Management of net form net blotch (NFNB) of barley in the low and medium rainfall zones of South Australia

Tara Garrard[1,2], Catherine Paterson[3], Kaidy Morgan[4], Mark Butt[1], Entesar Abood[1], Hari Dadu[1,2], Kul Adikari[1,2] and Mikaela Tiller[4]

[1]SARDI, Waite Research Centre, [2]University of Adelaide, [3]SARDI, Minnipa Agricultural Centre, [4]Hart Field-Site Group

Key findings

- In 2025, low NFNB pressure meant disease did not cause economically significant yield losses in either the medium or low rainfall zones.
- Fungicide applications, particularly at GS 31 and GS 39, reduced NFNB severity in susceptible varieties, however this did not consistently translate into yield benefits under low disease pressure.

Introduction

Net form of net blotch (NFNB) is now a widespread foliar disease commonly observed across southern Australian barley regions. Surveillance shows it occurs in most crops, is often severe in high rainfall zones (HRZ), and can also cause losses in medium (MRZ) and low rainfall zones (LRZ) when conditions favour infection. The disease is most problematic in susceptible varieties grown widely and in areas where fungicide resistance has developed.

Despite its prevalence, little is known about yield losses in the MRZ and LRZ, the conditions required to cause losses across regions, or the level of varietal resistance needed to minimise risk.

Fungicides remain an important management tool, but their reliability has declined due to increasing resistance. Widespread resistance to Group 7 and Group 3 fungicides is commonly observed, however recently, a triple resistance involving Group 11 has been identified. As a result, growers will need to adopt more strategic, integrated management approaches.

To address this, trials in South Australia evaluated the roles of varietal resistance and fungicide timing at Hart (MRZ, Mid North) and Calca (LRZ, Eyre Peninsula).

Methodology

At both the low rainfall zone (LRZ; Calca) and medium rainfall zone (MRZ; Hart) sites, replicated field trials were established using a randomised complete block design with six replicates. At each site, three commonly grown barley varieties with differing levels of resistance to NFNB were selected and infected with NFNB spore inoculum using a knapsack sprayer at tillering stage (GS 25). Fungicide treatments were applied at two growth stages: stem elongation (GS 31) and flag leaf emergence (GS 39).

NFNB severity was visually assessed at key growth stages by estimating the percentage of leaf area affected on ten representative plants per plot. An average disease severity score was calculated for each plot by averaging scores across the ten plants. Grain yield and quality were measured at harvest on November 12, 2025 at Hart and on December 8, 2025 at Calca.

Statistical analyses were conducted using Genstat (VSNi 23), with fungicide treatments and varietal responses compared using standard analysis of variance (ANOVA) procedures.

Barley varieties used in the trials

- **Hart (MRZ):**
  #Maximus CL (MRMS), Commodus CL (MSS), RGT Planet (SVS)
- **Calca (LRZ):**
  #Maximus CL (MRMS), Beast (S), Spartacus CL (VS)

 # MRMS – Moderately resistant to moderately susceptible; MSS – Moderately susceptible to susceptible; S – Susceptible; SVS – Susceptible to very susceptible.

Fungicide treatments

Four treatments were applied at each site:

1. **Foliar application at GS 31:**
   Prosaro 420 SC® (Prothioconazole 210 g/L + Tebuconazole 210 g/L) at 150 mL/ha
2. **Foliar applications at GS 31 and GS 39:**
   Prosaro 420 SC® at 150 mL/ha at GS 31 followed by Amistar Xtra® at 200 mL/ha at GS 39 (Azoxystrobin 200 g/L + Cyproconazole 80 g/ha)
3. **Foliar application at GS 39:**
   Amistar Xtra® at 200 mL/ha
4. **Untreated control:**
   No fungicide applied.

Table 1. Trial details for 2025 net form net blotch trials at Hart and Minnipa (Calca), SA.

Location	Hart field site	Calca
Average annual rainfall	419.7 mm	376.7 mm
Average growing season rainfall (GSR)	308.9 mm	301.7 mm
2025 Total	234.0 mm	346.4 mm
2025 GSR	206.6 mm	292.2 mm
Soil type	Clay loam	
Paddock history		
2024	Bale awnless wheat	
2023	Kingbale oaten hay	
2022	Scepter wheat	
Plot size	12 m x 1.7 m x 6 replicates	20 m x 20 m x 6 replicates

Results and discussion

Seasonal conditions in 2025 were generally unfavourable for the development of NFNB, and disease development was slow at both trial sites.

