

Spot form net blotch management

Background

Spot form net blotch – SFNB (*Pyrenophora teres f maculata*) is a key disease of barley in the northern region. It is a stubble-borne disease that has been favoured by the increasing level of stubble retention practised throughout the area combined with a lack of varieties with adequate resistance. Although it is generally regarded as a disease of wet seasons, agronomists in northern areas have noticed concerning levels of disease development, even in recent drier years.

Plant breeding represents the most effective method of long term disease management together with an increase in rotation interval between barley crops. However, fungicides are an important tool that will enable disease management in varieties without effective SFNB resistance but possessing other desirable agronomic attributes.

Current industry guidelines for fungicide timing are to delay application until close to flag leaf emergence. However many experienced advisers have been concerned that these recommendations may need review given recent application timing experiences for stripe rust management and the generally early onset of SFNB infection.

Although this project was focused on SFNB management, an opportunity arose in 2008 to evaluate the same treatments on the closely related net form net blotch – NFNB (*Pyrenophora teres f teres*). Only one trial has been conducted on this disease but the information included because of the similarity to SFNB.

Project aims

In 2007:

1. Identify the impact from spot form of net blotch on yield and grain quality of commercial varieties under regional conditions
2. Evaluate whether there is any benefit in fungicide application prior to flag leaf emergence for this disease
3. Provide additional data to support commercial management practices

In 2008:

1. Further evaluate the impact of application timing on disease management and economic return
2. Compare the efficacy and economic benefits of single and multiple application
3. Investigate the potential of a new fungicide for SFNB management



Spot form net blotch symptoms at harvest, variety Skiff, North Star 2007

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Results in a nutshell

Disease control:

- **Single timing:** in these trials the most effective SFNB (and NFNB) suppression was from application during early stem elongation (~GS30-32). Optimal timing may vary when high levels of late season rain are experienced
- **Multiple application timing:** more effective SFNB (and NFNB) suppression than single application. Most effective generally ~GS31-32 followed by later spray
- No consistent rate response to Tilt and no clear benefit from alternative chemistry

Yield impact:

- **Variable SFNB yield response:** Good benefits in both trials in 2007 (mean 221-352 kg/ha) but no yield benefit in two trials in 2008
- 2008 NFNB trial had mean 338 kg/ha benefit

Grain quality impact:

- Clear trend to reduced quality due to SFNB in all trials
- SFNB **increased** average screenings by ~10 to 15% at 3 of 4 sites
- SFNB **reduced** average retention by ~6 to 20% across all sites
- SFNB **reduced** test weight by ~2 to 4 kg/hL across all sites

Overall:

- ***Correct identification of SFNB is a major issue with many similar 'non disease' blotches occurring in barley***
- ***Fungicide application during early stem elongation provided the most consistent disease suppression***
- ***Economic impact of SFNB was variable with average net benefits of ~\$60 to \$100/ha in 2007 but net losses of ~\$6 to \$20/ha in 2008***
- ***SFNB resulted in reduced grain quality in all trials***

Trial design

2007: Two replicated small plot trials were established in commercial barley crops in the North Star and Bellata districts. Trials were conducted on the varieties Skiff (North Star) and Kaputar (Bellata) which are both rated as susceptible to SFNB. Both crops were planted into 2006 barley stubble with SFNB naturally present before first application.

Individual plot size was 4m x 10m with an untreated buffer area of 2m width between plots. Eleven different fungicide programs were evaluated over three replicates. Plots were sprayed with an ATV mounted 4m boom. DG110015 nozzles were used at 230 kPa, 12.3 km/hr and a volume of 50 L/ha. The droplet size produced at these parameters is rated as Fine/ Medium (ASAE standard S-572). Multiple applications received the indicated product rate at each designated timing.

Fungicide Program	Product	Product rate	Timing
Single application	Tilt®	250 mL/ha	T2 and T3
		500 mL/ha	T1, T2 and T3
	Amistar® Xtra	400 mL/ha	T2 and T3
Multiple application	Tilt	250 mL/ha x 2	T1+T2 and T2+T3
		250 mL/ha x 3	T1+T2+T3
		500 mL/ha x 2	T2+T3

T1 = Timing 1 etc

Assessments

- SFNB severity:** *severity* – visual rating of % leaf area diseased on top 3 leaves in 10 random main tillers/plot (*incidence* - % leaves with any SFNB presence also assessed but not presented)
- Yield and grain quality:** all plots were harvested by small plot header with grain quality analysis conducted by the QDPI&F grain quality laboratory

Disease assessment was made on the uppermost fully emerged 2 or 3 leaves on 10 random main tillers in each plot at approximately 2 week intervals from first spray timing for a minimum of 7 weeks.

