

## MORLEY RESEARCH CENTRE

### Foliar fungicide programmes on durum wheat

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#### Summary

Fungicide treatments were evaluated as one or two-spray programmes on the durum wheat variety Lloyd, drilled on 13 November 2001 on the loamy sand soil at Colney, Norwich. Treatments of Opus (alone or in mixture with Orka and Twist) and Landmark were applied on 16 May (GS 49), with the two-spray programmes also being treated with either Amistar (0.5 l/ha) or Landmark (0.5 l/ha) on 1 June (GS 61). When the second treatments were applied on 1 June, mildew was recorded on 0.5, 2, 5 and 10% of the area of leaves 1, 2, 3 and 4 respectively on untreated crop, with 0.5, 5 and 10% *Septoria tritici* on leaves 2, 3 and 4 respectively. When assessed on 24 June (GS 69-77) mildew was affecting 5.3 and 5.4% of the area of leaves 1 and 2 respectively on untreated crop, with 9.0% *Septoria tritici* on leaf 2. Treatments which included Opus + Orka on 16 May followed by Landmark on 1 June significantly reduced mildew infection, whilst all treatments significantly reduced levels of *Septoria tritici*. Where no fungicide was applied, the crop produced a yield of 2.68 t/ha. Overall mean yield was significantly increased following treatment with Opus + Orka or Opus + Twist + Orka, particularly when followed up with either Amistar or Landmark, when yields of up to 3.31 t/ha were recorded. The soil was relatively light, making the crop vulnerable to the dry conditions which had occurred in the spring and this affected the overall level of yield and increased site variation.

#### Object

To examine the effect of a range of foliar fungicide programmes on durum wheat

#### Method

<i>Site</i>	New Found Farm, Colney, Norwich
<i>Soil type and series</i>	Loamy sand
<i>Variety</i>	Lloyd
<i>Treatments</i>	Details of treatments are given in Tables 1 & 2
<i>Sowing date</i>	13 November 2001
<i>Husbandry</i>	The crop followed potatoes, all applications as farm crop except fungicide, field details as outlined in Appendix
<i>Trial design</i>	Randomised block with four replicates
<i>Analysis</i>	ANOVA with LSD's quoted at P = 0.05
<i>Plot size</i>	12 m x 2.1 m with buffers
<i>Application</i>	Treatments (see Tables 1 & 2) were applied on 16 May (GS 49) and 1 June (GS 61) in 200 l/ha water as a medium spray using F110-03 nozzles
<i>Experiment diary</i>	See Appendix
<i>Deviations from protocol</i>	<ul style="list-style-type: none"> <li>• First treatment timing delayed from GS 39 to GS 49</li> <li>• 1000 grain weight and hagberg were not determined</li> </ul>

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\*Not for publication without the consent of the Director of Morley Research Centre. This report deals primarily with only one year's work so any conclusions given are provisional

## Results

Table 1. Grain yield (t/ha at 85% dm)

Fungicide (l/ha) 16 May (GS 49)	1 June (GS 61)			Mean
	Untreated	Amistar (0.5)	Landmark (0.5)	
Untreated	-	-	-	2.68
Opus (0.5)	2.68	2.79	2.92	2.80
Opus + Orka (0.5 + 0.5)	2.87	3.27	3.07	3.07
Landmark (0.5)	3.00	2.80	2.77	2.86
Opus + Twist (0.5 + 1.0)	2.74	2.86	3.02	2.87
Opus + Twist + Orka (0.5 + 1.0 + 0.5)	3.13	3.20	3.31	3.21
LSD		0.326		0.188
Mean	2.88	2.98	3.02	
LSD		NS		

SE per plot (43 df) =  $\pm 0.232$  or 7.9 CV (%)

Table 2. Active ingredients of commercial products used

Product	Active ingredients (ai)	g ai/l or % w/w	Formulation
Amistar	azoxystrobin	250	SC
Landmark	epoxiconazole + kresoxim-methyl	125 + 125	SC
Opus	epoxiconazole	125	SC
Orka	fenpropimorph + quinoxyfen	250 + 66.7	EW
Twist	trifloxystrobin	125	EC

