

Seed yield of three annual pasture legumes in response to water deficits during flowering and seed development

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Persistence and regeneration of annual pasture legumes depends on adequate seed production. Marked seed yield reductions have been observed when water deficits occur at the peak of flowering (1,2). We examined the effects of water deficits during flowering and seed development on three pasture legumes.

Methods

In a glasshouse at the University of Western Australia, swards of *Trifolium subterraneum* cv. Nungarin, *Medicago truncatula* cv. Cyprus, *Medicago polymorpha* cv. Serena were grown in 60 x 30 x 25 cm wooden boxes containing a 4:1 sand: loam mixture, placed in trays for bottom watering. Swards were defoliated fortnightly 35-78 days from sowing (dfs) and flower counts were made twice weekly between 83 and 149 dfs. By withholding water, two cycles of soil moisture deficit were imposed, at 94-108 and 116-126 dfs. After the second water deficit, swards were rewatered for 3 weeks and leaf area index (LAI) and shoot dry weight measured at 148 dfs when watering ceased. At maturity, burrs were harvested from two 3.52 dm² quadrats for seed yield components.

Results and Discussion

Table 1. Effects on growth and the components of seed yield of water deficits during flowering in a subterranean clover and two annual medics

Pasture legume and treatment	GROWTH (148dfs)			COMPONENTS OF SEED YIELD			
	LAI (m ² /m ²)	Shoot dry weight (g/dm ²)	Flowers (83-149 dfs) (no/dm ²)	Burrs or pods (no/dm ²)	Seeds per burr or pod	Weight per seed (mg)	Total seed yield (mg/dm ²)
NUNGARIN							
Water deficit	1.6	6.8	73.2	43.4	3.23	5.70	549
Control	3.0	15.1	103.5	75.8	3.09	5.88	1,138
CYPRUS							
Water deficit	9.4	21.8	102.6	98.0	6.53	3.33	1,435
Control	5.9	29.1	87.7	62.2	6.99	3.63	1,034
SERENA							
Water deficit	0.3	3.5	105.5	80.0	3.79	3.11	755
Control	1.5	10.2	125.5	125.1	4.10	3.22	1,704
LSD (P=0.05)							
Species	-	3.1	-	-	-	0.42	-
Water	-	2.5	-	-	-	ns	-
Spp x Water	1.2	ns	7.8	19.7	0.27	ns	418

Three weeks after rewatering, LAI and shoot dry weight in Nungarin and Serena were depressed relative to the watered control. In Cyprus, however, LAI was 60% higher than in the controls even though the dry weight was less. Water deficits reduced flower and burr production in Nungarin and Serena, but in Cyprus they were greater than in the controls; seed yield reductions in Nungarin and Serena were 62% and 66% and in Cyprus there was an increase of 39%. The decrease of seed production in subterranean clover due to water deficits during flowering and seed set conforms to previous observations (1,2), but the increase in leaf area, flower production and seed yield in Cyprus was unexpected. This is being investigated further.

1. Andrews, P., Collins, W.J. and Stern, W.R. 1977. Aust. J. Agric. Res. 28: 301-7.
2. Wolfe, E.G. 1981. Rept. Reserve Bank of Aust. Research Fellowship pp. 1-17.