# Yield limitations of irrigated wheat in the lower Namoi Valley

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During the period 1977 to 1980 a study was conducted to investigate the reasons for poor yields of irrigated wheat in the lower Namoi Valley, a problem which has concerned producers for a number of years. A wide range of agronomic practices was examined, for which the major results are presented.

## **Sowing Date**

For a range of spring wheat cultivars the optimum time of sowing was early June (range of about 3 weeks). The optimum sowing date was that which resulted in flowering during the last week of September (range of 1 week). The percentage reduction in grain yield due to sowing and flowering beyond the optimum time was approximately 6% and 16% per week respectively. Early yield reductions were due to frost damage, while low yields at later sowings were caused by high temperatures during grain filling, curtailing grain growth.

## Varieties

The varieties recommended for the lower Namoi Valley are high- protein cultivars (eg. Songlen, Timgalen, Shortim). In all trials conducted these varieties were consistently outyielded by low-protein varieties (eg. Egret, WW15). It was also found that the response to irrigation tended to be lower with high protein wheat. There appears to be a ceiling yield limit for Songlen-like varieties of less than 600 gm/m<sup>2</sup>.

## **Crop Nutrition**

The major fertiliser need for irrigated wheat was nitrogen. Significant yield increases were obtained with applications of 100 kg N/ha, both after summer fallow and after a summer crop. In two experiments with wheat grown after cotton it was found that topdressing with nitrogen at late tillering increased yields, but no advantage was gained by splitting the total nitrogen application between presowing and late tillering.

## **Crop Rotation**

Many irrigated wheat crops are grown in a cotton rotation. Grain yields of cereals grown after cotton were 30% lower than those grown after fallow. Protein levels were also reduced. These effects were largely due to the low levels of soil nitrogen left after cotton at sowing. The nitrogen "cost" of growing wheat after cotton was of the order of 100-200 kg N/ha.

## Water Management

Soil measurements indicate that for about one week after an irrigation there are low levels of soil  $0_2$ . Flooding the soil for more than 2 to 4 days can adversely affect plant growth. However, subsequent grain yields may not be significantly affected. The essential feature of an irrigation system for the soils of the Namoi Valley is the ability to apply water rapidly and allow quick drainage. Using such a system high yields (in excess of 700 gm/m<sup>2</sup> for WW15) were obtained. However, the present commercial system of watering in the valley is not amenable to this strategy.

## Conclusions

Given the current options available to farmers, high yields (600-700 gm/m<sup>2</sup>) should not be expected. Such yields are obtainable, but probably with a low protein wheat sown in early June under an irrigation system which does not produce prolonged periods of waterlogging.