current production statistics & yields, issues in the industry and breeding focuses.

Australia: 3.2 million ha under lucerne cultivation with 90% grown in rainfed systems in South-Eastern Australia. Most systems rely on winter rainfall for growth, with producers favouring livestock grazing over hay or silage production, resulting in usually only a single hay cut during the later months of winter. Intensive hay production systems occupy 100,000 ha of land, representing ~3% of production, usually under irrigation due to sporadic summer rainfall. Winter rainfall pushes lucernes production into the later stages of summer, increasing the growing season compared to annual pasture species, with alfalfa stands commonly grown amongst naturalised grasses, clover, & annual medics.

Dry matter production is largely limited by rainfall or plant available water (PAW) with dry matter yields ranging from 5.4t/ha/yr in the drier parts of western Victoria, to 20t+/ha/yr in systems under irrigation. Lucerne/grass as well as other mixtures are becoming more commonplace in Australian systems, offering increased earlier season winter feed. Fescue, cocksfoot and chicory all compliment the spring and summer production of lucerne, closing the winter feed gap otherwise left by lucerne alone.

Alfalfa breeding in Australia have targeted limitations such as grazing pressure, drought tolerance, low soil pH and soil acidity. As rainfall and PAW is the greatest limiting factor, alfalfa is most commonly grazed as opposed to hay production. As a result, the two most targeted traits for new varieties are drought x grazing tolerance. Common variety winter active lucernes are 7-10 with WAc 7 favoured for greater persistence and survival in colder, wetter environments and extensive grazing. WAc10 varieties favoured in winter rainfall dominant cropping areas, and shorter rotations where fast regrowth is desired and shorter-term persistence is acceptable.

Seed production is almost entirely centered in the South-East of South Australia. With the localities around Keith accounting for 91% of Australia seed production. Alfalfa seed is a $30.5 million dollar industry with 7853 tonnes exported in 2019. Australian alfalfa seed exports target the middle east and Africa with key importing countries; Saudi Arabia, Egypt, South Africa, Sudan along with the United States comprising top 5 import partners.

Issues facing the Australian alfalfa industry are increasing seed wasp (Bruchophagus roddi) populations reducing yields in seed crops, as well as blue-green aphid (Acyrthosiphon kondoi) is re-emerging as a greater pest that has developed resistance to insecticides and overcome plant-based resistance.

New Zealand: New Zealand's lucerne production is largely limited by climate with the islands being dominated by perennial ryegrass and white clover pastures. Alfalfa is grown across 150 000ha based on estimates of seed imports. The cooler climate of New Zealand lends itself to more temperate species of pasture in the *Medicago & Trifolium* species. Dominant varieties grown are cultivars derived in Europe, North America & Australia. Much of the industry was brought to a standstill in the 1980's due to pests and disease such as Sitonia weevil and stem nematode.

Due to higher rainfall in New Zealand, winter active annuals provide greater cool season production. As a result, most varieties grown have lower winter activities, with emphasis placed on its growth in spring and early summer to close feed gaps. Sowing rates are subsequently lower at 7-10kg/ha^{-1} whilst being sown alongside grass mixtures. New Zealand production of alfalfa sees irrigated stands of alfalfa with yields of up to 28t/ha/yr.

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