

Effect of time of application of nitrogen fertilizer on dry matter and nitrogen partitioning in wheat

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Nitrogen (N) availability affects wheat yield and quality. Split applications of nitrogen fertilizer have been shown to increase wheat quality without detriment to yield on low fertility sites on the Canterbury Plains, New Zealand (1,2). These results may be influenced by how timing of N fertiliser application affects the accumulation and partitioning of dry matter (DM) and N.

Methods

An experiment consisting of all combination of six cultivars and four nitrogen strategies (50 or 100 kg N/ha at tillering (50T or 100T) and 0 or 50 kg N/ha at booting (0B or 50B)) was sown in autumn. Samples for dry matter and N concentration (%) determinations were taken at anthesis and maturity.

Results and discussion

There were no interactions between nitrogen treatments, and so only the main effects are presented in Table 1. Adding the extra 50 kg N/ha at tillering (100T) significantly ($P=0.05$) increased DM at both anthesis and maturity, whereas adding it at booting (50B) significantly increased grain yield only. Both treatments significantly increased N% at anthesis and maturity, but 50B had a greater effect on grain N% and a smaller effect on anthesis N% and crop residue N%. From anthesis to maturity net DM production was close to 5520 kg/ha for all treatments, whereas net N uptake was 4.7 kg/ha for extra early N (100T) and 15.5 kg/ha for late N (50B). In this low fertility situation, late N was equally effective as extra early N in raising grain yield and more effective in raising grain N%, whereas more of the early N was taken up before anthesis and diverted into the production of DM and N, which appeared to be less readily relocated to the grain.

Table 1. The effect of various N strategies on mean dry matter (kg/ha) and N% at anthesis, and of grain and crop residues at maturity.

			50T	100T	0B	50B	l.s.d.($P=0.05$)
Dry Matter	Anthesis		8260	8810	8400	8660	417
	Maturity	Grain	6730	7210	6750	7180	325
		Crop residue	6880	7300	6960	7220	368
Nitrogen %	Anthesis		1.72	2.01	1.79	1.94	0.07
	Maturity	Grain	2.00	2.13	1.94	2.19	0.06
		Crop residue	0.34	0.39	0.35	0.38	0.02

References

1. Martin. R.J. 1987. Proc. N.Z. Agron. Soc. 17, 103-8.
2. Martin. R.J., Sutton. K.H., Moyle, T., Hay. R.L. and Gillespie, R.N. 1992. N.Z. J. Crop and Hort. Sc. 20, 273-82.