Table S1. Accession names, country of origin and status of the WC germplasm

Accession	Country of Origin	Status
North America		-
AC Minto	Canada	Released cultivar
AC Vista	Canada	Released cultivar
Biggar	Canada	Released cultivar
Bluesky	Canada	Released cultivar
Burnside	Canada	-
BW 90	Canada	-
CDC Teal	Canada	Released cultivar
Columbus	Canada	Released cultivar
Corrine	Canada	-
Glenavon	Canada	-
HY 320	Canada	Released cultivar
HY358	Canada	Released cultivar
Katepwa	Canada	Released cultivar
Laura	Canada	Released cultivar
Neepawa	Canada	Released cultivar
Oslo	Canada	Released cultivar
RL4452	Canada	Breeding line
Wildcat	Canada	Released cultivar
Roblin	Canada	Released cultivar

Accession	Country of Origin	Status
Arcola	Canada	Released cultivar
Santa Elena	Mexico	Released cultivar
Bajio	Mexico	Released cultivar
Lom	Mexico	Released cultivar
Tobari F66	Mexico	Released cultivar
Andes	Mexico	Released cultivar
Beloglina	USA	Released cultivar
Marquillo	USA	Released cultivar
Carina	USA	Released cultivar
Touse	USA	Released cultivar
Hope	USA	Released cultivar
Kanred	USA	Released cultivar
Nordic	USA	Released cultivar
Prospur	USA	Released cultivar
Red River 68	USA	Released cultivar
Stoa	USA	Released cultivar
Wheaton	USA	Released cultivar
Buffum	USA	-
South America		-
Argentina	Argentina	-
Benvenuto 3085	Argentina	Released cultivar

Accession	Country of Origin	Status
Buck Nandu	Argentina	Released cultivar
Buck Pucara	Argentina	Released cultivar
Calidad	Argentina	Released cultivar
El Gaucho	Argentina	Released cultivar
Klein otto Wulff	Argentina	Released cultivar
Klein Sendero	Argentina	Released cultivar
Klein Credito	Argentina	Released cultivar
Klein Toledo	Argentina	Breeding line
Klein Universal	Argentina	Released cultivar
Retacon INTA	Argentina	Released cultivar
Rio Negro	Argentina	Released cultivar
Tezanos Printos Precoz	Argentina	Released cultivar
Universal II	Argentina	Released cultivar
Victoria INTA	Argentina	Released cultivar
Parana	Argentina	-
PAMPA-INTA	Argentina	Released cultivar
Olaeta Calandria	Argentina	Released cultivar
Sinvalocho	Argentina	Released cultivar
Cinquentenario	Brazil	Released cultivar
Colonias	Brazil	Released cultivar
Encruzilhada	Brazil	Released cultivar

Accession	Country of Origin	Status
Fortaleza	Brazil	Released cultivar
Frontana	Brazil	Released cultivar
Fronteira	Brazil	Released cultivar
Preludio	Brazil	Released cultivar
Surpresa	Brazil	Released cultivar
Toropi	Brazil	Released cultivar
Trintecinco	Brazil	Released cultivar
Tropeano	Brazil	Released cultivar
Bage	Brazil	Released cultivar
Combate	Brazil	Released cultivar
Trintani	Brazil	Released cultivar
Bola Picota	Colombia	Released cultivar
Bonza	Colombia	Released cultivar
CN12624	Colombia	-
Menkemen	Colombia	Released cultivar
Atacatzo 1	Ecuador	-
CN11698	Peru	-
CN12268	Peru	-
CN12358	Peru	-
Helvia	Peru	Released cultivar
Maribal 50	Peru	-

Accession	Country of Origin	Status
Americano 44D	Uruguay	Released cultivar
Asia		-
Chengdu Guangtou	China	Landrace
Fengcheung No. 1	China	-
Fu Mai No 3	China	Released cultivar
Ho chun No. 12	China	-
Hsin ShuKuan#1	China	-
Li Yang Wong Shu Bai	China	Released cultivar
Nan Tong DA Huang PI	China	Released cultivar
NING 7840	China	-
NING 8026	China	-
NING 8331	China	Breeding line
Shu Chou Wheat #3	China	Released cultivar
Su Mai No 3	China	Released cultivar
Xiang Mai No 1	China	Released cultivar
Yang Mai No.1	China	Released cultivar
Chinese Spring	China	Landrace
Girija	India	Released cultivar
Kenphad 25	India	Released cultivar
New Pusa	India	-
Sonalika	India	Released cultivar

Accession	Country of Origin	Status
Vijay	India	Released cultivar
Surkh	India	Landrace
Azar	Iran	Released cultivar
Rayhany	Iran	-
Shahpassand	Iran	-
Ajelea	Iraq	-
Gogatsukomugai	Japan	Released cultivar
Ikuzai #1	Japan	Released cultivar
Nobeoka Bozu	Japan	Landrace
Norin 75	Japan	Released cultivar
Nyu Bay	Japan	Landrace
Shinchunaga	Japan	Landrace
CN11204	Jordan	-
Golubka	Kazakhstan	Released cultivar
karagandinskaja	Kazakhstan	Released cultivar
Koktunkulskaja 332	Kazakhstan	-
Krasnaja Svenzda	Kazakhstan	-
Ferrugineum-87	Kyrgystan	-
CN29854	Nepal	-
CN29856	Nepal	-
CN29858	Nepal	-

Accession	Country of Origin	Status
CN29871	Nepal	-
CN42522	Nepal	-
CN10241	Pakistan	-
CN12251	Pakistan	-
CN30213	Pakistan	-
CN9934	Pakistan	-
CN9936	Pakistan	-
71GN No 115	Syria	-
Africa		-
CN12666	Congo	-
CN11720	Egypt	-
CN12425	Egypt	-
CN9794	Egypt	-
Giza 141	Egypt	Breeding line
Camadi	Ethiopia	Landrace
CN11307	Ethiopia	-
CN6024	Ethiopia	-
CN6025	Ethiopia	-
CN6030	Ethiopia	-
CN10661	Kenya	-
Equator	Kenya	Released cultivar

Accession	Country of Origin	Status
CN10750	Kenya	-
CN12388	Kenya	-
Cobbs 1066	Kenya	Released cultivar
Kenya 58	Kenya	Released cultivar
Kenya Farmer	Kenya	Released cultivar
Kenya Governor	Kenya	Released cultivar
Kenya	Kenya	Breeding line
Daeraad	South Africa	Released cultivar
Dromedaris	South Africa	Released cultivar
Duiker	South Africa	Released cultivar
Penkop	South Africa	Released cultivar
Klein Trou	South Africa	Released cultivar
Koalisie	South Africa	Released cultivar
Europe		-
CN11461	Austria	-
Fruher Tiroler Bin	Austria	-
Alfy 2	Belgium	Released cultivar
Fylby	Belgium	Released cultivar
Jufy 2	Belgium	Released cultivar
Phoebus	Belgium	Released cultivar
CN40750	Bulgaria	-

