4.2 BARLEY

4.2.1 TO ASSESS THE INFLUENCE OF STROBILURIN APPLICATION ON THE NUTRITIONAL REQUIREMENT FOR MALTING BARLEY – CV GAIRDNER (INVERLEIGH, VIC)

Abstract:
The trial was subject to a moderately dry finish and 2-3 week dry period in October, which curtailed grain fill, and resultant yields. Despite this, under moderate Scald (*Rhynchosporium*) pressure, a 2-spray fungicide programmes based on Tilt (propiconazole) and Tilt plus Amistar (azoxystrobin) gave a 6 and 7% yield increase (0.22 –0.25 t/ha) over the untreated (mean of nitrogen treatments). Though individual nitrogen levels differed, the 2-spray Tilt programme showed a small margin improvement, however the strobilurin was not cost effective in this trial.

In terms of disease control, the addition of azoxystrobin created significantly superior leaf rust control (the minor disease) over and above the Tilt programme, but the same enhancement of performance was not seen against Scald (*Rhynchosporium*), the major disease in this trial.

There was no significant yield interaction between the fungicide programme and the applied N level (0, 60, 80, 100, 120 kg/ha N) and no yield response beyond the lowest level of N tested (60 kg/ha N), however there was evidence that the addition of strobilurin significantly increased green leaf retention, particularly at higher levels of applied nitrogen (GS85 assessment).

Since yield was not great enough to justify anything more than the lowest level of applied nitrogen (despite low soil nitrogen reserves), it is not possible to deduce how much N could have been increased in the strobilurin treated crops to take advantage of the small reductions evident in grain protein.

Researchers: Nick Poole, Foundation for Arable Research, New Zealand;
Col Hacking, Southern Farming Systems, Ltd

Acknowledgements:
The authors would like thank Syngenta for funding this work.

Funding Organization:
Syngenta Crop Protection

Location: Inverleigh, Geelong, Victoria

Growing Season Rainfall (April-Nov): 388mm

Background/Objectives:
The overall objective is to determine the influence of strobilurin fungicide application on the nitrogen requirement for malting barley. Within this overall objective there are a number of component objectives that are interrelated

To assess the impact of strobilurin fungicide over and above conventional triazole fungicides on nitrogen requirement for malting barley, in order to quantify any interaction between disease management and applied nitrogen.

To measure the effect of disease management using strobilurins on the yield and quality of malting barley. To calculate the cost-effectiveness of strobilurin and applied nitrogen in relation to grain quality.

Methodology:
The trial was grown with standard field inputs with the exception of applied nitrogen and fungicide application.

The trial comprised of 15 treatments replicated 4 times, arranged with fungicide as the main plot and nitrogen level as the sub plot. Individual treatment applications were a combination of applied nitrogen and fungicide programme. There were five levels of applied nitrogen superimposed on three fungicide programmes.

1. Applied Nitrogen Levels:
0, 60, 80, 100 and 120 kg/ha N was applied as single nitrogen dose at GS30 on 6th September.

2. Fungicide Programmes:
Both fungicide treatments were based 2 sprays of triazole (Tilt – propiconazole) with and without the addition of strobilurin chemistry (Amistar – azoxystrobin)

Untreated
Propiconazole 62.5g/ha ai (Tilt 250 EC 250ml/ha) @ GS30-31 followed by Propiconazole 62.5g/ha ai (Tilt 250 EC 250ml/ha) @ GS39-49
Propiconazole 62.5g/ha ai + Azoxystrobin (Amistar 250 SC 400ml/ha) 100g/ha ai @ GS30-31 followed byPropiconazole 62.5g/ha ai + Azoxystrobin 100g/ha ai @ GS39-49

3. Application Dates and Water Rates:

Fungicide Timing	Application date	Water rate
GS 31	24th Sept	105 l/ha – flat fan
GS 39-49	13th Oct GS49	105 l/ha – flat fan

Results and Discussion:
Scald built up from trace levels at GS30-31 to reach approximately 20% on leaf 2 (flag –1) by late grain fill (Table 1.)

