

J K Doodson

PHYSIOLOGIC RACE SURVEYS

FINAL REPORT

1972

NOT FOR PUBLICATION

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Physiologic Race Survey Committee (Cereal Pathogens)

Acting Secretary
Dr J K Doodson
NIAB, Cambridge

PYHSIOLOGIC RACE SURVEYS - CEREAL PATHOGENS
 FINAL REPORT FOR 1972
 SUMMARY
 GENERAL

1. In 1972 disease samples were again collected for race identification. The total number of samples collected for each disease is shown in Table 1.

Table 1. Number of samples collected for each disease

Disease		Number of Samples			
		1969	1970	1971	1972
Yellow Rust	- Wheat	227	166	541	860
Yellow Rust	- Barley	48	16	4	63
Brown Rust	- Barley	289	369	131	97
Crown Rust	- Oats	28	10	35	32
Mildew	- Wheat	173	289	265	117
Mildew	- Barley	359	469	361	285
Mildew	- Oats	105	106	91	65
Rhynchosporium	- Barley	512	54	30	219
	TOTAL	1741	1479	1458	1738

2. Testing has been completed on nearly all the samples received in 1972. Those which have not been identified are undergoing confirmatory tests.

3. The following report is compiled from the results obtained at the three testing centres. Detailed results are presented in tabular form; a summary is given below.

4. It should be emphasised that sampling is not on a random basis, and therefore the frequency and distribution of races shown by the survey may not reflect that in the country as a whole.

YELLOW RUST OF WHEAT

Fifteen races were identified from the 860 samples collected in 1972, ie, 32E128(8B), 36E132(54), 37E132(60), 40E72(2B), 41E8(58), 41E136(58C), 43E138, 45E140, 104E9(3/55 Opal), 104E137(3/55D), 104E201, 106E139, 108E9(1B), 108E141 and 108E173. The three races most commonly identified were 104E137(3/55D), mainly from the southern part of Britain, 41E136(58C), mainly from northern England and Scotland and 108E173, found throughout Britain but mostly in the south. One or more of these races was found in all race mixtures, and singly they were identified from 95% of the samples. The other races were nearly all identified from mixtures.

Five new races were identified: 45E140, 104E201, 106E139, 108E141, and 108E173. Details of these races are given later in the report.

The majority of the samples received from the ADAS survey of foliar diseases arrived in very poor condition and could not be tested.

YELLOW RUST OF BARLEY

The majority of the 63 samples received were identified as race 24, two were found to be a variant of this race, and three samples were identified as race 23. All but four of the samples came from the northern half of England.

BROWN RUST OF BARLEY

The majority of the 97 samples received came from S.W. England and Wales. The widely virulent races E and F were most commonly identified (84 samples). Race B was also identified, and a hitherto unclassified culture from the NIAB designated race L.

CROWN RUST OF OATS

Nine races were identified from the 35 samples received, with 251, 234 and 289 comprising the majority. The others were 229, 272, 275, 280, 296 and the new race 236 from Selma grown in Kent. This race is similar to race 251.

MILDEW OF WHEAT

Only 23 of the 117 samples received have so far been fully tested. Virulence for varieties derived from H8810/47 or *T. carthlicum* and some varieties derived from CI 12633 is now common. There is considerable variation between the derivatives of CI12633 and tests are still in progress to identify the variation.

MILDEW OF BARLEY

Two hundred and eightyfive samples were received of which 61 have so far been tested on the full set of differentials. Two of the isolates obtained from Lyallpur derived varieties were found to be virulent on seedling leaf segments of Gopal. This is the first record of Gopal virulence in this country.

Isolates virulent on each of the Lyallpur derivatives in cultivation or trials have now been confirmed but the relationships between the derivatives are very complex and are being analysed further.

The appropriate virulence gene combinations necessary for conditioning virulence on seedlings of all the Vada derivatives and related varieties have now been detected, but the situation is again very complex. The durability of the resistance of this group cannot be predicted.

An intensive survey was also carried out. Approximately 1500 samples were collected from a large field of each of six varieties. There were two collection dates and the isolates were maintained on detached leaf segments of one of two varieties. The overall pattern of distribution of virulence genes in this survey resembles that observed in non-random surveys.

MILDEW OF OATS

Three races, 2, 3 and 4 were identified from the 65 samples received. The proportion of race 4 in the samples has increased while that of race 2 has decreased. Race 4 was identified on samples from Scotland for the first time. Races 3 and 4 have now been isolated from varieties with no known resistance suggesting that they can compete successfully with the previously prevalent race 2.

RHYNCHOSPORIUM OF BARLEY

Two hundred and nineteen samples were received 196 of which were identified as race UK1. Thirteen samples were identified as race UK2, of which only two were from winter varieties resistant to UK1.

YELLOW RUST - WHEAT

NATIONAL INSTITUTE OF AGRICULTURAL BOTANY, CAMBRIDGE.

N H CHAMBERLAIN and JUBILIA C SMITH

1. During 1972, 860 samples were received at the N.I.A.B. The number of samples collected from winter wheat varieties is shown in Table 2, from spring wheat varieties in Table 3.

Table 2 Yellow Rust of Wheat - Samples collected from winter varieties.

Winter Wheat	No. of samples
Joss Cambier	144
Cappelle-Desprez	91
Maris Minrod	69
Maris Ranger	62
Cama	61
Maris Huntsman	29
Champlain	21
Maris Templar	21
Maris Ridgeon	19
Tommy	14
Cebeco 148	13
West Desprez	12
Armentieres	10
Bouquet	9
Maris Beacon	6
Mercury (VR 761006)	6
Benoist 5780	5
SR 156/218	5
Ace	4
Lincoln	4
Maris Ploughman	4
Mildress	4
RFB 3668	4
VR 477	4
Chalk	3
Flinor	3
TJB 52/224	3
TL 365a/34	3
Urban	3
Hybrid 46	2
Maris Marksman (IR22)	2
Benno	1
Heima Desprez	1
Maris Freeman (TJB 75A)	1
Mega	1
Rodeo	1
RFB 668	1
TL 365a/37	1
U460/1	1
Val	1
VR 761079	1
TOTAL	650

Table 3 Yellow Rust of Wheat - samples collected from spring varieties.

Spring Wheat	No. of samples
Cardinal	35
Maris Dovo	22
Kolibri	18
Kleiber	15
Maris Halberd	10
Sappo	9
Tilly	9
Maris Butler	8
Copta	6
Sirius	6
Rothwell Sprite	5
Maris Pinion	4
Charles Peguy	2
Troll	2
Drabant	1
Janus	1
Maris Insign	1
6 W.M. 4	1
 TOTAL	155

Sixteen samples were received from Triticale, and eight from unknown varieties. A further 31 samples were received from the following varieties:- Bon Fermier (2); Harvest Queen (2); Heine VII(2); Lucas (2); Rubis (2); Weique x Perdix (2); Aegilops triuncialis; Aroso; Backweston selection 22/15/8; Chambord; Dwarf x (Yeonan x Nord) x TP114; (Dwarf x Weique) x Perdix 1; (Dwarf x Weique) x Perdix 2; HC73 x Cleo; Kolibri Cross; Little Club; Michigan Amber; Opal; Persian; Prof. Marchal; Siete Cerros; TMI 1364; 91499; 61-72-31; 68 FR 142 CI 13253/5 Nord.

2. RACE IDENTIFICATION

Full results of all samples tested are given in Table 4, using both old and new systems of race nomenclature. Samples not included are those which failed to establish, those which were discarded on arrival being in very poor condition, and those which have not been tested. Such a large number of samples was received that not all could be tested. A selection was made based on variety and location. Full results of samples sent in from the ADAS survey of foliar diseases of wheat are given in Table 5.

Table 4 Yellow Rust of Wheat - Race Identification

Location	NIAB Code No. 72/-	Date of Reception 1972	Variety	Race	
				New	Old
NORTHERN REGION					
	821	3/8	Cama	108E173	-
	848	10/8	"	108E173	-
Cumberland Wigton	48	2/5	Joss Cambier	41E136 + 43E138	58C + 43E138
Northumberland	53	8/5	" "	104E137	3/55D
	54	" "		104E137 + 41E136	3/55D + 58C
Alnmouth Cockle Park, Norpeth	98	25/5	Cama	41E136	58C
	97	"	Joss Cambier	41E136	58C
	443	5/7	West Desprez	41E136	58C
	445	"	Maris Ranger	41E136	58C
	447	"	Bouquet	41E136	58C
	448	"	Tommy	41E136 + 104E137	58C + 3/55D
	849	14/8	Maris Dove	108E173	-
	850	"	Maris Butler	108E141	-
Lowick Shoreswood	64	9/5	Cappelle-Desprez	41E136	58C
	785	31/7	Cebeco 148	41E136 + 104E137	58C + 3/55D
	786	"	Maris Templar	41E136 + 108E173	58C + 108E173
Yorkshire					
Croft, Darlington	92	24/5	" "	41E136	58C
	93	"	Maris Nimrod	108E173 + 104E137	108E173 + 3/55D
	95	"	Cama	104E137	3/55D
YORKS AND LANCS REGION					
	718	21/7	Joss Cambier	104E137	3/55D
	719	"	" "	104E137 + 41E136	3/55D + 58C
Yorkshire					
Barmston, Driffield	273	20/6	Maris Huntsman	104E137	3/55D
East Lutton	270	21/6	Joss Cambier	41E136	58C
Headley Hall, Tadcaster	670	18/7	SR156/218	41E136	58C
	672	"	Lincoln	41E136	58C
Lissett, Driffield	455	5/7	Cardinal	104E137	3/55D
Wetwang, Driffield	245	20/6	Joss Cambier	104E201	-
EAST MIDLANDS					
	776	28/7	" "	41E136 + 108E173	58C + 108E173
	778	"	Maris Ranger	108E141	-
	791	1/8	Joss Cambier	43E138	-
	796	"	Maris Nimrod	108E173	-
	798	"	Joss Cambier	104E137	3/55D
	800	"	Champlain	41E136	58C
	801	"	Maris Ranger	104E137	3/55D
	805	"	Cappelle-Desprez	108E173	-
Leicestershire					
Kibworth Harcourt	697	18/7	Tommy	104E137 + 41E136	3/55D + 58C
	698	"	Maris Ranger	108E173	-
	699	"	Cama	108E173	-
Pickering, Market Harborough	852	15/8	Maris Ranger	108E141	-
Sutton Bonington, Loughborough	488	10/7	Chambord	104E137	3/55D

Table 4 (Cont'd.)

Location	NIAB Code No. 72/-	Date of Reception 1972	Variety	Race	
				New	Old
EAST MIDLANDS (Cont'd.)					
Lincolnshire	429	4/7	West Desprez	108E173 + 37E132	108E173+ 60
	433	"	Maris Ranger	108E9	1B
	434	"	" "	108E9	1B
Bracebridge Heath	616	14/7	Maris Dove	108E173	-
Donington, Boston	507	10/7	Kleiber	108E9	1B
Eastville	829	3/8	Sirius	108E173	-
	830	"	Maris Ranger	108E173	-
Fen End, Holbeach	210	15/6	Joss Cambier	104E137	3/55D
Hagnaby	383	27/6	Maris Ranger	108E173+?	-
Irby on Humber	351	26/6	Cama	104E137	3/55D
Kirton	472	7/7	Maris Ranger	108E173+ 104E9	108E173+ 3/550pal
Long Sutton	145	12/6	Maris Nimiröd	104E137	3/55D
Mareham le Fen	297	22/6	Maris Ranger	108E141	-
	298	"	Cama	104E137	3/55D
	301	"	Tommy	104E137	3/55D
	304	"	Maris Templar	41E136	58C
	305	"	Bouquet	104E137	3/55D
Market Deeping	611	13/7	Maris Templar	41E136	58C
Market Rasen	257	20/6	Maris Huntsman	104E137+ 108E9	3/55D+ 1B
Moulton, Spalding	148	12/6	Cappelle-Desprez	104E137	3/55D
	150	"	TMA 1364	104E137	3/55D
	151	"	Cama	41E136	58C
Tattershall	198	13/6	Joss Cambier	104E137	3/55D
Terrington Marsh	353	27/6	Maris Ranger	108E141	-
	354	"	" "	108E141	-
Wainfleet	384	"	Cappelle-Desprez	32E128	8B
	707	19/7	Maris Ranger	104E137	3/55D
Wigtoft	293	22/6	Cebeco 148	41E136	58C
	294	"	Benoist 5780	41E136	58C
Wykeham Chapel	291	"	Maris Freeman	108E9 + 108E173	1B + 108E173
	292	"	Maris Ranger	108E9 + 108E173	1B + 108E173
Northamptonshire					
Brackley	125	7/6	Maris Beacon	108E173	-
Houlton	255	20/6	Cardinal	104E137 + 108E173	3/55D + 108E173
Orlingbury, Lettering	704	19/7	Cama	108E173	-
	705	"	Tommy	108E173 + 104E137	108E173+ 3/55D
	706	"	Maris Ranger	104E137	3/55D
Nottinghamshire					
Colston Bassett	622	13/7	" "	108E173	-
East Markham	700	19/7	Cardinal	108E173	-
	701	"	Maris Halberd	104E137	3/55D
Gleadthorpe	197	13/6	Cama	41E136+ 104E137	58C + 3/55D
WEST MIDLANDS	626	18/7	"	104E137	3/55D
	631	"	Heima Desprez	104E137	3/55D
	797	1/8	West Desprez	104E137	3/55D

Table 4 (Cont'd.)