- The crop followed potatoes and was drilled on 13 November 2001.
- Establishment was satisfactory, with 222 plants/m<sup>2</sup> recorded when counts were made on 14 January 2002.
- When the first fungicides were applied on 16 May (GS 49), traces of *Septoria tritici* were present in the crop, but mildew was more wide spread on the lower leaves with 7 and 10% of the area of leaves 4 and 5 respectively affected. At the second application on 1 June (GS 61), mildew was recorded on 0.5, 2, 5 and 10% of the area of leaves 1, 2, 3 and 4 respectively on untreated crop (leaf 1 = flag), with 0.5, 5 and 10% *Septoria tritici* on leaves 2, 3 and 4 respectively.
- A full assessment made on 24 June (GS 69-77) showed mildew to be affecting 5.3 and 5.4% of the area of leaves 1 and 2 respectively on untreated crop, with 9.0% *Septoria tritici* on leaf 2 (Table A2). Treatments which included Opus + Orka applied on 16 May followed by Landmark on 1 June significantly reduced mildew infection, whilst all treatments significantly reduced levels of *Septoria tritici*.
- Where no fungicide was applied, the crop produced a yield of 2.68 t/ha (Tables 1 and A3). Overall mean yield was significantly increased following treatment with Opus +

Orka or Opus + Twist + Orka, particularly when followed up with either Amistar or Landmark, when yields of up to 3.31 t/ha were recorded. However, the soil was relatively light making the crop vulnerable to the dry conditions which had occurred in the spring and this affected the overall level of yield and increased site variation.

- Where no fungicide was applied, a specific weight of 75.4 kg/hl was recorded (Table A3). Many of the treatments significantly increased specific weight, particularly when a fungicide was used on the ear, with the highest value (79.1 kg/hl) following treatment with Opus + Twist + Orka on 16 May and Landmark on 1 June.
- A grain protein content of 14.4% was recorded on the untreated crop (Table A3). Treatment with Amistar significantly reduce protein content.

### **Further details**

Other experiment details and results are presented in the appendix.

#### Field details

Applications to crop

Experiment diary

Method

Results

- Table A1 Order of treatments in tables of results
- Table A2 Disease and green leaf area (% leaf area) on 24 June
- Table A3 Grain yield (t/ha), specific weight (kg/hl) and grain protein content (%)

**Field details**

<b>Site</b>	New Found Farm, Colney, Norwich			
<b>Field reference</b>	Block 3			
<b>Crop</b>	Durum wheat			
<b>Variety</b>	Lloyd			
<b>Previous crop</b>	2001 Potatoes 2000 Winter barley 1999 Set aside 1998 Sugar beet			
<b>Soil type and series</b>	Loamy sand			
<b>Soil analysis</b>	pH	P	K	Mg
July 2002	8.2	3-	2-	0+
<b>Seed rate</b>	475 seeds/m <sup>2</sup>			
<b>Date sown</b>	13 November 2001			
<b>Cultivations</b>	5 November 2001			Flatlifted
	6 November			Cultivated
				Double ring pressed

**Applications to crop**

Precise treatments remain confidential but they are held on file. Appropriate treatments were applied to give a good commercial level of control of weeds, pests and crop growth and of crop nutrition.

### Experiment diary

Date	GS	Treatments applied or action
13 November 2001	-	Trial drilled using Oyjord plot drill
14 January 2002	11-12	Plant count (222/m <sup>2</sup> )
16 May	49	1 <sup>st</sup> fungicide application as per treatment list. Weather conditions sunny and hot (25°C)
1 June	61	2 <sup>nd</sup> fungicide application as per treatment list. Weather conditions sunny and warm (18°C)
24 June	69-77	Assessment of disease and green leaf area
7 August	92	Trial harvested using Sampo 2010 "R" plot combine

### Spray and assessment methods for cereal trials

This is an abbreviated version of the standard operating procedures used at Morley Research Centre.

#### Plot layout

Plots were sown at 475 seeds/m<sup>2</sup> with an Oyjord drill. The drilled plots were 12 m long and 1.56 m wide from outside row to outside row (14 rows at 12.0 cm spacing). Plots were separated by a buffer of the same size with a 54 cm gap between successive plots and buffers. This gave an effective plot width of 2.10 m, which was used for harvest yield calculations. Treatments were applied to the plot and to half of the buffer at each side. For harvest purposes, plot length was reduced to 9.5 m.

#### Overall treatments

Overall treatments such as fertiliser, insecticides, herbicides and growth regulators were applied across all plots with farm machinery using wheelings which were 24 m apart.

#### Spraying details

Treatments were applied using a CO<sub>2</sub> powered backpack sprayer, utilising 'Cornelius' vessels and a 4 m boom (eight nozzles at 0.5 m spacings) with Lurmark F110-03 nozzles at 2 bar pressure, to give 200 l/ha spray volume at 1.6 m/s forward speed.

