MORLEY RESEARCH CENTRE

Rye varieties and seed treatments, 1994

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Summary

Nine varieties of rye were grown on a light land site. All were sown with a Baytan seed treatment, and selected varieties received two other seed treatments. The test product UK 158 produced about 10% higher plant populations than the other seed treatments. There were no significant differences between seed treatments for either brown rust levels prior to fungicide application or grain yield. Differences in grain yield between varieties were found to be significant, Marder was highest at 5.26 t/ha and Merkator lowest at 4.08 t/ha. There was some variability in soil across the site.

Object

To assess the agronomic characteristics and yield potential of a range of rye varieties and seed treatments.

Method

Four replicates of twenty treatments, shown in Table 1, were sown on 10 October 1993 on a loamy sand site at New Found Farm, Colney. The trial received normal farm inputs and was harvested on 9 August 1994.

Brown rust (*Puccinia recondita*) levels were monitored and assessed as necessary throughout the growing season, and assessments of plant establishment, brackling, yield, grain size and specific weight were made, according to Morley standard procedures.

*Not for publication without the Director's consent.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

Table 1. *Rye varieties and seed treatments*

Treatment	Variety	Seed treatment
1	Motto	Baytan
2		UK158
3		UK160
4	Amando	Baytan
5		UK158
6		UK160
7	Halo	Baytan
8		UK158
9		UK160
10	Merkator	Baytan
11		UK158
12	Marder	Baytan
13		UK158
14	Luchs	Baytan
15		UK158
17	Marlo	Baytan
17		UK158
18	Gambit	Baytan
19		UK158
20	Admiraal	Baytan

Layout

Randomised block of 20 treatments with 4 replicates analysed primarily as a factorial trial by removing treatments 3, 6, 9 and 20 leaving eight varieties each with two seed treatments.

Results

The treatments and results quoted in brackets in the tables are extra to the factorial analysis and are not significant unless an LSD is given. SE per plot and CV figures quoted apply to the factorial layout only.

Crop establishment

Table 2. *Crop establishment on 20 January 1994 (plants/m²)*

Variety	Baytan	UK 158	Mean	(UK 160)
Motto	176	213	194	(172)
Amando	176	207	192	(188)
Halo	175	210	192	(178)
Merkator	157	189	173	
Marder	182	209	195	
Luchs	191	187	189	
Marlo	201	235	218	
Gambit	214	234	224	
LSD	25.2		17.8	
Mean	184	210		
LSD	8.9			
(Admiraal)	(185)			
LSD (compared to main table)	(27.1)			
SE per plot (45 df)	19.17			
CV (%)	9.9			

(LSD = least significant difference at 95% probability level)

Plant population was affected by seed dressing, UK 158 significantly increasing establishment in all the ryes compared to Baytan. Populations were significantly lower with Motto and Halo treated with UK 160 compared to UK 158. Populations achieved by UK 160 appear to be very similar to those achieved using Baytan. There was no significant interaction between variety and seed dressing. The populations achieved for all treatments were acceptable, as shown in Table 2.

Brackling

Brackling occurred in all varieties, partly because the trial area was fit for several days before it was harvested. Brackling was not affected by seed dressing but Gambit and Motto suffered less than average and Amando was significantly worse. There was no loss of grain at harvest as a result of brackling.

Grain yield

Table 3. *Grain yield (t/ha at 85% dm)*

Variety	Baytan	UK 158	Mean	(UK 160)
Motto	4.41	5.16	4.78	(4.80)
Amando	4.59	4.76	4.67	(4.75)
Halo	4.10	4.52	4.31	(4.64)
Merkator	3.81	4.34	4.08	
Marder	5.37	5.15	5.26	
Luchs	4.74	4.99	4.87	
Marlo	4.75	4.86	4.81	
Gambit	4.91	5.02	4.96	
LSD	0.958		0.667	
Mean	4.58	4.85		
LSD	NS			
(Admiraal)	(4.49)			
SE per plot (45 df)	0.673			
CV (%)	14.3			

Table 3 summarises yield results.

The only significant differences were between varieties, Merkator and Halo being significantly lower than Marder, which gave the highest yield. There was a trend for the Baytan treatments to produce lower yields than the UK 158/160 equivalents but this was not significant.

Disease levels prior to fungicide treatment

Low levels of brown rust were noted on some plots on 7 February 1994. This was monitored during February and March but with cold weather during this period the disease levels did not increase dramatically. A disease assessment of leaf two was undertaken on March 17 as the field was due to be fungicide treated and any differences between seed dressings should have appeared by this stage. The results (Table 4) show that there was a significant difference between Marlo, Gambit and Luchs and the varieties with the lowest recorded disease incidence, Motto, Marder and Merkator. There was no significant difference between seed treatments.