Location	NIAB Code No. 72/-	Date of Reception 1972	Variety	Race	
				New	Old
WEST MIDLANDS (Cont'd.)					
Cheshire					
Farndon	647	17/7	Maris Huntsman	41E136	58C
	648	"	Cappelle-Desprez	104E137	3/55D
	650	"	Val	104E137	3/55D
	656	"	Kleiber	108E173	-
	657	"	Maris Dove	108E173	-
	659	"	Cardinal	104E137-	3/55D-
				108E173	108E173
	661	"	Triticale	108E173	-
Herefordshire					
Bridstow, Ross-on-Wye	321	21/6	Cama	41E136 + 108E173+	58C + 108E173+
Rosemaund	319	20/6	"	36E132 104E137+ 108E173	54 3/55D + 108E173
Shropshire					
Baschurch	173	12/6	Maris Nimrod	104E137	3/55D
	174	"	Joss Cambier	104E137	3/55D
	175	"	Maris Huntsman	104E137	3/55D
	176	"	Cama	104E137	3/55D
Staffordshire					
Wolverhampton	465	5/7	Maris Ranger	32E128	8D
Warwickshire					
Stoneleigh	325	26/6	Joss Cambier	104E137	3/55D
Sutton Coldfield	249	20/6	Cama	104E137	3/55D
	251	"	Maris Midgeon	104E137	3/55D
	460	5/7	Cama	104E137	3/55D
Worcestershire					
Evesham	100	25/5	Maris Beacon	104E137+ 37E132	3/55D + 60
Honeybourne	220	16/6	Maris Nimrod	37E132 + 104E137+ 40E72	60 + 3/55D + 2B
EASTERN REGION					
	496	10/7	Joss Cambier	104E137	3/55D
	627	18/7	Cappelle-Desprez	104E137	3/55D
	635	"	Maris Ranger	108E173	-
	683	20/7	Cappelle-Desprez	41E136	58C
	686	"	Joss Cambier	104E137	3/55D
	687	"	" "	41E136+	58C +
	740	25/7	" "	104E137	3/55D
	825	3/8	" "	104E137	3/55D
				108E173	-
Bedfordshire					
Cockayne Hatley	475	7/7	Cardinal	108E173	-
Cambridgeshire					
Boxworth	194	14/6	Maris Nimrod	104E137	3/55D
Cambridge	242	16/6	<u>Aegilops</u> <u>triuncialis</u>	108E173	-
Friday Bridge, Wisbech	56	3/5	Maris Ranger	108E173	-
	376	28/6	" "	108E173	-
	377	"	" "	108E173	-
Lolworth	378	"	Cappelle-Desprez	108E173	-
	666	18/7	Maris Dove	108E173	-
	667	"	Cardinal	108E173	-
	691	20/7	"	108E173	-
	692	"	Maris Dove	108E173	-
	693	"	Maris Ranger	108E173+ 104E137	108E173+ 3/55D
	694	"	Kleiber	108E173	-

Table 4 (Cont'd.)

Location	NIAB Code No. 72/-	Date of Reception 1972	Variety	Race	
				New	Old
EASTERN REGION (Cont'd.)					
Cambridgeshire (Cont'd.)					
Manea	520	11/7	Cardinal	108E173	-
NIAB, Cambridge	521	"	Maris Dove	108E173+?	
	77	17/5	RFB 3668	104E137	3/55D
	78	"	TL365a/34	104E137	3/55D
	147	12/6	Triticale Graze		
			Grain 70A	108E173	-
Stapleford	722	24/7	Maris Dove	108E173	-
Whittlesey	669	19/7	Bouquet	104E137	3/55D
	20	18/4	Joss Cambier	104E137	3/55D
Essex -					
Little Bromley, Mistly	102	25/5	Maris Nimrod	104E137+	3/55D+
				41E8	58 variant
St Osyth	101	"	Cama	104E137	3/55D
Hertfordshire					
Nuthamstead	146	12/6	Joss Cambier	104E137	3/55D
Rothamsted	108	30/5	Cama	104E137	3/55D
	109	"	Joss Cambier	104E137	3/55D
	760	25/7	Cappelle-Desprez	104E137	3/55D
	761	"	Tommy	104E137+	3/55D+
				106E139	106E139
	762	"	Cama	104E137	3/55D
	763	"	Kolibri	108E173	-
	764	"	Maris Ranger	108E173	-
Huntingdonshire					
	665	18/7	" "	108E173+	108E173+
				104E137	3/55D
Abbots Ripton	123	6/6	Joss Cambier	104E137	3/55D
Keyston	580	13/7	Maris Dove	108E173	-
Leighton Bromswold	575	"	Bouquet	104E137	3/55D
	577	"	Maris Ranger	104E137	3/55D
	578	" "	" "	41E136	58C
Somersham	531	12/7	Maris Dove	108E173	-
	534	"	Cardinal	108E173	-
	536	"	Sirius	104E137	3/55D
	538	"	Kleiber	108E173	-
Spaldwick	52	4/5	Joss Cambier	104E137	3/55D
Norfolk					
Clenchwarton, King's Lynn	126	7/6	Maris Nimrod	104E137	3/55D
Ingham, Norwich	468	6/7	Maris Dove	108E173	-
	470	"	Maris Nimrod	104E137+	3/55D+
				37E132	60
Loddon	46	27/4	Joss Cambier	41E136	58C
Morley	187	12/6	" "	104E137	3/55D
	189	"	Cama	104E137	3/55D
	191	12/6	Maris Nimrod	104E137	3/55D
	227	19/6	Kolibri	108E173	-
	228	"	Cardinal	108E173	-
	230	"	Kleiber	104E137	3/55D
	231	"	Maris Ensign	104E137	3/55D
	236	"	Maris Halberd	104E137	3/55D
	347	28/6	Maris Dove	104E137	3/55D
	450	5/7	Tommy	108E173	-
Narborough	88	23/5	Ace	41E136	58C
	89	"	RFB 3668	104E137	3/55D
	110	31/5	Lincoln	108E173+	108E173+
				41E136	58C
Outwell	178	14/6	Maris Nimrod	41E136	58C

Table 4 (Cont'd.)

Location	NIAB CODE No. 72/-	Date of Reception 1972	Variety	Race	
				New	Old
EASTERN REGION (Cont'd.)					
Norfolk (Cont'd.)					
Terrington	26	26/4	Maris Ranger	108E173	-
	27	"	Flinor	104E137	3/55D
	29	"	Joss Cambier	104E137	3/55D
	30	"	Cappelle-Desprez	104E137	3/55D
	31	"	Armentieres	104E137	3/55D
	306	30/6	Maris Dove	108E173	-
	481	7/7	Kleiber	108E173	-
	482	"	Kolibri	104E137	3/55D
	723	24/7	Maris Ranger	108E173	-
	724	"	Mercury	104E137	3/55D
	727	"	Cardinal	108E173	-
	728	"	Kleiber	108E173	-
	729	"	Maris Dove	108E173	-
Peterborough					
Eye	525	11/7	Cardinal	108E173	-
Wittering	79	17/5	Maris Beacon	104E137	3/55D
Suffolk					
Badingham	306	23/6	Maris Ranger	36E132+	54 +
				104E137	3/55D
Clare	103	25/5	Flinor	108E9	1B
Hartest, Bury St Edmunds	307	22/6	Kolibri	104E137	3/55D
Levington	437	4/7	Maris Templar	41E136+	58C +
				104E137+	3/55D+
				37E132+	60+
				104E9+	3/55
				36E132	Opal+
Mendlesham, Stowmarket	365	28/6	Maris Huntsman	108E173+	54
				108E173+	108E173+
Ousden, Newmarket	467	6/7	Maris Ranger	37E132	60
Stoke-by-Clare	19	19/4	Joss Cambier	104E137	3/55D
	51	3/5	Joss Cambier	104E137	3/55D
West Row Fen, Mildenhall	203	15/6	Maris Nimrod	104E137	3/55D
	790	31/7	Cardinal	108E173	-
SOUTH EASTERN REGION					
	614	14/7	Maris Ranger	108E173	-
	636	18/7	Joss Cambier	104E137	3/55D
	731	25/7	" "	104E137+	3/55D+
				41E136	58C
Berkshire					
Abingdon	57	5/5	Maris Nimrod	104E137	3/55D
	117	2/6	Armentieres	104E137	3/55D
Ashbury	130	8/6	Maris Ranger	108E173	-
	1	24/3	Joss Cambier	41E136	58C
	2	5/4	" "	104E137	3/55D
	6	14/4	Champlain	104E137	3/55D
	7	"	Joss Cambier	104E137+?	3/55D+?
	8	"	" "	104E137	3/55D
	9	"	" "	104E137	3/55D
	127	5/6	Maris Ranger	104E137	3/55D
	128	"	Cama	104E137	3/55D
Coleshill, Faringdon	129	"	Kolibri	104E137	3/55D
	116	2/6	Maris Huntsman	104E137+	3/55D+
				108E173	108E173
Garford, Gallows Bridge	63	9/5	Maris Nimrod	104E137	3/55D
Hungerford	211	16/6	" "	104E137	3/55D

Table 4 (Cont'd.)

Location	NIAB Code No. 72/-	Date of Reception 1972	Variety	Race	
				New	Old
SOUTH EASTERN REGION (Cont'd.)					
Berkshire (Cont'd.)					
Marcham, Abingdon	137	8/6	Maris Nimrod	104E137	3/55D
	139	"	Maris Ranger	104E137	3/55D
	199	14/6	" "	104E137	3/55D
	200	"	Maris Nimrod	104E137	3/55D
Radley, Abingdon	118	2/6	Prof. Marchal	104E137	3/55D
Shellingford	60	9/5	Cappelle-Desprez	104E137+	3/55D+
				41E8	58
					variant
Buckinghamshire					
Aylesbury	132	5/6	Maris Nimrod	104E137	3/55D
Bledlow	105	25/5	Kolibri	104E137	3/55D
Edlesborough	49	1/5	Cappelle-Desprez	104E137	3/55D
	114	2/6	" "	104E137	3/55D
	439	30/6	West Desprez	104E137	3/55D
	440	"	Maris Ploughman	104E137	3/55D
	441	"	Maris Widgeon	104E137	3/55D
	442	"	Flinor	108E173+	108E173+
				41E136	58C
Hardmead, Newport Pagnell	134	6/6	Cama	104E137	3/55D
	135	"	Maris Nimrod	104E137	3/55D
Ivinghoe	58	8/5	Maris Ploughman	104E137	3/55D
	59	"	Maris Widgeon	104E137	3/55D
	327	26/6	Cappelle-Desprez	104E137	3/55D
Stoke Mandeville	22	20/4	Joss Cambier	104E137	3/55D
	50	28/4	" "	104E137	3/55D
Hampshire					
Sparsholt	497	9/7	Maris Templar	108E173+	108E173+
	498	"	SR 185/262	41E136	58C
				41E136	58C
Kent					
Ash, Canterbury	340	26/6	Maris Templar	104E137+	3/55D+
	341	"	Maris Ranger	104E137	58C
	343	"	Joss Cambier	104E137	3/55D
Barham, Canterbury	55	5/5	Joss Cambier	104E137	3/55D
Elham	212	15/6	West Desprez	104E137	3/55D
Faversham	853	15/8	Maris Dove	108E173	-
Ickham	217	15/6	Maris Ranger	104E137	3/55D
	218	"	West Desprez	104E137	3/55D
Ivy church	337	23/6	" "	104E137	3/55D
Romney Marsh	85	23/5	Joss Cambier	104E137	3/55D
Wootton, Canterbury	474	5/7	Cardinal	108E173	-
Wye	40	28/4	Joss Cambier	104E137	3/55D
	41	" "	" "	104E137	3/55D
	179	13/6	Maris Huntsman	104E137	3/55D
	180	"	Maris Nimrod	104E137	3/55D
	181	"	Cappelle-Desprez	36E132	54
	183	"	Maris Ranger	108E173	-
	184	"	Cama	108E173	-
	185	"	Maris Widgeon	104E137	3/55D
	186	"	Bouquet	104E137	3/55D
	204	15/6	West Desprez	108E173+	108E173+
				104E137	3/55D
	205	" " "	" "	104E137	3/55D
	366	27/6	Cardinal	104E137	3/55D
	367	"	Kolibri	104E137+	3/55D+
				108E173	108E173
	368	"	Rothwell Sprite	104E137	3/55D
	373	"	Maris Dove	108E173	-
	374	"	Kleiber	108E173	-

Table 4 (Cont'd.)