Accession	Country of Origin	Status
Minskaja	Bulgaria	-
Lada	Bulgaria	Released cultivar
Maja	CSK	Released cultivar
Sandra	CSK	Released cultivar
Vega	CSK	Released cultivar
KVL 2263	Denmark	-
Etoile De Choisy	France	Released cultivar
Ventura	France	Released cultivar
Cargimarec	France	Released cultivar
Bersee	France	-
Hybride Du Jubile	France	-
Werna	France	Released cultivar
Prinqual	France	Released cultivar
Froubou	Germany	-
Heines Peko	Germany	Released cultivar
Janetzkis Fruher S	Germany	Released cultivar
Hohenhein	Germany	-
Janetzkis Probat	Germany	-
Strubes Fortschritt	Germany	Released cultivar
Funo	Italy	Released cultivar
Falerio	Italy	-

Accession	Country of Origin	Status
Mentana	Italy	Released cultivar
CN11642	Poland	-
Magueija	Portugal	Landrace
Pirana	Potrugal	Released cultivar
Da Maia	Portugal	Landrace
Acadimia 48	Romania	-
Dvina	Russia	Released cultivar
Gorkorskaja-15	Russia	Released cultivar
Narinskajal	Russia	-
Pamjat Urala	Russia	-
Severodvinskaja 1	Russia	Released cultivar
Udarnica	Russia	Released cultivar
Moskovka	Russia	Released cultivar
Irkutskaja 49	Russia	-
Krasnokutka 3	Russia	Unreleased cultivar
Onohoiskaja 4	Russia	-
Ladoga	Russia	Landrace
Jakutjanka	Russia	Released cultivar
Krasnojarskaja 1103	Russia	-
Pobeda	Russia	Released cultivar
Iskra	Russia	Released cultivar

Accession	Country of Origin	Status
Kamalinka	Russia	Released cultivar
Ladoga	Russia	Landrace
Albimonte	Switzerland	Released cultivar
Dominator	UK	Released cultivar
Holdfast	UK	Released cultivar
Little Joss	UK	Released cultivar
Red Marvel	UK	Released cultivar
Squarhead's Master	UK	Released cultivar
Warden	UK	Released cultivar
Musket	UK	Released cultivar
Tonic	UK	Released cultivar
Kinsman	UK	-
DART	UK	Released cultivar
Katja A1	UK	Released cultivar
Setter	UK	Released cultivar
Odess kaja 13	Ukraine	Released cultivar
Oceania		-
Comeback	Australia	Released cultivar
Bunyip	Australia	Released cultivar
cailloux	Australia	Released cultivar
BAART	Australia	Released cultivar

Accession	Country of Origin	Status
Bungulla	Australia	Released cultivar
Chara	Australia	Released cultivar
Federation	Australia	Released cultivar
Gabo	Australia	Released cultivar
Hard Federation	Australia	Released cultivar
Hofed	Australia	Released cultivar
John Brown	Australia	Released cultivar
Jumbuck	Australia	Released cultivar
Kukri	Australia	-
Major	Australia	Released cultivar
Pacific Bluestem	Australia	Released cultivar
Sabre	Australia	Released cultivar
Sunstar	Australia	Released cultivar
White Federation	Australia	Released cultivar
Warigo	Australia	Released cultivar
CD87	Australia	-
Bencubbin	Australia	Released cultivar
Sunbird	Australia	Released cultivar
Arawa	New Zealand	Released cultivar
CN12035	New Zealand	-
Endeavor	New Zealand	-

Accession	Country of Origin	Status
Hilgendorf	New Zealand	Released cultivar
Oroua	New Zealand	Released cultivar
Otane	New Zealand	Released cultivar
Cross 7	New Zealand	Released cultivar
Unknown		
CN33802	Unknown	-
CN11739	Unknown	-
G3893	Unknown	-
CWI42988	Unknown	-
CN12361	Unknown	-
Dorziyeh Karak	Unknown	-
CN99032	Unknown	-
CN9940	Unknown	-
Kostoff's Triple Hybrid	Unknown	-
CN12213	Unknown	-
CN33892	Unknown	-
CN33893	Unknown	-
CN2758	Unknown	-
CN11647	Unknown	-
CN33803	Unknown	-
CN32504	Unknown	-

Accession	Country of Origin	Status
CN12442	Unknown	-
CN1849	Unknown	-
CN12261	Unknown	-
Kozlodui	Unknown	-
Dorziyey Safra	Unknown	-
CN6171	Unknown	-
Tambillo 1	Unknown	-
Indur Compactum	Unknown	-
CN37599	Unknown	-
CN12229	Unknown	-
CN40895	Unknown	-

Table S2. Primer names, sequences, PCR conditions, amplicon sizes and references for four *Lr* gene specific markers

Gene	Primer Name	Sequence	PCR condition	Resolution method	Amplicon sizes	Reference
Lr1	Glenlea5_F233 Glenlea5_R712	AGTCTGCACAATCTTTTCCGG ATCTGTAGTTGGTCCACCAAGG	Initial denaturation: 94˚C, 4 min Denaturation: 94˚C, 15 sec Annealing: 65˚C, 30 sec Extention: 72˚C, 30 sec Cycles: 35 Final extension: 72˚C, 10 min End: 15˚C constant	1.5% agarose gel	500/N	Cloutier et al. 2007
Lr10	Lrk10D1 Lrk10D2	GAAGCCCTTCGTCTCATCTG TTGATTCATTGCAGATGAGATCACG	Initial denaturation: 94˚C, 3 min Denaturation: 94˚C, 45 sec Annealing: 57˚C, 45 sec Extention: 72˚C, 30 min Cycles: 35 Final extension: 72˚C, 10 min End: 15˚C constant	1.5% agarose gel	300/400/500	Schachermayr et al. 1997

Gene	Primer Name	Sequence	PCR condition	Resolution method	Amplicon sizes	Reference
Lr21	Lr21-227F Lr21-550R	TATTTGACATCAGTCATTGAGG CATCTTGAGATAGCAGTAAGG	Initial denaturation: 95˚C, 5 min Denaturation: 95˚C, 1 min Annealing: 54˚C, I min Extention: 72˚C, 1 min Cycles: 34 Final extension: 72˚C, 10 min End: 15˚C constant	1.5% agarose gel	400/N	Huang and Gill 2001
Lr34	caIND11	F: GTCTCCCAATCTGCATGCTC R: TACCTCCCAAAAGCCAGTTG	Initial denaturation: 93˚C, 2 min Denaturation: 94˚C, 1 min Annealing: 58˚C, 50 sec Extention: 72˚C, 1 min Cycles: 30 Final extension: 72˚C, 10 min End: 15˚C constant	ABI3130*x*1	394/397	Dakouri et al. 2010