Table 1: GS 85 Assessment - % Scald Infection (Rhynchosporium) and Mildew Infection on Leaf 2, Leaf 3 and Leaf 4 - Inverleigh, Victoria, cv Gairdner November 24th 2004

Nitrogen Level kg/ha N/	% Scald Infection	% Leaf Rust Infection	% Green Leaf Retention
Fungicide Treatment GS31 + 49	**L2(F-1)**	**L2(F-1)**	**L2(F-1)**
A. Untreated with Fungicide			
0	2.7	0.6	0
60	9.7	1.9	5
80	14.5	2.6	6
100	19.3	4.1	7
120	21.7	5.8	16
Mean	**13.6**	**3.0**	**7**
B. Propiconazole 62.5 g/ha ai applied GS31			
0	0.3	0.4	1
60	1.8	2.2	14
80	3.1	2.9	19
100	3.0	3.0	25
120	5.8	3.0	31
Mean	**2.8**	**2.3**	**18**
C. Propiconazole 62.5 g/ha ai + Azoxystrobin 100g/ha ai applied GS31			
0	0.0	0.0	4
60	1.1	0.1	18
80	2.9	0.1	14
100	3.4	0.2	40
120	3.7	0.2	38
Mean	**2.2**	0.1	23
LSD (5%)			
Fungicide	**2.4**	**0.4**	**4.0**
Nitrogen rate	**3.1**	**0.5**	**5.2**
Fungicide/Nitrogen	**5.3**	**0.8**	**9.0**

The final assessment, unlike the early assessments, revealed that higher levels of applied nitrogen increased resultant Scald infection (graph 1.), all fungicide treatments giving a correlation of $r^2 = 0.9$ or over between disease infection and level of applied nitrogen. The benefit of the strobilurin treatment over the triazole was also noted in the green leaf retention scores, again this was more pronounced at higher N levels. Table 2 and 3 illustrates how the results related to yield and quality.

Graph 1: Influence of Nitrogen Level and Fungicide Treatment on % Scald Infection Assessed on Leaf 2 at GS85 42 Days After Second Application of Fungicide at GS49

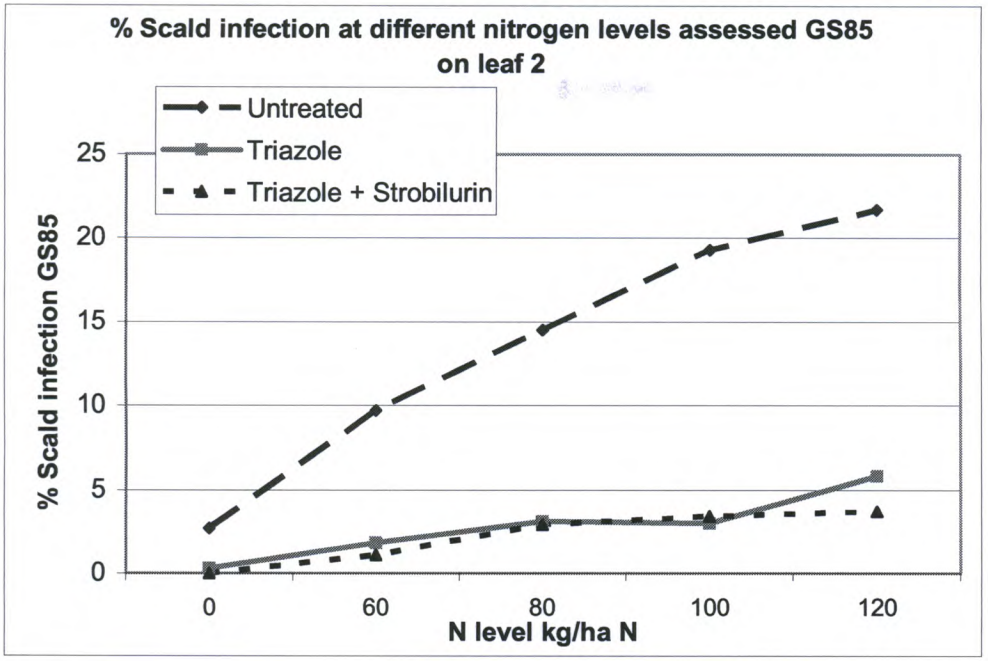

Table 2: Influence of Nitrogen Level (kg/ha N) and Fungicide Regime on Yield (t/ha, % Relative to Zero N Untreated With Fungicide) – cv Gairdner