Location	NIAB Code No. 72/-	Date of Reception 1972	Variety	Race	
				New	Old
SOUTH EASTERN REGION (Cont'd.)					
Oxfordshire					
Banbury	466	7/7	Cardinal	108E173	-
Durford	86	24/5	Maris Beacon	104E137	3/55D
Chinnor	239	16/6	Maris Ranger	108E173	-
Kingston Blount	124	7/6	Cappelle-Desprez	104E137	3/55D
	240	16/6	Maris Huntsman	104E137	3/55D
North Stoke, Woodcote	106	26/5	Cappelle-Desprez	104E137	3/55D
Tetsworth	238	16/6	Maris Ranger	104E137	3/55D
Watlington	509	9/7	" "	108E173	-
Sussex					
Iford	833	4/8	Kleiber	108E173	-
Northiam	695	14/7	Cardinal	104E137	3/55D
	835	4/8	"	108E173	-
Offham	834	"	"	108E173	-
Rudgewick	267	20/6	Maris Huntsman	104E137+ 37E132	3/55D+ 60
SOUTH WESTERN REGION					
Cornwall					
Newquay	387	29/6	Cardinal	108E173	-
St Columb, Newquay	789	1/8	"	108E173	-
St Erme, Truro	326	25/6	Joss Cambier	104E137	3/55D
Tresillian, Truro	541	11/7	Cardinal	108E173	-
Devon					
Ashburton	663	17/7	"	108E173	-
East Budleigh	438	30/6	Maris Nimrod	104E137	3/55D
Ide	206	14/6	Joss Cambier	104E137	3/55D
	359	26/6	Bouquet	104E137	3/55D
	361	"	Champlain	104E137	3/55D
Seale-Hayne, Newton Abbot	708	20/7	Cardinal	108E173+ 104E137	108E173+ 3/55D
	709	"	Maris Butler	108E173	-
	710	"	Maris Dove	108E173	-
	711	"	Maris Halberd	104E137	3/55D
	712	"	Kleiber	108E173	-
Totnes	854	15/8	Cardinal	108E173	-
	855	"	Kleiber	108E173	-
	856	"	Sirius	108E173	-
	857	"	Maris Dove	108E173	-
	858	"	Holibri	37E132	60
	860	"	Rothwell Sprite	108E173	-
Venny Tedburn, Crediton	223	16/6	Cam	104E137	3/55D
Dorset					
Dorchester	392	3/7	Maris Templar	104E137+ 37E132	3/55D+ 60
	393	"	Maris Nimrod	104E137	3/55D
Sherborne	285	21/6	Maris Widgeon		
Gloucestershire					
Barnsley, Cirencester	831	3/8	Bouquet	104E137	3/55D
Cirencester	352	28/6	Nest Desprez	108E173	-
Eastleach	141	8/6	Maris Nimrod	104E137	3/55D
Kembley, Dymock	315	22/6	" "	104E137	3/55D
Middle Lypiatt, Stroud	208	15/6	Maris Widgeon	104E137	3/55D
Old Sudbury	47	1/5	Joss Cambier	104E137	3/55D
Stow-on-the-Wold	248	19/6	Cardinal	104E137	3/55D

Table 4 (Cont'd.)

Location	NIAB Code No. 72/-	Date of Reception 1972	Variety	Race	
				New	Old
SOUTH WESTERN REGION (Cont'd.)					
Somerset	783	29/7	Maris Huntsman	41E136	58C
Bleadon	81	22/5	Cappelle-Desprez	104E137	3/55D
	82	"	Cama	104E137	3/55D
Bradford-on-Tone	788	31/7	Cardinal	108E173	-
	308	23/6	Maris Nimrod	104E137	3/55D
	526	11/7	Maris Ranger	108E173	-
Butleigh, Glastonbury	4	12/4	Joss Cambier	104E137	3/55D
	510	10/7	Maris Nimrod	108E173+	108E173+
Cannington	37	26/4	Joss Cambier	41E136	58C
	104	25/5	Triticale	104E137	3/55D
	142	9/6	Tommy	104E137	3/55D
	144	"	Maris Huntsman	104E137	3/55D
Fiddington	159	12/6	Maris Nimrod	104E137	3/55D
	167	12/6	Cama	104E137	3/55D
	276	21/6	Triticale	41E136+	58C+
				108E173+	108E173+
	277	"	Tommy	36E132	54
Milverton	283	"	Champlain	104E137+	3/55D+?
Nether Stowey	38	26/4	Joss Cambier	104E137	3/55D
	39	"	" "	41E136	58C
Northover, Fiddington	35	"	" "	104E137	3/55D
	68	15/5	Triticale	36E132+	54+
				41E136	58C
North Petherton	160	12/6	Maris Nimrod	104E137 +	3/55D +
Shapwick	861	15/8	Maris Dove	41E136	58C
Staple Fitzpaine, Taunton	280	21/6	Maris Ranger	45E140	-
Stowell	161	12/6	" "	104E137	3/55D
Tiddington, Bridgwater	3	12/4	Joss Cambier	104E137	3/55D
Wellington	24	20/4	" "	104E137	3/55D
	207	14/6	" "	104E137	3/55D
Wiltshire					
All Cannings, Devizes	395	3/7	Maris Ranger	108E173+	108E173+
Badbury, Swindon	61	9/5	" "	41E136	58C
				104E137	3/55D
Broad Hinton	288	21/6	Tommy	104E137	3/55D
	163	12/6	Maris Nimrod	104E137	3/55D
	165	"	Cama	104E137	3/55D
Burbage	529	11/7	Cardinal	108E173	-
	730	24/7	Maris Huntsman	108E173	-
Chippenham	18	17/4	Joss Cambier	104E137	3/55D
Chiseldon	10	14/4	Maris Ranger	104E137	3/55D
	12	12/4	Champlain	104E137	3/55D
	13	14/4	Cama	104E137	3/55D
	42	26/4	Joss Cambier	104E137	3/55D
	43	"	Maris Nimrod	104E137	3/55D
	44	1/5	Cappelle-Desprez	104E137	3/55D
	45	"	Maris Nimrod	104E137	3/55D
Codford	237	16/6	Tommy	104E137	3/55D
Dinton	177	13/6	Cappelle-Desprez	104E137	3/55D
Downton, Salisbury	774	27/7	Cardinal	108E173	-
Highworth, Swindon	808	1/8	"	108E173	-
Hinton	11	12/4	Joss Cambier	104E137	3/55D
Thornhill, Wootton Bassett	5	14/4	" "	104E137	3/55D
	69	15/5	" "	104E137	3/55D
	70	"	Cama	104E137	3/55D
Wilsford, Pewsey	21	19/4	Joss Cambier	104E137	3/55D
Wilton	16	12/4	" "	104E137	3/55D
Wootton Bassett	538	26/6	Cama	104E137	3/55D
Wroughton, Swindon	241	16/6	Maris Nimrod	104E137	3/55D

Table 4 (Cont'd.)

Location	NIAB Code No. 72/-	Date of Reception 1972	Variety	Race	
				New	Old
WALES	822	3/8	Maris Nimrod	108E173	-
Cardiganshire	607	13/7	(Dwarf x Weique) x Perdix 1	104E137	3/55D
W P B S Aberystwyth	608	"	(Dwarf x Weique) x Perdix 2	108E173	-
	609	"	Dwarf x (Yeoman x Nord) x TP114	104E137	3/55D
	610	"	HC 73 x Cleo	104E137	3/55D
	720	20/7	Weique x Perdix	108E173	-
Glamorganshire					
St Donats, Llantwit Major	133	6/6	Joss Cambier	104E137	3/55D
Monmouthshire					
Cleppa Park, Newport	385	29/6	Chalk	104E137	3/55D
	463	5/7	Cama	104E137	3/55D
Pembrokeshire					
Lawrenny	219	15/6	Maris Nimrod	104E137+ 37E132	3/55D + 60
SCOTLAND					
Angus					
Letham	840	7/8	Cappelle-Desprez	108E173+ 41E136	108E173+ 58C
	843	"	Mildress	108E173+ 41E136	108E173+ 58C
	844	"	Cama	108E173+ 41E136	108E173+ 58C
	845	"	Urban	41E136	58C
	846	"	Joss Cambier	104E137	3/55D
	847	"	Maris Templar	41E136	58C
Berwickshire					
Coldstream	560	10/7	Maris Ranger	41E136	58C
	561	"	Cappelle-Desprez	41E136	58C
	562	"	Cebeco 148	41E136	58C
	564	"	Mildress	41E136	58C
	571	"	VR477	41E136	58C
	809	27/7	Capta	41E136+ 108E173	58C+ 108E173
Cravington	398	29/6	Maris Nimrod	41E136	58C
Duns	119	3/6	Cappelle-Desprez	41E136	58C
	121	"	Cebeco 148	41E136	58C
	122	"	Kolibri	41E136	58C
	243	18/6	Benoist 5780	41E136	58C
	547	12/7	Maris Ranger	41E136	58C
	549	"	Maris Templar	41E136	58C
	553	"	Cebeco 148	41E136	58C
	554	"	Lincoln	41E136	58C
	555	"	Mercury	41E136	58C
	811	27/7	VR477	41E136 + 108E173	58C+ 108E173
East Lothian					
Bolton	72	15/5	Maris Templar	41E136+ 104E9	58C + 3/55 Opal
	74	"	Cebeco 148	41E136	58C
	258	20/6	Cama	41E136	58C
	259	20/6	VR477	41E136	58C
	260	"	Mercury	41E136	58C
	261	"	Capta	41E136	58C
	414	2/7	Joss Cambier	41E136	58C
	415	"	Maris Ranger	41E136+ 104E137+ 45E140	58C+ 3/55D+ 45E140
	- 13 -				

Table 4 (Cont'd.)

Location	NIAB Code No. 72/-	Date of Reception 1972	Variety	Race				
				New	Old			
SCOTLAND (Cont'd.)								
East Lothian (Cont'd.)								
Bolton (Cont'd.)	417	2/7	Maris Templar	41E136	58C			
	419	"	Chalk	41E136	58C			
	420	"	Tommy	41E136	58C			
	421	"	Maris Marksman	41E136	58C			
	422	"	Benoist 5780	37E132+	60+			
				104E137+	3/55D+			
				41E136	58C			
	423	"	Cebeco 148	41E136	58C			
	424	"	Lincoln	41E136	58C			
	425	"	Mercury	41E136	58C			
	426	"	Kolibri	41E136+	58C+			
				37E132+	60+			
				104E9	3/55			
					Opal			
	427	"	Kleiber	37E132+	60+			
				41E136	58C			
Drem	619	13/7	Joss Cambier	41E136	58C			
Gullane	405	2/7	Maris Ranger	41E136	58C			
	407	"	Cappelle-Desprez	41E136	58C			
	411	"	Mercury	41E136	58C			
	412	"	Maris Templar	41E136	58C			
Haddington	404	"	Maris Ranger	41E136	58C			
Morham	400	"	Joss Cambier	41E136	58C			
	402	"	Maris Himrod	41E136	58C			
Spott	524	7/7	Joss Cambier	41E136	58C			
Midlothian								
Gogar Bank	311	21/6	Maris Himrod	41E136	58C			
Newbridge	263	20/6	Cappelle-Desprez	41E136	58C			
	674	18/7	" "	41E136	58C			
	675	"	Cama	41E136	58C			
	677	"	Ace	41E136+?	58C+?			
Perthshire								
Errol	332	22/6	Cebeco 148	41E136	58C			
	333	"	Charles Peguy	108E173+	108E173+			
				41E136	58C			
	334	"	Triticale Graze					
			Grain 70	41E136	58C			
	462	"	Maris Templar	41E136	58C			
	748	20/7	Cappelle-Desprez	41E136	58C			
	749	"	Charles Peguy	41E136	58C			
	750	"	Mildress	41E136	58C			
	751	"	Hybrid 46	104E9	3/55			
					Opal			
	752	"	Urban	41E136	58C			
	753	"	Joss Cambier	41E136	58C			
	755	"	Tommy	41E136	58C			
West Lothian								
South Queensferry	678	18/7	Cappelle-Desprez	41E136	58C			
	679	"	Triticale Graze					
			Grain 70	41E136	58C			
	682	"	Maris Templar	41E136	58C			

Table 4 (Cont'd.)

