

Response of malting barley grown on a red-brown earth to spring irrigation and nitrogen fertiliser

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Strategies for growing malting barley should aim to produce the maximum number of plump grains from the resources available. Irrigation provides the opportunity to manage nitrogen fertility and water status for optimum effect if the interaction between these factors and yield and quality is understood.

Methods

The response to irrigation at either 50 mm or 90 mm deficit and up to 100 kg N/ha applied at sowing was studied using the variety "Parwan" sown in mid- July at 120 kg/ha following pre-irrigation in autumn. Total available nitrogen to 60 cm depth at sowing was 85 kg/ha with 30 kg/ha in the top 10 cm layer. Nitrate-N to 60 cm was 60 kg/ha. Irrigation commenced at 83 days after sowing and was maintained until physiological maturity. Water use for all treatments was measured using gravimetric and neutron probe techniques.

Results and discussion

All treatments produced malting grade barley. Kernel weight averaged 41 mg and protein contents ranged from 7.5% to 9.8%. Head density was the dominant component determining yield. The relationship between head density and yield is shown in Figure 1. As the main phase of tillering had ceased before irrigation commenced, the number of tillers produced was mainly affected by the level of nitrogen. Subsequent productivity was further influenced by water regime. Differences in yield between irrigation treatments were not always significant. The yield response to nitrogen fertiliser and irrigation is drawn in Figure 2. Marginal return from applied nitrogen and irrigation diminished with increasing fertility. Figure 3 shows the water use efficiency of irrigation for the range of fertiliser rates. Since quality was acceptable in all situations, optimum strategies for production would depend on the availability and cost of both water and nitrogen in relation to the price of malting barley.