Gene	Primer Name	Sequence	PCR condition	Resolution method	Amplicon sizes	Reference
	caSNP4	F: GCGTTTCTGTCACCAGAAGT R: AATAAACTCGCGCCTCTTGA	Initial denaturation: 94˚C, 5 min Denaturation: 94˚C, 1 min Annealing: 65˚C, 30 sec Extention: 72˚C, 1 min Cycles: 35 Final extension: 72˚C, 10 min End: 15˚C constant	1.5% agarose gel	390/N	
	caSNP12	F: TCCCCAGTTTAACCATCCTG R: CATTCAGTCACCTCGCAGC			234/N	

Table S3. Seedling resistance gene postulation based on the infection types of 10 races of *P. triticina* and molecular data, and evaluation of maximum rust severity and host response of a world collection of 275 wheat accessions

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
Group1																			
Neepawa	none	3	3	3	3	33+	33+	33+	3	33+	3				61	4	MRMS	S	S
Kanred	none	3	3	3	3	3	3	33+	3	33+	3				4	1	R	MS	R
Chinese Spring	none	3	3	3	3	3+	3	33+	3	33+	3			*Lr34*	2	1	MS	?	R
CN33802	none	3	3	3	3	4	33+	33+	3	3	3				78	3	?	?	MS
CN11739	none	3	3	3	3	33+	33+	33+	3	3	3				70	4	S	MSS	MSS
G3893	none	3	3	3	3	33+	33+	3	3	3	3				30	5	MR	MSS	S
CWI42988	none	3	3	3	3	33+	3	33+	3	3	3				41	5	MRMS	MS	R
Surkh	none	3	3	3	3	33+	33+	3	3	3	3				78	2	S	S	S
Li Yang Wong Shu Bai	none	3	3	3	3	33+	3	33+	3	3	3			*Lr34*	4	1	MS	R	MS
Ajelea	none	3	3	3	3	33+	33+	33+	3	3	3				2	1	?	R	R
Nyu Bay	none	3	3	3	3	33+	33+	33+	3	3	3			*Lr34*	14	3	MS	MS	MS
CN29856	none	3	3	3	3	43+	33+	33+	3	3	3				63	3	MS	S	MS

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
CN29854	none	3	3	3	3	33+	33+	33+	3	3	3				53	4	S	S	MSS
CN9934	none	3	3	3	3	33+	33+	3	3	3	3				21	4	R	R	MS
CN9936	none	3	3	3	3	33+	3	33+	3	3	3				40	8	R	MS	MS
CN12251	none	3	3	3	3	33+	33+	3	3	3	3				13	6	MRMS	R	MR
Dvina	none	3	3	3	3	33+	33+	3	3	3	3				70	6	S	S	S
Golubka	none	3	3	3	3	33+	33+	33+	3	3	3				36	6	?	MS	MS
Gorkorskaja15	none	3	3	3	3	3	33+	33+	3	3	3				25	3	MRMS	MS	MS
Narinskajal	none	3	3	3	3	33+	33+	33+	3	3	3				66	5	S	S	S
Odess kaja 13	none	3	3	3	3	3	33+	33+	3	3	3				48	7	S	S	S
Pamjat Urala	none	3	3	3	3	33+	33+	33+	3	3	3				65	4	MSS	S	S
Severodvinskaja1	none	3	3	3	3	33+	33+	33+	3	3	3				70	6	S	S	S
Udarnica	none	3	3	3	3	33+	33+	33+	3	3	3				65	7	S	S	S
CN11461	none	3	3	3	3	3	33+	33+	3	3	3				41	4	S	S	MSS
Comeback	none	3	3	3	3	33+	33+	33+	3	3	3				56	5	MS	S	S
Fylby	none	3	3	3	3	33-	33+	33+	3	3	3				57	4	S	S	S
CN40750	none	3	3	3	3	33-	33+	3	3	3	3				50	3	MRMS	MS	S

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
Lada	none	3	3	3	3	33-	33+	3	3	3	3				9	3	MR	R	MS
Falerio	none	3	3	3	3	33+	33+	3	3	3	3			*Lr34*	21	6	MSS	R	R
Albimonte	none	3	3	3	3	33+	33+	33+	3	3	3			*Lr34*	7	2	MSS	R	MS
CN11642	none	3	3	3	3	33+	33+	3	3	3	3				39	6	S	S	MS
CN12361	none	3	3	3	3	33+	33+	33+	3	33+	3				52	5	MS	?	?
CN11720	none	3	3	3	3	33+	33+	3	3	3	3				38	7	MS	MS	MS
CN10661	none	3	3	3	3	33+	33+	3	3	3	3			*Lr34*	35	5	?	MS	MS
Bunyip	none	3	3	3	3	33+	33+	3	3	3	3				57	5	S	S	MS
Bungulla	none	3	3	3	3	33+	33+	3	3	3	3				46	6	MS	S	MS
Vijay	none	3	3	3	3	33+	3	33+	3	?	3				24	4	MS	S	R
Dorziyeh karak	none	33+	3	33-	?	33+	3	3	3	3	3				6	1	?	R	?
Krasnaja Svenzda	none	3	3	33-	33+	33+	33+	33+	3	3	3				54	5	MS	S	S
Group2																			
CN99032	*N*	3	3	2	3	33+	3	33+	3	3	3				1	0	R	R	R
Preludio	*N*	3	3	3	1	33+	33+	3	3	33+	3				3	1	MR	R	R
Kenya Farmer	*N*	3	2	3	3	3	33+	3	3	3	3				28	4	MR	R	MS

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
Santa Elena	*N*	33+	3	3	3	21	3	3	3	3	3				53	5	MS	R	MS
CN9940	*N*	3	2	33-	3	33+	3	33+	3	3	3				10	2	MRMS	MS	R
Beloglina	*N*	3	3	3	3	33-	3	;2	3	3	3				34	4	S	S	?
StrubesFortschritt	*N*	3	3	33-	3	33+	33+	;1	3	3	3				42	5	MS	MS	MS
Atacatzo 1	*N*	3	3	3	33+	33+	33+	;1	3	3	3				76	3	S	S	S
CN10750	*N*	3	3	2	2	33+	33+	3	3	3	3				44	6	MSS	MSS	S
Klein Credito	*N*	3	2	1	2	33+	3	33+	3	3	3				17	3	MR	MS	MS
CN12624	*N*	3	3	2	2	33+	2	3	;12	3	3				7	2	MR	R	R
Group 3																			
Subgroup 1																			
Red River 68	*Lr1*	0	3	3	1	33+	3	33+	3	33+	3	*Lr1*			13	3	MR	MRMS	MS
Shu Chou Wheat #3	*Lr1*	;	3	3	3	33+	33+	3	33+	3	3	*Lr1*		*Lr34*	21	3	MS	MSS	MSS
Shinchunaga	*Lr1*	2	3	3	3	33+	33+	3	3	3	3	*Lr1*			37	5	MSS	MSS	MS
Kostoff's Triple hybrid	*Lr1*	1	3	3	3	3	33+	33+	3	3	3	*Lr1*			29	4	MS	S	MS
Iskra	*Lr1*	2	3	3	3	33+	33+	33+	3	3	3	*Lr1*			56	6	R	MR	?