Location	NIAB Code No. 72/-	Date of Reception 1972	Variety	Race	
				New	Old
NORTHERN IRELAND					
Co. Down Hillsborough	451	5/7	Joss Cambier	41E136	58C
EIRE					
Co. Kildare Backweston	688	20/7	Drabant	41E136+	58C+
	689	"	Kolibri Cross	104E137	3/55D
	690	"	91499	40E72	2E
	756	24/7	Maris Halberd	104E137	3/55D
	757	"	Sappo	41E136	58C
	758	"	Siete Cerros	104E137	3/55D
	782	27/7	68FR142CI 13253/5 Nord	41E136	58C

Table 5 Yellow Rust of Wheat - Samples from ADAS Survey

Location	NIAB Code No. 72/-	PPL No.	Variety	Race	
				New	Old
Northern Region	814	287	Cama	N1	-
	815	292	Unknown	N1	-
	816	24	Joss Cambier	N1	-
	817	286	Cappelle-Desprez	N1	-
	821	20	Cama	108E173	-
	826	288	Unknown	N1	-
	832	297	Cappelle-Desprez	FTE	-
	836	308	Joss Cambier	N1	-
	839	307	Unknown	N1	-
	848	309	Cama	108E173	-
Yorks and Lancs Region	718	132	Joss Cambier	104E137	3/55D
	719	134	" "	104E137+	3/55D+
				41E136	58C
	732	141	Unknown	FTE	-
	813	243	"	N1	-
	818	293	Joss Cambier	N1	-
	819	242	Cappelle-Desprez	N1	-
	837	303	" "	N1	-
	838	305	Unknown	N1	-
East Midlands	629	102	Cappelle-Desprez	N1	-
	766	168	Joss Cambier	N1	-
	767	211	Cappelle-Desprez	FTE	-
	770	38	Joss Cambier	N1	-
	775	67	" "	FTE	-
	776	218	" "	41E136+	58C+
				108E173	108E173
	777	191	Cama	FTE	-
	778	208	Maris Ranger	108E141	-
	780	205	Cappelle-Desprez	N1	-
	791	196	Joss Cambier	43E138	-
	792	43	Cappelle-Desprez	N1	-
	793	207	Cama	N1	-
	794	202	Cappelle-Desprez	FTE	-
	795	199	Tommy	FTE	-
	796	217	Maris Nimrod	108E173	-
	798	216	Joss Cambier	104E137	3/55D
	799	188	Cappelle-Desprez	FTE	-
	800	221	Champlain	41E136	58C
	801	68	Maris Ranger	104E137	3/55D
	802	219	Cappelle-Desprez	N1	-
	803	203	Joss Cambier	N1	-
	804	215	" "	FTE	-
	805	222	Cappelle-Desprez	108E173	-
	806	210	Joss Cambier	N1	-
	807	201	Cama	N1	-
	828	209	Joss Cambier	N1	-
West Midlands	626	90	Cama	104E137	3/55D
	631	23	Heima Desprez	104E137	3/55D
	633	96	Champlain	N1	-
	634	93	Cappelle-Desprez	FTE	-
	638	92	Joss Cambier	N1	-
	769	175	" "	FTE	-
	779	171	Cappelle-Desprez	N1	-
	797	226	West Desprez	104E137	3/55D
	820	29	Cappelle-Desprez	N1	-

Table 5 (Cont'd.)

Location	NIAB Code No. 72/-	PPL No.	Variety	Race	
				New	Old
Eastern Region	496	51	Joss Cambier	104E137	3/55D
	518	59	" "	N1	
	519	57	Cappelle-Desprez	N1	
	605	62	Joss Cambier	N1	
	606	64	Cappelle-Desprez	N1	
	612	78	Joss Cambier	N1	
	613	73	" "	N1	
	620	70	Cappelle-Desprez	FTE	
	625	104	Maris Ranger	N1	
	627	83	Cappelle-Desprez	104E137	3/55D
	628	82	Joss Cambier	N1	
	630	87	Cappelle-Desprez	FTE	
	632	98	Maris Ranger	FTE	
	635	100	" "	108E173	-
	683	122	Cappelle-Desprez	41E136	58C
	684	126	Joss Cambier	N1	
	685	123	Maris Ranger	FTE	
	686	124	Joss Cambier	104E137	3/55D
	687	121	" "	41E136+	58C+
					104E137
	714	123	Cappelle-Desprez	FTE	
	715	130	" "	N1	
	717	129	" "	N1	
	734	146	Cama	N1	
	737	149	Cappelle-Desprez	N1	
	738	156	" "	N1	
	739	148	Joss Cambier	N1	
	740	152	" "	104E137	3/55D
	741	144	Champlain	N1	
	746	145	Maris Ranger	FTE	
	812	261	Maris Nimrod	N1	
	825	257	Joss Cambier	108E173	-
	827	249	Cama	N1	
South Eastern Region	614	10	Maris Ranger	108E173	-
	636	107	Joss Cambier	104E137	3/55D
	637	8	" "	N1	
	716	131	Maris Widgeon	N1	
	731	65	Joss Cambier	104E137+	3/55D+
				41E136	58C
	735	36	" "	N1	
	736	150	Cappelle-Desprez	N1	
	765	179	" "	FTE	
	824	234	" "	FTE	
South Western Region	615	76	Cama	N1	
	743	137	Joss Cambier	N1	
	744	30	Cama	FTE	
	745	33	Joss Cambier	N1	
	747	136	Cappelle-Desprez	FTE	
	771	182	Joss Cambier	N1	
	772	181	" "	FTE	
	823	231	Cappelle-Desprez	N1	
Wales	733	4	Joss Cambier	FTE	
	742	5	" "	FTE	
	768	13	Cappelle-Desprez	FTE	
	822	246	Maris Nimrod	108E173	-

Ninety six of the 860 samples received failed to establish, 131 were discarded on arrival and 183 have not been tested. Tests are still in progress on one sample, to identify the components of a mixture. Table 6 shows which races were identified from the samples successfully tested; fifteen races were identified.

Table 6 Races of Yellow Rust Identified in 1972

Race		No of times identified singly	No of times identified in mixtures	Total no of times identified
New	Old			
32E128	8B	2	-	2
36E132	54	1	5	6
37E132	60	1	12	13
40E72	2B	1	1	2
41E8	58	-	2	2
41E136	58C	85	35	120
43E138		1	1	2
45E140		1	1	2
104E9	3/550pal	1	4	5
104E137	3/55D	191	38	229
104E201		1	-	1
106E139		-	1	1
108E9	1B	4	3	7
108E141		6	-	6
108E173		88	33	121

Sixty-seven of the 450 samples tested have proved to be mixtures of two or more races; five races were identified from one mixture. All mixtures contained at least one of the three major races. Despite the predominance of these three races [41E136 (58C), 104E137(3/55D) and 108E173] the older races formerly prevalent in Britain have not disappeared completely although now found mainly in mixtures. Several of the new races were also isolated from the mixtures.

108E173

This race combines the virulence of 104E137(3/55D) and 108E9(1B), with additional virulence on Heine Peko. It was isolated 121 times from both winter and spring varieties from a large number (78) of sites throughout Britain, from nearly all wheat growing areas. It is very widespread. Spores have been provided for tests.

108E141

This race is a variant of 108E173, and very similar to it. The differential variety Carstens V has been giving mixed reactions in all tests, and both races could have the same race number. They are distinguished by their reaction on the variety Cama, used as a differential in NIAB tests. Cama is susceptible to 108E173 but resistant to 108E141. 108E141 was identified six times, from Maris Butler from Cockle Park and from Maris Ranger from the East Midlands; Market Harborough, Leics; Marcham le Fen, Lincs and Terrington Marsh, Lincs (twice). Spores can be provided for tests.

45E140

This race was identified twice, from Maris Ranger from Bolton, East Lothian and Maris Dove from Somerset. It combines the virulence of 41E136(58C) and 108E9(1B) with additional virulence on Heine Peko. Field tests may only be carried out at the WPBS to decrease risk of spread.

106E139

This race is similar to 104E137(3/55D) with the ability to attack Thatcher and all other varieties containing the Yr7 gene for resistance. It was found once only, from Tommy from Rothamsted, Herts. Spores cannot yet be provided for tests.

104E201

This race is also similar to 104E137 (3/55D) but has additional virulence on Spaldings Prolific. It was found once only, from Joss Cambier from Driffield, Yorkshire. Spores cannot yet be provided for tests.

43E138

This race was first identified in 1971 from Scotland. It was found twice in 1972 from Joss Cambier from the East Midlands and Wigton, Cumberland. It was not found in Scotland, although varieties containing the Yr7 gene for resistance were grown at the same site. Spores have been provided for tests.

ADAS Survey of foliar diseases

- Of the 106 samples received from the ADAS survey of foliar diseases of wheat 79 failed to establish or were discarded on arrival. From the remainder five races were identified: 41E136(58C) (2), 104E137 (3/55D) (11), 108E173(8), 43E138 (1), 128E141 (1). Four of the samples proved to be mixtures.

YELLOW RUST - BARLEY

NATIONAL INSTITUTE OF AGRICULTURAL BOTANY, CAMBRIDGE
N H CHAMBERLAIN and JULIA C SMITH

1. During 1972, 63 samples were received at the NIAB. The number of samples collected from winter barley varieties is given in Table 7, from spring varieties in Table 8.

Table 7 Yellow Rust of Barley - Samples from winter varieties.

Winter Barley	No. of samples
Astrix	3
Senta	2
Maris Otter	1
Mirra	1
TOTAL	7

Table 8 Yellow Rust of Barley - Samples from spring varieties.

Spring Barley	No. of samples
Julia	9
Vada	8
Zephyr	6
Lofa Abed	3
Midas	3
Proctor	3
Maris Mink	2
Mazurka	2
Wing	2
Armelle (Inra CF17/68)	1
Berac	1
Clermont	1
Deba Abed	1
Freegold	1
Gerkra	1
Golden Promise	1
Goldfield	1
Hassan	1
RPB 11069	1
Sabarlis	1
Sultan	1
Universe	1
TOTAL	51

In addition, one sample was received from each of the following varieties - Abed Binder, BHJ, Bigo, Cambrinus and Topper.

2. RACE IDENTIFICATION

Full results are given in Table 9. Full results of the samples received from the ADAS survey of foliar disease of barley are given in Table 10.

