## Influence of post-seeding application of nitrogen on grain yield and water stress of wheat in a Mediterranean climate

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One tactical decision that dryland farmers can make to improve wheat yields is to manage fertiliser nitrogen application in relation to rainfall. Application of nitrogen at seeding is often conservative and cannot reflect seasonal variation in rainfall after sowing. One solution is to apply nitrogen after sowing in parallel with rainfall. However, there is little information on the correct timing and rates of use of post seeding applications of nitrogen fertiliser for West Australian conditions.

## Methods

Wheat (Triticum aestivum L. cv. Gutha) was sown at 50 kg/ha on 29 May 1986 in plots 2.1 m wide by 22 m long. Immediately prior to sowing either 0 or 30 kg N/ha as ammonium nitrate was drilled into the plots. The soil was a sandy loam above a grey clay below 40 cm. The May to October rainfall was 225 mm with 73 mm falling in the first month of seeding. On 16 July (tillering), 12 August (stem elongation) and 15 September (ear emergence), 0, 15, 30 or 60 kg N/ha as ammonium nitrate was broadcast on subplots of 2.1 m by 2.0 m superimposed on the plots that had received 30 kg N/ha at seeding. The centre 1 m<sup>2</sup> of each subplot was harvested at anthesis and maturit<sup>y</sup>. The leaf water potential was measured at anthesis by the pressure chamber technique.

## Results and discussion

Nitrogen ( Seeding	(kg N/ha) at t <sub>1</sub> t <sub>2</sub> t <sub>3</sub>	$(m^2/m^2)$	LWP (MPa)	DM (t/ha)	$\frac{\text{Heads}}{(\text{no/m}^2)}$	Grain (t/ha)
0	0	0.58	-1.3	2.92	155	1.18
30	0	0.73	-1.5	4.23	158	1.62
Tillering	(t,)					
30	15	1.05	-1.1	5.70	166	2.07
30	30	1.29	-1.6	6.80	206	2.55
30	60	1.74	-2.5	7.51	238	2.68
Stem elons	zation (t <sub>a</sub> )					
30	15 *	0.68	-	4.45	145	1.71
30	30	1.05	-	4.79	166	1.82
30	60	1.27	-	5.20	188	2.03
Ear emerge	ence (t <sub>a</sub> )					
30	153	0.73	-	4.46	138	1.72
30	30	0.73	-	5.06	170	1.98
30	60	0.73	7	3.43	158	1.36
LSD(P=0.05)		0.50		1.30	38	0.48

Table 1. Leaf area index (LAI), leaf water potential (LWP) at anthesis, and dry matter production (DM), number of heads and grain yield at maturity in Gutha wheat given various nitrogen treatments (n=4).

The application of 30 kg N/ha at seeding increased LAI at anthesis and increased grain yield by 37%. Additional nitrogen at tillering further increased the LAI at anthesis, dry matter at maturity and the final grain yield. Application of 60 kg N/ha lowered the leaf water potential at anthesis, but no "haying off" was evident and the grain yield was maximal in this treatment. Later application of nitrogen had no significant effect on grain yield. The results show that yield increases over those obtained from nitrogen applied at seeding are possible if applied up to tillering. No evidence was obtained that high nitrogen use lowered the grain yield due to excess water use prior to flowering (1).

1. Fischer, R.A. 1979. J. Aust. Inst. Agric. Sci. 45: 83-94.