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
Fruher Tiroler Bin	*Lr1*	2	3	3	3	3	33+	33+	3	3	3	*Lr1*			51	5	MS	MSS	S
Ventura	*Lr1*	1	3	3	3	33+	33+	3	3	3	3	*Lr1*			44	6	MS	S	S
Endeavor	*Lr1*	0	3	3	3	3	33+	3	3	3	3	*Lr1*			29	6	MS	MS	S
cailloux	*Lr1*	3	3	3	3	33+	33+	33+	3	33+	3	*Lr1*			55	3	?	S	S
CN12213	*Lr1*	3	3	3	3	33+	33+	33+	3	3	3	*Lr1*			65	4	MSS	MSS	S
Shahpassand	*Lr1*	3	3	3	3	33+	33+	33+	3	3	3	*Lr1*			84	2	S	S	?
Moskovka	*Lr1*	3	3	3	3	33+	33+	33+	3	3	3	*Lr1*		*Lr34*	53	5	MS	MS	S
Buffum	*Lr1*	3	3	3	3	33-	33+	3	3	3	3	*Lr1*			48	4	?	S	S
Maja	*Lr1*	3	3	3	3	33+	33+	3	3	3	3	*Lr1*			48	4	MS	S	S
Kinsman	*Lr1*	3	3	3	3	3+	33+	3	3	3	3	*Lr1*			8	3	?	S	S
Heines Peko	*Lr1*	3	3	3	3	33+	33+	3	3	3	3	*Lr1*			32	6	S	MSS	MSS
CN12425	*Lr1*	3	3	3	3	3	33+	3	3	3	3	*Lr1*			16	4	MR	R	R
Ho chun No. 12	*Lr10*	2	3	3	3	33+	33+	33+	3	3	3		*Lr10*		48	5	MS	S	MS
Etoile De Choisy	*Lr10*	2	3	3	3	33+	33+	33+	3	3	3		*Lr10*		58	6	S	MS	S
Magueija	*Lr10*	2	3	3	3	33+	33+	3	3	3	3		*Lr10*	*Lr34*	3	2	R	?	R
Bonza	*Lr10*	0	3	3	3	33+	33+	3	3	3	3		*Lr10*	*Lr34*	18	4	MRMS	R	5jw

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
Chara	*Lr10*	2	3	3	3	33+	33+	3	3	3	3		*Lr10*	*Lr34*	30	6	?	S	?
Federation	*Lr10*	1	3	3	3	33+	33+	3	3	3	3		*Lr10*		60	6	MS	S	MSS
CN33892	*Lr10*	2	3	3	3	33+	?	33+	3	3	3		*Lr10*		25	5	S	S	R
CN33893	*Lr10*	3	3	3	3	33+	33+	33+	3	3	3		*Lr10*		7	3	R	R	R
Kenphad 25	*Lr10*	3	3	3	3	33+	3	33+	3	3	3		*Lr10*		46	4	MRMS	MSS	MSS
Sonalika	*Lr10*	33+	3	3	3	3	33+	33+	3	3	3		*Lr10*		47	6	MS	S	R
Irkutskaja 49	*Lr10*	3	3	3	3	33+	33+	33+	3	3	3		*Lr10*		67	6	S	S	S
Krasnokutka 3	*Lr10*	3	3	3	3	33+	33+	3	3	3	3		*Lr10*		72	4	MSS	S	S
CN9794	*Lr10*	3	3	3	3	33+	3	33+	3	3	3		*Lr10*		25	6	?	?	R
Hard Federation	*Lr10*	3	3	3	3	33+	33+	3	3	3	3		*Lr10*		50	5	S	S	MS
Hofed	*Lr10*	3	3	3	3	33+	3	3	3	3	3		*Lr10*		44	4	MRMS	S	S
Sinvalocho	*Lr3*	0	3	3	3	33+	33+	3	3	33+	3			*Lr34*	18	3	S	MS	R
CN2758	*Lr3*	1	3	3	3	33+	33+	33+	3	33+	33+				7	2	MS	MS	MS
CN11647	*Lr3*	2	3	3	3	33+	33+	33+	3	3	3				43	6	S	S	S
CN33803	*Lr3*	2	3	3	3	33+	33+	33+	3	3	3				17	5	MS	R	R
Su Mai No 3	*Lr3*	1	3	3	3	33+	33+	3	3	3	3			*Lr34*	47	7	S	S	S

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
Azar	*Lr3*	2	3	3	3	33+	33+	3	3	3	3				73	3	S	S	S
Norin 75	*Lr3*	2	3	3	3	33+	3	4	3	3	3				71	4	?	?	S
Nobeoka Bozu	*Lr3*	2	3	3	3	33+	33+	33+	3	3	3			*Lr34*	14	2	MS	MS	S
Ikuzai #1	*Lr3*	2	3	3	3	33+	33+	33+	3	3	3			*Lr34*	42	7	?	S	?
CN42522	*Lr3*	2	3	3	3	33+	33+	3	3	3	3				70	3	MS	R	MS
CN29871	*Lr3*	2	3	3	3	33+	33+	33+	3	3	3				61	5	MS	R	MS
CN29858	*Lr3*	2	3	3	3	33+	33+	33+	3	3	3				69	2	S	S	S
CN10241	*Lr3*	2	3	3	3	33+	33+	3	3	3	3				15	4	?	R	?
Ferrugineum87	*Lr3*	2	3	3	3	33+	33+	33+	3	3	3				18	3	MS	MS	MS
karagandinskaja	*Lr3*	2	3	3	3	33+	33+	33+	3	3	3				44	6	MS	MS	MSS
Vega	*Lr3*	2	3	3	3	33+	33+	33+	3	3	3				46	5	?	S	MSS
71GN No 115	*Lr3*	2	3	3	3	3	33+	33+	3	3	3				51	7	MR	MS	MS
Sandra	*Lr3*	1	3	3	3	33+	33+	3	3	3	3				51	4	MS	S	S
CN32504	*Lr3*	2	3	3	3	33+	33+	3	3	3	3			*Lr34*	31	6	S	RMR	R
Argentina	*Lr3*	1	3	3	3	33+	33+	3	3	3	3			*Lr34*	17	5	MS	R	R
Klein otto Wulff	*Lr3*	0	3	3	3	33+	33+	3	3	3	3				17	4	MS	MSS	MS