Table 9 Yellow Rust of Barley - Race Identification

Location	NIAB Code No B/72/-	Date of Reception 1972	Variety	Race
NORTHERN REGION				24
	32	27/7	Julia	Variant
	52	28/7	Zephyr	24
	54	2/8	Julia	NI
	55	"	"	24
	56	4/8	Midas	24
	57	"	Julia	24
	58	"	Zephyr	FTE
	59	"	Clermont	FTE
	61	7/8	Zephyr	FTE
	63	23/8	"	FTE
Northumberland				
Cockle Park	1	25/5	Proctor	24
	2	"	Mirra	24
	3	"	Astrix	24
	12	5/7	"	24
	13	"	Maris Otter	24
	14	"	Senta	24
	33	26/7	Julia	24
	34	"	Proctor	24
	35	"	Lofa Abed	24
	36	"	RPB 11069	24
	37	"	Freegold	24
	38	"	Mazurka	24
	39	"	Wing	24
	40	"	Zephyr	24
	41	"	Berac	24
	42	"	Maris Mink	24
	43	"	Midas	24
	44	"	Vada	24
	45	"	Armelle	24
	46	"	Universe	24
	47	"	Hassan	24
	48	"	Topper	24
	49	"	Cambrinus	24
	50	"	Abed Binder	24
	51	"	Bigo	24
Yorkshire				
Cundall	15	5/7	Julia	24
				24
YORKS & LANCS REGION	28	21/7	Vada	Variant
EAST MIDLANDS	29	"	Julia	24
	31	27/7	Vada	FTE
	53	1/8	Julia	NI
	60	4/8	Vada	24
Nottinghamshire				
Gleadthorpe	16	11/7	Lofa Abed	24
	17	"	Sabarlis	24

Table 9 Continued

Location	NIAB Code No P/72/-	Date of Reception 1972	Variety	Race
WEST MIDLANDS	62	7/8	Vada	24 Variant
Cheshire				
Farndon, Chester	4	30/5	Gerkra	24
	5	"	Senta	FTE
	6	"	BHJ	24
	18	17/7	Maris Mink	24
	19	"	Zephyr	24
	20	"	Wing	24
	21	"	Golden Promise	24
	22	"	Julia	24
	23	"	Vada	24
	24	"	Deba Abed	24
	25	"	Goldfield	24
	26	"	Lofa Abed	24
	27	"	Midas	24
Tarporley	11	29/6	Astrix	24
EASTERN REGION	30	21/7	Vada	24
SOUTH EASTERN REGION				
Kent				
Wye	7	27/6	Proctor	23
	8	"	Sultan	23
	9	"	Mazurka	23
	10	"	Vada	

Table 10 Yellow Rust of Barley - Samples from ADAS Survey

Location	NIAB Code No B/72/-	P.P.L No	Variety	Race
Northern Region	32	-	Julia	24 Variant
	52	139	Zephyr	24
	54	181	Julia	NI
	55	199	"	24
	56	214	Midas	24
	57	216	Julia	24
	58	217	Zephyr	FTE
	59	215	Clermont	FTE
	61	237	Zephyr	FTE
	63	260	"	FTE
Yorks & Lancs Region	28	26	Vada	24 Variant
East Midlands	29	71	Julia	24
	31	126	Vada	FTE
	53	146	Julia	NI
	60	222	Vada	24
West Midlands	62	231	"	24
Eastern Region	30	93	"	24

Six of the 63 samples received failed to establish, while two were discarded on arrival as they were in very poor condition. Nearly all (57) of the samples came from the northern half of Britain, where there were very high levels of infection and all but two were identified as race 24. These two samples from Julia and Vada from the Northern and Yorks and Lancs regions respectively were found to be a variant of race 24, virulent on Varunda. A similar variant had previously been identified in NW Europe, but not in Britain prior to 1972.

Three of the samples received from Wye, Kent were found to be race 23. Tests are still in progress on the fourth sample which appears to be a variant of this race.

Of the 17 samples received from the ADAS Survey of foliar diseases of barley, ten were successfully identified as race 24 or a variant .

BROWN RUST - BARLEY
 WELSH PLANT BREEDING STATION, ABERYSTWYTH
 R B CLOTHIER and B C CLIFFORD

1. During 1972, 97 samples were received at the WPBS. The number of samples received from winter barley varieties is shown in Table 11, those from spring varieties in Table 12.

Table 11 Brown Rust of Barley-Samples from Winter Varieties

Winter Barley	No. of Samples
Maris Otter	5
Malta	2
Astrix	1
Maris Trojan (HB609/36)	1
Mirra	1
Senta	1
TOTAL	11

Table 12 Brown Rust of Barley-Samples from Spring Varieties

Spring Barley	No. of Samples
Julia	8
Sultan	7
Vada	7
Berac	6
Lofa Abed	6
Mazurka	6
Hassan	5
Midas	2
Ruby	2
Akka	1
Aramir (Cebeco 6501)	1
Ark Royal (RPB 19869)	1
Armelie (Inra CF 17/68)	1
Beckett (PPB 3269)	1
CIV 344	1
Feronia	1
Hornisse	1
Knock	1
Kristina	1
K282	1
Lauda	1
Mimi (HMS 659 M118)	1
Miranda (CIV354)	1
Pauline	1
Proctor	1
RPB 8269	1
RPB 11069	1
RPB 14160	1
Sabarlis	1
SJ678060	1
Tellus	1
Varunda	1
Weiby (WR34165)	1
Wing	1
W273368	1
6262 Co	1
TOTAL	87

Two samples were received from unknown varieties and one from each of the following:- Abed Binder; AG10; CI 4974; Freja x Jerusalem 7-14; Hellas; Israel 264; San Carlos; WB 5-67.

2. RACE IDENTIFICATION
Full results are given in Table 13.

Table 13 Brown Rust of Barley - Race Identification

Location	W.P.B.S. Code No. BRS/72/-	Date of Collection 1972	Variety	Race
NORTHERN REGION				
Yorkshire				
Cundall	32	19/7	Julia	F
EASTERN REGION				
Cambridgeshire				
NIAB	9	-	Unknown	L
Essex	10	8/6	"	E
Hertfordshire				
Rothamsted	42	25/7	Berac	F
	43	"	Julia	E
	44	"	Mazurka	E+F
	45	"	Vada	F
Norfolk				
Morley	2	20/3	Astrix	E
	3	"	Malta	F
	4	"	Maris Otter	E
	5	"	Senta	E
	6	"	Maris Trojan	E
SOUTH EASTERN REGION				
Isle of Wight				
Wootton	7	4/4	Maris Otter	E
Kent				
Wye	13	29/6	Berac	FTE
	14	"	Hassan	B
	15	"	Julia	F
	16	"	Lofa Abed	FTE
	17	"	Maris Otter	F
	18	"	Mazurka	F
Sussex				
Bognor	8	9/5	Mirra	F
SOUTH WESTERN REGION				
Cornwall				
Tresillian	24	11/7	Berac	F
	25	"	Hassan	F
	26	"	Julia	F
	27	"	Lofa Abed	FTE
	28	"	Mazurka	F
	29	"	Sultan	F
	30	"	Vada	E
Devon				
Ashburton	31	17/7	Sultan	F
Burrington	68	18/8	Berac	FTE
	69	"	Hassan	F
	70	"	Hornisse	E
	71	"	Julia	F
	72	"	Knock	F
	73	"	Kristina	F
	74	"	Lauda	F
	75	"	Lofa Abed	FTE
	76	"	Mazurka	F+E
	77	"	Pauline	F
	78	"	Sabarlis	F
	79	"	Sultan	F
	80	"	Vada	F
	81	"	Varunda	F

Table 13 cont'd

Location	W.P.B.S. Code No. BRS/72/-	Date of Collection 1972	Variety	Race
Burrington cont.	82	18/8	Wing	E+F
	83	"	Aramir	F
	84	"	CIV 344	F
	85	"	Miranda	F
	86	"	Mimi	F
	87	"	Armelle	F
	88	"	K282	F
	89	"	Beckett	E+F
	90	"	RPB 8269	F
	91	"	RPB 11069	F
	92	"	RPB 14160	FTE
	93	"	Ark Royal	F
	94	"	SJ 678060	F
	95	"	Weiby	FTE
	96	"	W273368	F
	97	"	6262 Co	E
Newton Abbot	46	9/8	Berac	E
	47	"	Hassan	F
	48	"	Julia	F
	49	"	Lofa Abed	E
	50	"	Mazurka	E+F
	51	"	Sultan	F
	52	"	Vada	F
	53	15/8	Berac	E
	54	"	Hassan	F
	55	"	Julia	F
	56	"	Lofa Abed	E
	57	"	Mazurka	E+F
	58	"	Sultan	E
	59	"	Vada	F
Starcross, Exeter	19	4/7	Lofa Abed	B
	20	"	Malta	FTE
	21	"	Maris Otter	F
	22	"	Ruby	F
	23	"	Vada	FTE
Wiltshire				
Warminster	12	26/6	Maris Otter	B
WALES				
Cardiganshire				
Ffos-y-ffin	67	18/8	Midas	E
WPBS, Aberystwyth	1	14/3	WB 5-67	E
	11	20/6	Akka	F
	33	26/7	Julia	E+F
	34	"	Proctor	E
	35	"	Sultan	F
	36	"	Vada	F
	37	"	AG 10	F
	38	"	GI 4973	F
	39	"	Fraja	F
			Jerusalem 7-14	
	40	"	Israel 264	F
	41	"	San Carlos	F
EIRE				
Co. Kildare				
Leixlip	60	16/8	Abed Binder	E
	61	"	Feronia	F
	62	"	Hellas	FTE
	63	"	Midas	E
	64	"	Ruby	F
	65	"	Sultan	E
	66	"	Tellus	E+F

The majority of the samples came from S.W. England and Wales; most of the remainder were from Kent, Hertfordshire and Norfolk. None was received from further north than Yorkshire.
Seven came from Eire.
Most samples were from recommended list varieties and varieties in NIAB trials.

Eighty-seven of the samples were successfully cultured and of these 54 were race F and 21 were race E. These widely virulent races were the most common in the 1971 Survey. When tested on the differential varieties, they differ only in the virulence of race F on Reka 1. The relatively avirulent race B was detected 3 times and a hitherto unclassified culture from the NIAB, Cambridge has been designated race L; this is a simple race which is virulent only on the differential varieties Gold and Egypt 4. Of the 12 samples from winter varieties 8 were received during the period March to May. These were all classified as either race E or race F indicating that these complex races do overwinter and that stabilising selection against them does not appear to operate.

CROWN RUST OATS
WELSH PLANT BREEDING STATION, ABERYSTWYTH
R B CLOTHIER and B C CLIFFORD

1. During 1972, 32 samples were received at the WPBS. The number of samples received from winter varieties is shown in Table 14, from spring varieties in Table 15.

Table 14 Crown Rust of Oats - Samples from Winter Varieties

Winter Oats	No of samples
Peniarth	4
Maris Quest	2
Pendrwm	2
TOTAL	8

Table 15 Crown Rust of Oats - Samples from Spring Varieties

Spring Oats	No of samples
Mostyn	7
Maris Oberon (AJ13/111)	2
Maris Titan	2
Selma	2
Astor	1
Condor	1
Leanda	1
Manod	1
Maris Tabard	1
Nelson	1
03004 cn 29	1
TOTAL	20

One sample was received from each of the following:-
Astor x 6290 cn; 06526 cn IV/8; Avena fatua and wild oat.

2. RACE IDENTIFICATION

Full results are given in Table 16.

Table 16 Crown Rust of Oats - Race Identification

Location	WPBS Code No CRS/72/-	Date of Collect- ion 1972	Variety	Race
EASTERN REGION Suffolk Ipswich	30	22/8	<u>Avena fatua</u>	251
SOUTH EASTERN REGION Kent Wye	16 17 18 19 20	14/8 " " " "	Astor Condor Leanda Maris Quest " "	275 234 289 251 251

Table 16 (contd)

Location	WPBS Code No CRS/72/-	Date of Collect- ion 1972	Variety	Race
Wye (contd)	21	14/8	Maris Tabard	FTE
	22	"	Maris Titan	289
	23	"	Mostyn	289
	24	"	Pendrwm	251
	25	"	"	234
	26	"	Peniarth	234
	27	"	"	251
	28	"	Selma	236
SOUTH WESTERN REGION				
Cornwall				
Hayle	3	11/7	Mostyn	234
	4	"	Maris Oberon	296
	5	"	Mostyn	272
DEVON				
Newton Abbot	9	9/8	Manod	251
	10	"	Maris Titan	296
	11	"	Mostyn	280
	12	"	Nelson	FTE
	13	"	Maris Oberon	272
	14	"	03004 cn29	234
Wiltshire				
Melksham	32	22/8	Wild oats	FTE
WALES				
Cardiganshire				
Llanon	8	1/8	Peniarth	229
WPBS, Aberystwyth	2	6/7	Mostyn	234
	6	20/7	Astor x 6290 cn	251
	15	10/8	Selma	234
	31	22/8	06526 Cn IV/8	FTE
Monmouthshire				
Newport	7	22/7	Mostyn	251
	29	10/8	"	251
Pembrokeshire				
Clarbeston Road	1	29/6	Peniarth	289

The majority of the samples came from Kent, Devon, Cornwall and Wales. The most northerly sample was from Avena fatua in Suffolk. Winter varieties contributed 25% of the samples and the remainder were from Spring types. Twenty five were from named varieties, five from breeders lines and two from wild oats and of these, four failed to culture. One culture from Selma grown in Kent was tentatively identified as a new race (race 236) which is similar to the known race 251 but is virulent on the differential variety Anthony. All the remaining cultures were of races previously identified in Britain; 251, 234 and 289 comprised the majority. No cultures virulent on either Victoria or Landhafer were identified. As noted before, the variability in terms of virulence genes in the pathogen population is greater than might be expected from the lack of resistance genes in cultivated varieties except in Manod (Victoria gene) and Nelson (Landhafer gene).

