Spring barley management – irrigated vs. dryland

Key Points

• The maximum yield responses at this site to fungicide in spring sown Optic was 78% (3t/ha increase) irrigated and 60% (1.9t/ha increase) dryland.
• Yield increases gave margins over chemical costs ranges of $187 to $616/ha on irrigated and $148 to $299/ha on dryland.
• The use of strobilurins in an irrigated situation gave the greatest yield benefits over that on dryland.
• Proline gave better disease control, grain yield and MOCC than Opus on its own.
• The difference between Proline and Opus was not apparent when these products were partnered with Acanto and Twist.
• The addition of Protek improved disease control and slightly improved grain yield and MOCC when applied with a triazole.

Introduction

With the arrival of new chemistry to the New Zealand market place, growers are faced with decisions this spring as to which ones to employ on their spring sown dryland or irrigated barley crops. The recent arrivals include Proline (prothioconazole), Fandango (Fluoxastrobin + prothioconazole) and Acanto (picoxystrobin). The purpose of this trial was to provide growers with a general understanding of the performance of these fungicides on spring sown barley compared with the industry standards.

Objectives

The objectives included:

• Evaluate a two-spray programme for a more disease susceptible cultivar (cv. Optic) when spring sown (both irrigated and dryland).
• Evaluation of three new fungicides; Proline (a triazole type), Fandango (strobilurin + Proline) and Acanto (strobilurin).
• Compare the efficacy (& cost effectiveness) of Proline against a common triazole Opus, Fandango against Opus + Twist and Acanto against a strobilurin Twist.
• Reconfirm the role of carbendazim (Protek) in a spring barley fungicide programme when the above new chemistry is adopted.
• Determine which of the programmes is providing the best margin over fungicide cost (MOFC).

The trial

Effectively two trials were run opposite each other. One was dryland and the other was irrigated. A range of fungicide treatments (Table 1) were applied to a spring sown crop of cv. Optic barley at the FAR Arable Site, Chertsey, Mid Canterbury. The trials were sown on 9 September with a target population of 250plants/m². The irrigated trial received 200mm from early November through to late December. The two main diseases present in the trials were Leaf Rust (Puccinia hordii) and Powdery Mildew (Erysiphe (=Blumeria) graminis). There was a trace of Scald (Rhynchosporium secalis) but this was not separately assessed.

Three disease assessments were completed at GS26 (main stem – 6 tillers), GS49 (first awns visible) and either GS85 (soft dough – irrigated) and GS87 (hard dough – dryland). Green leaf area (GLA) was the main gauge as to the performance of the chemistry.

Table 1: Treatment list for spring sown Optic (irrigated vs. dryland)

<table>
<thead>
<tr>
<th>Date</th>
<th>Trt</th>
<th>Op</th>
<th>Twst</th>
<th>Pro</th>
<th>Ptk</th>
<th>Fan</th>
<th>Ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.11.05</td>
<td>nil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.12.05</td>
<td>Pro 0.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.25</td>
<td>Op 0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.25</td>
<td>Pro 0.2 + Ptk 0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.5</td>
<td>Op 0.25 + Protek 0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.5</td>
<td>Pro 0.2 + Acanto 0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.5</td>
<td>Pro 0.25 + Acanto 0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.5</td>
<td>Op 0.25 + Twist 0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.5</td>
<td>Op 0.25 + Twst 0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.5</td>
<td>Op 0.25 + Acanto 0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.5</td>
<td>Op 0.25 + Twist 0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.5</td>
<td>Op 0.25 + Twst 0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.5</td>
<td>Fan 1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.5</td>
<td>Fan 0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40.5</td>
<td>Fan 0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Assessments and Results

At the first assessment (7 November) at GS26 leaf rust and powdery mildew were well established on the leaves. These diseases were having an effect on the green leaf area of the crop. There was a trace of scald, although this was not assessed.