2008: Four replicated small plot trials were established in commercial barley crops in the Crooble and Liverpool Plains districts. Three trials were conducted on SFNB in the varieties Gairdner (Crooble and Spring Ridge) and Fitzroy (Caroona). The remaining trial was conducted on the closely related disease, net form net blotch (NFNB) in the variety Grimmatt near Curlewis. All trial sites other than Crooble had been planted into 2007 barley stubble. Crooble was planted to chickpeas in 2007 and wheat in 2006. All sites had SFNB or NFNB naturally present before first application timing.

Fungicide Program	Product	Product rate	Timing
Single application	Tilt	250 mL/ha	T2, T3 and T4
		500 mL/ha	T1, T2, T3 and T4
	Prosaro [®] + Hasten [™] 1%	150 mL/ha	T3
Multiple application	Tilt	250 mL/ha x 2	T2+T3 and T3+T4
		250 mL/ha x 3	T2+T3+T4

T1 = Timing 1, T2 = Timing 2, T3 = Timing 3, T4 = Timing 4

NB Timing 1 was expected to be too early with only a single treatment evaluated

SFNB disease ratings, grain yield and quality were assessed as in 2007.

Despite generally 'soft' growing conditions in 2008, SFNB in many barley crops failed to develop to concerning levels. No results are presented for the SFNB trial at Spring Ridge. The trial area was affected, firstly by glyphosate drift and then suffered severe crop effects as a result of a post emergent grass herbicide. This herbicide damage produced symptoms similar to SFNB. Variability in visual disease ratings and the general poor growing conditions resulted in extremely uneven and erratic yields.

Multi-trial summary

Disease levels

Due to large site differences in disease levels and treatment performance, no multi trial summaries for disease severity have been presented for 2007 or 2008. Disease graphs are located in the individual trial results.

Key messages – SFNB severity 2007

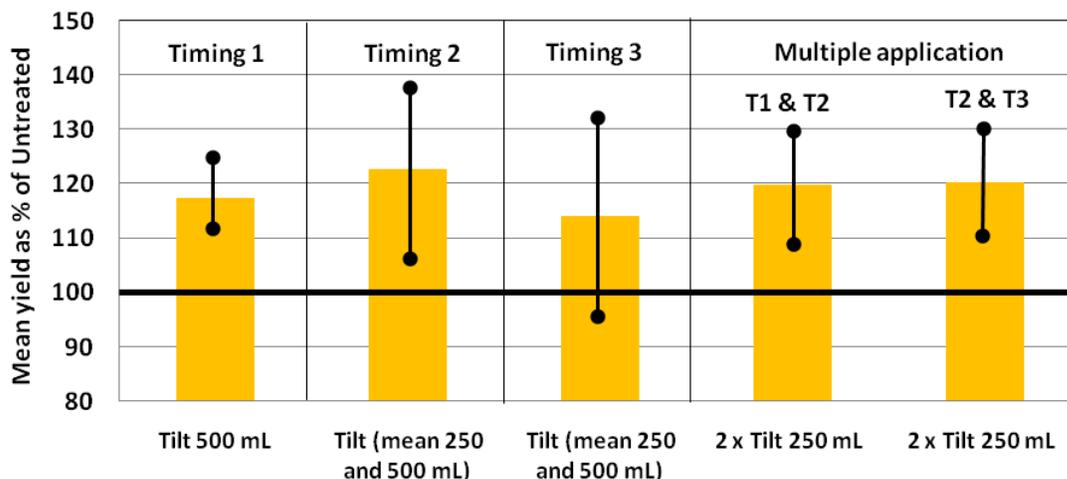
- Disease well established at both sites before T1
- T1 application at ~GS30 (jointing) in both trials, T2 - 14 days later at ~GS31-33, T3 – another 14-24 days later at ~GS39-45
- Surprising level of disease suppression from T1 application
- No clear difference in disease control between individual timings
- No clear rate response to Tilt observed
- No clear difference in efficacy evident between Tilt and Amistar Xtra
- All treatments suppressed SFNB, none fully controlled it

Key messages – SFNB severity 2008

- Disease well established at all sites before T1
- T1 application at ~GS14-15/23-26 (expected to be too early for prolonged disease management), T2 at ~GS31, T3 at ~GS32-33, T4 varied between ~GS39-57
- Most consistent disease suppression from single applications at Timing 2 and 3 and multiple applications
- No consistent rate response to Tilt observed
- No clear difference in efficacy evident between Tilt and Prosaro
- All treatments suppressed SFNB, none fully controlled it

Yield impact

Grain yield 2007 – mean % of Untreated yield



Columns show the mean yield as a % of Untreated. Range bars show the actual results
Untreated yield: North Star 1217 kg/ha, Bellata 2969 kg/ha

Key messages – Yield 2007

- No significant difference in yield at either site
- However all 11 fungicide treatments recorded higher yield than the Untreated at North Star and 10 of 11 fungicide treatments recorded higher yield at Bellata
- No clear difference in yield between individual application timings
- No clear difference between multiple application timings or between single and multiple application
- No clear difference between products or rates applied

Key messages – Yield 2008

As yield responses varied dramatically by site, no multi trial graph is presented. Actual yield graphs are located in the individual trial results.

