THE EVALUATION OF RYE AND TRITICALE VARIETIES AS A SECOND CEREAL, 1992

D B Stevens and M Nuttall

Summary

Four varieties each of rye and triticale were grown as a second cereal on sandy loam soil at Morley. In spite of intensive treatment with growth regulator all rye varieties were over 1 m tall and the triticale was 88 cm or more. Brown rust was a problem on rye but not triticale. Yields in excess of 8.0 t/ha were obtained from all varieties with little difference between species.

Introduction

A limited market exists in the UK for rye to be used in the manufacture of crispbreads and for addition to other speciality products. Since the crop has been shown to be more tolerant of drought and some stem base diseases than wheat or barley it has found a place on light, drought prone soils and on other sites where take-all is a risk.

Triticale is a cross of wheat and rye, aiming to combine the disease resistance of rye with the greater yield potential of wheat.

Object

To monitor the performance of a range of rye and triticale varieties when grown as a second cereal on the sandy loam soil at Morley.

Method

Four varieties of rye and four of triticale, as shown in Table 1, were sown at a seedrate of 400 seeds/m^2 on 10 October 1991, in four randomised blocks. Most varieties had a Rappor type of seed treatment but Luchs was only available with Baytan.

*Not for publication without Director's consent.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

Table 1. *Rye and triticale varieties in 1992 at Morley*

Rye	Triticale
Amando	Almo
Halo	Cumulus
Luchs	Lasko
Marder	Purdy

Normal inputs of fungicide, fertiliser, insecticide and growth regulator were applied overall as on the adjoining farm crop of winter wheat with some additional application of fungicide and growth regulator to improve the control of brown rust and straw growth. The trial was conducted according to normal Morley procedures.

Crop growth, in terms of emergence on 28 October, straw height on 17 July, ear emergence and lodging on 14 July and at harvest (23 August) was recorded. In addition an assessment of stem base diseases was made on 4 July and brown rust infection was recorded on 16 June. After harvest on 23 August grain quality was measured as specific weight and 1000 grain weight.

Results and discussion

Crop growth and lodging

Table 2. *Crop growth and lodging*

Variety	Emergence score (0=nil, 10 complete)	Straw length (cm)	Lodging (%)		Leaning/brackled (%)	
			14 July	At harvest	14 July	At harvest
Rye						
Amando	8.1	104	0.0	6.2	1.8	66.2
Halo	9.0	117	0.0	3.7	5.5	44.0
Luchs	6.8	103	0.0	3.7	0.0	80.0
Marder	8.9	107	0.0	1.3	0.2	55.0
Triticale						
Almo	7.8	88	0.0	0.0	0.0	12.5
Cumulus	7.4	91	0.0	0.0	0.0	15.0
Lasko	8.0	88	5.0	90.02	3.8	10.0
Purdy	6.9	100	0.0	11.3	9.3	75.0
LSD	0.45	4.7	NS	12.191	1.79	20.42
SE per plot (21 df)	±0.31	±3.2	±2.5	±8.28	±8.02	±13.88
or as % GM	3.9%	3.2%	400%	57%	158%	31.4%

(LSD = least significant difference at 95% probability level)
(NS = no significant difference)

The crop established well with Halo being the most advanced and Luchs the least well established on 28 October. The latter was probably delayed by the Baytan seed treatment. Apart from the Baytan treated Luchs the rye tended to establish more rapidly than the triticale. Although there was some leaning following a summer storm at the end of June, this remained at a low level on most varieties until harvest approached and probably had little effect on yield. The rye was taller than the triticale and tended to suffer more leaning but Lasko (triticale) was the weakest variety tested.

The triticale remained free of foliar disease throughout the season but brown rust was severe on the rye in spite of the fungicides applied.

Luchs, Amando and Marder carried a significantly higher infection than Halo. Eyespot infections were relatively low compared to wheat but differences between varieties were seldom significant. Some rye varieties had less infection than triticale but some varieties of each species carried equal levels of infection.

Ear emergence was earlier in the rye than the triticale. Marder was the earliest rye reaching ear emergence on 11 May with the other varieties following within two days. Ear emergence for the triticale was spread from 19 May (Almo) to 26 May (Purdy).

Yield and quality

The trial was harvested on 23 August and although there was considerable leaning and brackling by that time, severe lodging was restricted to small areas towards the end of the growing season. It was considered that the crop had reached its potential without serious lodging but the brown rust had caused premature leaf death on the rye varieties.

Table 3. *Yield and grain quality (at 85% dm)*

Variety	Grain yield (t/ha)	1000 grain weight (g)	Specific weight (kg/hl)
Rye			
Amando	8.46	38.3	71.7
Halo	8.21	41.5	72.0
Luchs	9.08	45.3	72.0
Marder	9.12	44.4	71.1
Triticale			
Almo	9.03	47.5	69.2
Cumulus	8.87	46.3	68.3
Lasko	8.09	42.6	67.8
Purdy	8.75	52.1	69.7
LSD	0.731	4.89	1.19
SE per plot (21 df)	±0.497	±3.32	±0.81
or as % GM	5.7%	7.4%	1.2%

As shown in Table 3, yields of both rye and triticale ranged from just over 8.0 t/ha to just over 9.0 t/ha. Triticale tended to give the larger grain but lower specific weight.

Conclusion

Both rye and triticale proved to be capable of producing yields of 8-9 t/ha as a second cereal. Both required considerable input of growth regulator when fertilised as winter wheat. Levels of eyespot and foliar disease were low except for brown rust which was a particular problem on the hybrid rye varieties.

