IV. CULTIVARS AND GERM PLASM

USDA–ARS NATIONAL SMALL GRAINS GERMPLASM RESEARCH FACILITY
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National Small Grains Collection activities.

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Table 1. Wheat descriptors with data currently in GRIN (Febraury 2006).

Character	Years	Location	Accessions evaluated
Disease descriptors.			
Barley Yellow Dwarf Virus	1985–92	Davis, CA	2,287
Barley Yellow Dwarf Virus	1988–94	Urbana, IL	17,517
Soilborne Mosaic Virus	1985–89	Urbana, IL	6,587
Soilborne Mosaic Virus	2000	Manhattan, KS	4,998
Leaf Rust	1983–89, 1991–95	Manhattan, KS	38,751
Leaf Rust – Adult	2000	Manhattan, KS	5,000
Stripe Rust – Adult	1984–2005	Mt. Vernon, WA	47,540
Stripe Rust – Adult	1984–2005	Pullman, WA	37,676
Stripe Rust – PST 17	1984–2005	Pullman, WA	24,662
Stripe Rust – PST 20	1984–95	Pullman, WA	12,508
Stripe Rust – PST 25	1984–95	Pullman, WA	1,682
Stripe Rust – PST 27	1984–95	Pullman, WA	14,511
Stripe Rust – PST 29	1984–95	Pullman, WA	14,259
Stripe Rust – PST 37	1984–2005	Pullman, WA	17,252
Stripe Rust – PST 43	1984–2005	Pullman, WA	16,285
Stripe Rust – PST 45	1984–2005	Pullman, WA	17,217
Stripe Rust – PST 78	2000–05	Pullman, WA	4,277
Stripe Rust – PST 80	2004–05	Pullman, WA	2,998
Stripe Rust – PST 100	2004–05	Pullman, WA	5,892
Stem Rust – Adult	1987–94	Rosemount, MN	8,078
Stem Rust – Adult	1987–94	St. Paul, MN	19,141
Stem Rust – HJCS	1987–92	St. Paul, MN	4,342
Stem Rust – QFBS	1987–92	St. Paul, MN	8,639
Stem Rust – QSHS	1987–92	St. Paul, MN	4,455
Stem Rust – RHRS	1987–92	St. Paul, MN	4,312
Stem Rust – RTQQ	1987–92	St. Paul, MN	8,973
Stem Rust – TNMH	1987–92	St. Paul, MN	4,402
Stem Rust – TNMK	1987–92	St. Paul, MN	8,938
Stem Rust – HNLQ	1987–92	St. Paul, MN	4,705
Stem Rust – RKQS	1987–92	St. Paul, MN	4,682
Stem Rust – Genes	1987–92	St. Paul, MN	1,018
Common Bunt	1981–2004	Aberdeen, ID & Pendleton, OR	25,245
Dwarf Bunt	1978–2005	Aberdeen, ID	18,141
Stagonospora nodorum Blotch	1970-78	Bozeman, MT	8,095
Powdery Mildew	1996–2003	Kinston, NC	12,973
Fusarium Head Blight/Scab	1998–2002	Brookings, SD	4,084

Table 1 (continued). Wheat descriptors with data currently in GRIN (Febraury 2006).

Character	Years	Location	Accessions
INSECT DESCRIPTORS.			
Hessian Fly – B	1983–94	W. Lafayette, IN	449
Hessian Fly – C	1983–94	W. Lafayette, IN & Manhattan, KS	24,165
Hessian Fly – E	1983–94	W. Lafayette, IN & Manhattan, KS	24,149
Hessian Fly – GP	1983–94	W. Lafayette, IN & Manhattan, KS	14,441
Hessian Fly – L	1983–97	W. Lafayette, IN & Manhattan, KS	8,315
Russian Wheat Aphid – Biotype I	1988–95, 2005	Stillwater, OK & Ft. Collins, CO	41,161
Russian Wheat Aphid – Biotype II	2003–05	Ft. Collins, CO	7,902
Cereal Leaf Beetle	1963–70	Indiana, Michigan	16,347
AGRONOMIC, TAXONOMIC, AND QUALITY DESCRIPTORS.			
Growth Habit	1987–05	Aberdeen, ID	54,079
Lysine Content	1966–69	Lincoln, NE	10,367
Awn Color	1983–97	Aberdeen, ID & Maricopa, AZ	22,650
Awn Type	1983–97	Aberdeen, ID & Maricopa, AZ	26,561
Glume Color	1983–97	Aberdeen, ID & Maricopa, AZ	22,812
Glume Pubescence	1983–97	Aberdeen, ID & Maricopa, AZ	24,312
Heading Date	1983–94	Aberdeen, ID & Maricopa, AZ	18,365
Heading Date – related to check	1999–2004	Maricopa, AZ	46,831
Kernel Color	1983–94, 2005	Aberdeen, ID & Maricopa, AZ	21,876
Kernels/Spike	1983–94	Aberdeen, ID & Maricopa, AZ	3,666
Kernel Weight	1983–94, 2005	Aberdeen, ID & Maricopa, AZ	5,178
Leaf Pubescence	1983–94	Aberdeen, ID & Maricopa, AZ	20,888
Plant Height	1983–97	Aberdeen, ID & Maricopa, AZ	21,841
Plant Height – related to check	1999–2004	Maricopa, AZ	46,841
Rachis Length	1995	Maricopa, AZ	2,512
Shattering	1983–94	Aberdeen, ID & Maricopa, AZ	10,637
Spike Density	1983–98	Aberdeen, ID & Maricopa, AZ	15,823
Spikelets/Spike	1995	Maricopa, AZ	2,502
Spike Type	1983–97	Aberdeen, ID & Maricopa, AZ	15,551
Straw Breakage	1983–94	Aberdeen, ID & Maricopa, AZ	16,829
Straw Color	1983–97	Aberdeen, ID & Maricopa, AZ	24,142
Straw Lodging	1983–94	Aberdeen, ID & Maricopa, AZ	23,075

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PI Assignments in Triticum, Aegilops, Secale, and intergeneric hybrids, January 2005 – February 2006.

Passport and descriptor data for these new accessions can be found on the Germplasm Resources Information Network (GRIN): http://www.ars-grin.gov/npgs. Certain accessions may not be available from the National Small Grains Collection due to intellectual property rights, quarantine, or insufficient inventories. *Crop Science*-registered accessions are available by contacting the developers.

Table 2. PI assignments in *Triticum, Aegilops, Secale,* and intergeneric hybrids from January 2005–February 2006.

