

## Relationships between n supply, crop growth and yield of irrigated wheat

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Water restrictions have forced many farmers in Southern N.S.W. to grow more wheat rather than rice. Unfortunately irrigated wheat yields are often low, and similar to those obtained under dryland conditions. One reason for this is that many crops are N deficient. Farmers aim to fertilize for maximum economic return, but too much N fertilizer leads to lodging and severe yield reduction. Thus there is a need to accurately predict the quantity of N necessary to maximise economic returns. In the experiments below the relationship between crop growth and yield was examined. Crop growth at ear initiation (E.I.) was taken as the critical growth stage as earlier studies (1) showed that N fertilizer application to crops which are deficient at this time will markedly increase yield.

### Methods

Data from 3 factorial experiments (2) which examined the effects of stubble management, N application rate and timing on wheat growth and yield were combined with data from a series of 13 N fertilizer studies conducted in irrigated wheat crops in N.S.W. The combined data was used to develop a general relationship between crop growth and yield

### Results and discussion

The relationship between crop DM at E.I. and yield is presented in Figure 1. Variation in crop DM explained 70% of the yield variation over the 5 years and 16 sites. In 1979 applying 140kg N ha<sup>-1</sup> to plots at E.I. increased mean yield from 1.7 to 3.2t ha<sup>-1</sup>. In 1986 applying an average of 117kg N ha<sup>-1</sup> across 3 sites at E.I. increased yield of unfertilized plots from 3.4 to 5.7kg N ha<sup>-1</sup>. These results demonstrate the potential for using simple crop growth measurements to identify N deficient crops. Nitrogenous fertilizer can then be applied as necessary to improve economic returns.

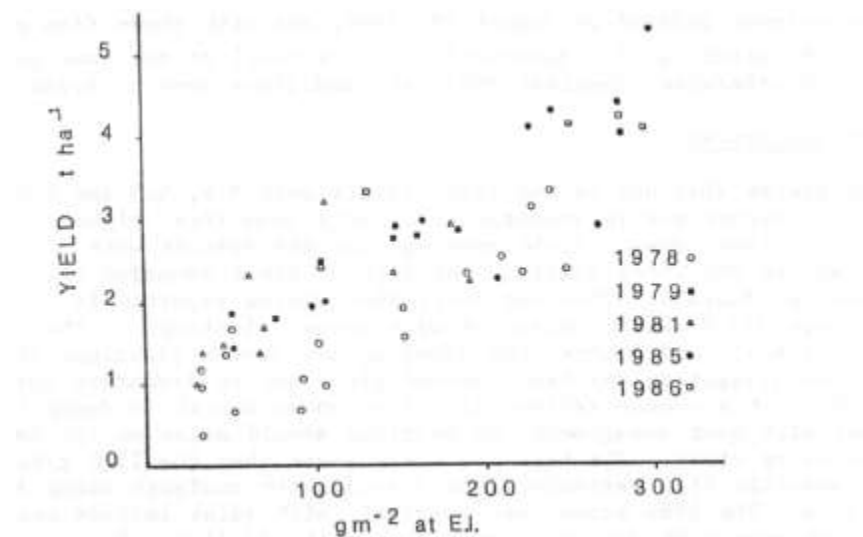


Figure 1. Relationship between Dry Matter at Ear Initiation(gmm<sup>-2</sup>) and grain Yield of wheat. Yield (t ha<sup>-1</sup>) = 0.65 + .0112 x DM at EI r<sup>2</sup> = .71.

### References

1. Bacon, P.E. and Cooper, J.L. (1985a). *Fld Crops Res.* 10 229-240.

2. Bacon, P.E. and Cooper, J.L. (1985b). *Fld Crops Res.* 10 241-250.