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
CN11307	*Lr3*	;	3	3	3	33+	33+	3	3	3	3				52	6	S	S	MS
Gabo	*Lr3*	1	3	3	3	33+	33+	3	3	3	3				59	3	MS	S	S
Hilgendorf	*Lr3*	1	3	3	3	33+	3	3	3	3	3			*Lr34*	1	0	MS	R	R
Sunbird	*Lr9*	0	;	;	0	23	0	x	;	3	;			*Lr34*	35	6	MS	R	MS
Onohoiskaja 4	*Lr20*	3	3	3	3	22+	33+	33+	3	3	3				45	4	MS	MS	S
Ladoga	*Lr20*	3	3	3	3	X	33+	33+	3	3	3				55	5	S	S	S
Janetzkis Probat	*Lr20*	3	3	3	3	22+	33+	3	3	3	3				41	5	MSS	S	S
Da Maia	*Lr20*	3	3	3	3	22+	33+	3	3	3	3				41	4	MS	MSS	MS
Red Marvel	*Lr20*	3	3	3	3	22+	33+	33+	3	3	3				12	4	MS	R	?
Little Joss	*Lr20*	3	3	3	3	22+	33+	3	3	3	3				46	6	MS	MS	MSS
Holdfast	*Lr20*	3	3	3	3	22+	33+	3	3	3	3				1	0	MS	R	MS
CN6030	*Lr20*	3	3	3	3	22+	33+	3	3	3	3			*Lr34*	41	7	MR	S	MS
John Brown	*Lr20*	33+	3	3	3	2	33+	3	3	3	3			*Lr34*	43	5	MRMS	S	S
Cross 7	*Lr20*	3	3	3	3	;	33+	3	3	3	3				39	7	MS	MS	S
Oroua	*Lr20*	3	3	3	3	21	33+	3	3	3	3				14	2	MR	MS	MS
Giza 141	*Lr20*	3	3	3	?	22+	33+	33+	3	3	3				18	5	?	MSS	R

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
Fronteira	*Lr20*	3	3	3	33+	22+	33+	3	3	3	3				25	3	MR	S	S
Janetzkis FruherS	*Lr28*	2	2	3	3	33+	33+	33+	3	3	3				45	4	S	S	S
Prospur	*Lr28*	0	2	3	3	33-	33+	33+	3	3	3			*Lr34*	36	4	MR	MSS	MS
Subgroup 2																			
Glenavon	*Lr1,Lr10*	0	3	3	3	33+	33+	3	3	33+	3	*Lr1*	*Lr10*	*Lr34*	28	5	RMR	?	MS
Koktunkulskaja 332	*Lr1,Lr10*	0	3	3	3	33+	33+	33+	3	3	3	*Lr1*	*Lr10*		47	4	MSS	S	MS
Cargimarec	*Lr1,Lr10*	0	3	3	3	33+	33+	3	3	3	3	*Lr1*	*Lr10*		22	5	?	S	S
Hohenhein	*Lr1,Lr10*	;	3	3	3	3	33+	3	3	3	3	*Lr1*	*Lr10*		50	6	S	S	MSS
Jakutjanka	*Lr1,Lr10*	3	3	3	3	3	33+	33+	3	3	3	*Lr1*	*Lr10*		65	4	80	S	S
Kamalinka	*Lr1,Lr10*	3	3	3	3	33+	33+	33+	3	3	3	*Lr1*	*Lr10*		49	5	MS	?	MS
Krasnojarskaja 1103	*Lr1,Lr10*	3	3	3	3	33+	33+	3	3	3	3	*Lr1*	*Lr10*		69	3	S	S	S
Penkop	*Lr1,Lr10*	3	3	3	3	33+	33+	3	3	3	3	*Lr1*	*Lr10*		64	4	MSS	S	MSS
White Federation	*Lr1,Lr10*	3	3	3	3	?	33+	3	3	3	3	*Lr1*	*Lr10*		59	6	?	S	R
Carina	*Lr1,Lr2c*	0	0	0	3	33+	0	33+	3	3	3	*Lr1*			65	4	S	MSS	S
Hsin ShuKuan#1	*Lr1,Lr14a*	3	3	3	3	X	33+	x	3	33+	3	*Lr1*			50	5	MSS	S	MS

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
New Pusa	*Lr1,Lr20*	2	3	3	3	;	33+	3	3	3	3	*Lr1*			25	4	MR	MS	MS
Retacon INTA	*Lr1,Lr20*	0	3	3	2	33+	33+	33+	3	3	3	*Lr1*			22	5	MS	S	MS
CN12666	*Lr1,Lr20*	1	3	3	3	0	33+	33+	3	3	3	*Lr1*		*Lr34*	46	4	?	S	MS
CN6025	*Lr1,Lr20*	0	3	3	3	22+	33+	3	3	3	3	*Lr1*			58	5	S	S	S
Sabre	*Lr1,Lr20*	1	3	3	3	2	3	3	3	3	3	*Lr1*		*Lr34*	34	7	S	?	MS
Pobeda	*Lr1,Lr20*	3	3	3	3	2	33+	33+	3	3	3	*Lr1*			66	4	MSS	S	S
CN12442	*Lr1,Lr20*	3	3	3	3	22+	33+	3	3	3	3	*Lr1*			47	6	MS	S	S
Kenya Governor	*Lr1,Lr20*	3	3	3	3	22+	3	3	3	3	3	*Lr1*		*Lr34*	30	4	MS	S	MSS
NING 8331	*Lr1,Lr26*	1	2	1	;	X	;	;	3	;	33-	*Lr1*			3	1	?	?	?
Wildcat	*Lr1,N*	0	3	3	3	33+	33+	X	3	33+	3	*Lr1*			66	5	MRMS	MSS	S
Xiang Mai No 1	*Lr1,N*	1	3	3	2	33+	3	3	3	3	3	*Lr1*			9	3	MR	MS	R
Touse	*Lr1,N*	2	3	3	0	33+	33+	33+	3	3	3	*Lr1*			69	3	S	S	MS
Buck Pucara	*Lr1,N*	0	3	3	3	33+	33+	;1	3	3	3	*Lr1*			19	4	MR	R	MS
Kukri	*Lr1,N*	0	3	3	2	33-	33+	3	3	3	3	*Lr1*			26	5	MRMS	MS	MSS
Tobari F66	*Lr1,N*	0	3	3	2	33-	33+	;	3	3	3	*Lr1*			26	5	MRMS	MS	R
CDC Teal	*Lr1,N*	2	3	2	1	33+	X	0	3	21	3	*Lr1*		*Lr34*	16	4	MR	MS	MS