PI number	Taxon	Cultivar name or Identifcation number	Country	State/Province
636458	*Triticum aestivum*	Clear First	United States	Washington
636459	*Triticum aestivum* subsp. *compactum*	Mel	United States	Washington
636470	*Triticum aestivum* subsp. *aestivum*	AR910	United States	Arkansas
636471	*Triticum aestivum* subsp. *aestivum*	AR93005	United States	Arkansas
636498	*Triticum turgidum* subsp. *durum*	L092	United States	North Dakota
636499	*Triticum turgidum* subsp. *durum*	L252	United States	North Dakota
636500	*Triticum turgidum* subsp. *durum*	S99B33	United States	North Dakota
636501	*Triticum turgidum* subsp. *durum*	S99B34	United States	North Dakota
636689	*Secale cereale* subsp. *cereale*	AGS 104	United States	Florida
636690	*X TriticoSecale* sp.	Monarch	United States	Florida
636754	*Triticum aestivum*	McIntosh	United States	Georgia
637779	*Triticum aestivum* subsp. *aestivum*	Penawawa-X	United States	Washington
638512	*Triticum aestivum* subsp. *aestivum*	Hatcher	United States	Colorado
638521	*Triticum aestivum* subsp. *aestivum*	Wendy	United States	South Dakota
638535	*Triticum aestivum* subsp. *aestivum*	WA007975	United States	Washington
638536	*Triticum aestivum* subsp. *aestivum*	WA007995	United States	Washington
638537	*Triticum aestivum* subsp. *aestivum*	WA007998	United States	Washington
638554	*Triticum aestivum* subsp. *aestivum*	99CF 585	United States	Washington
638555	*Triticum aestivum* subsp. *aestivum*	99CF 587	United States	Washington
638556	*Triticum aestivum* subsp. *aestivum*	99CF 591	United States	Washington
638557	*Triticum aestivum* subsp. *aestivum*	99CF 597	United States	Washington
638558	*Triticum aestivum* subsp. *aestivum*	99CF 598	United States	Washington
638559	*Triticum aestivum* subsp. *aestivum*	99CF 589	United States	Washington
638560	*Triticum aestivum* subsp. *aestivum*	99CF 590	United States	Washington
638561	*Triticum aestivum* subsp. *aestivum*	99CF 593	United States	Washington
638562	*Triticum aestivum* subsp. *aestivum*	99CF 600	United States	Washington
638563	*Triticum aestivum* subsp. *aestivum*	99CF 604	United States	Washington
638564	*Triticum aestivum* subsp. *aestivum*	99CF 605	United States	Washington
638565	*Triticum aestivum* subsp. *aestivum*	99CF 611	United States	Washington
638566	*Triticum aestivum* subsp. *aestivum*	99CF 617	United States	Washington
638567	*Triticum aestivum* subsp. *aestivum*	99CF 623	United States	Washington
638568	*Triticum aestivum* subsp. *aestivum*	99CF 608	United States	Washington
638569	*Triticum aestivum* subsp. *aestivum*	99CF 615	United States	Washington
638570	*Triticum aestivum* subsp. *aestivum*	99CF 620	United States	Washington
638571	*Triticum aestivum* subsp. *aestivum*	99CF 621	United States	Washington
638572	*Triticum aestivum* subsp. *aestivum*	99CF 627	United States	Washington
638573	*Triticum aestivum* subsp. *aestivum*	99CF 630	United States	Washington
638574	*Triticum aestivum* subsp. *aestivum*	99CF 633	United States	Washington
638575	*Triticum aestivum* subsp. *aestivum*	99CF 634	United States	Washington
638576	*Triticum aestivum* subsp. *aestivum*	99CF 635	United States	Washington
638577	*Triticum aestivum* subsp. *aestivum*	02CF 124	United States	Washington
638578	*Triticum aestivum* subsp. *aestivum*	99CF 639	United States	Washington

Table 2 (continued). PI assignments in *Triticum, Aegilops, Secale,* and intergeneric hybrids from January 2005–February 2006.

PI number	Taxon	Cultivar name or Identifcation number	Country	State/Province
638579	*Triticum aestivum* subsp. *aestivum*	99CF 641	United States	Washington
638580	*Triticum aestivum* subsp. *aestivum*	99CF 642	United States	Washington
638581	*Triticum aestivum* subsp. *aestivum*	99CF 643	United States	Washington
638582	*Triticum aestivum* subsp. *aestivum*	99CF 645	United States	Washington
638583	*Triticum aestivum* subsp. *aestivum*	99CF 650	United States	Washington
638584	*Triticum aestivum* subsp. *aestivum*	99CF 656	United States	Washington
638585	*Triticum aestivum* subsp. *aestivum*	99CF 660	United States	Washington
638586	*Triticum aestivum* subsp. *aestivum*	99CF 663	United States	Washington
638587	*Triticum aestivum* subsp. *aestivum*	99CF 670	United States	Washington
638588	*Triticum aestivum* subsp. *aestivum*	99CF 653	United States	Washington
638589	*Triticum aestivum* subsp. *aestivum*	99CF 658	United States	Washington
638590	*Triticum aestivum* subsp. *aestivum*	99CF 665	United States	Washington
638591	*Triticum aestivum* subsp. *aestivum*	99CF 666	United States	Washington
638592	*Triticum aestivum* subsp. *aestivum*	99CF 671	United States	Washington
638620	*Triticum aestivum* subsp. *aestivum*	99CF 761	United States	Washington
638621	*Triticum aestivum* subsp. *aestivum*	99CF 776	United States	Washington
638622	*Triticum aestivum* subsp. *aestivum*	99CF 768	United States	Washington
638623	*Triticum aestivum* subsp. *aestivum*	99CF 769	United States	Washington
638624	*Triticum aestivum* subsp. *aestivum*	99CF 774	United States	Washington
638625	*Triticum aestivum* subsp. *aestivum*	99CF 765	United States	Washington
638626	*Triticum aestivum* subsp. *aestivum*	99CF 771	United States	Washington
638627	*Triticum aestivum* subsp. *aestivum*	99CF 772	United States	Washington
638628	*Triticum aestivum* subsp. *aestivum*	99CF 778	United States	Washington
638629	*Triticum aestivum* subsp. *aestivum*	99CF 779	United States	Washington
638630	*Triticum aestivum* subsp. *aestivum*	99CF 783	United States	Washington
638631	*Triticum aestivum* subsp. *aestivum*	99CF 784	United States	Washington
638632	*Triticum aestivum* subsp. *aestivum*	99CF 795	United States	Washington
638633	*Triticum aestivum* subsp. *aestivum*	99CF 796	United States	Washington
638634	*Triticum aestivum* subsp. *aestivum*	99CF 786	United States	Washington
638635	*Triticum aestivum* subsp. *aestivum*	99CF 788	United States	Washington
638636	*Triticum aestivum* subsp. *aestivum*	99CF 794	United States	Washington
638637	*Triticum aestivum* subsp. *aestivum*	99CF 798	United States	Washington
638638	*Triticum aestivum* subsp. *aestivum*	99CF 800	United States	Washington
638639	*Triticum aestivum* subsp. *aestivum*	99CF 802	United States	Washington
638640	*Triticum aestivum* subsp. *aestivum*	99CF 807	United States	Washington
638641	*Triticum aestivum* subsp. *aestivum*	99CF 814	United States	Washington
638642	*Triticum aestivum* subsp. *aestivum*	99CF 816	United States	Washington
638643	*Triticum aestivum* subsp. *aestivum*	99CF 806	United States	Washington
638644	*Triticum aestivum* subsp. *aestivum*	99CF 810	United States	Washington
638645	*Triticum aestivum* subsp. *aestivum*	99CF 817	United States	Washington
638646	*Triticum aestivum* subsp. *aestivum*	99CF 818	United States	Washington
638647	*Triticum aestivum* subsp. *aestivum*	99CF 822	United States	Washington
638648	*Triticum aestivum* subsp. *aestivum*	99CF 828	United States	Washington
638649	*Triticum aestivum* subsp. *aestivum*	99CF 834	United States	Washington
638650	*Triticum aestivum* subsp. *aestivum*	99CF 838	United States	Washington
638651	*Triticum aestivum* subsp. *aestivum*	99CF 840	United States	Washington
638652	*Triticum aestivum* subsp. *aestivum*	99CF 848	United States	Washington
638653	*Triticum aestivum* subsp. *aestivum*	99CF 830	United States	Washington
638654	*Triticum aestivum* subsp. *aestivum*	99CF 836	United States	Washington
638655	*Triticum aestivum* subsp. *aestivum*	99CF 844	United States	Washington

Table 2 (continued). PI assignments in *Triticum, Aegilops, Secale,* and intergeneric hybrids from January 2005–February 2006.

