

Trial Title: Fungicide timing response monitoring in winter barley at Morley.
Centre: Morley

Trial Code: WB20-05502

Variety: Craft

Objective: To record and monitor the yield responses to each of the component spray timings within a fungicide spray programme on barley.

Background and summary

This is the eleventh year that this trial has been running. It is supported through The Morley Agricultural Foundation (TMAF) as part of the NIAB Morley Long Term Studies (LoTS) programme.

Disease levels were low throughout the trial period. There was no significant difference between treatment yields, with only a 0.3 t/ha difference observed between the untreated and the 3-spray programme (T1 + T2 + T3) containing chlorothalonil. This response was the lowest it has been in the 11 years of trialling at this site, but only slightly lower than the 2011 total yield response of 0.45 t/ha. The bulk of the yield response came from the T1+T2 standard spray programme, with a slight yield reduction observed when chlorothalonil was omitted from the programme.

Table 1. Products

Product	Active ingredient and concentration
Proline 275	Prothioconazole 275 g/l
Siltra	Bixafen 60 g/l plus prothioconazole 200 g/l
Bravo 500	Chlorothalonil 500 g/l

Table 2. Treatments and timings

Trt.	Growth stage timing and date of application				Comment
	GS25 25/03/20	GS32 23/04/20	GS39 12/05/20	GS65 19/05/20	
1	Untreated	-	-	-	Untreated
2	-	Siltra (0.6 l/ha) + Bravo 500 (1.0 l/ha)	-	-	T1 only
3	-	Siltra (0.6 l/ha) + Bravo 500 (1.0 l/ha)	Siltra (0.4 l/ha) + Bravo 500 (1.0 l/ha)	-	Standard programme
4	-	Siltra (0.6 l/ha)	Siltra (0.4 l/ha)	-	Standard (no chlorothalonil)
5	Proline 275 (0.25 l/ha)	Siltra (0.6 l/ha) + Bravo 500 (1.0 l/ha)	Siltra (0.4 l/ha) + Bravo 500 (1.0 l/ha)	-	Standard + Spring T0
6	-	Siltra (0.6 l/ha) + Bravo 500 (1.0 l/ha)	Siltra (0.4 l/ha) + Bravo 500 (1.0 l/ha)	Proline 275 (0.25 l/ha)	Standard + T3

The site is part of a long-term experiment that has run at Morley for 11 years (supported by The Morley Agricultural Foundation). The experiment records a snapshot of the yield response to fungicide input and spray programme components in winter barley each year.

This trial was funded by NIAB TAG Morley Long-term Studies programme

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With regards data interpretation, the "T1+T2" response is based on a comparison of treatments 3 and 1; the "T3" response is based on treatments 6 and 3 and the "T0" is a comparison of treatments 5 and 3.

Results

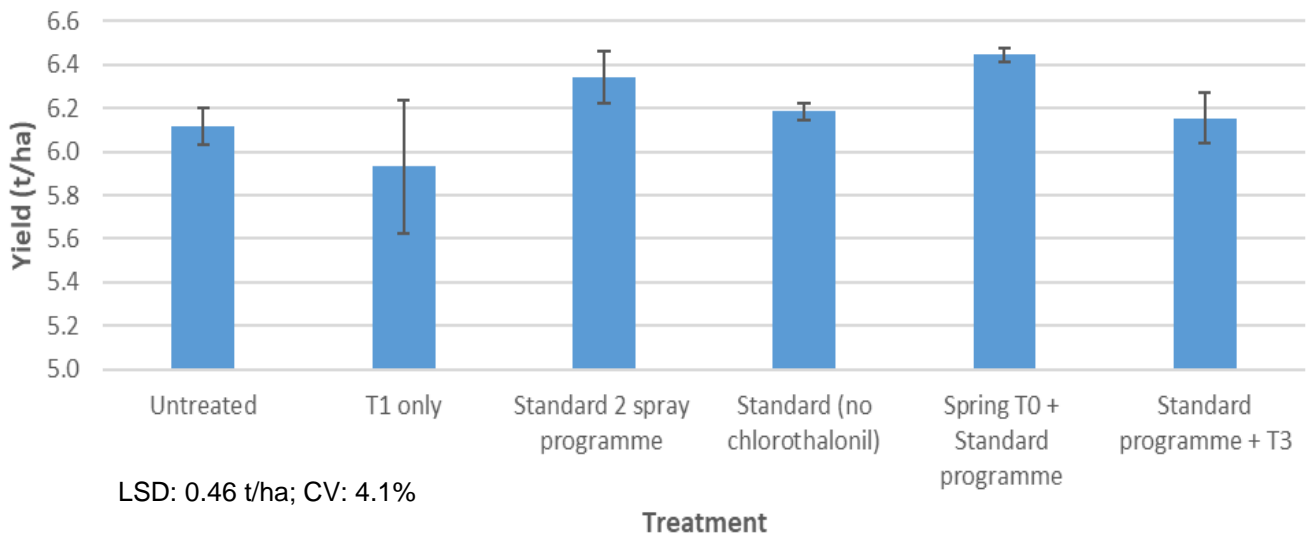
Figure 1 shows the yield performance of Craft in untreated and fungicide treated plots. There was no significant difference between treatment yields, with only a 0.3 t/ha difference observed between the untreated (Treatment 1) and the full 3 spray programme containing chlorothalonil (Treatment 5). In 2018, the 3-spray programme yielded up to 0.6 t/ha more than the standard 2 spray programme. However, the marginal yield gains delivered by using a 3-spray programme in the 2020 trial are similar to results observed in 2019.