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

1. Field details
2. Method
3. Experiment diary
4. Results

Table A1	Date of ear emergence
Table A2	Eyespot and sharp eyespot on 4 July
Table A3	Brown rust resistance score on 16 June

Field details

Site: Morley Research Centre

Field reference: 9 Clampe Close

Crop: Winter wheat surrounding rye/triticale trial

Previous crop:

1991	Winter wheat
1990	Sugar beet
1989	Linseed
1988	Winter wheat

Soil type and series: Sandy loam over chalky boulder clay (Ashley series)

Soil analysis:

	pH	P	K	Mg
6 September 1991	8.0	3.3	1.2	2.1

Seed: C1 direct from agents except Amando which was from Morley bulk supply

Seedrate: 400 seeds/m^2

Date sown: 10 October 1991

Nutrients applied:

		Rate (kg/ha)
11 March 1992	N	40
23 April	N	120
8 May	N	60
Total	**N**	**220**

Cultivations: 3 October 1991, ploughed and pressed

Applications to crop:	GS	Item	Rate/ha
13 November 1991	10	Cyperkill (cypermethrin, 100g)	0.25 l
11 March 1992	22-23	Urea (46% N)	90 kg
1 April	31	Chlormequat 700 (chlormequat, 700g)	1.3 l
8 April	31	Chlormequat 700 + Ally (metsulfuron-methyl, 20%w/w)	0.7 l 30 g
23 April	32	Urea	260 kg
3 May	33-37	Terpal (mepiquat chloride, 308g + 2-chloroethylphosphonic acid, 155g) + citowett	 2.0 l 80 ml
8 May	37	Nitram (34% N)	175 kg
28 May	51	Patrol (fenpropidin, 750 g) + Impact Excel (chlorothalonil, 300 g + flutriafol, 47 g)	0.7 l 2.0 l
16 June	69	Punch C (carbendazim, 125 g + flusilazole, 250)	0.5 l
3 July	75	Aphox (pirimicarb, 50% w/w)	560 g

Method

Plot layout

Plots were sown at 400 seeds/m^2 with an Oyjord drill. The drilled plots were 12 m long and 1.66 m wide from outside row to outside row (14 rows at 12.8 cm spacing). Plots were drilled 51 cm apart giving an effective plot width of 2.17m which was used for harvest yield calculations.

Agronomic factors

Straw length was determined by measuring the average height to the base of the ear of a group of plants at 10 sites per plot.

Stem base disease

Eyespot infection was determined by examining 25 main tillers selected at random in each plot. The presence of sharp eyespot or fusarium was also recorded as an additional assessment. Each shoot was assigned to one of these classes:

Uninfected	
Slight	one or more lesions occupying in total less than half the circumference of the stem; or, one or more lesions on leaf sheaths, not penetrating to the stem
Moderate	one or more lesions occupying in total at least half the circumference of the stem
Severe	tissue softened so that lodging would readily occur; one or more lesions occupying in total at least half the circumference of the stem.

The total number in each of these four categories was used to determine the per cent tillers infected.

Foliar disease

Foliar disease was assessed using the whole plot method, where the top four leaves were examined. Disease levels were determined by walking along the gap between plots and examining the plot from both sides. The leaf canopy was compared with standard NIAB assessment keys for the relevant disease.

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.

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.

Experiment diary

Date	Treatment applied
10 October 1991	Plots drilled into ploughed and pressed land after one pass with a power harrow. Seedrate 400 seeds/m^2.
28 October	Plant emergence score.
10-26 May 1992	Ear emergence recorded.
16 June	Brown rust score.
14 July	Lodging and leaning assessed.
23 August	Crop harvested after assessment of brackling and lodging.

Results

Table A1. *Date of ear emergence*

Variety	Date in May
Amando	12.8
Halo	13.3
Luchs	12.3
Marder	11.0
Almo	19.0
Cumulus	21.3
Lasko	24.3
Purdy	26.0
LSD	1.17
SE per plot (21 df) = ± 0.79 or 4.5% of GM	

Table A2. *Eyespot and sharp eyespot on 4 July*

Variety	Eyespot (% of tillers)				Sharp eyespot
	Uninfected	Slight	Moderate	Severe	infection (% of tillers)
Rye					
Amando	33.0	48.0	17.0	4.0	5.0
Halo	29.0	47.0	20.0	4.0	11.0
Luchs	52.0	42.0	5.0	1.0	5.0
Marder	70.0	29.0	1.0	0.0	1.0
Triticale					
Almo	16.0	30.0	40.0	14.0	3.0
Cumulus	22.0	34.0	28.0	16.0	5.0
Lasko	13.0	21.0	36.0	30.0	3.0
Purdy	24.7	48.5	19.8	7.0	3.9
LSD	17.53	17.18	15.56	12.00	NS
SE per plot (21 df)	±11.93	±11.68	±10.58	±8.15	±3.97
or as %GM	36.7%	31.4%	50.8%	85.8%	86.1%

Table A3. *Brown rust resistance score*

Variety	Rust resistance score (10 = completely clean, 0 = dead, 5 = L1-trace, L2-2-3%, L3-5%, L4-10%
Rye	
Amando	4.3
Halo	6.0
Luchs	4.0
Marder	4.1
Triticale	
Almo	10.0
Cumulus	10.0
Lasko	10.0
Purdy	10.0
LSD	1.59
SE per plot (21 df)	±1.08
or as % GM	14.8%