At Hart (MRZ), fungicide treatments significantly reduced NFNB severity in the susceptible variety RGT Planet at flag leaf emergence (Table 2). The application of Prosaro 420 SC® at GS 31 followed by Amistar Xtra® at GS 39 had the greatest reduction in disease severity, reducing pressure from 10% in the untreated control (UTC) to 1% at grain filling stage (GS 73) in RGT Planet. However, disease pressure was transient, and flag-leaf emergence disease levels had no significant effect on final yield.

Disease levels were negligible in the moderately resistant varieties Commodus CL and Maximus CL, regardless of fungicide treatment. At Calca (LRZ), NFNB severity remained low across all varieties and fungicide treatments throughout the season. As a result, no significant differences in grain yield were observed between treatments (Table 3).

No significant differences were observed for grain quality between treatments (data not shown).

Table 2: Net form net blotch (NFNB) severity (%) and grain yield (t/ha) of three barley varieties in response to different fungicide treatments at Hart, Mid North, South Australia, 2025. Shaded values indicate best performing treatments.

Variety / Treatment	RGT Planet (SVS)		Commodus CL (MSS)		Maximus CL (MS)	
	NFNB severity % GS 73, Oct 10	Yield (t/ha)	NFNB severity % GS 73, Oct 10	Yield (t/ha)	NFNB severity % GS 73, Oct 10	Yield (t/ha)
Untreated control	10[c]	2.0	2	2.7	0	2.7
Foliar spray at GS 31	7[b]	2.1	2	2.7	0	2.8
Foliar spray at GS 39	7[b]	1.7	5	2.4	0	2.4
Foliar spray at GS 31 + 39	1[a]	1.8	1	2.6	0	2.6
P-value	**<0.001**	**0.46**	**0.22**	**0.58**	**0.44**	**0.35**
LSD (0.05)	**2.7**	**ns**	**ns**	**ns**	**ns**	**ns**

Table 3: Net form net blotch (NFNB) severity (%) and grain yield (t/ha) of three barley varieties in response to different fungicide treatments at Calca, Eyre Peninsula, South Australia, 2025.

Variety / Treatment	Spartacus CL (VS)		Beast (S)		Maximus CL (MS)	
	NFNB severity % GS 71, Oct 8	Yield (t/ha)	NFNB severity % GS 71, Oct 8	Yield (t/ha)	NFNB severity % GS 71, Oct 8	Yield (t/ha)
Untreated control	5	3.16	3	3.69	2	3.34
Foliar spray at GS 31	4	3.21	2	3.80	2	3.10
Foliar spray at GS 39	5	3.11	2	3.67	2	3.16
Foliar spray at GS 31 + 39	4	3.03	2	3.96	2	3.33
P-value	**0.57**	**0.91**	**0.24**	**0.60**	**0.78**	**0.83**
LSD (0.05)	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**

Summary

In 2025, seasonal conditions were not favourable for the development of net form of net blotch (NFNB), resulting in low disease pressure at both the medium (Hart) and low rainfall (Calca) sites. The application of Prosaro 420 SC® at GS 31 followed by Amistar Xtra® at GS 39 had the greatest reduction in disease severity, however all fungicides reduced NFNB severity in RGT Planet (SVS). This did not result in higher yields, as disease pressure declined later in the season.

At Calca, NFNB levels were low across all varieties and fungicide treatments, and no yield benefits from fungicide application were detected.

Overall, results indicate that under low to moderate NFNB pressure, fungicide applications are unlikely to deliver consistent economic returns, even in susceptible varieties. Growing moderately resistant varieties, such as Maximus CL, reduced disease risk and further limited the need for fungicides.

These findings highlight the importance of aligning fungicide use with seasonal disease risk and varietal resistance. In low rainfall zones and low disease pressure seasons with modest yield potential (~3 t/ha), regular crop monitoring is likely sufficient, and avoiding unnecessary fungicide applications can help reduce costs and slow the development of fungicide resistance.

Acknowledgements

The research undertaken as part of this project is made possible by the significant contributions of growers through both trial cooperation and the support of the GRDC, the authors would like to thank them for their continued support. Funding for this work was provided by the South Australian Government (SARDI) and the GRDC (DAQ2304-008RTX). Thanks to the Hart Field-Site Group and Minnipa Agricultural Centre for field trials and to our research collaborators across the country.

Photo. Looking over the net form net blotch trial at Hart, 2025.