

3.1.4 The Relationship Between Nitrogen Rate And The Need For Disease Control In Winter Wheat - Hagley, Tas

Location:

Hagley, Northern Tasmania

Funding Organisation:

Grains Research and Development Corporation.

Researchers:

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Growing Season Rainfall (Apr – Dec): 488mm

Irrigation: 108mm

Soil Nitrogen status:

113 kg/ha N (0-60cm) plus 61.5 kg/ha N (pre GS30)

Summary of Findings:

In an irrigated trial on Mackellar (feed wheat) at Hagley, Tasmania, plot yields ranged from 6.6 – 9.4 t/ha depending on the level of nitrogen and fungicide input. There was a significant response to nitrogen application, with an optimum that varied from 60 -120 kg/ha depending on whether fungicide was applied. There was a significant yield interaction ($P=0.003$) between the amount of applied nitrogen and the level of fungicide input, whereby the higher the level of applied nitrogen the greater was the need for fungicide input. Without fungicide application at stem elongation the optimum nitrogen input for the crop was 60 kg/ha N; however with fungicide application it was at least 90 kg/ha N.

There was a significant increase in grain protein associated with increasing nitrogen level in the range of 60 -120 kg/ha N and a significant increase in protein associated with fungicide application.

Background and Objectives:

To determine the relationship between nitrogen rate and the need for disease control in winter wheat in the high rainfall zone environment of Tasmania.

▼ **Table 3.11: Trial inputs**

| | |
|---------------------------|---------------------------|
| Sowing date: | 25 May 2007 |
| Harvest date: | 25 January 2008 |
| Variety: | Mackellar |
| Target population: | 204 plants/m ² |



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Treatments:

Mackellar wheat sown 25th May was treated with three levels of fungicide superimposed on 5 rates of nitrogen.

i) Applied nitrogen levels:

0, 30, 60, 90 & 120 kg/ha N applied as a single nitrogen dose at GS30-31 – 12th September

ii) Fungicide Programmes:

1. Untreated
2. Opus 250 ml/ha @ GS 32-33 followed by Opus 250 ml/ha @ GS39-45
3. Opus 250 ml/ha + Strobilurin (F500) @ GS 32-33 followed by Opus 125 ml/ha + Strobilurin (F500) @ GS39-45

Opus 125SC – 250ml/ha = 31.25g/ha

Epoxiconazole ai

F500 contains pyraclostrobin

iii) Disease assessments:

There were large differences in green leaf retention due to fungicide treatment (full analysis currently being undertaken) which illustrated that Opus + F500 gave slightly superior green leaf retention to Opus which in turn was significantly better than the untreated.

ii) Yield*Response to nitrogen rate*

There was a significant response to increasing nitrogen rate in the trial when all fungicide treatments were averaged (Figure 3.11), with an optimum of approximately 90 kg/ha N. However these mean values disguise a considerable difference in optimum rate dependent on whether fungicide was applied (Figure 3.11).

Response to fungicide application

Both the triazole fungicide programme (Opus) and the triazole plus strobilurin programme significantly out yielded the untreated control as result of leaf rust control, giving an average yield increase of 1.24 – 1.38 t/ha. There was no advantage to the addition of strobilurin (F500) in this trial when all nitrogen levels were considered (Figure 3.13).

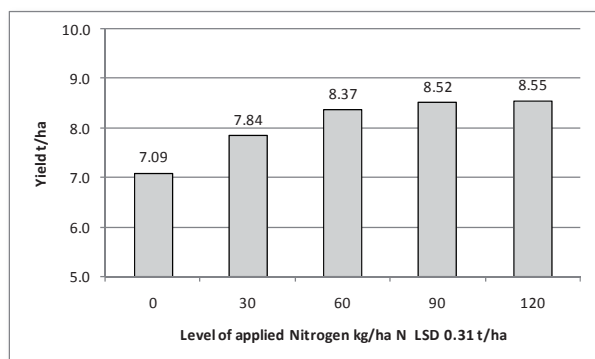
Response to increasing nitrogen rate and fungicide application

There was a significant yield interaction $P=0.003$ between the amount of applied nitrogen and the level of fungicide input, whereby the higher the level of applied nitrogen the greater was the need for fungicide input (Figure 3.12).