By GS49 (second assessment 8 December) leaf rust was developing rapidly throughout the untreated plots. The severity of the leaf rust was similar in both
dryland and irrigated plots. It was apparent at this early stage that Opus was giving the least control compared to all fungicide treatments on both dryland and irrigated sites.

The addition of Protek to Opus significantly improved disease control on the irrigated plots only. Proline on its own was noted to be significantly better in controlling leaf rust, compared to Opus. This result was in strong contrast to its inferior performance on wheat leaf rust. However, Proline still benefited from being partnered with Acanto/Protek and also with Twist in order to maximise disease control and margin in the irrigated treatments.

Proline partnered with Acanto and Protek gave an 89% improvement in green leaf area retention control over the untreated. This was followed by Fandango at 1ltr/ha which gave an improvement of 85%. The addition of Protek to Proline gave no significant increase in control under both dryland and irrigation.

By the third assessment GS85 (irrigated) and GS87 (dryland) (6 January) the leaf rust had become inactive and natural senescence was accelerating (Figure 1). The untreated plots had virtually no green leaf area left. Assessment of leaf 2 was only carried out as leaf 3 had all but gone.

Opus was clearly inferior to all other fungicide treatments at this site giving lowest yields and lower margins over chemical costs. The addition of Protek did not give a significant increase in yield (Figure 2) whereas the addition of Acanto and Twist did, in both irrigated and dryland trials. This is likely to have been because Protek has poor activity against leaf rust compared to the strobilurins. The same pattern was shown with the addition of these above fungicides to Proline.

Grain Yield
A yield response over the untreated 78% was achieved using Fandango (treatment 11) on the irrigated plots (3t/ha). A similar result was achieved using Proline/Acanto/Protek which also gave a 78% increase. On the dryland plots this result was mirrored with the application of Proline/Acanto/Protek giving a response (60% - 1.75t/ha). Fandango (treatment 11) also gave a 60% response (Figure 2).

These increases in grain yield were also reflected in these treatments giving the highest margins over fungicide costs (Figure 3).

**Figure 1:** The effect of fungicide treatments on the retention of green leaf area of leaf 2 (down from the flag) on spring sown barley (cv. Optic) at GS 85 (irrigated) and GS 87 (dryland) on 6 Jan 06.

**Figure 2:** The effect of fungicide treatments on grain yield of spring sown barley optic (Dryland and Irrigated). LSD Irrigated = 0.57, LSD Dryland = 0.32.

**Margin over chemical cost (MOCC)**
All fungicide treatments gave positive margin over fungicide costs. The highest MOCC for the dryland plots was the Proline/Acanto/Protek giving $299/ha. The lowest was Opus at $148/ha (Figure 3).

**Figure 3:** The effect of fungicide and irrigation on MOCC of spring sown barley

Under irrigation the highest MOCC was from Proline/Acanto/Protek at $616/ha. Although Fandango gave good control a price was not available to complete a MOCC analysis. The lowest MOCC was from Opus (treatment 3) at $187/ha.

**Conclusions**
Proline gave better disease control, grain yield and MOCC than Opus on its own. The addition of Protek improved disease control and slightly improved grain yield and MOCC when applied with a triazole. Strobilurins gave the greatest yield benefits under irrigation. Fandango gave significantly higher yields than Proline partnered with Protek on dryland. The difference between Proline and Opus was not apparent when these products were partnered with the strobilurins Acanto and Twist. The performance of Acanto was slightly better than that of Twist under irrigation.

©This publication is copyright to the Foundation for Arable Research and may not be reproduced or copied in any form whatsoever without their written permission. This Arable Update is intended to provide accurate and adequate information relating to the subject matters contained in it. It has been prepared and made available to all persons and entities strictly on the basis that FAR, its researchers and authors are fully excluded from any liability for damages arising out of any reliance in part or in full upon any of the information for any purpose. No endorsement of named products is intended nor is any criticism of other alternative, but unnamed products.