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
Klein Universal	*Lr1,N*	3	3	0	2	33-	3	3	3	3	3	*Lr1*			10	4	MS	R	MSS
Fengcheung No.1	*Lr1,N*	3	3	2	3	33+	3	33+	3	3	3	*Lr1*			78	2	S	S	S
Jufy 2	*Lr1,N*	3	3	3	2	33+	33+	3	3	3	3	*Lr1*			65	4	SMS	S	S
Bersee	*Lr10,Lr14a*	3	3	3	3	33+	33+	3	3	3	3		*Lr10*		15	3	MR	RMR	R
Pirana	*Lr10,Lr20*	2	3	3	3	;	33+	3	3	3	3		*Lr10*	*Lr34*	15	3	MS	S	MS
Dominator	*Lr10,Lr20*	1	3	3	3	22+	33+	33+	3	3	3		*Lr10*		70	4	SMS	S	S
CN6024	*Lr10,Lr20*	1	3	3	3	;12	33+	3	3	3	3		*Lr10*		41	4	S	S	S
CN12388	*Lr10,Lr20*	2	3	3	3	22+	33+	3	3	3	3		*Lr10*	*Lr34*	27	3	MS	MS	MS
Daeraad	*Lr10,Lr20*	1	3	3	3	0	3	3	3	3	33-		*Lr10*	*Lr34*	36	5	MRMS	S	S
CD87	*Lr10,Lr20*	;	3	3	3	2	33+	3	3	3	3		*Lr10*		36	4	MS	S	S
CN12035	*Lr10,Lr20*	1	3	3	3	0	33+	3	3	3	3		*Lr10*		47	7	MR	R	R
Trintani	*Lr10,Lr20*	3	3	3	3	22+	33+	33+	3	3	3		*Lr10*		37	6	MRMS	S	S
Olaeta Calandria	*Lr10,Lr20*	3	3	3	3	X	33+	33+	3	33+	3		*Lr10*		69	4	MS	S	MS
CN1849	*Lr10,Lr28*	2	1	3	3	33+	33+	3	3	3	3		*Lr10*		47	4	MS	MSS	MS
CN12261	*Lr10,N*	1	3	1	3	33+	22+	33+	3	33+	33-		*Lr10*		20	3	MRMS	R	MS
Hybride DuJubile	*Lr10,N*	3	3	3	3	33-	22+	3	3	3	3		*Lr10*		56	3	S	S	MSS

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
Phoebus	*Lr10,N*	3	3	1	3	33-	33+	3	3	3+	33-+		*Lr10*		9	4	MR	R	R
Werna	*Lr10,N*	3	2	3	3	33+	2	33+	3	3	3		*Lr10*		31	3	MR	R	S
Combate	*Lr10,N*	3	3	3	3	33+	3	x	3	3	33+		*Lr10*		22	3	MR	S	S
Arawa	*Lr3,Lr14a*	2	3	3	3	21	33+	;1	3	3	3				13	2	MRMS	R	R
Ladoga	*Lr3,Lr15*	0	3	3	3	33+	33+	33+	3	;12	3				71	5	MS	MS	S
KVL 2263	*Lr3,Lr20*	2	3	3	3	;	33+	3	3	3	3			*Lr34*	8	1	R	R	MRMS
Chengdu Guangtou	*Lr3,Lr20*	1	3	3	3	;	3	3	3	3	3				6	2	MRMS	R	S
Nan Tong DA Huang PI	*Lr3,Lr20*	0	3	3	3	;1	33+	3	3	3	3				13	3	MR	MS	?
Minskaja	*Lr3,Lr20*	;	3	3	3	;	33+	33+	3	3	3				50	4	S	S	MSS
Setter	*Lr3,Lr20*	2	3	3	3	0	33+	3	3	3	3				18	4	S	R	MS
Musket	*Lr3,Lr20*	2	3	3	3	22+	33+	3	3	3	3				24	5	MS	MSS	MS
Tonic	*Lr3,Lr20*	2	3	3	3	0	33+	3	3	3	3				34	5	MRMS	MS	MS
Hope	*Lr3,Lr20*	0	3	3	3	;12	33+	3	3	3	3			*Lr34*	52	4	MRMS	MSS	MSS
Klein Toledo	*Lr3,Lr20*	2	3	3	3	1	33+	3	3	3	3				4	1	R	R	R
Calidad	*Lr3,Lr20*	0	3	3	3	X	33+	33+	3	3	3				30	6	MS	MS	MS

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
Surpresa	*Lr3,Lr20*	1	3	3	3	22+	33+	3-	3	3	3				25	4	MR	S	MSS
Toropi	*Lr3,Lr20*	2	3	3	3	22+	33+	3	3	3	3				8	2	?	MS	MS
Menkemen	*Lr3,Lr20*	0	3	3	3	22+	3	3	3	3	3			*Lr34*	22	4	?	MSS	R
Maribal 50	*Lr3,Lr20*	;	3	3	3	22+	33+	3	3	3	3				38	5	MS	S	S
Sunstar	*Lr3,N*	2	3	3	3	3	33+	3	3	3	0				37	6	MS	MS	MS
Prinqual	*Lr3,N*	;	3	0	3	33+	33+	3	3	3	3			*Lr34*	25	3	MR	MS	MS
CN12268	*Lr3,N*	2	3	3	3	33+	33+	;	3	3	3				31	4	R	S	MS
Rayhany	*Lr3,N*	`1	3	2	3	33+	?	33+	3	3	3				76	6	S	S	S
Froubou	*Lr3,N*	1	3	3	1	33+	33+	3	3	3	3				2	1	R	R	R
Gogatsukomugai	*Lr3,N*	2	3	2	3	33+	33+	33+	3	3	3				39	6	MS	S	MSS
HY 320	*Lr3,N*	2	3	3	2	33+	3	3-	3	33+	0				39	5	R	MRMS	?
Funo	*Lr3,N*	2	3	3	3	33+	22+	3	3	33+	2				38	4	MS	MS	MS
Squarhead's Master	*Lr3,N*	2	3	2	3	33+	33+	x	3	3	3				60	5	S	?	S
Bola Picota	*Lr3,N*	1	3	3	3	33+	2	;	3	3	3				31	5	MS	R	MS
El Gaucho	*Lr2c,N*	2	1	0	;	3	1	3	3	3	3			*Lr34*	2	1	MRMS	R	R