Table 4. *Brown rust on the the fourth fully expanded leaf on 17 March 1994 (%)*

Variety	Baytan	UK 158	Mean	(UK 160)
Motto	0.00	0.00	0.00	(0.01)
Amando	0.02	0.02	0.02	(0.01)
Halo	0.01	0.04	0.03	(0.01)
Merkator	0.01	0.02	0.01	
Marder	0.01	0.02	0.01	
Luchs	0.04	0.04	0.04	
Marlo	0.03	0.07	0.05	
Gambit	0.04	0.07	0.05	
LSD	0.047		0.033	
Mean	0.02	0.03		
LSD	NS			
(Admiraal)	(0.01)			
SE per plot (45 df)	0.033			
CV (%)	126.1			

Grain size and quality

TGW varied significantly between varieties with Motto highest at 38.7g and Amando lowest at 28.8g. This was also reflected in the screenings through a 2mm sieve when the samples were pre-cleaned. While most varieties had screenings (<2mm) of around 6%, Motto had significantly less (2.1%) and Amando very high levels (13%). There was no difference between seed treatments.

Specific weights did not vary greatly although the differences between varieties were significant. Admiral recorded the highest specific weight at 74.4 kg/hl, the lowest was Gambit at 72.0 kg/hl. There were no differences between seed treatments.

Table 5. *Thousand grain weight (g, 85% dm)*

Variety	Baytan	UK 158	Mean	(UK 160)
Motto	38.4	39.0	38.7	(37.4)
Amando	29.2	28.4	28.8	(27.7)
Halo	33.9	34.0	33.9	(32.5)
Merkator	30.3	30.4	30.4	
Marder	32.0	30.1	31.1	
Luchs	32.3	29.6	30.9	
Marlo	34.4	34.9	34.7	
Gambit	35.1	34.6	34.9	
LSD	3.06		2.17	
Mean	33.2	32.6		
LSD	NS			
(Admiraal)	(36.3)			
LSD (compared to main table)	(2.93)			
SE per plot (45 df)	2.15			
CV (%)	6.5			

Table 6. *Specific weight (kg/hl)*

Variety	Baytan	UK 158	Mean	(UK 160)
Motto	73.1	73.7	73.4	(73.6)
Amando	72.5	72.7	72.6	(73.1)
Halo	73.4	73.5	73.4	(73.6)
Merkator	74.1	73.7	73.9	
Marder	73.2	73.1	73.2	
Luchs	73.3	73.4	73.4	
Marlo	72.6	72.7	72.7	
Gambit	72.1	72.0	72.0	
LSD	0.96		0.68	
Mean	73.0	73.1		
LSD	NS			
(Admiraal)	(74.4)			
LSD (compared to main table)	(1.01)			
SE per plot (45 df)	0.68			
CV (%)	0.9			

Discussion

It was very unfortunate that the trial was sited on an area which had a marked change of soil which was not visible on the surface when the site was chosen. When the yield results were mapped out on a plan of the trial a distinct line of change became obvious, yields being lower on one side of the line compared to the other. This did not appear to affect the early assessments of population and disease, but it was responsible for variation in the yield results. Some of this variation was overcome by using a factorial anlysis for the main part of the trial, so that the extra seed treatment and the plots of Baytan treated Admiraal became separate parts of the tables. All results should be considered with this in mind.

UK 158 significantly improved establishment of the crop in all the varieties when compared to Baytan and UK 160

Disease levels in the early spring seem to have been checked by the cold weather. Accordingly, there were only small differences between varieties.

In spite of the site problem, the yields were broadly in line with the NIAB's results for 1994 when making comparisons between varieties. No significant yield differences between seed treatments were detectable.

Appendix

The following information is presented as an appendix which is available on request.

Diary	
Field details	
Method	
Appendix Table 1	pre-cleaning grain size <2mm
Appendix Table 2	brackling at harvest

Experiment diary

10 October 93	Trial drilled to plan, drilling depth 50mm in a ploughed and pressed seedbed which was reasonably firm with a very fine tilth.
20 January 94	Population counts GS 12/21
7 February	Trial inspected for brown rust infection, very low levels present on some plots, insufficient to assess. GS 22
7 March	Trial inspected for brown rust development, fresh pustules present but still at low levels on lowest leaves of Luchs and Amando. GS 22
17 March	Crop to be fungicide treated at next available opportunity, brown rust development disappointing, assessment done on the 4th fully emerged leaf. GS 23/4
28 April	Trial inspected, brown rust on lowest dying leaves. Leaves 1 and 2 clean, leaf 3 infected up to 0.5%. Varietal differences only, insufficient to assess. GS 31/2
27 June	Trial inspected, Varietal differences in brown rust, Motto apeared to have less than others. plants appear droughted, all leaves are dying even where there is less disease present.
9 August	Trial harvested.