PI number	Taxon	Cultivar name or Identifcation number	Country	State/Province
638656	*Triticum aestivum* subsp. *aestivum*	99CF 851	United States	Washington
638697	*Triticum aestivum*	Nick	United States	Montana
638698	*Triticum turgidum* subsp. *durum*	Primo D'oro	United States	Montana
638715	*Triticum aestivum*	XW03R	United States	Indiana
638716	*Triticum aestivum*	XW03U	United States	Indiana
638717	*Triticum aestivum*	XW03X	United States	Indiana
638718	*Triticum aestivum*	YW03W	United States	Indiana
638726	*Triticum turgidum* subsp. *durum*	Desert King	United States	California
638738	*Triticum aestivum* subsp. *aestivum*	Yecora Rojo *Lr47*	United States	California
638739	*Triticum aestivum* subsp. *aestivum*	Kern Lr47	United States	California
638740	*Triticum aestivum* subsp. *aestivum*	Yecora Rojo *Yr36 Gpc-B1*	United States	California
638741	*Triticum turgidum* subsp. *durum*	UC1113 *Yr36 Gpc-B1*	United States	California
638742	*Triticum aestivum* subsp. *aestivum*	Anza *Lr37 Yr17 Sr38*	United States	California
638790	*Triticum aestivum* subsp. *aestivum*	Hallam	United States	Nebraska
639058	*Triticum aestivum* subsp. *aestivum*	99CF 386	United States	Washington
639059	*Triticum aestivum* subsp. *aestivum*	99CF 389	United States	Washington
639060	*Triticum aestivum* subsp. *aestivum*	99CF 397	United States	Washington
639061	*Triticum aestivum* subsp. *aestivum*	99CF 399	United States	Washington
639062	*Triticum aestivum* subsp. *aestivum*	99CF 405	United States	Washington
639063	*Triticum aestivum* subsp. *aestivum*	99CF 390	United States	Washington
639064	*Triticum aestivum* subsp. *aestivum*	99CF 394	United States	Washington
639065	*Triticum aestivum* subsp. *aestivum*	99CF 400	United States	Washington
639066	*Triticum aestivum* subsp. *aestivum*	99CF 403	United States	Washington
639067	*Triticum aestivum* subsp. *aestivum*	99CF 407	United States	Washington
639068	*Triticum aestivum* subsp. *aestivum*	99CF 411	United States	Washington
639069	*Triticum aestivum* subsp. *aestivum*	99CF 412	United States	Washington
639070	*Triticum aestivum* subsp. *aestivum*	99CF 419	United States	Washington
639071	*Triticum aestivum* subsp. *aestivum*	99CF 427	United States	Washington
639072	*Triticum aestivum* subsp. *aestivum*	99CF 433	United States	Washington
639073	*Triticum aestivum* subsp. *aestivum*	99CF 415	United States	Washington
639074	*Triticum aestivum* subsp. *aestivum*	99CF 417	United States	Washington
639075	*Triticum aestivum* subsp. *aestivum*	99CF 425	United States	Washington
639076	*Triticum aestivum* subsp. *aestivum*	99CF 431	United States	Washington
639077	*Triticum aestivum* subsp. *aestivum*	99CF 438	United States	Washington
639078	*Triticum aestivum* subsp. *aestivum*	99CF 443	United States	Washington
639079	*Triticum aestivum* subsp. *aestivum*	99CF 449	United States	Washington
639080	*Triticum aestivum* subsp. *aestivum*	99CF 457	United States	Washington
639081	*Triticum aestivum* subsp. *aestivum*	99CF 459	United States	Washington
639082	*Triticum aestivum* subsp. *aestivum*	99CF 465	United States	Washington
639083	*Triticum aestivum* subsp. *aestivum*	99CF 448	United States	Washington
639084	*Triticum aestivum* subsp. *aestivum*	99CF 455	United States	Washington
639085	*Triticum aestivum* subsp. *aestivum*	99CF 460	United States	Washington
639086	*Triticum aestivum* subsp. *aestivum*	99CF 462	United States	Washington
639087	*Triticum aestivum* subsp. *aestivum*	99CF 468	United States	Washington
639088	*Triticum aestivum* subsp. *aestivum*	99CF 470	United States	Washington
639089	*Triticum aestivum* subsp. *aestivum*	99CF 472	United States	Washington
639090	*Triticum aestivum* subsp. *aestivum*	99CF 473	United States	Washington
639091	*Triticum aestivum* subsp. *aestivum*	99CF 484	United States	Washington
639092	*Triticum aestivum* subsp. *aestivum*	99CF 485	United States	Washington
639093	*Triticum aestivum* subsp. *aestivum*	99CF 471	United States	Washington

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PI number	Taxon	Cultivar name or Identifcation number	Country	State/Province
639094	*Triticum aestivum* subsp. *aestivum*	99CF 475	United States	Washington
639095	*Triticum aestivum* subsp. *aestivum*	99CF 477	United States	Washington
639096	*Triticum aestivum* subsp. *aestivum*	99CF 488	United States	Washington
639097	*Triticum aestivum* subsp. *aestivum*	99CF 489	United States	Washington
639098	*X TriticoSecale* sp.	KT941276pb003	United States	Oregon
639099	*X TriticoSecale* sp.	KT941256h003	United States	Oregon
639100	X Triticos*ecale* sp.	KT941256h3063	United States	Oregon
639101	X Triticos*ecale* sp.	KT941256h3066	United States	Oregon
639102	X Triticos*ecale* sp.	KT941312SA018	United States	Oregon
639103	X Triticos*ecale* sp.	KT941312SA024	United States	Oregon
639104	X Triticos*ecale* sp.	KT010127P2020	United States	Oregon
639105	X Triticos*ecale* sp.	KT010130CB001	United States	Oregon
639106	*Triticum aestivum* subsp. *aestivum*	KW9043	United States	Oregon
639107	*Triticum aestivum* subsp. *aestivum*	KW981718h0024	United States	Oregon
639108	*Triticum aestivum* subsp. *aestivum*	KW960190-CB2B	United States	Oregon
639177	*Triticum aestivum* subsp. *aestivum*	ND 652	United States	North Dakota
639227	*Triticum aestivum*	Branson	United States	Colorado
639228	*Triticum aestivum*	Panola	United States	Colorado
639229	*Triticum aestivum*	Myers	United States	Colorado
639230	*Triticum aestivum*	AP603 CL	United States	Colorado
639231	*Triticum aestivum*	Fannin	United States	Texas
639232	*Triticum aestivum* subsp. *aestivum*	Deliver	United States	Oklahoma
639233	*Triticum aestivum* subsp. *aestivum*	Endurance	United States	Oklahoma
639242	*Triticum aestivum*	Coker 9436	United States	Minnesota
639273	*Triticum aestivum* subsp. *aestivum*	Glenn	United States	North Dakota
639286	*Aegilops cylindrica*	K2003-1	Kazakhstan	
639289	*Triticum aestivum* subsp. *aestivum*	K2003-8	Kazakhstan	
639290	*Triticum turgidum* subsp. *durum*	K2003-9	Kazakhstan	
639293	*Aegilops cylindrica*	K2003-13	Kazakhstan	
639294	*Aegilops cylindrica*	K2003-15	Kazakhstan	
639295	*Triticum aestivum* subsp. *aestivum*	K2003-32	Kazakhstan	
639301	*Aegilops cylindrica*	K2003-51	Kazakhstan	
639302	*Aegilops cylindrica*	K2003-52	Kazakhstan	
639303	*Triticum aestivum* subsp. *aestivum*	K2003-55	Kazakhstan	
639304	*Triticum aestivum* subsp. *aestivum*	K2003-65	Kazakhstan	
639306	*Triticum aestivum* subsp. *aestivum*	K2003-79	Kazakhstan	
639307	*Triticum aestivum* subsp. *aestivum*	K2003-82	Kazakhstan	
639308	*Triticum aestivum* subsp. *aestivum*	K2003-87	Kazakhstan	
639310	*Triticum aestivum* subsp. *aestivum*	K2003-93	Kazakhstan	
639311	*Triticum aestivum* subsp. *aestivum*	K2003-107	Kazakhstan	
639312	*Triticum aestivum* subsp. *aestivum*	K2003-108	Kazakhstan	
639313	*Aegilops triuncialis*	TJK03-2	Tajikistan	
639314	*Triticum aestivum* subsp. *aestivum*	TJK03-4	Tajikistan	
639315	*Triticum aestivum* subsp. *aestivum*	TJK03-7	Tajikistan	
639316	*Aegilops triuncialis*	TJK03-8	Tajikistan	
639317	*Aegilops cylindrica*	TJK03-9	Tajikistan	
639318	*Triticum aestivum* subsp. *aestivum*	TJK03-17	Tajikistan	
639319	*Triticum aestivum* subsp. *aestivum*	TJK03-20	Tajikistan	
639321	*Triticum aestivum* subsp. *aestivum*	TJK03-26	Tajikistan	
639322	*Triticum aestivum* subsp. *aestivum*	TJK03-31	Tajikistan	

Table 2 (continued). PI assignments in *Triticum, Aegilops, Secale,* and intergeneric hybrids from January 2005–February 2006.