N Level kg/ha N	Untreated		2 Spray triazole GS31 + 49		2 Spray triazole + strobilurin GS31 + 49		Mean	
	t/ha	%	t/ha	%	t/ha	%	t/ha	%
0	3.11	100	3.17	102.2	3.25	104.6	**3.18**	**100**
60	3.80	122.3	4.09	131.6	4.01	129.2	**3.97**	**124.8**
80	3.65	117.7	3.95	127.1	4.06	130.8	**3.89**	**122.4**
100	3.81	122.8	3.95	127.1	3.93	126.5	**3.90**	**122.7**
120	3.63	116.8	3.94	127.0	4.00	128.8	**3.86**	**121.4**
Mean	**3.60**	**100**	**3.82**	**106.1**	**3.85**	**106.9**		
LSD (5%)								
Nitrogen	**0.214**							
Fungicide	**0.166**							
N/Fungicide	**0.370**							
CV %	**6.9**							

Averaging nitrogen levels, both fungicide programmes significantly out yielded the untreated, however the differences were relatively small (6-7%) 0.22 – 0.25 t/ha. There was no difference in yield between the Tilt (triazole) and Tilt plus Amistar (triazole + strobilurin). There was a significant response to applied nitrogen but no further response beyond the lowest N level tested (60 kg/ha N).

Table 3: Influence of Nitrogen Level (kg/ha N) and Fungicide Regime on % Protein and % Screenings (2.2 mm) – Inverleigh, Victoria cv Gairdner

N Level kg/ha N	Untreated		2 Spray triazole GS31 + 49		2 Spray triazole + strobilurin GS31 + 49		Mean	
	% Protein	% Screen	% Protein	% Screen	% Protein	% Screen	% Protein	% Screen
0	9.3	0.7	8.9	0.7	8.8	1.0	9.0	0.8
60	9.9	0.9	10.6	0.9	10.4	1.3	10.3	1.1
80	10.8	1.2	10.7	1.1	10.4	0.9	10.6	1.1
100	11.7	1.2	11.1	1.3	11.4	1.3	11.4	1.3
120	11.5	1.5	10.8	1.2	11.0	1.1	11.1	1.3
Mean	**10.6**	**1.1**	**10.4**	**1.0**	**10.4**	**1.1**		
LSD (5%)								
Nitrogen	**0.5**	**0.3**						
Fungicide	**0.4**	**0.2**						
N/Fungicide	**1.0**	**0.4**						
CV %	**6.4**	**27.3**						

Increasing applied nitrogen significantly increased grain protein content over the range of 0 – 120 kg/ha applied nitrogen. With the exception of the 60 kg/ha nitrogen level, the untreated fungicide treatments always produced the highest grain protein. Thus overall whilst not significant, the untreated produced protein contents 0.2% higher than those plots treated with fungicide, between which there was no difference.
Small screening differences (all samples 1.5% or less) were significant but these were associated with increases in applied nitrogen rather than fungicide treatment

Table 4: Influence of Nitrogen Level (kg/ha N) and Fungicide Regime on Gross Output and Margin After Nitrogen and Fungicide ($/ha) – Inverleigh, Vic cv Gairdner

N Level kg/ha N	Untreated		2 Spray triazole GS31 + 49		2 Spray triazole + strobilurin GS31 + 49		Mean	
	Output $/ha	Output minusN/ F cost $/ha	Output $/ha	Output minusN/ F cost $/ha	Output $/ha	Output minusN/F cost $/ha	Output $/ha	Output minusN /F cost $/ha
0	420	420	428	428	413	333	420	394
60	513	453	614*	524*	509	369	545	449
80	548*	468*	533	423	516	356	532	415
100	514	414	533	403	499	319	516	379
120	490	370	591*	441*	508	308	530	373
Mean		425		444		337		

Note:
Grain priced at $135/t unless marked with '*'
* = Grain priced at $150/t.

There were some samples that qualified for higher grain price based on specific weight being above 62.5 kg/hl the lower limit for feed F1 standard.

Triazole (Tilt) cost @ $10/ha plus $5/ha per application. Assumed price for Strobilurin plus triazole @ $35/ha plus $5/ha per application.
Nitrogen costed $1 kg/ha N