#### Agronomic factors

Overall plant population was determined by making 30 counts of a 30.5 x 30.5 cm quadrat at random across the site.

#### Foliar disease and green leaf area

Foliar disease of a particular leaf or leaf layer was determined by the following method. A standard (based on the appropriate key from the ADAS manual of disease assessment keys, 1976) was agreed between two experienced assessors and plots were assessed by walking along the gap between the harvest area and the buffer, examining the plot from both sides. The crop was examined at intervals and an appropriate disease level was agreed at the end of each plot.

The green area of a particular leaf or leaf layer was determined by two experienced assessors walking along the gap between the harvest area and the buffer, examining the plot from both sides. The crop was examined at intervals and an appropriate green leaf area was agreed at the end of each plot.

#### Harvest details

Plots were harvested using a Sampo 2010 combine which was modified for plot work and used electronic weighing (Harvest Master HM-400 with Grain Gauge). Trials were harvested by replicate.

#### Post harvest determinations

The grain samples were pre-cleaned using a Rational sample cleaner to remove any chaff or straw before further assessments (moisture content, specific weight or protein content) were carried out.

Moisture content, specific weight and protein content were determined using a FOSS Infratec 1241-050 grain analyser.

### Results

Table A1 *Order of treatments in tables of results*

Fungicide (l/ha) 16 May (GS 49)	1 June (GS 61)			Mean
	Untreated	Amistar (0.5)	Landmark (0.5)	
Untreated	-	-	-	16
Opus (0.5)	1	2	3	
Opus + Orka (0.5 + 0.5)	4	5	6	
Landmark (0.5)	7	8	9	
Opus + Twist (0.5 + 1.0)	10	11	12	
Opus + Twist + Orka (0.5 + 1.0 + 0.5)	13	14	15	

## Tables of results

Table A2 *Disease and green leaf area (% leaf area) on 24 June*

Treatment	Mildew	GLA	Mildew	Septoria	GLA
-	Leaf 1	Leaf 1	Leaf 2	Leaf 2	Leaf 2
Unit	%	%	%	%	%
Date	24/06/2002	24/06/2002	24/06/2002	24/06/2002	24/06/2002
1	3.8	56.5	4.4	4.6	46.0
2	3.4	61.3	3.8	4.0	49.0
3	2.3	63.0	3.3	4.3	47.5
4	2.9	57.5	3.1	5.5	43.8
5	2.2	64.0	2.2	3.1	49.8
6	1.0	63.8	1.0	3.1	52.8
7	3.3	55.0	4.4	4.6	43.3
8	3.8	59.0	4.0	4.5	48.5
9	2.8	59.5	4.3	2.6	44.8
10	3.5	59.3	2.9	2.8	48.0
11	3.7	65.3	3.7	3.4	52.5
12	2.3	61.3	2.3	3.3	49.3
13	2.7	63.8	2.7	4.3	47.5
14	2.3	57.0	2.0	2.8	45.8
15	1.2	68.0	1.1	2.4	52.5
16	5.3	55.0	5.4	9.0	38.8
LSD (P=005)	1.37	NS	1.16	1.86	NS
SE per plot (45 df)±	0.96	5.65	0.81	1.30	5.51
CV (%)	33.3	9.3	25.7	32.5	11.6

Table A3 Grain yield (t/ha at 85% dm), specific weight (kg/hl at 85% dm) and grain protein content (% Dumas)

Treatment - Unit Date	Grain yield at 85% dm t/ha 07/08/2002	Specific weight at 85% dm kg/hl	Protein Dumas %
1	2.68	76.3	14.7
2	2.79	78.0	14.4
3	2.92	77.3	14.3
4	2.87	78.0	14.8
5	3.27	79.0	13.9
6	3.07	78.7	14.3
7	3.00	77.5	14.5
8	2.80	78.8	14.5
9	2.77	77.7	14.8
10	2.74	76.6	14.4
11	2.86	78.9	14.3
12	3.02	78.2	14.4
13	3.13	77.8	14.2
14	3.20	78.6	14.2
15	3.31	79.1	14.4
16	2.68	75.4	14.4
LSD (P=005)	0.331	2.10	NS
SE per plot (43 df)±	0.232		0.34
SE per plot (45 df)±		1.47	
CV (%)	7.9	1.9	2.4