PI number	Taxon	Cultivar name or Identifcation number	Country	State/Province
639323	*Triticum aestivum* subsp. *aestivum*	TJK03-36	Tajikistan	
639324	*Aegilops cylindrica*	TJK03-37	Tajikistan	
639325	*Triticum aestivum* subsp. *aestivum*	TJK03-39	Tajikistan	
639326	*Triticum aestivum* subsp. *aestivum*	TJK03-45	Tajikistan	
639327	*Triticum aestivum* subsp. *aestivum*	TJK03-46	Tajikistan	
639328	*Secale cereale* subsp. *cereale*	TJK03-47	Tajikistan	
639330	*Triticum aestivum* subsp. *aestivum*	TJK03-57	Tajikistan	
639331	*Triticum aestivum* subsp. *aestivum*	TJK03-58	Tajikistan	
639332	*Aegilops cylindrica*	TJK03-59	Tajikistan	
639333	*Triticum aestivum* subsp. *aestivum*	TJK03-64	Tajikistan	
639334	*Secale cereale* subsp. *cereale*	TJK03-68	Tajikistan	
639336	*Secale cereale* subsp. *cereale*	TJK03-83	Tajikistan	
639337	*Secale cereale* subsp. *cereale*	TJK03-89	Tajikistan	
639338	*Triticum aestivum* subsp. *aestivum*	TJK03-90	Tajikistan	
639339	*Triticum aestivum* subsp. *aestivum*	TJK03-91	Tajikistan	
639340	*Triticum aestivum* subsp. *aestivum*	TJK03-93	Tajikistan	
639342	*Triticum aestivum* subsp. *aestivum*	TJK03-100	Tajikistan	
639348	*Triticum aestivum* subsp. *aestivum*	TJK03-116	Tajikistan	
639349	*Triticum aestivum* subsp. *aestivum*	TJK03-123	Tajikistan	
639350	*Triticum aestivum* subsp. *aestivum*	TJK03-124	Tajikistan	
639352	*Triticum aestivum* subsp. *aestivum*	TJK03-126	Tajikistan	
639353	*Secale cereale* subsp. *cereale*	TJK03-127	Tajikistan	
639354	*Triticum aestivum* subsp. *aestivum*	TJK03-128	Tajikistan	
639355	*Triticum aestivum* subsp. *aestivum*	TJK03-129	Tajikistan	
639356	*Secale cereale* subsp. *cereale*	TJK03-136	Tajikistan	
639358	*Triticum aestivum* subsp. *aestivum*	TJK03-139	Tajikistan	
639359	*Triticum aestivum* subsp. *aestivum*	TJK03-140	Tajikistan	
639360	*Triticum aestivum* subsp. *aestivum*	TJK03-141	Tajikistan	
639361	*Triticum aestivum* subsp. *aestivum*	TJK03-148	Tajikistan	
639362	*Triticum aestivum* subsp. *aestivum*	TJK03-149	Tajikistan	
639363	*Triticum aestivum* subsp. *aestivum*	TJK03-150	Tajikistan	
639364	*Triticum aestivum* subsp. *aestivum*	TJK03-151	Tajikistan	
639366	*Secale cereale* subsp. *cereale*	TJK03-154	Tajikistan	
639367	*Triticum aestivum* subsp. *aestivum*	TJK03-155	Tajikistan	
639369	*Triticum aestivum* subsp. *aestivum*	TJK03-163	Tajikistan	
639370	*Triticum aestivum* subsp. *aestivum*	TJK03-164	Tajikistan	
639372	*Secale cereale* subsp. *cereale*	TJK03-166	Tajikistan	
639374	*Triticum aestivum* subsp. *aestivum*	TJK03-172	Tajikistan	
639375	*Triticum aestivum* subsp. *aestivum*	TJK03-173	Tajikistan	
639376	Secale cereale subsp. cereale	TJK03-174	Tajikistan	
639377	*Triticum aestivum* subsp. *aestivum*	TJK03-183	Tajikistan	
639378	*Triticum aestivum* subsp. *aestivum*	TJK03-184	Tajikistan	
639379	*Secale cereale* subsp. *cereale*	TJK03-185	Tajikistan	
639380	*Triticum aestivum* subsp. *aestivum*	TJK03-189	Tajikistan	
639381	*Triticum aestivum* subsp. *aestivum*	TJK03-190	Tajikistan	
639382	*Triticum aestivum* subsp. *aestivum*	TJK03-191	Tajikistan	
639383	*Secale cereale* subsp. *cereale*	TJK03-192	Tajikistan	
639384	*Triticum aestivum* subsp. *aestivum*	TJK03-193	Tajikistan	
639385	*Triticum aestivum* subsp. *aestivum*	TJK03-194	Tajikistan	
639386	*Triticum aestivum* subsp. *aestivum*	TJK03-195	Tajikistan	

Table 2 (continued). PI assignments in *Triticum, Aegilops, Secale,* and intergeneric hybrids from January 2005–February 2006.

