**The effect of nitrogen fertilizer and disease control on yield and protein content of wheat in Canterbury, New Zealand**

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Following deregulation of the New Zealand wheat industry, there is increasing emphasis on grain quality. On the Canterbury Plains, where high yields are required for economic survival, there can be large variations in the yield and quality of wheat between sites and seasons. To help explain these conflicting responses a quantitative framework (1), previously used to explain fertility differences (1,2), can be extended to include other agronomic factors, and is demonstrated using results from a series of field trials (3).

**Methods**

Trials were undertaken with autumn sown Rongotea wheat over three years on flood irrigated fertility depleted stony Lismore silt loam soils at Winchmore Irrigation Research Station near Ashburton (3). Treatments included 3 or 4 rates of nitrogen, under either complete or partial disease control.

**Results and discussion**

Grain yield and % protein responses to nitrogen and disease control are shown in Figure 1. Major diseases were stripe rust and mildew. Compared to complete disease control, partial control either decreased yield, increased % protein or both.

Figure 1 shows the C shaped response of yield and protein to nitrogen fertilizer. Factors restricting yield such as disease will move this response down and/or to the right, particularly at high nitrogen rates.

Results from Seasons 1 (x) and 3 (e) compare favourably with British trial results (1), whereas Season 2 (o) is more similar to Australian results (2). The results demonstrate the large between season variation in yield and quality in Canterbury, in this case due mainly to rainfall and disease pressure.

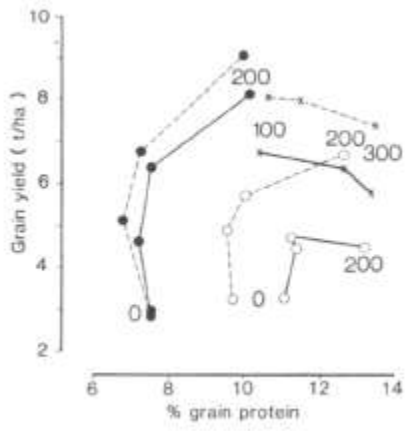


**Figure 1: The effect of disease control (low ---; high --- -) and different rates of nitrogen fertilizer (kg N/ha) over three seasons (x = 100, 200, 300 kg/ha; 0,0 = 0, 50, 100, 200 kg/ha) on grain yield and % grain protein.**

1. Benzian, B., Lane, L. (1979). J. Sci. Food. Agric. 30, 59-70.

2. Russell, J. (1964). Aust. J. Exp. Agric. Anim. Husb. 4, 345-351.

3. Daly, M.J., Dyson, C.B. (1987). Proc. Agron. Soc. N.Z. 17, 95-101.