Quality impact

Key messages – Screenings 2007

- No significant difference in screenings at either site
- Untreated screenings were 31% at North Star and 34% at Bellata
- Single application reduced screenings to ~17% at North Star and ~28% at Bellata
- 20 of 22 treatments reduced screenings across the two sites
- No clear difference in screenings between individual application timings
- Multiple applications trended to lower screenings than single applications
- No clear difference between products or rates applied

Key messages – Screenings 2008

- Significant differences only at Caroonia SFNB site
- Untreated screenings were 4% at Caroonia, 23% at Crooble and 7% at Curlewis
- Single application reduced screenings to ~3% at Caroonia, ~19% at Crooble and ~6% at Curlewis
- 33 of 33 treatments reduced screenings across the three sites
- No clear difference in screenings between individual application timings
- Multiple applications trended to lower screenings than single applications
- No clear difference between products or rates applied

Key messages – Retention 2007

Retention is a measure of barley grain size. It is the % of grain weight that is retained above a 2.5 mm screen. High % retention is important for malt classification.

- No significant difference in retention at either site
- Untreated retention was 32% at North Star and 7% at Bellata
- Single application increased retention to ~48% at North Star and ~11% at Bellata
- 21 of 22 treatments increased retention across the two sites
- No clear difference in retention between individual application timings
- No clear difference between multiple application timings or between single and multiple application
- No clear difference between products or rates applied

Key messages – Retention 2008

- Significant differences only at Curlewis NFNB site
- Untreated retention was 77% at Carroona, 23% at Crooble and 44% at Curlewis
- Single application increased retention to ~81% at Carroona, ~27% at Crooble and ~53% at Curlewis
- 32 of 33 treatments increased retention across the three sites
- No clear difference in retention between individual application timings
- Multiple applications trended to increased % retention compared to single applications
- No clear difference between products or rates applied

Key messages – Test weight 2007

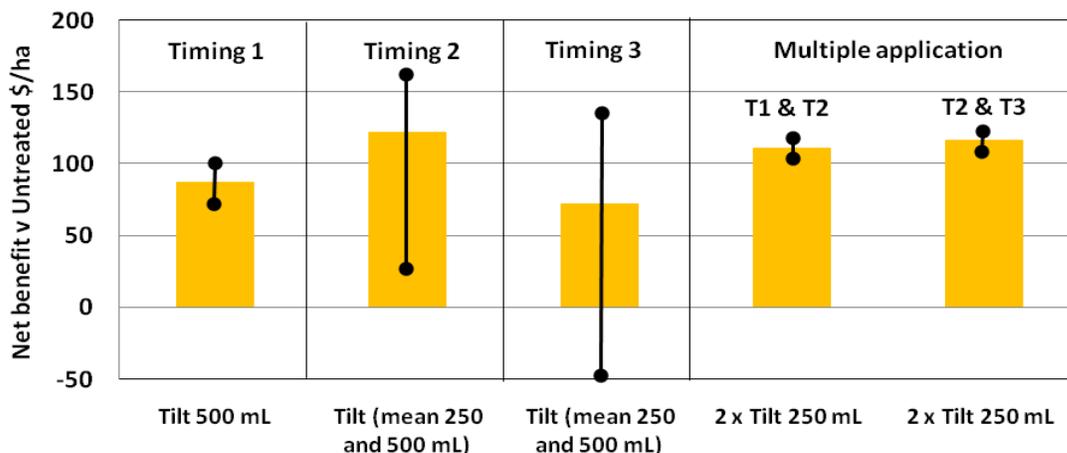
- No significant difference in test weight at either site
- Untreated test weight was 62 kg/hL at North Star and 60 kg/hL at Bellata
- Single application increased test weight to ~66 kg/hL at North Star and ~61 kg/hL at Bellata
- 22 of 22 treatments increased test weight across the two sites
- No clear difference in test weight between individual application timings
- No clear difference between multiple application timings or between single and multiple application
- No clear difference between products or rates applied

Key messages – Test weight 2008

- No significant difference in test weight at any site
- Untreated test weight was 56 kg/hL at Caroonna, 58 kg/hL at Crooble and 62 kg/hL at Curlewis
- No impact on test weight at Caroonna or Curlewis, with single application increasing test weight to ~59 kg/hL at Crooble

Economic impact

Economic impact 2007 – net benefit compared to Untreated



Assuming Tilt \$25/L, foliar application \$8/ha, Feed 3 grain price \$325/t, Feed 2 \$340/t and Feed 1 \$355/t

Key messages – net benefit

- Trials conducted in a year with very low rainfall after June
- On 2007 grain prices, mean fungicide treatment benefit was \$102/ha
- No clear difference between application timing, product or Tilt rate
- Encouraging level of benefit obtained from application at Timing 1 or 2 in both trials
- Similar net benefit from multiple application but with apparently lower variability in these two trials

Net economic benefit 2008

No multi trial summary due to site variability. Comments included in individual trials.