PI number	Taxon	Cultivar name or Identifcation number	Country	State/Province
639387	*Triticum aestivum* subsp. *aestivum*	TJK03-196	Tajikistan	
639389	*Triticum aestivum* subsp. *aestivum*	TJK03-200	Tajikistan	
639390	*Triticum aestivum* subsp. *aestivum*	TJK03-209	Tajikistan	
639391	*Triticum aestivum* subsp. *aestivum*	TJK03-210	Tajikistan	
639392	*Triticum aestivum* subsp. *aestivum*	TJK03-211	Tajikistan	
639393	*Secale cereale* subsp. *cereale*	TJK03-212	Tajikistan	
639394	*Triticum aestivum* subsp. *aestivum*	TJK03-218	Tajikistan	
639397	*Triticum aestivum* subsp. *aestivum*	TJK03-225	Tajikistan	
639398	*Triticum aestivum* subsp. *aestivum*	TJK03-226	Tajikistan	
639399	*Triticum aestivum* subsp. *aestivum*	TJK03-227	Tajikistan	
639401	*Triticum aestivum* subsp. *aestivum*	TJK03-234	Tajikistan	
639402	*Secale cereale* subsp. *cereale*	TJK03-237	Tajikistan	
639405	*Triticum aestivum* subsp. *aestivum*	TJK03-260	Tajikistan	
639408	*Triticum aestivum* subsp. *aestivum*	TJK03-280	Tajikistan	
639409	*Secale cereale* subsp. *cereale*	TJK03-281	Tajikistan	
639410	*Triticum aestivum* subsp. *aestivum*	TJK03-282	Tajikistan	
639411	*Triticum aestivum* subsp. *aestivum*	TJK03-283	Tajikistan	
639413	*Triticum aestivum* subsp. *aestivum*	TJK03-285	Tajikistan	
639414	*Triticum aestivum* subsp. *aestivum*	TJK03-286	Tajikistan	
639416	*Triticum aestivum* subsp. *aestivum*	TJK03-295	Tajikistan	
639417	*Triticum aestivum* subsp. *aestivum*	TJK03-296	Tajikistan	
639418	*Secale cereale* subsp. *cereale*	TJK03-297	Tajikistan	
639419	*Triticum aestivum* subsp. *aestivum*	TJK03-305	Tajikistan	
639420	*Triticum aestivum* subsp. *aestivum*	TJK03-306	Tajikistan	
639421	*Triticum aestivum* subsp. *aestivum*	TJK03-308	Tajikistan	
639424	*Triticum aestivum* subsp. *aestivum*	TJK03-311	Tajikistan	
639426	*Triticum aestivum* subsp. *aestivum*	TJK03-321	Tajikistan	
639427	*Triticum aestivum* subsp. *aestivum*	TJK03-323	Tajikistan	
639428	*Secale cereale* subsp. *cereale*	TJK03-324	Tajikistan	
639429	*Triticum aestivum* subsp. *aestivum*	TJK03-325	Tajikistan	
639430	*Triticum aestivum* subsp. *aestivum*	TJK03-337	Tajikistan	
639431	*Triticum aestivum* subsp. *aestivum*	TJK03-338	Tajikistan	
639432	*Triticum aestivum* subsp. *aestivum*	TJK03-341	Tajikistan	
639433	*Triticum aestivum* subsp. *aestivum*	TJK03-343	Tajikistan	
639435	*Triticum aestivum* subsp. *aestivum*	TJK03-351	Tajikistan	
639436	*Triticum aestivum* subsp. *aestivum*	TJK03-352	Tajikistan	
639437	*Triticum aestivum* subsp. *aestivum*	TJK03-362	Tajikistan	
639438	*Triticum aestivum* subsp. *aestivum*	TJK03-363	Tajikistan	
639439	*Secale cereale* subsp. *cereale*	TJK03-367	Tajikistan	
639441	*Triticum aestivum* subsp. *aestivum*	TJK03-369	Tajikistan	
639442	*Triticum aestivum* subsp. *aestivum*	TJK03-370	Tajikistan	
639443	*Triticum aestivum* subsp. *aestivum*	TJK03-371	Tajikistan	
639445	*Triticum aestivum* subsp. *aestivum*	TJK03-377	Tajikistan	
639447	*Triticum aestivum* subsp. *aestivum*	Altaiskaya 325	Russia	Altay
639448	*Triticum aestivum* subsp. *aestivum*	Karagandinskaya 21	Kazakhstan	Qaraghandy
639450	*Triticum aestivum* subsp. *aestivum*	Altaiskaya Stepnaya	Russia	Altay
639451	*Triticum aestivum* subsp. *aestivum*	Samal	Kazakhstan	
639452	*Triticum aestivum* subsp. *aestivum*	Zhenis	Kazakhstan	
639453	*Triticum aestivum* subsp. *aestivum*	Kutulukskaya	Russia	Samara
639454	*Triticum aestivum* subsp. *aestivum*	Dauyl	Kazakhstan	

Table 2 (continued). PI assignments in *Triticum, Aegilops, Secale,* and intergeneric hybrids from January 2005–February 2006.

PI number	Taxon	Cultivar name or Identifcation number	Country	State/Province
639455	*Triticum aestivum* subsp. *aestivum*	Altaiskaya 100	Russia	Altay
639456	*Triticum aestivum* subsp. *aestivum*	Lutescens 521	Russia	Buryatia
639457	*Triticum aestivum* subsp. *aestivum*	Kontegirskaya	Kazakhstan	
639458	*Triticum aestivum* subsp. *aestivum*	Karabalykskaya 92	Kazakhstan	Qostanay
639459	*Triticum aestivum* subsp. *aestivum*	Avangard	Kazakhstan	
639460	*Triticum aestivum* subsp. *aestivum*	Vera	Kazakhstan	
639462	*Triticum aestivum* subsp. *aestivum*	Tselinnaya	Kazakhstan	Qostanay
639463	*Triticum aestivum* subsp. *aestivum*	Akmola 40	Kazakhstan	Aqmola
639464	*Triticum aestivum* subsp. *aestivum*	Lutescens 7/87A	Kazakhstan	
639465	*Triticum aestivum* subsp. *aestivum*	Sibirskaya 122	Russia	
639466	*Triticum aestivum* subsp. *aestivum*	Sibirskaya 119	Russia	
639467	*Triticum aestivum* subsp. *aestivum*	Omskaya 28	Russia	Omsk
639468	*Triticum aestivum* subsp. *aestivum*	Lutescens 300/89-45	Kazakhstan	
639469	*Triticum aestivum* subsp. *aestivum*	Dostyk	Kazakhstan	
639470	*Triticum aestivum* subsp. *aestivum*	Sibinka	Russia	Novosibirsk
639471	*Triticum turgidum* subsp. *durum*	Omskaya Yantarnaya	Russia	Omsk
639472	*Triticum aestivum* subsp. *aestivum*	Omskaya 33	Russia	Omsk
639473	*Triticum aestivum* subsp. *aestivum*	Omskaya 29	Russia	Omsk
639474	*Triticum aestivum* subsp. *aestivum*	Omskaya 31	Russia	Omsk
639475	*Triticum aestivum* subsp. *aestivum*	Omskaya 24	Russia	Omsk
639476	*Triticum aestivum* subsp. *aestivum*	Omskaya 17	Russia	Omsk
639477	*Triticum aestivum* subsp. *aestivum*	Ulbinka 25 Tychnaya	Kazakhstan	
639478	*Triticum aestivum* subsp. *aestivum*	Ulbinka 25	Kazakhstan	
639479	*Triticum aestivum* subsp. *aestivum*	Korund	Russia	Krasnodar
639480	*Triticum aestivum* subsp. *aestivum*	Karand 70	Kazakhstan	
639481	*Triticum aestivum* subsp. *aestivum*	Androgen 2R3-2	Kazakhstan	
639482	*Triticum aestivum* subsp. *aestivum*	Altai	Russia	Altay
639483	*Triticum aestivum* subsp. *aestivum*	Altaiskaya 98	Russia	Altay
639484	*Triticum aestivum* subsp. *aestivum*	Altaiskaya 60	Russia	Altay
639485	*Triticum aestivum* subsp. *aestivum*	Altaiskaya 92	Russia	Altay
639486	*Triticum aestivum* subsp. *aestivum*	Altaiskaya 50	Russia	Altay
639487	*Triticum aestivum* subsp. *aestivum*	Tselinnaya 26	Kazakhstan	
639488	*Triticum aestivum* subsp. *aestivum*	Bagrationovskaya	Russia	Novosibirsk
639489	*Triticum aestivum* subsp. *aestivum*	Bulava	Russia	Novosibirsk
639490	*Triticum aestivum* subsp. *aestivum*	Kutumskaya	Kazakhstan	
639491	*Triticum aestivum* subsp. *aestivum*	Komsomolskaya 56	Kazakhstan	Qostanay
639492	*Triticum aestivum* subsp. *aestivum*	Lutescens 720/556/84	Kazakhstan	
639493	*Triticum aestivum* subsp. *aestivum*	Lutescens 308/89	Kazakhstan	
639494	*Triticum aestivum* subsp. *aestivum*	Lutescens 88/28	Kazakhstan	
639495	*Triticum aestivum* subsp. *aestivum*	Lutescens 767/165	Kazakhstan	
639506	*Triticum aestivum*	MPV 57	United States	Virginia
639507	*Triticum aestivum*	Rachel	United States	Virginia
639687	*Triticum aestivum*	Oropos	Greece	
639697	*Triticum turgidum* subsp. *durum*	ELS 6404-93	Ethiopia	Harer
639698	*Triticum turgidum* subsp. *durum*	MG 27027	Greece	
639699	*Triticum turgidum* subsp. *durum*	MG 27054	Greece	
639700	*Triticum turgidum* subsp. *durum*	MG 27063	Greece	
639701	*Triticumturgidum* subsp. *durum*	MG 27071	Greece	
639724	*Triticum aestivum* subsp. *aestivum*	Choptank	United States	Maryland
639729	*Triticum aestivum* subsp. *aestivum*	ND 735	United States	North Dakota

Table 2 (continued). PI assignments in *Triticum, Aegilops, Secale,* and intergeneric hybrids from January 2005–February 2006.