MILDEW - WHEAT
PLANT BREEDING INSTITUTE, CAMBRIDGE
M S WOLFE

1. During 1972, 117 samples were received at the P B I. The number of samples collected from winter wheat varieties is given in Table 17, from spring varieties in Table 18.

Table 17. Mildew of Wheat - samples from winter varieties

Winter Wheat	No. of Samples
Maris Nimrod	26
Maris Huntsman	11
SR.156/218	8
Maris Templar	5
Joss Cambier	4
Mega	4
SR.185/262	3
Armentieres	2
Atou	2
Cama	2
Cappelle-Desprez	2
Chalk	2
Maris Ploughman	2
Maris Ranger	2
SR.185/461	2
Tommy	2
Bouquet	1
TP114E	1
Val	1
VR477	1
TOTAL	83

Table 18. Mildew of Wheat - samples from spring varieties

Spring Wheat	No. of Samples
Cardinal	10
Maris Dove	5
Maris Halberd	5
Tilly	5
Maris Pinion	4
WR112/79/14/20	2
ELS	1
Kleiber	1
Sappo	1
TOTAL	34

2. RACE IDENTIFICATION

Full results of all samples tested are given in Table 19. Many samples failed to establish, while tests are still in progress on the others.

Table 19. Mildew of Wheat - Race Identification

Location	P B I Code No. W72/-	Date of Reception 1972	Variety	Race
YORKS AND LANCS REGION				
Yorkshire				
Headley Hall	91	20/7	Cardinal	65
Welton	21	14/6	Maris Nimrod	48
EAST MIDLANDS				
Lincolnshire				
Mareham le Fen	27	23/6	Cappelle-Desprez	1
	34	"	Maris Huntsman	0
	37	"	SR.156/218	9
	39	"	Bouquet	1
Kelstern	51	29/6	Maris Nimrod	17
Nottinghamshire				
East Markham	107	21/7	Cardinal	65
WEST MIDLANDS				
Cheshire				
Farndon	10	23/5	Joss Cambier	5
Taporley	58	3/7	Mega	5
Herefordshire				
Rosemaund	43	23/6	SR.156/218	5
	45	"	Mega	5
Warwickshire				
Sutton Coldfield	67	6/7	SR.156/218	17
	68	"	Maris Nimrod	49
EASTERN REGION				
Norfolk				
Docking	2	12/4	SR.156/218	2
Martham	66	4/7	Maris Nimrod	48
SOUTH EASTERN REGION				
Berkshire				
Marcham	8	3/5	Maris Nimrod	1
Hampshire				
Sparsholt	76	11/7	MR.112/79/14/20	64
Kent				
Wye	47	29/6	Maris Templar	0
SOUTH WESTERN REGION				
Cornwall				
Tresillian, Truro	81	12/7	Cardinal	65
Somerset				
Bleadon	62	4/7	Cardinal	65
WALES				
Pembrokeshire				
Lawrenny	14	31/5	Maris Huntsman	49
EIRE				
Co. Kildare				
Backweston	117	31/7	Cardinal	65

Table 20 shows which differentials are attacked by the races so far identified, while Tables 21 and 22 show which races have been identified from varieties derived from T. carthlicum and CI 12633 respectively.

Table 20. Mildew of Wheat - Differentials attacked:-

	Wain M1	H.13471	Ulka	St. 14/14	Hope	Chul	Arminster	No. of Samples	Variety & Location
Race No.	64	32	16	8	4	2	1		
0							X	2	M. Huntsman (Marsham le Fen) M. Templar (Wye)
1						X		3	Cappelle-Desprez (Marsham le Fen) Bouquet (Marsham le Fen)
2					X	X		1	M. Nimrod (Marsham) SR.156-218 (Docking)
5				X		X		4	Joss Cambier (Farndon) SR.156/218 Rosemaund) Mega (Rosemaund, Tarporley)
9				X			X	1	SR.156/218 (Marsham le Fen)
17			X				X	2	M. Nimrod (Kelstern) SR.156/218 (Sutton Coldfield)
48		X	X					2	M. Nimrod (Marsham, Welton)
49		X	X				X	2	M. Nimrod (Sutton Coldfield), M. Huntsman (Lawrenny)
64	X							1	WR.112/79/14/20 (Sparsholt)
65	X						X	5	Cardinal (Tresillian, Bleedon, Headley Hall, East Markham, Backweston)
10	6	4	6	1	4	1	17	23	TOTAL

Table 21. Mildew of Wheat - Samples from varieties derived from T. carthlicum

Variety	No. of Samples	FTE	NYT	Reaction on Wain M1	
				Virulent	Avirulent
Cardinal	10	4	0	6, 5 of race 65, 1 race unknown	0
M. Halberd	5	4	0	1, race unknown	0
M. Pinion	4	3	0	1, race unknown	0
WR.112/79/14/20	2	1	0	1, race 64	0
ELS	1	1	-	-	-

Table 22. Mildew of Wheat - Samples from varieties derived from CI.12633

Variety	No. of Samples	FTE	NYT	Reaction on Ulka		Reaction on H.13471 of Ulka vir samples	
				Virulent	Avirulent	Virulent	Avirulent
M. Nimrod	26	13	3	9	1, race 1	7, 2 race 48 1 race 1 race 49 4 race unknown	2, 1 race 17 1 race unknown
M. Huntsman	11	8	1	2	0	1, race 49	1, race 0
M. Templar	5	4	0	0	1, race 0	0	1, race
M. Ploughman	2	0	0	1	1		unknown
M. Dove	5	4	1				

Summary

Of the 117 isolates received 23 have so far been tested on the ~~+~~ set of differential varieties and a further 40 are still in store.

Virulence for some varieties derived from CI.12633 and those derived from H.8810/47 or *T. carthlicum* is obviously now common. There is however, considerable variation between the derivatives of CI.12633 and tests are still in progress to identify the variation. One isolate from WR.112/79/14/20, an X-ray mutant involving ELS, proved to be virulent on Weih.M1 only in the differentials. It is therefore assumed that WR.112/79/14/20 possesses the *T. carthlicum* resistance.

In examining the reactions of some varieties to a range of isolates, it became apparent that a number of virulence genes not present in the differential varieties occur commonly in the pathogen population. One example is a gene for virulence on Ibis derivatives, which is presumably the same gene as that first noted in isolates virulent on Rothwell Perdix in 1965.

MILDew - BARLEY

PLANT BREEDING INSTITUTE, CAMBRIDGE

M S WOLFE

1. During 1972, 285 samples were received at the PBI. The number of samples received from winter barley varieties is shown in Table 23, from spring varieties in Table 24.

Table 23 Mildew of Barley - Samples from Winter Varieties

Winter Barley	No of samples
Maris Otter	6
Senta	3
Malta	1
TOTAL	10

Table 24 Mildew of Barley - Samples from Spring Varieties

Spring Barley	No of samples
Lofa Abed	26
Vada	26
Universe	24
Mazurka	21
Maris Mink	17
Wing	16
Golden Promise	12
RPB 11069	11
Tern	9
Julia	8
Aramir (Cebeco 6501)	7
Impala	7
Zephyr	7
Beckett (RPB3269)	6
Paloma	6
Berac	4
Proctor	4
Deba Abed	3
Hassan	3
Hornisse	3
Sultan	3
Akka	2
Midas	2
Banba	1
Goldfield	1
Imber	1
Mala Abed	1
Maris Badger	1
Maris Concord	1
Nessa	1
Ruby	1
SJ678060	1
TOTAL	236

In addition, two samples were received from each of the following varieties: Algerian, Arabische, Durani/4(F13)x Manchuria, Grannerlose Zweizeilige, Hanna/4(F12) x Manchuria, Lyallpur 3465, SV66367, No. 6018 and one from each of the following: A222, Algerian/4(F14) x Manchuria, Amsel, Bigo, CB1227, EP9, H1036, H1063, Hor 1677, Hor 1884, IS, Long Glumes, Long Glumes/4(F15) x Manchuria, Lyallpur BS, Lyallpur P, Lyallpur 3647, Marocaine 079, Minerva, Ricardo, Rupee, Rupee/4(F13 x Manchuria, Spiti, SV64505.

2. RACE IDENTIFICATION

Full results of all samples which have been tested are given in Table 25. Many samples failed to establish, while tests are still in progress on the others.

Table 25 Mildew of Barley - Race Identification

Location	PBI Code No B72/-	Date of Recept- ion 1972	Variety	Race
YORKS AND LANCS REGION				
Lancashire				
Culcheth	164	7/7	Maris Mink	17,3
EAST MIDLANDS				
Lincolnshire				
Brigg	199	14/7	Universe	27,15
Weston	36	1/6	Vada	15,11
Northamptonshire				
Moulton	77	28/6	Zephyr	31,13
Nottinghamshire				
Kirklington	204	14/7	Lofa Abed	17,2
Sutton Bonington	54	19/6	Proctor	11,11
	58	"	Julia	19,8
WEST MIDLANDS				
Cheshire				
Farndon	22/1	23/5	Golden Promise	15,11
	23	"	Midas	7,10
	25	"	Mala Abed	15,11
	26	"	Universe	23,13
Reaseheath	94	3/7	Vada	15,11
Warwickshire				
Sutton Coldfield	153	6/7	Universe	17,2
	156	"	Maris Mink	8,12
Worcestershire				
Evesham	45	14/6	Wing	99,15
Shropshire				
Harper Adams, Newport	75	28/6	Vada	19,15
EASTERN REGION				
Cambridgeshire				
Abington	68/1	23/6	Vada	25,7
	68/4	"	"	25,3
NIAB, Cambridge	12	27/4	"	23,15
	13	"	Lofa Abed	17,2
	16	"	Maris Mink	11,15
	18	"	Hornisse	15,11
	19	"	Beckett	27,11
	20	"	RPB11069	23,11

Table 25 (Contd)

Location	PBI Code No B72/-	Date of Recept- ion 1972	Variety	Race
PBI, Trumpington	104	4/7	Arabische	9,0
	120	"	Ricardo	11,9
	122	"	Algerian/4 (F14) x	9,2
			Manchuria	
	123	"	Hanna/4 (F12) x	7,9
			Manchuria	
	132	"	Arabische 47-16	26,13
	135	"	Lyallpur 3645	99,9
	141	"	Rupee/4 (F13) x	9,4
			Manchuria	
Hertfordshire				
Rothamsted	261	27/7	Zephyr	3,8
Norfolk				
Bawburgh	27	24/5	Tern	11,11
Brancaster	5/7	17/1	Maris Otter	8,0
Docking	49	15/6	Vada	17,2
Guestwick	100/8	4/7	Maris Mink	11,9
	100/9	"	" "	15,11
	100/13	"	" "	11,14
Martham	99	"	Julia	3,8
Morley	88	30/6	Tern	99,15
	90	"	Wing	99,15
Norwich	91	"	Lofa Abed	19,15
Terrington	226	19/7	Mazurka	123,10
Suffolk				
Benhall	64	22/6	Universe	23,11
	66	"	Tern	99,9
SOUTH EASTERN REGION				
Berkshire				
Streatley	4	10/1	Senta	25,2
SOUTH WESTERN REGION				
Cornwall				
Tresillian Truro	196	12/7	Lofa Abed	19,1
Dorset				
Wimborne St Giles	30	31/5	Vada	23,11
	33	"	Lofa Abed	17,2
Gloucestershire				
Cirencester	179	12/7	Mazurka	15,11
	182	"	Universe	19,8
Wiltshire				
Stourton	184	"	Lofa Abed	17,2
WALES				
Anglesey	9	25/1	Malta	23,15
Cardiganshire				
WPBS Aberystwyth	39	5/6	Vada	17,2
	60	21/6	Mazurka	99,15
Flintshire	10	31/1	Maris Otter	15,15
SCOTLAND				
Aberdeenshire				
St Combs	218	19/7	Goldfield	9,3
Berwickshire				
Greenlaw	143	6/7	Paloma	17,0
	152	"	Universe	17,11

Table 25 (contd)

Location	PBI Code No B72/-	Date of Recept- ion 1972	Variety	Race
Perthshire Guildtown	168 172	11/7 "	Impala Universe	7,13 16,1
EIRE Co Kildare Backweston	246	20/7	Sultan	27,9

Table 26 shows which differentials are attacked by the races which have been identified. Tables 27 and 28 show which races have been identified on varieties derived from Lyallpur and Vada respectively.