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
Tropeano	*Lr14a,N*	3	2	3	2	22+	33+	x	3	3	3			*Lr34*	5	2	R	MS	R
NING 8026	*Lr15,N*	2	3	12	2	33+	;	;12	3	;1	3				52	4	MRMS	MS	MS
CN11698	*Lr15,N*	3	3	2	2	3	1	3	;	;	;				10	2	MR	R	R
Warden	*Lr20,Lr28*	2	1	3	3	0	33+	33+	3	33+	3				45	5	MS	S	MS
DART	*Lr20,Lr28*	3	2	3	3	21	33+	3	3	3	3				54	6	MS	S	S
BAART	*Lr20,Lr28*	1	2	3	3	22+	33+	3	33+	3	3				51	5	S	S	MS
Girija	*Lr20,N*	3	3	3	2	0	3-	3	3	3	3			*Lr34*	11	3	MS	R	R
Kozlodui	*Lr20,N*	3	2	3	3	2;	33+	3	3	3	3				61	7	S	S	S
Acadimia 48	*Lr20,N*	3	3	3	3	22+	22+	3	3	3	3				37	5	MS	MSS	MS
Mentana	*Lr20,N*	3	2	3	3	22+	33+	3	3	3	3			*Lr34*	36	5	MS	S	S
Equator	*Lr20,N*	3	2	3	3	22+	3	3	3	3	3				30	7	S	S	S
Kenya 58	*Lr20,N*	3	3	3	2	;12	33+	3	3	3	3			*Lr34*	17	3	MS	MS	MS
Pacific Bluestem	*Lr20,N*	33+	2	3	3	22+	3	3	3	3	3				35	5	MS	R	MS
CN30213	*Lr20,N*	3	2	2	3	;	3	3	3	3	3				31	4	MRMS	MSS	MS
Benvenuto 3085	*Lr20,N*	3	2	3	2	X	33+	33+	3	3	3			*Lr34*	4	1	MS	R	R
Colonias	*Lr20,N*	1	3	2	2	21	33+	3	3	33+	3				16	3	MRMS	S	R

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
Camadi	*Lr20,N*	3	1	;	2	22+	2	3	3-	3	3				4	1	R	MR	R
Encruzilhada	*Lr28,N*	2	0	2	2	33+	33+	33+	3	3	3				6	2	MR	R	R
Arcola	*Lr28,N*	2	1	2	3	33+	3	3	33+	3	3				3	1	R	?	MS
Lom	*Lr28,N*	2	1	1	3	3	33+	3	3	3+	3				17	5	R	R	R
Dorziyeh Safra	*Lr28,N*	1	1	0	2	33+	3	3	3	3	3				5	1	R	MS	?
Pampa INTA	*Lr28,N*	2	2	2	3	2	33+	3	3	3	3			*Lr34*	3	1	MR	R	MS
AC Minto	*Lr28,N*	1	2	1	2	33+	33+	;3	3	3	3				8	2	R	RMR	R
Subgroup 3																			
Jumbuck	*Lr3,Lr20,N*	1	3	3	2	;	33+	3	3	3	3			*Lr34*	48	5	MRMS	S	MS
Bluesky	*Lr1,Lr10,N*	0	3	2	3	33+	33+	33+	3	3	3	*Lr1*	*Lr10*		19	3	MS	MS	MR
RL4452	*Lr1,Lr10,N*	0	3	2	3	33+	3	3	3	33+	3	*Lr1*	*Lr10*		28	5	MRMS	MS	S
Roblin	*Lr1,Lr10,N*	0	3	3	2	33+	33+	3	3	3	3	*Lr1*	*Lr10*	*Lr34*	30	5	MR	SMS	MS
Corrine	*Lr1,Lr10,N*	0	3	2	3	33+	3	3	3	3	3	*Lr1*	*Lr10*		16	2	R	SMS	MS
Laura	*Lr1,Lr10,N*	0	3	2	3	33+	33+	3	3	3	3	*Lr1*	*Lr10*	*Lr34*	5	2	MR	R	R
BW 90	*Lr1,Lr10,N*	2	3	3	12	33+	3	3	3	3	3	*Lr1*	*Lr10*		13	2	MRMS	MS	MS
Otane	*Lr1,Lr10,Lr20*	;	3	3	3	2	3	33+	3	3	3	*Lr1*	*Lr10*		31	5	MRMS	S	MS

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
Biggar	*Lr3,15,N*	2	3	3	2	33+	3	3	3	22+	3				28	3	?	R	S
CN11204	*Lr1,Lr20,N*	2	3	3	3	;	22+	33+	3	3	3	*Lr1*		*Lr34*	8	2	MS	MS	MS
Katja A1	*Lr1,Lr20,Lr28*	;	2	3	3	32	33+	33+	3	3	3	*Lr1*			24	6	S	S	MS
Parana	*Lr10,Lr20,N*	;	3	3	2	22+	3	3	3	3	3		*Lr10*		19	4	MS	R	R
CN6171	*Lr3,Lr20,N*	1	3	3	2	22+	33+	3	3	3	3				53	5	S	MSS	MS
Marquillo	*Lr10,Lr20,N*	2	3	3	3	22+	22+	3	3	3	3		*Lr10*		24	3	MR	MRMS	MS
AC Vista	*Lr3,Lr14a,N*	2	3	3	2	X	33+	;1	3	3	3				29	5	MR	MSS	S
HY358	*Lr3,Lr14a,N*	;	3	3	2	X	33+	x	3	33+	3				21	2	R	MS	MS
Fu Mai No 3	*Lr1,Lr15,N*	2	3	3	3	33+	2	;1	3	23	3	*Lr1*			37	4	MS	MS	R
Bajio	*Lr1,Lr14a,N*	0	3	3	12	0	33+	X	3	3	3	*Lr1*		*Lr34*	18	3	MR	MS	MS
Victoria INTA	*Lr1,Lr14a,N*	1	3	2	3	;	33+	;	3	3-	3	*Lr1*			16	3	MS	MS	MS
Tezanos Printos Precoz	*Lr3,Lr20,N*	0	3	2	2	21	33+	3	3	3	3			*Lr34*	6	1	MR	MRMS	R
Fortaleza	*Lr3,Lr20,N*	2	3	2	1	0	33+	3	3	33+	3			*Lr34*	3	1	R	R	R
Helvia	*Lr10,Lr14a,N*	2	3	3	3	22+	22+	;1	3	3	3		*Lr10*		56	5	S	MR	?
Duiker	*Lr1,Lr14a,*	2	2	3	3	22+	33+	x	3	3	3	*Lr1*			71	3	MR	MRMS	MS