PI number	Taxon	Cultivar name or Identifcation number	Country	State/Province
639730	*X Aegilo* sp.	SW8	United States	North Dakota
639731	*X Aegilo* sp.	SW34	United States	North Dakota
639732	*X Aegilo* sp.	SW39	United States	North Dakota
639736	*Triticum aestivum*	Rjames	United States	Washington
639737	*Triticum aestivum*	George	United States	Washington
639738	*Triticum aestivum*	HBK 3266	United States	Kansas
639739	*Triticum aestivum*	Neosho	United States	Missouri
639869	*Triticum turgidum* subsp. *durum*	Rusty	United States	North Dakota
639877	*Triticum turgidum* subsp. *durum*	N02Y3003	United States	Nebraska
639878	*Triticum turgidum* subsp. *durum*	N02Y3005	United States	Nebraska
639879	*Triticum turgidum* subsp. *durum*	N02Y3009	United States	Nebraska
639880	*Triticum turgidum* subsp. *durum*	N02Y3012	United States	Nebraska
639881	*Triticum turgidum* subsp. *durum*	N02Y3014	United States	Nebraska
639882	*Triticum turgidum* subsp. *durum*	N02Y3015	United States	Nebraska
639883	*Triticum turgidum* subsp. *durum*	N02Y3021	United States	Nebraska
639884	*Triticum turgidum* subsp. *durum*	N02Y3022	United States	Nebraska
639886	*Triticum turgidum* subsp. *durum*	UCRD05-1	United States	California
639887	*Triticum turgidum* subsp. *durum*	UCRD05-2	United States	California
639888	*Triticum turgidum* subsp. *durum*	UCRD05-3	United States	California
639907	*Triticum aestivum*	MSU D8006	United States	Michigan
639921	*Triticum aestivum* subsp. *aestivum*	Ulen	United States	Minnesota
639922	*Triticum aestivum* subsp. *aestivum*	Infinity CL	United States	Nebraska
639923	*Triticum aestivum* subsp. *aestivum*	Protection	United States	Colorado
639924	*Triticum aestivum* subsp. *aestivum*	Bond CL	United States	Colorado
639951	*Triticum aestivum* subsp. *aestivum*	Juniper	United States	Idaho
639952	*Triticum aestivum* subsp. *aestivum*	Lochsa	United States	Idaho
639953	*Triticum aestivum* subsp. *aestivum*	UI Darwin	United States	Idaho
640424	*Triticum aestivum* subsp. *aestivum*	Genou	United States	Montana
640425	*Triticum aestivum* subsp. *aestivum*	Paul	United States	Montana
640426	*Triticum aestivum* subsp. *aestivum*	SRS05049	United States	Washington
640427	*Triticum aestivum* subsp. *aestivum*	SRS05189	United States	Washington
640428	*Triticum aestivum* subsp. *aestivum*	SRS05192	United States	Washington
640429	*Triticum aestivum* subsp. *aestivum*	SRW05554	United States	Washington
640430	*Triticum aestivum* subsp. *aestivum*	SRW05611	United States	Washington
640431	*Triticum aestivum* subsp. *aestivum*	SRW05619	United States	Washington
641164	*Triticum aestivum* subsp. *aestivum*	W14	China	Jiangsu
641165	*Triticum aestivum* subsp. *aestivum*	CJ 9306	China	Jiangsu
641166	*Triticum aestivum* subsp. *aestivum*	CJ 9311	China	Jiangsu
641167	*Triticum aestivum* subsp. *aestivum*	CJ 9403	China	Jiangsu
641168	*Triticum aestivum* subsp. *aestivum*	CJ 9815	China	Jiangsu
641220	*Triticum aestivum* subsp. *aestivum*	RCATL33	Canada	Ontario
641221	*Triticum aestivum* subsp. *aestivum*	MT1159CL	United States	Montana
641222	*Triticum turgidum* subsp. *durum*	Commander	Canada	Saskatchewan
641729	*Triticum aestivum* subsp. *aestivum*	SSL 1-5	United States	Indiana
641730	*Triticum aestivum* subsp. *aestivum*	SSL 6-9	United States	Indiana
641731	*Triticum aestivum* subsp. *aestivum*	SSL 10-11	United States	Indiana
641732	*Triticum aestivum* subsp. *aestivum*	SSL 12	United States	Indiana
641733	*Triticum aestivum* subsp. *aestivum*	SSL 13-16	United States	Indiana
641734	*Triticum aestivum* subsp. *aestivum*	SSL 17-18	United States	Indiana
641735	*Triticum aestivum* subsp. *aestivum*	SSL 19-24	United States	Indiana

Table 2 (continued). PI assignments in *Triticum, Aegilops, Secale,* and intergeneric hybrids from January 2005–February 2006.

PI number	Taxon	Cultivar name or Identifcation number	Country	State/Province
641223	*Triticum turgidum* subsp. *durum*	Strongfield	Canada	Saskatchewan
641736	*Triticum aestivum* subsp. *aestivum*	SSL 21-22	United States	Indiana
641737	*Triticum aestivum* subsp. *aestivum*	SSL 25-26	United States	Indiana
641738	*Triticum aestivum* subsp. *aestivum*	SSL 27-28	United States	Indiana
641739	*Triticum aestivum* subsp. *aestivum*	SSL 29-32	United States	Indiana
641740	*Triticum aestivum* subsp. *aestivum*	SSL 33-36	United States	Indiana
641741	*Triticum aestivum* subsp. *aestivum*	SSL 37-42	United States	Indiana
641742	*Triticum aestivum* subsp. *aestivum*	SSL 39-40	United States	Indiana
641743	*Triticum aestivum* subsp. *aestivum*	SSL 43-44	United States	Indiana
641744	*Triticum aestivum* subsp. *aestivum*	SSL 45-47	United States	Indiana
641745	*Triticum aestivum* subsp. *aestivum*	SSL 46-50	United States	Indiana
641746	*Triticum aestivum* subsp. *aestivum*	SSL 51	United States	Indiana
641747	*Triticum aestivum* subsp. *aestivum*	SSL 52-53	United States	Indiana
641748	*Triticum aestivum* subsp. *aestivum*	SSL 54-55	United States	Indiana
641749	*Triticum aestivum* subsp. *aestivum*	SSL 56-57	United States	Indiana
641750	*Triticum aestivum* subsp. *aestivum*	SSL 58-61	United States	Indiana
641751	*Triticum aestivum* subsp. *aestivum*	SSL 62-63	United States	Indiana
641752	*Triticum aestivum* subsp. *aestivum*	SSL 64-65	United States	Indiana
641753	*Triticum aestivum* subsp. *aestivum*	SSL 66-69	United States	Indiana
641754	*Triticum aestivum* subsp. *aestivum*	SSL 67-68	United States	Indiana
641755	*Triticum aestivum* subsp. *aestivum*	SSL 70-73	United States	Indiana
641756	*Triticum aestivum* subsp. *aestivum*	SSL 74-77	United States	Indiana
641757	*Triticum aestivum* subsp. *aestivum*	SSL 78-81	United States	Indiana
641758	*Triticum aestivum* subsp. *aestivum*	SSL 82-83	United States	Indiana
641759	*Triticum aestivum* subsp. *aestivum*	SSL 84-85	United States	Indiana
641760	*Triticum aestivum* subsp. *aestivum*	SSL 87-88	United States	Indiana
641761	*Triticum aestivum* subsp. *aestivum*	SSL 89-90	United States	Indiana
641762	*Triticum aestivum* subsp. *aestivum*	SSL 91-94	United States	Indiana
641763	*Triticum aestivum* subsp. *aestivum*	SSL 92-96	United States	Indiana
641764	*Triticum aestivum* subsp. *aestivum*	SSL 97	United States	Indiana
641765	*Triticum aestivum* subsp. *aestivum*	SSL 98-102	United States	Indiana
641772	*Triticum aestivum* subsp. *aestivum*	Santa Fe	United States	Montana
641778	*Triticum aestivum* subsp. *aestivum*	3706	United States	Virginia
641786	*Triticum aestivum* subsp. *aestivum*	ORSS-1757	United States	Oregon
641787	*Triticum aestivum* subsp. *aestivum*	ORCF-102	United States	Oregon
641801	*X Triticosecale* sp.	TAMcale 5019	United States	Texas
641802	*X Triticosecale* sp.	TAMcale 6331	United States	Texas
641952	*Triticum aestivum* subsp. *aestivum*	Allegiance	United States	Kentucky
641961	*Triticum aestivum* subsp. *aestivum*	Elissavet	Greece	