Table 26 Differential attacked - Mildew of barley

Race No	Wing	H.1063	Vada	Sultan	Concord	CP.127422	41/145	No. of samples	Variety and Location
	64	32	16	8	4	2	1		
3,8					X	X	2	Zephyr (Rothamsted) Julia (Martham)	
7,9					X	X	1	Hanna x Manchuria (PBI)	
7,10					X	X	1	Midas (Farndon)	
7,13					X	X	1	Impala (Guildtown)	
8,0							1	M Otter (Brancaster)	
8,12					X		1	M Mink (Sutton Coldfield)	
9,0					X		1	Arabische (PBI)	
9,2					X		1	Algerian x Manchuria (PBI)	
9,3					X		1	Goldfield (St Combs)	
9,4					X		1	Rupee x Manchuria (PBI)	
11,9					X	X	2	Ricardo (PBI) M Mink (Guestwick)	
11,11					X	X	2	Proctor (Sutton Bonington) Tern (Bawburgh)	
11,14					X	X	1	M Mink (Guestwick)	
11,15					X	X	1	M Mink (NIAB)	
15,11					X	X	5	Vada (Reaseheath, Weston), Mala Abed (Farndon) Hornisse (NIAB), Maris Mink (Guestwick)	
15,15					X	X	1	M Otter (Flintshire)	
16,1							1	Universe (Guildtown)	
17,0							1	Paloma (Greenlaw)	
17,2							7	Lofa Abed (NIAB, Wimborne St Giles, Stourton, Kirklington) Vada (WPBS, Docking) Universe (Sutton Coldfield)	
17,3							1	M Mink (Culcheth)	
17,11							1	Universe (Greenlaw)	
19,1					X	X	1	Lofa Abed (Tresillian)	
19,8					X	X	2	Universe (Cirencester) Julia (Sutton Bonington)	
19,15					X	X	2	Vada (Harper Adams) Lofa Abed (Norwich)	
23,11					X	X	3	RFB 11069 (NIAB) Universe (Benhall) Vada (Wimborne St Giles)	

Table 26 (Contd)

Race No.	Wing	H.1063	64	32	16	Sultan	Vada	Concord	GP.127422	41/145	No. of samples	Variety and Location
23,13			X			X	X	X	X		1	Universe (Farndon)
23,15			X			X	X	X	X		2	Vada (NIAB) Malta (Anglesey)
25,2			X	X					X		1	Senta (Streatley)
25,3			X	X					X		1	Vada (Abington)
25,7			X	X					X		1	Vada (Abington)
26,13			X	X				X			1	Arabische (PBI)
27,9			X	X				X	X		1	Sultan (Backweston)
27,11			X	X				X	X		1	Beckett (NIAB)
27,15			X	X				X	X		1	Universe (Scarby)
31,13			X	X		X		X	X		1	Zephyr (Moulton)
99,9	X	X						X	X		2	Tern (Benhall) Lyallpur 3645 (PBI)
99,15	X	X						X	X		4	Wing (Morley, Evesham) Tern (Morley) Mazurka (IPBS)
115,11	X	X	X					X	X		1	Mazurka (Cirencester)
123,10	X	X	X	X				X	X		1	Mazurka (Terrington)
39	8	8	32	27	16	41	57	61				TOTAL

Table 27 Mildew of Barley - Lyallpur derivatives

Variety	No of samples	FTE	NYT	Reaction on Tern	
				virulent (also on H.1063)	avirulent
Mazurka	21	14	1	6 1 race 99,15 1 race 115,11 1 race 123,10 3 race unknown*	0
Wing	16	11	0	5 2 race 99,15* 3 race unknown	0
Tern	9	5	0	3 1 race 99,9 1 race 99,15 1 race unknown	1, race 11,11
Hornisse	3	2	0	0	1, race 15,11
Lyallpur 3645	2	0	0	2 1 race 99,9 1 race unknown	0
Lyallpur P	1	0	0	0	1
Long Glumes X	1	0	0	1	0
Manchuria					
I5	1	0	0	1	0
Spiti	1	0	0	1	0
H.1063	1	0	0	0	1 (vir on H 1063)

* NB includes one isolate each, virulent on Gopal.

Table 28 Mildew of barley - Vada derivatives

Variety	No of Samples	FTE	NYT	Reaction on Vada			
				virulent	intermediate	avirulent	
Universe	24	11	2	10, 1 each of 1 races 16,1;17,2; 17,11;19,8; 23,11;23,13; 27,15; and 3 race unknown	1	0	
Vada	26	13	2	8, 1 each races 19,15; 23,11;23,15; 25,3;25,7; and 1 race unknown	2, both race 15,11	1, race un- known	
Lofa Abed	26	13	0	7, race 17,2(4) 19,1(1),19,15 (1) and 1 race unknown and 2 of race 17,2	1, race unknown	0	
Beckett	6	3	2	1, race 27,11	0	0	
RPB 11069	11	8	2	1, race 23,11	0	0	
Paloma	6	4	1	1, race 17,0	0	0	
Mala Abed	1	0	0	0	1, race 15,11	0	

Summary

Of the 285 samples received 61 have so far been analysed with the full set of differential host varieties; 55 are still in store. Two of the isolates obtained from Lyallpur-derived varieties were found to be virulent on seedling leaf segments of Gopal (Mla 5). This is the first record of Gopal virulence in this country.

Lyallpur - derivatives

Although isolates virulent on each of the Lyallpur derivatives in cultivation or in trials have now been confirmed, considerable confusion exists over the relationships between the derivatives. All appear to have in common the Mla-a7 allele derived from Lyallpur 3645. Most also appear to possess in common the resistance gene identified in HOR 1063, which may be JML-nz. Some, eg Wing, appear to possess resistance additional to these two genes. Further, from the evidence of the UK survey and from tests carried out in Sweden, there appears to be some relationship between the resistance of the Lyallpur derivatives and that of a series of varieties including Long Glumes, I5 and Spiti. These complex relationships are being analysed in collaboration with other workers in Sweden and the Netherlands. Since several resistance genes are involved in this group of varieties, it is possible that the degree of complexity involved may help to reduce the rate at which all of the derivatives become susceptible in the field.

Vada derivatives and related varieties

The situation with this form of resistance is also complex. It appears that basically there are two resistance genes: 'Ml-vn' conditions a necrotic resistance reaction with little or no pathogen growth. 'Ml-vs' retards pathogen growth and sporulation with no necrosis. Variations in the frequency of Vada-virulence are thought to be due more to variations in the frequency of 'V-vs' rather than 'V-vn'.

In addition to the Vada resistance, some recent derivatives possess the Ml-g resistance gene; this is evident from the race identification table (28) above, where the isolates virulent on Beckett and RPB 11069 are seen to possess the V-g virulence gene in addition to Vada-virulence.

Although the appropriate virulence gene combinations necessary for conditioning virulence on seedlings of all of the Vada derivatives and related varieties have now been detected, it is not possible to predict the durability of the resistance of this group. However, there are now so many potentially promising varieties with this form of resistance, that there is an obvious risk to the resistance if many of the varieties are successful and are grown in close proximity over large areas.

INTENSIVE SURVEY

Summary

Approximately 1500 isolates from six varieties (Vada, Julia, Sultan, Maris Otter, Proctor and Maris Mink) were obtained from a large field of each variety in the vicinity of Cambridge. They were collected on two dates separated by 2-3 weeks and maintained on detached leaf segments of either Proctor or Golden Promise.

The 12 collections (ie 6 vars x 2 dates) are being analysed on selected differential varieties to determine

- a) the frequencies of common virulence genes in each
- b) the frequencies of all possible combinations of the virulence genes
- c) the occurrence of virulence genes corresponding to resistance genes which are currently being used, or which are of potential use in breeding programmes and general cultivation.

The overall pattern of distribution of virulence genes in the intensive survey resembles that observed in the current and previous non-random surveys. For example, the frequencies of four virulences on Vada and related varieties, and of Vada-virulence on unrelated varieties, are compared below from the intensive survey and from the 1972 non-random survey:-

	Frequency of virulence for			Frequency of Vada-virulence on non-Vada Varieties	
	CP127422	Concord	Sultan	41/145	
Intensive survey 1972	41	27	35*	98	15
Non-random survey 1972	54†	31	27	96	26

P \approx 0.7 for agreement of fit between the two populations

* Vada was close to a heavily infected field of Sultan

† indicates isolates from varieties which have Vada-resistance plus Ml-g

It seems that varieties with the same resistance gene(s) select out of the pathogen population the virulence gene(s) corresponding to that resistance which is in accordance with the gene-for-gene hypothesis. In addition, however, they also appear to select out a pattern of distribution of other virulence genes which is unique for that particular group of varieties. Thus the resistance gene(s) appear to interact with and influence the occurrence of non-corresponding virulence genes, which represents a deviation from the gene-for-gene theory.

Other virulence genes

A collection of 46 resistant varieties which are being used, or are of potential use, in breeding programmes and in agriculture were subjected to a bulk inoculation from the survey collection. Altogether, 26 of these varieties allowed development of some mildew and the pathogen has been re-isolated from these varieties for further testing. The objective is to determine the extent to which variation may exist for any degree of virulence on the resistance sources. In one instance, Weibulls 1001, virulence for the variety has been detected, apparently at a high level.

MILDEW - DATS

WELSH PLANT BREEDING STATION - ABERYSTWYTH

I T JONES and R B CLOTHIER

1. During 1972, 65 samples of oat mildew were received at the WPBS. The number of samples received from winter varieties is shown in Table 29, from spring varieties in Table 30.

Table 29 Mildew of Oats - Samples from Winter Varieties

Winter Oats	No of samples
Peniarth	9
Maris Quest	5
Pendrwm	5
Maris Osprey	1
04435 Cn/n/n/75/1	1
TOTAL	21

Table 30 Mildew of Oats - Samples from Spring Varieties

Spring Oats	No of samples
Condor	15
Mostyn	11
Manod	8
Maris Oberon (AJ 13/111)	2
Nelson	2
Maris Tabard	1
TOTAL	39

In addition one sample was received from each of the following varieties:
Blenda, Nuprime, S225, W1010 n/n/9, 05866 Cn/n/n/116.

2. RACE IDENTIFICATION

Full results are given in Table 31.

Table 31 Mildew of Oats - Race Identification

Location	WPBS Code No. OMS/72/-	Date of Collection 1972	Variety	Race
NORTHERN REGION				
Northumberland				
Morpeth	57	26/7	Condor	2
	58	"	Manod	2
YORKS AND LANCS REGION				
Yorkshire				
Tadcaster	21	28/6	04435 Cn/n/n/75/1	4
	22	"	Maris Osprey	3
	23	"	Peniarth	4
	24	"	05866 Cn/n/n/116	4
	25	28/6	W1010 n/n/39	4
	52	18/7	Condor	FTE
	53	"	Manod	FTE
	54	"	Mostyn	FTE
		- 42 -		

Table 31 (Cont'd.)

Location	WPBS Code No. OMS/72/-	Date of Collection 1972	Variety	Race
EAST MIDLANDS				
Northamptonshire				
Moulton	39	10/7	Condor	2
	40	"	Hanod	4
	41	"	Maris Quest	2
	42	"	Maris Tabard	FTE
	43	"	Nelson	FTE
	44	"	Pendrwm	FTE
	45	"	Peniarth	FTE
WEST MIDLANDS				
Cheshire				
Farndon	2	1/5	Maris Quest	4
	3	"	Peniarth	4
	4	22/5	Blenda	4
	5	"	Maris Quest	4
	6	"	Peniarth	4
Shropshire				
Newport	26	3/7	Mostyn	4
	27	"	Pendrwm	2
	28	"	Peniarth	2
EASTERN REGION				
Hertfordshire				
Rothamsted	55	25/7	Maris Quest	2
	56	"	Hanod	2
SOUTH EASTERN REGION				
Kent				
Wye	12	27/6	Condor	2
	13	"	Hanod	2
	14	"	Mostyn	4
	15	"	Nelson	3
	16	"	Maris Oberon	4
	17	28/6	Condor	4
	18	"	Maris Quest	2+4
	19	"	Peniarth	2
	20	"	Pendrwm	4
SOUTH WESTERN REGION				
Cornwall				
Hayle	46	11/7	Condor	4
	47	"	Hanod	2
	48	11/7	Mostyn	4
	49	"	Pendrwm	2
	50	"	Peniarth	2
Devon				
Okehampton	30	4/7	Condor	2+4
	31	"	Hanod	2
	32	"	Mostyn	4
	33	"	Pendrwm	2
	34	"	Peniarth	2
	35	"	Maris Oberon	3
Starcross	29	3/7	Condor	4
WALES				
Cardiganshire				
Llanon	10	6/6	Mostyn	4
WPBS, Aberystwyth	1	14/3	S225	2+3+4
	7	1/6	Hanod	4
	8	"	Mostyn	4
	9	"	Nuprime	2+4
	11	8/6	Condor	4

Table 31 (Cont'd.)