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
	Lr28																		
Columbus	*Lr3,Lr15,N*	1	3	3	3	33+	2	;12	3	21	2				49	5	MRMS	MS	S
Yang Mai No.1	*Lr3,Lr15,N*	2	3	3	3	33+	33+	;1	3	12	3				46	5	MS	MSS	S
Buck Nandu	*Lr10,Lr28,N*	0	1	3	3	33+	1	;	3	33+	2		*Lr10*		23	5	MSS	MR	MS
Universal II	*Lr1,Lr28,N*	2	0	2	2	33-	33+	;2	3	3	3	*Lr1*			14	4	S	R	MS
Trintecinco	*Lr10,Lr20,N*	1	3	2	2	0	22+	3	3	33+	3		*Lr10*		11	3	MR	MRMS	MS
Cinquentenario	*Lr3,Lr14a,N*	2	3	3	2	22+	22+	;1	3	33+	3				7	2	MR	MS	R
Burnside	*Lr10,Lr3ka/30*	1	1	;	;	0	33+	0	3	33+	3		*Lr10*		4	1	MR	R	R
Tambillo 1	*Lr20,Lr28,N*	1	2	2	?	21	2	x	3	33+	;12				5	1	?	?	R
Oslo	*Lr3,Lr20,N*	1	3	1	2	X	2;	33+	3	;	2				24	4	MR	MS	?
CN12358	*Lr3,Lr15,N*	;	3	1	2	3	1	3	;	0	;1				6	2	MR	R	R
Americano 44D	*Lr1,Lr20,N*	3	3	2	2	12;	2	33+	3	3	3	*Lr1*			8	3	MRMS	R	R
Alfy 2	*Lr1,Lr20,N*	3	2	3	3	21	33+	33+	3	3	3	*Lr1*			48	5	S	S	MSS
Wheaton	*Lr1,Lr15,N*	3	3	1	3	33+	1	;1	3	;	23	*Lr1*			30	5	R	S	?
Major	*Lr1,Lr20,N*	3	2	3	3	2	33+	3	3	3	3	*Lr1*			42	6	MRMS	R	R
Indur compactum	*Lr10,Lr20,N*	3	2	1	3	0	1	3	3	3	3-		*Lr10*		57	7	S	S	MSS

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
Rio Negro	*Lr10,Lr14a,N*	3	3	3	2	X	33+	;	3	3	3		*Lr10*	*Lr34*	3	1	R	R	R
Warigo	*Lr10,Lr20,N*	3	3	3	3	22+	3	3	3	3	3		*Lr10*		44	5	MS	SMS	MS
Cobbs 1066	*Lr10,Lr20,N*	3	3	3	3	22+	33+	3	3	3	3		*Lr10*		23	4	MS	MS	MS
Kenya	*Lr1,Lr10,N*	3	3	3	2	3	33+	3	3	3	3	*Lr1*	*Lr10*		46	5	MSS	S	S
Bencubbin	*Lr1,Lr10,Lr20*	3	3	3	3	X	33+	3	3	3	3	*Lr1*	*Lr10*		45	6	S	S	MS
Klein Trou	*Lr1,Lr10,Lr20*	3	3	3	33+	;	33+	33+	3	3	3	*Lr1*	*Lr10*		34	6	MS	?	MS
Subgroup 4																			
Frontana	*Lr10,Lr20, Lr28,N*	1	2	3	2	22+	33+	3	3	3	3		*Lr10*	*Lr34*	3	1	R	R	R
CN37599	*Lr10,Lr15, Lr20,N*	1	3	2	3	;	2	3	3	;12	33-		*Lr10*		31	3	MS	S	MS
Bage	*Lr1,Lr10,Lr20,N*	2	3	2	2	0	;1	33+	3	3-	3	*Lr1*	*Lr10*	*Lr34*	22	5	MS	S	R
Katepwa	*Lr1,Lr10, Lr3ka or Lr30*	1	1	2	2	22+	33+	x	3	3	3	*Lr1*	*Lr10*		36	5	MR	MS	MS
CN12229	*Lr10,Lr2c, Lr15,N*	1	2	12	3	33-	22+	3	3	;12	21				18	4	MRMS	R	MS
Klein Sendero	*Lr15,Lr20,*	1	2	;	;	21;	1	33+	3	0	;				14	4	MR	R	MS

Accession name	Seedling genes	BBBD	MBDS	MGBJ	TJBJ	TDBG	MBRJ	PBDQ	THMJ	TNRJ	TCRJ	Marker data			MRS	SE	HR		
												Lr1	*Lr10*	*Lr34*			WPG	GLN	POR
	Lr28,N																		
CN40895	*Lr10,Lr15, Lr20,N*	3	2	;	1	22+	1	3	;12	;12	;12		*Lr10*		8	3	?	MR	R
Koalisie	*Lr1,Lr10,Lr20,N*	3	2	3	3	22+	33+	33+	3	3	3	*Lr1*	*Lr10*		21	5	?	MSS	S
Dromedaris	*Lr1,Lr10,Lr20,N*	3	3	2	3	0	33+	3	3	3	3	*Lr1*	*Lr10*		53	4	?	?	MS
Stoa	*Lr10,Lr2c, Lr15,N*	0	;	;	3	33+	0	3	;	;1	0		*Lr10*		46	4	MRMS	MS	S
Nordic	*Lr1,Lr10,Lr2a,Lr15,N*	0	2	2	3	33-	2	2	3	;	2	*Lr1*	*Lr10*		16	3	MRMS	MS	R
NING 7840	*Lr1,Lr14b, Lr15,Lr20,N*	3	2	;	12	22+	;	;	33+	;	3	*Lr1*		*Lr34*	3	1	MR	R	R

Infection types: 0 = no flecks or uredinia, 0; = faint hypersensitive flecks, ; = hypersensitive flecks, 1 = small uredinia with necrosis, , 2 = small to medium uredinia with necrosis, 3 = moderate to large size uredinia with/without chlorosis, 4 = very large uredinia without chlorosis, “+” = indicates slightly larger uredinia, “-“ = indicates slightly smaller uredinia, ITs with two symbols denote a range in IT: 22+= indicates a mixture of 2 size uredinia with chlorosis and slightly larger uredinia with chlorosis. Host response (HR): 0 = no flecks or uredinia, R = small uredinia with necrosis, MR = moderate size uredinia with necrosis, MRMS = small to medium size uredinia with moderate sporulation, MS = moderate size uredinia with chlorosis, S = large uredinia. MRS: Maximun rust severity. SE: standard error. ?: missing data

Table S4. Analysis of variance of rust severity rating of 275 accessions of a world collection of wheat tested in nine environments

Source of Variation	DF	SS	MS	F Value	Pr>F	Variance components	%
Envivronments	8	231276	28909.0	20.6	<.0001	57.5	7.7
Accessions	274	1526625	5571.6	11.7	<.0001	324.3	43.4
With *Lr34*	51	168505	3304.0	8.6	<.0001		
Without *Lr34*	222	1235863	5566.9	11.3	<.0001		
With vs. without *Lr34*	1	122257	122257	553	<.0001		
Block(Environment)	9	10188	1132.0	5.1	<.0001	3.9	0.5
Environments by Accessions	2102	1019685	485.1	2.2	<.0001	140.5	18.8
Residual	2105	465480	221.1	.	.	221.1	29.6

S.E. Mean = 0.41