V. CATALOGUE OF GENE SYMBOLS FOR WHEAT: 2006 SUPPLEMENT

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The most recent edition of the Catalogue, produced and presented at the 10th International Wheat Genetics Symposium is available on CD. MacGene was produced by Y. Yamazaki (yyamazak@lab.nig.ac.jp) in collaboration with R.A. McIntosh. The Catalogue and the 2004 Supplement are displayed on the GrainGenes Website: http://wheat.pw.usda.gov.

INTRODUCTION

Recommended Rules

9. Laboratory Designators

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Gene Symbol

Almt. Malate transporter (GeneBank AB081803).
Lv1. Loaf volume.
Vrt-2. Mads-box (GenBank DQ022679) {10294}.

DNA Markers

A number of previously unlisted chromosome 6A *Xgwm* markers (719 and above) are given in {0604}.

Group 5L

Add:
XPhyC-5A,B,D {10289}. PCCF2/PCCR1 clone.
The analysis of seven SNPs, of the differential presence of a MITE, and of a 12-bp deletion in the *PhyC-5A* locus in 81 wheat cultivars is described in {10288}.

1. Gross Morphology

Line 6. Change to: 4. Spelt and macha wheat *q c S-D1a* or *q C S-D1a* **v:** Spelt and macha groups (including *vavilovi*).

1.3. Sphaerococcum

S-D1b. **v:** *T. antiquorum* K-56397 & K-56398 {10234}.

4. Aluminium Tolerance

Alt2.

Add at end of section: Malate transporter *Almt-D1* gene (GeneBank AB081803) is completely linked to aluminum tolerance in chromosome arm 4DL between SSR markers *Xwmc48b* and *Xwmc331* in a similar region to *Alt2* {10285}. *Almt1* transgenic expression in barley conferred an Al-activated efflux of malate with properties sililar to those of Al-tolerant wheat {10285}.

QTL: Atlas 66 / Century: A QTL in the region *Xdgm125-4DL – Xwmc331-4DL* accounted for nearly 50 % of the phenotypic variation in root growth rate in hydroponic solution {10265}. An Al-activated malate transporter (*LMT1*) was earlier mapped to the same location {10266}.

5.3. Red/purple coleoptiles

Add to the end of the section:

The *Rc* gene appears to encode a transcription activator of late biosynthesis genes involved in the light regulation of anthocyanin synthesis (studies carried out on CS (Hope 7A) substitution line) {10317}.

9. Brittle Rachis

Insert note: Brittle rachis in *T. turgidum* subsp. *durum* was defined as a spike that disarticulated when the tip was bent by 45° relative to the peduncle {10242}.

Br-A1. […, *Br-A2* {10280}. **it:** ANW10A = LD222*7 / LDN–DIC DS 3A {10242}.
ma: *Xgwm2-3A* – 3 cM – *Br-A1* – 8 cM – *Xgwm666-3A.1*/*Xbarc356-3A*/*Xbarc19-3A*/*Xgwm674-3A*/*Xcfa2164-3A* {10280}.

Br-B1. […, *Br-A3* {10280}. **it:** ANW10B = LD222*7 / LDN–DIC DS 3B {10242}.
ma: *Xbarc218-3B* – 22 cM – *Br-B1* – 2 cM – *Xwmc-3B* {10280}.
tv: Senatore Cappelle PI 242646 {10242}; Sammartinara {10242}; others {10242}.

The presence of *Br-B1* in some durums apparently does not lead to significant shattering under conditions of Mediterranean agriculture {10242}.

Br-D1. **dv:** *Ae. tauschii* KU2126 10227}.
ma: In *Ae. tauschii*: *Br*^{t} – 19.7 cM – *Xgdm72-3D* {10227}.

17. Dormancy

Continue section: 'In cross Zen /CS': Insert as the second sentence: '*QPhs.ocs.3A-1* was localized to a 4.6 cM interval flanked by *Xbarc310-3A* and *Xbcd907-3A* {10245}.'

Add at end: *Qphs.ocs-4A.1* may be the same as a QTL in AC Domain / Haruyutaka due to tight linkage with *Xcdo785-4A* {10245}.

QPhs.ocs. 4B.1, a CS allele contributing to dormancy, was located in the region of *Xgwm495-4B* {10245}.
In cross SPR 8198 (dormant) / HD2329, *QPhs.occsu-3A* was located in the *Xgwm155-3A – Xwmc153-3A* region with R^2 = 75 % across six environments (10261).

QTL analyses in several crosses {10275} indicated a common region in chromosome 4A associated with dormancy; dormant genotypes included AUS1408, SW95-50213, and Halberd. The location was consistent with Japanese and U.K. work even though different flanking markers were involved.

19. Earliness per se

Eps-1A^{m}. Add to: **ma:** ……{0364}, within a 0.9-cM region within the *VAtpC* **–** *Smp* region {10246}.

QTL: Add: '*QEet.fcu.5AL* identified in *Xfcp359-5A – Xfcp231-5A* interval (R^2 = 0.38), at or near the *Q* locus in Grandin / BR34 {10256}. Grandin was the earlier parent.

20. Flowering time

Add at end of section:

Heading date QTL: CI 13227 / Suwon 92 RIL population: AFLP marker – 2.6 cM – *QHd.pser-2DS* – 121.1 cM – *Xgwm261-2D* {10269}. This QTL could be *Ppd-D1*{10269}.

Karl 92*2 / TA 4152-4 F_2:F_4 population: Two QTL, *QHd.ksu-2D,* associated with *Xgwm261-2D* (R^2 = 0.17), and *QHd.ksu-3D,* associated with *Xgwm161-2D* 9 (R^2) {10273}.

23. Frost Resistance

Fr-A2. **ma:** Insert the following sentence as the third sentence in the existing text: Eleven different *Cbf* transcription factors were identified at the *Fr-A2* locus {10302}.

24. Gametocidal Genes

24.1. Gametocidal activity

***Sd1*. ma:** Proximal to *Lr19* and distal to *Xpsr165-7D* {10255}.

***Sd2*.** Add note following the entry. 'Zhang et al. {10255} question the existence of this gene and alternatively suggest a duplication or deletion event influencing the transmission.'

26.2. Epistatic inhibitors of glaucousness

***Iw2*. ma:** In *Ae. tauschii: Iw2* – 30.1 cM – *Xgdm35-2DS* {10227}.

28. Grain Hardness / Endosperm Texture

Insert before the paragraph 'Using proteomic analysis….': Two QTL, *QHa.ksu-3B*, associated with *Xksum9-3B* (R^2 = 0.09, and *QHa.ksu-5D(Ha), associated with Xcfd-5D* (R^2 = 0.3), were identified in Karl*2 / TA 4152-4 {10273}.

29. Grain Quality parameters

29.7. Starch characteristics

Insert as the first sentence: The Isoamylase-1 gene from *Ae. tauschii* (*Iso-1*) complements the deficient rice sugary-1 mutant line {10295}.