Field details

Trial	NAS 377, Rye varieties and seed dressings		
Site	Newfound Farm, Colney		
Field reference	Block 3 J		
Crop	Winter Rye		
Treatments	20 (listed in table 1 of trial report)		
Previous crop	1993	Spring barley	
	1992	Rye	
	1991	Fallow	
	1990	Sugar beet	
Soil type (series)	Loamy sand (Burlingham series)		
Drilling date		Field 22 Sept	Trial 10 Oct
Seedrate		135kg/ha	400 seeds/m^2

	Date	Rate/ha	Product
Herbicide	20 Mar	30 g	Ally (metsulfuron-methyl 20% w/w)
Insecticide	30 Oct	0.25 l	Cypermethrin 100g/l
Fungicide	20 Mar	0.4 l	Alto 100 SL (cyproconazole 100 g/l)
	26 Apr	1.0 l	Folicur (tebuconazole 250g/l)
	26 May	1.0 l	Folicur
Growth reg.	20 Mar	1.3 l	MSS Chlormequat 70 (chlormequat 700g/l)
Nutrients applied	14 Mar	40 kg	Nitrogen as ammonium nitrate
		65 kg	Potassium as muriate of potash
	4 May	124 kg	Nitrogen as urea
Total N applied		164 kg	
Harvest date	9 Aug		

Method

These are an abbreviated version of the Standard Operating Procedures used at Morley Research Centre.

Plot layout

Plots were sown at 400 seeds/m^2 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).

Common treatments such as fertiliser, insecticides, herbicides, fungicides or growth regulators were applied across all plots with farm machinery using wheelings, 12 m apart. For harvest purposes, plot length was reduced to 9.0 or 9.5 m depending on track and tyre size.

Agronomic factors

Plant population was determined by making six counts of a 30.5 cm x 30.5 cm square quadrat per plot.

Foliar disease, green leaf and ear colour

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.

Harvest details

Plots were harvested using a Claas Compact combine which was modified for plot work and used electronic weighing (Novatech M864 Loadmeter). Trials were harvested by replicate.

Post harvest determinations

Moisture content was determined using a Burrows digital moisture computer. A minimum of two samples were tested from each plot, with a tolerance of 0.2% required between samples.

The grain samples were pre cleaned using a Rational sample cleaner to remove any chaff or straw before further assessments (specific weight or 1000 grain weight) were carried out. The fractions of grain that passed over and through a 2mm sieve were separately weighed.

Specific weight was determined using a Farm-Tec Easi-Lab chondrometer and electronic balance. A minimum of two samples were tested from each plot, with a tolerance of 2.0 g required between samples.

1000 grain weight was determined by counting 200 grains from a well mixed sample and weighing on an electronic balance. A minimum of two samples were counted from each plot with a tolerance of 0.2 g required between samples.

Table 1. *Pre-cleaning screenings <2mm (%)*

Variety	Baytan	UK 158	Mean	(UK 160)
Motto	2.1	2.2	2.1	(2.2)
Amando	12.6	13.5	13.0	(11.9)
Halo	3.7	4.3	4.0	(4.0)
Merkator	5.9	6.0	6.0	
Marder	6.3	6.6	6.4	
Luchs	5.9	6.5	6.2	
Marlo	5.4	5.7	5.6	
Gambit	6.2	5.7	5.9	
LSD	NS		1.57	
Mean	6.0	6.3		
LSD	NS			
(Admiraal)	(2.8)			
LSD (compared to main table)	(2.11)			
SE per plot (45 df)	1.56			
CV (%)	25.3			

Table 2. *Brackling at harvest (%)*

Variety	Baytan	UK 158	Mean	(UK 160)
Motto	20	21	21	(21)
Amando	43	45	44	(43)
Halo	30	30	30	(28)
Merkator	34	34	34	
Marder	31	36	34	
Luchs	30	33	31	
Marlo	30	30	30	
Gambit	20	21	21	
LSD	7.9		5.6	
Mean	30	31		
LSD	NS			
(Admiraal)	(36)			
LSD (compared to main table)	(7.5)			
SE per plot (45 df)	5.6			
CV (%)	18.3			