Location	WPBS Code No. OMS/72/-	DATE of Collection 1972	Variety	Race
WALES (Cont'd.)				
Denbighshire Ruthin	51	20/7	Peniarth	2
SCOTLAND				
Fifeshire Kincardine	63	11/8	Condor	2
Perthshire Methven	36 64 65	6/7 11/8 "	" " Mostyn	4 2 4
Roxburghshire Kelso	37 38 61 62	7/7 " 10/8 "	Condor Mostyn Condor Mostyn	4 4 4 4
Selkirkshire Galashiels	59 60	" "	Condor Mostyn	4 4

Of the sixty-five samples received in 1972, seven failed to establish. Three races, namely 2, 3 and 4, have been identified. Samples of Race 4, which is capable of attacking the differential varieties Milford, 9065 Cn 6/3/74, Manod and the variety Mostyn, have increased in number constituting 54% of the samples tested, while the proportion of Race 2 in the samples collected has decreased. This is probably due to the increase in acreage sown to Mostyn. Race 4 was identified on eight samples from Scotland for the first time, but none were received from Ireland.

Three samples were found to be Race 3 from Nelson (Wye), Maris Osprey (Tadcaster) and Maris Oberon (Okehampton).

Race 3 and Race 5 are capable of attacking Cc 4146 resistance which is currently being incorporated into new varieties such as Maris Tabard. On the basis of differential tests it appears that Nelson and Maris Oberon also possess this source of resistance.

Race 5 was not identified in 1972. The only cases of it having been found were in 1969 (2 samples) and 1970 (1 sample).

Four samples consisted of mixtures of races 2, and 4 and one sample from Milford variety was a mixture of race 2, 3 and 4 from the WPBS.

Races 3 and 4 have now been isolated from varieties with no known resistance, suggesting that they can successfully compete with the previously prevalent Race 2.

No samples were received which were stated to be from ethirimol or other fungicide treated crops during 1972.

RHYNCHOSPORIUM - BARLEY

WELSH PLANT BREEDING STATION, ABERYSTWYTH

R B CLOTHIER

1. During 1972, 219 samples were received at the WPBS. The number of samples received from winter barley varieties is given in Table 32., from spring varieties in Table 33.

Table 32 Rhynchosporium of Barley - Samples from Winter Varieties

Winter Barley	No of samples
Maris Otter	11
Malta	2
Mirra	2
Senta	2
Alpha	1
Astrix	1
Engelen 2300	1
Hoppel (Hop)	1
Maris Trojan (HB609/36)	1
MG 64127	1
MG 66489	1
TOTAL	24

Table 33 Rhynchosporium of Barley - Samples from Spring Varieties

Spring Barley	No of samples
Julia	17
Mazurka	17
Proctor	15
Zephyr	11
Lofa Abed	10
Universe	10
Hassan	9
Maris Mink	9
Berac	7
Midas	7
Wing	7
RPB 11069	5
Sultan	5
Vada	5
Aramir (Cebeco 6501)	4
Deba Abed	4
Gerkra	4
Hornisse	3
Ruby	3
Armelle (Inra CF17/68)	2
Freegold	2
Golden Promise	2
Imber	2
SJ 678060	2
Tern	2
Varunda	2
Ark Royal (RPB 19869)	1
Banba	1
Beckett (RPB 3269)	1
CIV 344	1
Clermont	1
Feronia	1
Inis	1
Knook	1
Kristina	1
K282	1
Lauda	1
LG1 Ceres	1
Nimi (HMS 659 N118)	1
Miranda (CIV 354)	1

Table 33 (Cont'd.)

Spring Barley	No of samples
Pauline	1
RPB 8269	1
RPB 14670	1
Sabarlis	1
Weiby (WR 34165)	1
W 273368	1
6262 Co	1
TOTAL	187

In addition four samples were received from unknown varieties,
and one from each of the following varieties:
Hellas, Nessa, Pallas and 13192 Co n/9.

2. RACE IDENTIFICATION

Full results are given in Table 34.

Table 34 Rhynchosporium of Barley - Race Identification

Location	WPBS Code No RS/72/-	Date of collection 1972	Variety	Race
NORTHERN REGION				
Northumberland				
Belford	172	21/7	Gerkra	1
Cockle Park, Morpeth	111	5/7	Maris Otter	1
	112	"	Proctor	1
Morpeth	176	26/7	Berac	1
	177	"	Freegold	1
	178	"	Golden Promise	1
	179	"	Hassan	1
	180	"	Armelle	1
	181	"	Julia	1
	182	"	Lofa Abed	1
	183	"	Maris Mink	1
	184	"	Mazurka	1
	185	"	Midas	1
	186	"	Proctor	1
	187	"	Universe	1
	188	"	Vada	1
	189	"	Wing	1
	190	"	Zephyr	1
	191	"	RPB 11069	
YORKS AND LANCS REGION				
Yorkshire				
Cundall	168	19/7	Julia	1
Tadcaster	47	28/6	Universe	1
WEST MIDLANDS				
Cheshire				
Farndon	3	2/5	Berac	1
	4	"	Hassan	1
	5	"	Lofa Abed	1
	6	"	Midas	1
Herefordshire				
Rosemaund	15	16/5	Nalta	FTE
	16	"	Maris Otter	1
	17	"	Mirra	FTE
	18	"	Proctor	1
Shropshire	86	3/7	Universe	1
Wellington	171	19/7	Deba Abed	2

Table 34 (Cont'd.)

Location	WPBS Code No RS/72/-	Date of collection 1972	Variety	Race
WEST MIDLANDS (Cont'd.)				
Warwickshire				
Alcester	1	20/3	Unknown	1
Sutton Coldfield	109	5/7	Mazurka	1
	110	"	Universe	1
EASTERN REGION				
Essex	27	8/6	Unknown	1
Norfolk				
Morley	2	20/3	Maris Otter	1
SOUTH EASTERN REGION				
Berkshire				
South Fawley	64	27/6	Vada	1
Buckinghamshire				
Bourne End	7	4/5	Maris Otter	1
Hampshire				
Winchester	28	8/6	Julia	1
Isle of Wight				
Carisbrooke	25	24/5	Maris Otter	1
Wellow	124	5/7	Julia	1
Kent				
Wye	63	28/6	Proctor	1
	70	30/6	Berac	1
	71	"	Deba Abed	1
	72	"	Gerkra	1
	73	"	Hassan	2
	74	"	Imber	1
	75	"	Julia	1
	76	"	Lofa Abed	FTE
	77	"	Maris Otter	1
	78	"	Midas	1
	79	"	Mazurka	1
	80	"	Proctor	2
	81	"	Sultan	1
	82	"	Tern	1
	83	"	Vada	1
	84	"	Wing	1
	85	"	Zephyr	1
SOUTH WESTERN REGION				
Cornwall				
Newquay	46	28/6	Mazurka	1
Devon				
Ashburton	158	17/7	Inis	1
	159	"	Julia	1
	160	"	Proctor	1
	161	"	Ruby	1
	162	"	Sultan	2
	163	"	Vada	1
	164	"	Zephyr	1
Burrington	194	18/8	Hornisse	1
	195	"	Julia	1
	196	"	Knook	1
	197	"	Kristina	1
	198	"	Lauda	1
	199	"	Pauline	1
	200	"	Proctor	
	201	"	Sabarlis	1
	202	"	Varunda	1
	203	"	Aramir	1
	204	"	CIV 344	1
	205	"	Miranda	1
	206	"	Mimi	1
	207	"	Armelle	FTE

Table 34 (Cont'd.)

Location	WPBS Code No RS/72/-	Date of Collection 1972	Variety	Race
SOUTH WESTERN REGION (Cont'd.)				
Devon (Cont'd.)				
Burrington (Cont'd.)	208	18/8	K282	1
	209	"	LG1 Ceres	1
	210	"	Beckett	1
	211	"	RPB 8269	1
	212	"	RPB 11069	1
	213	"	RPB 14670	1
	214	"	Ark Royal	1
	215	"	SJ 678060	FTE
	216	"	W273368	2
	217	"	Weiby	1
	218	"	6262 Co	1
Seale-Hayne, Newton Abbot	48	28/6	Alpha	1
	49	"	Astrix	1
	50	"	Berac	1
	51	"	Clermont	1
	52	"	Hoppel	1
	53	"	Malta	1
	54	"	Maris Otter	1
	55	"	Maris Mink	1
	56	"	Mirra	1
	57	"	Senta	2
	58	"	Tern	1
	59	"	Engelen 2300	1
	60	"	Maris Trojan	1
	61	"	MG 66489	1
	62	"	MG 64127	1
Dorset	9	5/5	Maris Otter	1
	10	9/5	Hassan	1
	11	"	Maris Mink	1
	12	"	Maris Otter	1
	13	"	Mazurka	1
	14	"	Unknown	FTE
Gloucestershire				
Cirencester	133	10/7	Berac	1
	134	"	Julia	1
	135	"	Hassan	1
	136	"	Lofa Abed	1
	137	"	Maris Mink	1
	138	"	Mazurka	1
	139	"	Proctor	2
	140	"	Universe	1
	141	"	Wing	1
	142	"	Zephyr	2
	143	"	RPB 11069	1
Somerset				
Frome	103	5/7	Julia	1
	103a	"	Lofa Abed	1
	104	"	Mazurka	1
	105	"	Proctor	1
	106	"	Ruby	1
	107	"	Vada	1
	108	"	Zephyr	1
Williton	113	6/7	Berac	1
	114	"	Hassan	1
	115	"	Imber	1
	116	"	Julia	1
	117	"	Lofa Abed	1
	118	"	Maris Mink	1
	119	"	Mazurka	1
	120	"	Proctor	1
	121	"	Universe	1

Table 34 (Cont'd.)

Location	WPBS Code No RS/72/-	Date of Collection 1972	Variety	Race
SOUTH WESTERN REGION (Cont'd.)				
Somerset (Cont'd.)				
Williton (Cont'd.)	122	6/7	Wing	1
	123	"	Zephyr	1
Wiltshire				
Devizes	65	29/6	Berac	1
	66	"	Julia	1
	67	"	Lofa Abed	1
	68	"	Mazurka	1
	69	"	Proctor	1
Gifford	132	10/7	Golden Promise	1
Stourton	144	11/7	Hassan	1
	145	"	Maris Mink	1
	146	"	Mazurka	1
	147	"	Proctor	1
	148	"	Universe	1
	149	"	Wing	1
	150	"	Zephyr	1
Warminster	45	26/6	Maris Otter	1
WALES				
Anglesey	125	6/7	Mazurka	1
Cardiganshire				
Ffos-y-Ffin	193	18/8	Lofa Abed	1
Llangranog	41	14/6	Ruby	1
Rhydlewis	42	16/6	Proctor	1
WPBS, Aberystwyth	8	9/5	Unknown	FTE
	43	26/6	Maris Otter	1
	44	"	Mazurka	1
	175	26/7	Midas	1
Denbighshire				
Ruthin	169	20/7	Julia	1
Flintshire				
Rhuddlan	173	21/7	Mazurka	1
	174	"	Proctor	1
Glamorgan				
Cowbridge	26	6/6	Senta	2
Rhossili	127	10/7	Hassan	2
	128	"	Julia	2
	129	"	Lofa Abed	2
	130	"	Mazurka	1
	131	"	Zephyr	2
Pembrokeshire				
Martlebury	36	15/6	Hassan	1
	37	"	Julia	1
	38	"	Lofa Abed	1
	39	"	Mazurka	1
	40	"	Proctor	1
SCOTLAND				
Aberdeenshire				
St Combs	165	17/7	Universe	1
Angus				
Forfar	170	19/7	Deba Abed	1
Perthshire				
Guildtown	126	6/7	13192 Co n/9	1
	192	11/8	Deba Abed	1

Table 34 (Cont'd.)

Of the two hundred and nineteen samples received only ten failed to produce an infection on the test plants. The majority of the samples were from spring varieties and 45% of the total were sent from SW England.

Thirteen samples gave race UK2 reactions and the remaining 196 samples were classified as race UK1.

Only two of the race UK 2 samples were from winter varieties resistant to race UK1, the remainder coming from spring varieties. Race UK 2 was identified on material sent from S Wales, Devon, Gloucestershire, Shropshire and Kent.

