GROWING LUCERNE FOR SEED

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Research at Trangie has addressed the main effects and interactions of the major factors influencing seed yield in lucerne. High inputs of irrigation, pollination and insect pest management were essential to achieve consistently high seed yields over several seasons. Yields were reduced when the level of one or more of these factors was decreased. The maximum measured seed yield (machine harvested) exceeded 1100 kg/ha; this was obtained from a 3 year old crop. This is well above average commercial yields of 250 kg/ha. Break-even yield has been calculated to be 200 kg/ha, given average seed prices and seasonal conditions.

EXPERIMENTAL

The main field work in this project involved detailed studies of water deficits (in the soil and plant), insect pest populations, and different indices to assess pollination efficiency of the honeybee.

A shallow clay soil typical of major inland irrigation areas in eastern Australia was selected on the Research Centre at Trangie. Two separate experiments were established to achieve the project's objectives. In experiment one, a range of commercial irrigation strategies was field tested. Effects of insect pests on seed set were also quantified. In experiment two, four irrigation frequencies were compared to determine the effect of water stress on yield. Differences in yield response were explained in terms of the effect of water supply on growth, individual yield components and pollinator activity.

RESULTS

Findings from both experiments highlight the fact that yield response to irrigation is dependent on the effectiveness of insect pollinators and pest control strategy and clearly is not an equilbrium value. Frequent small irrigations optimised the use of applied water, increased the production of flowers, raised the number of potential sites for seed setting on stems, and maximised seed yield. Yield was found to have a strong positive relationship with total dry matter of lucerne tops, the number of seeds/m^2 and the total amount of water applied. Seed yields were reduced by increasing stress, particularly during flowering.

High rates of pollination were measured in all irrigation treatments, indicating that yields were reduced in the drier treatments because of the lower number of racemes and flowers produced. Pollination efficiency was not significantly affected by irrigation regime but showed large variations between years, particularly with less frequent irrigation. Good control of insect pests increased seed yields by 300% even in relatively low yielding dryland stands. The major insect pest identified over several seasons was the lucerne seed wasp (*Bruchophagus roddi*) which caused yield losses around 46% in most years.

Economic analysis of data from this project is planned, culminating in an information base suitable for rational decision-making by seed growers. To assist this transfer of knowledge an advisory video is already available. These data are also currently being used to develop the LATIS (Lucerne Agronomy Technology Information System), a type of expert system computer model.