

## Lucerne production under different frequencies of flood irrigation

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Over 4,500 ha of lucerne was grown in 1983 for hay or grazing in northern Victoria. Most of the lucerne is grown on sandy or sandy loam soil types. This experiment investigates the relationship between irrigation frequency, the quantity of applied water and lucerne production.

### Method

A two hectare paddock of Cohuna Fine Sandy Loam was landformed to an average fall of 0.2% (1:500). Lucerne c.v. WL 318 was sown at 10 kg/ha in 1980 and established over the 1980/81 irrigation season. Superphosphate was applied at 650 kg/ha/yr. The experiment was a randomized block design with four replicates. Four different irrigation treatments (see Table 1) was applied over the 1981/82 irrigation season. Black plastic sheeting was buried vertically to a depth of one metre between bays to prevent treatment interaction.

Lucerne yields were recorded by cutting two subplots, each 5m x 1m in each treatment. Water use was recorded for each bay by a segmented orifice flow meter (1).

### Results and discussion

**Table 1. Water applied and resulting yields of the different irrigation treatments.**

Treatment		Lucerne Yields (Tonnes/D.M./ha)					Irrigation Water Use ML/ha		
Irrigation Interval	Number of Waterings	3/11/81	22/12/81	2/2/82	1/3/82	14/3/82	Total Yield	Av. Per Irrigation	Av. Per Season
No irrigation	0	4.1	4.2	2.6	3.1	1.6	16.1	-	-
E-R = 225 mm	5	4.1	4.7	5.3	4.4	3.9	22.4	0.98	5.3
E-R = 150 mm	8	4.6	5.2	5.7	3.6	4.2	23.3	0.74	5.4
E-R = 75 mm	17	5.1	5.4	6.4	4.5	4.3	25.7	0.55	8.6

Less water was applied per irrigation to the more frequently irrigated treatments. However, seasonal water use was greater with more frequent irrigations. Dry matter yields were directly related to this higher seasonal water use and the total yields were all significantly different ( $P < 0.05$ ). Higher lucerne production from more frequent irrigation agrees with (2,3)

The high yields of the "No Irrigation" treatments early in the season were attributed to soil moisture reserves generated during the preceding winter (229mm of rain fell in June, July and August). The watertable rose to 80cm from the soil surface in September but fell to below two metres by early December. Even with these extra reserves of soil moisture, a linear relationship was found between yield and water applied ( $X$  = irrigation plus rainfall in ML) from September to mid-April with no evidence of curvilinearity.

Yield (Tonne/ha)  $r 15.3 + 1.2 X$ . Range  $1.2 < X < 11.4$   $R^2 r 0.90$  i.e. for every extra megalitre received 1.2 tonnes of extra dry matter was produced.

A high seasonal water use resulting from fast, frequent irrigation produces higher yields in lucerne. We have no knowledge of the long term effects of frequent irrigation on the longevity of a lucerne stand.

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3. Stanberry C.O. (1955) Yearbook of Agriculture 1955 D.S. Govt. Printing Office Washington D.C. pp. 435.