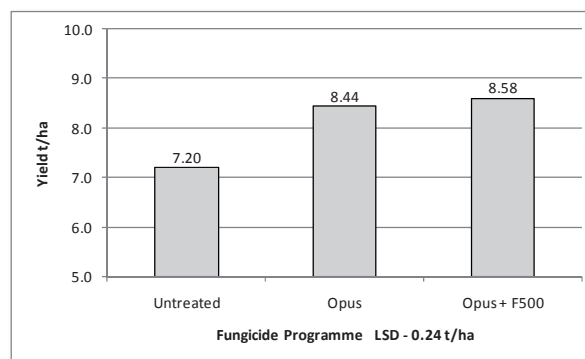
Results are very similar to the 2006/07 trial in Tasmania with additional applied nitrogen increasing the level of disease pressure in the crop. Without fungicide application at early stem elongation the optimum nitrogen input for the crop was 60 kg/ha N; above this the additional canopy biomass resulted in greater disease pressure. With fungicide application the optimum was at least 90 kg/ha N. From 90 to 120 kg/ha N there was a trend for increased yield with the Opus plus strobilurin, but not with the Opus alone, a difference that related to small differences in green leaf retention at this higher N level.

iii) Protein

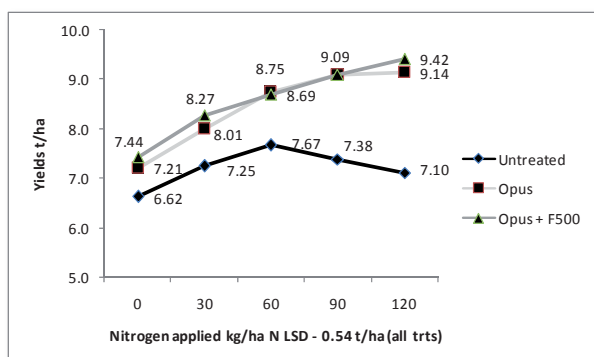
There was a significant increase in protein associated with increasing nitrogen level in the range of 60 -120 kg/ha N and a significant increase in protein associated with fungicide application. (Figure 3.14)



▲ Figure 3.11: Influence of increasing nitrogen rate on yield (t/ha) averaged over the three fungicide programmes.

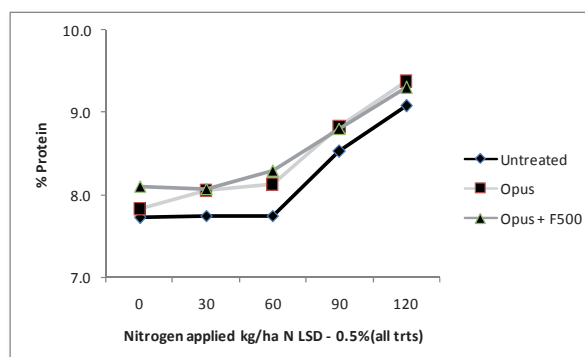


▲ Figure 3.13: Influence of fungicide programme on yield (t/ha) averaged over the five different nitrogen rates.



LSD – Nitrogen rates 0.31 t/ha, Fungicide programmes 0.24 t/ha & individual treatments 0.54t/ha

▲ Figure 3.12: Influence of increasing nitrogen rate on yield (t/ha) and its interaction with three fungicide programmes– Hagley, Tasmania 2007/08.



LSD – Nitrogen rates 0.3 %, Fungicide programmes 0.2 % & individual treatments 0.5%

▲ Figure 3.14: Influence of increasing nitrogen rate on % protein and its interaction with three fungicide programmes – Hagley, Tasmania 2007/08.



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