Table 3. Mean disease scores on untreated plots (n= 3 plots per treatment).

Growth stage	GS73-77			GS73-77			GS73-77			GS73-77			GS73-77		
Date	16/06/20			16/06/20			16/06/20			16/06/20			16/06/20		
Disease	Powdery Mildew			Net Blotch			Brown Rust			Yellow Rust			Ramularia		
Treatment	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1	0	0	0	0	1.67	2.67	0	0.37	1.67	0	0.033	0.33	0	0	0

As in 2018 and 2019, disease levels in 2020 were low for net blotch, brown and yellow rust, and no powdery mildew or Ramularia was recorded.

Figure 1: Yield (t/ha) ± SE for Craft at Morley in 2020.



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Table 4 and Table 5 shows the 2020 yield response and multi-year yield response to fungicides respectively, for each spray timing. Response to an autumn T0 spray was not investigated in the 2020 trials; in previous years it has proven to be small and not economic. In this low disease pressure year, the mean yield response in 2020 to all fungicides was 0.3 t/ha and there were no significant differences between treatments. This response was the lowest it has been in the 11 years of trialling at this site, but only slightly lower than the 2011 total yield response of 0.45 t/ha. The bulk of the yield response coming from the T1+T2 standard spray programme. There was a slight yield reduction observed when chlorothalonil was omitted from this programme.

Table 4: Component yield responses (t/ha) for Craft

Comparison	Yield response (t/ha)
Benefit of T0 alone	0.1
Benefit T1 alone	-0.2
Benefit of T2 alone	0.4
Benefit of T1 + T2 (standard programme)	0.2
Benefit of T3 alone	-0.1
Benefit of chlorothalonil	0.1

Table 5. Multi-year fungicide yield responses, starting from 2008 at Morley.

Harvest	Timing				
	Autumn T0	Spring T0	T1 + T2	T3	3 spray vs 2 spray programme
2008	0.05	0.10	1.75	No data	
2011	0.00	0.08	0.37	0.00	
2012	0.65	0.73	0.34	0.36	
2013	0.01	0.00	0.51	0.33	
2014	0.12	0.27	1.87	0.53	
2015	0.47	0.49	0.35	0.67	
2016	0.00	0.04	1.24	0.56	
2017	0.00	0.13	1.73	0.36	
2018	0.05	0.08	2.29	0.32	0.31
2019	0.10	0.30	1.48	0.16	-0.06
2020	-	0.10	0.20	-0.10	0.10
Mean response		0.21	1.10	0.32	0.12
Mean total response					1.75

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Appendices

Ramularia detection via qPCR

During this trial, leaf samples were harvested for DNA extraction and subsequent detection of ramularia via qPCR. Fifty leaf samples were collected per plot (across all replicates) from all treatments, at growth stages 31, 39 and 59. Leaves were then pooled into ten groups of five for DNA extraction and qPCR was carried out to detect the pathogen. Due to the sensitivity of the detection method, it was possible to detect ramularia within the trial despite no visible symptoms being observed throughout the growth stages. The highest levels of ramularia were detected at GS31, with up to 20% of DNA samples within a given treatment testing positive for the pathogen (Table 6). Levels of ramularia across the treatments dropped substantially from GS39 onwards in treated plots, in contrast to 13% of DNA samples which tested positive for ramularia at GS59. This could suggest a potential treatment effect at latter growth stages. It was not possible to detect any reliable differences between the untreated and treated plots at GS31, or between any of the fungicide treatments at latter growth stages.

Table 6. % of Ramularia detected in leaf samples collected from treated and untreated plots of Craft at Morley in 2020.

Trt no.	Treatment	<i>% of DNA samples testing positive for Ramularia</i>		
		GS31	GS39	GS59
1	Untreated	10	3	13
2	T1 Only	17	7	0
3	Standard	10	0	0
4	Standard (No CTL)	13	0	3
5	Spr T0 + Standard	20	3	7
6	Standard + T3	10	3	3

Net Blotch Detection

Net blotch molecular data is currently delayed due to a combination of technical problems and reduced staff time in the laboratory due to Covid-19 restrictions. Report will be amended when data is available.

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Field details & overall applications to crop

Trial Code:	WB20-05502
Trial Centre:	Morley
Location:	Angela's
Crop:	Winter barley
Previous Crop:	Spring barley
Soil Texture:	Sandy loam
Total N/ha Applied:	134 kgN/ha
Drill Date:	30/10/19
Seed Rate:	300 seeds/m ²
Drilled plot size:	12m x 2m
Replicates:	3
Harvest date:	23/07/20

Input type	Product	Product rate	Date
Herbicide	Roundup Vista Plus (18002)	2.0 l/ha	12/09/19
	Topsail (19024)	3.0 l/ha	06/11/19
	Trooper (13924)	4.0 l/ha	06/11/19
Adjuvant	Remix	0.3 l/ha	06/11/19
Fungicide	See Table 1 and Table 2		
PGR	Agrovista 3 See 750 (15975)	2.0 l/ha	06/04/20
Fertiliser	Liquid N 27 + S	53 kg N/ha + 10 kg SO ₃ /ha	14/03/20
	Headland Multiple	0.9 l/ha	06/04/20
	Liquid N 27 + S	81 kgN/ha + 15 SO ₃ /ha	09/04/20
	Headland Magnus Pro	1.5 l/ha	12/05/20

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