Grain yield and protein content in wheat cultivars in response to time of application of nitrogen fertilizer

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Responses by wheat to nitrogen fertilizer vary considerably from season to season, depending on weather conditions, particularly rainfall, which cannot be forecast with any certainty. If the decision to apply nitrogen is deferred until several weeks after seeding (double ridge stage, Single 1964), it will enable the farmer to obtain a more accurate forecast of the season on the basis of the early season rainfall. Further, any nitrogen deficiency in the crop can be recognised at this stage and the fertilizer applied to areas where it is most needed.

The experiment was conducted on a red-brown earth with a clay loam topsoil at Dookie Agricultural College in 1978. The site was selected for a uniformly low level of available nitrogen following a wheat crop in the preceding season. Six cultivars (Table l) were chosen and nitrogen at the rate of 80 kg/ha as ammonium nitrate was applied at one of two stages, (seeding and double ridge stage). The treatments (including a no nitrogen control) were factorially combined and arranged in a randomized block design with three replications.

TABLE l. Grain yield (t/ha) and grain protein content (%) of wheat cultivars as affected by time of application of nitrogen fertilizer.

Cultivar	No nitrogen		Nitrogen application at seeding (middle June)		deferred (middle August)	
	Yield	Protein	Yield	Protein	Yield	Protein
Egret	2.68	12.07	2.77	13.27	2.93	14.03
Olympic	1.99	11.57	2.29	13.93	2.79	14.50
Kalkee	2.80	11.73	2.96	13.27	3.03	14.27
Kewell	2.62	12.97	2.85	12.83	2.82	13.20
Zenith	2.99	11.97	3.90	13.67	3.68	13.97
Oxley	4.54	12.50	4.55	12.37	4.23	14.17

Both grain yield and protein content of all cultivars were increased by the application of nitrogen except Oxley which did not show any yield response. Compared to differences between cultivars, the yield response due to nitrogen was small but consistent. Cultivar differences in yield and protein content are clearly evident from the data. With Olympic, Egret and Kalkee yields were increased by 31.8, 5.8 and 3.4% respectively when the fertilizer was applied in August instead of in June, at the time of seeding. Yields were less for the other cultivars when the nitrogen was applied late than when it was applied at seeding. The effect of deferred application of nitrogen was more pronounced on the protein content than the grain yield of the various cultivars.

The results show that the cultivars differ in their ability to utilize nitrogen supplied at different stages of growth. The data indicate that during favourable seasons, it may be possible to produce high yields and high protein wheat with the existing cultivars by manipulating the time of application of nitrogen fertilizer.

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