29.8. Loaf volume

Lvl1 [{10312}]. *Lvl 1* {10312}. 3A {10312}. **v:** Cappelle Desprez*7 / Bezostaya 1 3A {10312}.
ma: *Xgwm720-3A* **–** *Lvl1* appeared to be located in the *Xgwm2-3A – Xgwm720-3A* region {10312}.

29.9 Dough rheological properties

QTL: In a Cranbrook / Halberd DH population, environmental factors were a major determinant of dough extensibility, whereas additive effects of alleles at the high and low molecular weight glutenin loci determined dough strength {10247}.

New Section: Growth rate and Early Vigour

QTL analyses in *Ae. tauschii*: chromosomes 1D, 4D, and 7D carried QTL for relative growth rate, biomass allocation, specific leaf area, leaf area ratio, and unit leaf rate. Chromosome 2D had QTL for rate and duration of leaf elongation, cell production rate, and cell length. Chromosome 5D harbored QTL for total leaf mass and area, number, and growth rate of leaves and tillers {10293}.

39. Height

39.2. Reduced height: GA sensitive

***Rht4*.** 2BL {10249}. **ma:** Associated with *Xwmc317-2B* {10249}.

***Rht5*.** 3BS {10249}. **ma:** Approximately 10cM from *Xbarc102-3B* {10249}.

***Rht8*.** **v:** Chuan Mai 18 {10249}.
ma: Close linkage with *Xwmc-2D* {10249}. A survey of Chinese cultivars showed 13 alleles of *Xgwm261-2D* {10284}.

***Rht9*.** Add: , 5AL {10249} **v:** Mercia 12 {10249}.
ma: Close linkage with *Xwmc410-4A* {10249}.

***Rht13*.** Add: , 7BS **ma:** Associated with *Xwms577-7B* {10249}.

39.3 Reduced height: QTL

QHt.fcu-4BL {10256}. **ma:** Associated with *Xbarc125-4B* (R^2 = 0.57) {10256}.
Reduced height allele in Grandin {10256}.

Qht.fcu-6AS {10256}. **ma:** Associated with *Xbarc23-6A – Xcp201-6A* (R^2 = 0.07) {10256}.
Reduced height allele in BR34 {10256}.

QHt.crc-4B {10287}. 4B {10287}. **ma:** Linked to *Rht-B1* (LOD 7.7) in RL4452 / AC Domain {10287}.
Associated with QTL for lodging and 1,000-kernel weight.

QHt.crc-4D {10287}. 4D {10287}. **ma:** Linked to *Rht-D1* (LOD 30.9) in RL4452 / AC Domain {10287}.
Associated with QTL for lodging, 1,000-kernel weight, yield, height, and test weight.

QHt.crc-2D {10287}. 2D {10287}. **ma:** Linked to BE497718-260 (LOD 4.2) in RL4452 / AC Domain {10287}.

QHt.crc-5B {10287}. 5B {10287}. **ma:** Linked to *Xwmc640-5B* (LOD 6.1) in RL4452 / AC Domain {10287}.

QHt.crc-7A {10287}. 7A {10287}. **ma:** Linked to *Xwmc139-7A* (LOD 3.3) in RL4452 / AC Domain {10287}.
QHt.crc-7B {10287}. 7B {10287}. **ma:** Linked to *Xgwm333-7B* (LOD 3.3) in RL4452 / AC Domain {10287}.

45. Leaf Tip Necrosis
Add to existing entry for *Ltn*.
Ltn1 {10281}. [*Ltn* {1361}]. **v2:** Parula *Ltn2* {10281}.
ma: Associated with *Xgwm295-7D* and *Xgwm130-7D* {10218}.
Ltn2 {10281}. **v:** 1B {10281}. Wheats with *Yr29/Lr46* {10281}. See *Yr29, Lr46*.
v2: Parula *Ltn1* {10281}.
ma: *Xwmc44-1B* – 1.4 cM – *Xbac24prot* – 9.5 cM – *Ltn2* – 2.9 cM – *Xbac17R . . . Xgwm140-1B* {10281}. *Xgwmc441B* – 3.6 cM – *Ltn2* – 2.1 cM – *XtG818/XBac17R . . . Xgwm140-1B* {10281}.
According to Messmer et al. {0031} LTN may be caused by several QTL and is affected by genetic background and environment.

46. Lodging
QLd.crc-3D {10287}. 3D {10287}. **ma:** Linked to *Xgwm191-3D* (LOD 3.7) in RL4452 / AC Domain {10287}.

New Section: Maturity time
QTL:
QMat.crc-3B {10287}. 3B {10287}. **ma:** Linked to *Xwmc231-3B* (LOD 3.0) in RL4452 / AC Domain {10287}.
QMat.crc-4A {10287}. 4A {10287}. **ma:** Linked to *Wx-B1* (LOD 6.1) in RL4452 / AC Domain {10287}.
QMat.crc-7D {10287}. 7D {10287}. **ma:** Linked to *Xgwm130-7D* (LOD 17.5) in RL4452 / AC Domain {10287}.

50. Meiotic Characters
50.2. Pairing homoeologous
Add note at end of *Ph1* section: A complex *Ph1* candidate structure comprising at least one 5B-specfic member of the *cdc2* complex multigenic cluster (involved in chromosome condensation), a unique repeat structure with similarities to repeats on chromosome 3B, and a heterochromatic sub-telomeric insertion from chromosome 3AL was identified {10240}.

57. Polyphenol Oxidase (PPO) Activity
Add after the first paragraph: STS marker PPO18 based on a polyphenol oxidase (*PPO*) gene (GenBank AY596268) was closely linked to SSR markers *Xgwm312* and *Xgwm294* on chromosome arm 2AL. PPO18 explained 28–43 % of the variation in PPO activity in the cross Zhongyou 9507 / CA9632 {10290}.

58. Red Grain Colour
R-B1. **ma:** *Xwmc29-3B* – 5 cM – *R-B1* – 5 cM – *Xbarc-3B* {10280}.

63. Response to Vernalization
Replace the existing material in this section with the following:
Vrn-1{1398}. [Synonymous with *TaVRT-1* {10019}]. Orthologous series in long arms of chromosomes of homoeologous group 5. *Vrn-1* is a MADS-box gene similar to Arabidopsis *APETALA1* {10014}. Spring types are associated with mutations in the promoter or the first intron {10014,10198,10202,10288}. Reduction of *Vrn-1* transcripts in transgenic hexaploid spring wheat delays flowering {10300}.

Vrn-2{1398}. Orthologous series in chromosomes of homoeologous group 4. *Vrn-A^{m}2* was located in *T. monococcum* subsp. *monococcum* {279} on chromosome 5A^m on the 4A^m translocated region. *Vrn-A^{m}2* was mapped to the distally located *Xwg114-5A – Xwec87-5A* region {0312}. *Vrn-H2* (*sh/sgh1*) occurs in barley chromosome 4H {1455} and is probably orthologous to *Vrn-A^{m}2* based on comparative maps {279,767}. *Vrn-2* is a zinc-finger / CCT domain transcription factor (*ZCCT1*) {10299} and repressor of flowering down-regulated by vernalization and short days {10301}. Reduction of *Vrn-2* transcripts in transgenic hexaploid winter wheat accelerates flowering {10299}.

Vrn-A2a {279}. Winter habit, dominant in diploid wheat {279}. **dv:** G1777 {279}; G3116 {279}.
Vrn-A2b {279}. Spring habit, recessive in diploid wheat. **dv:** DV92 {279}, PI355517, PI345242, PI352475, PI277137 {10299}.

Contains a nonfunctional mutation in the CCT domain {10299}.

Vrn-A2c {10299}. Spring habit, recessive in diploid wheat. **dv:** PI352484, PI323437, PI286068, PI591871, PI542474, PI428175, PI237659, PI221329, PI225164, PI377662, PI377648, PI362610 {10299}.

Complete deletion of the *ZCCT1* gene {10299}.

64. Restorers for Cytoplasmic Male sterility

64.1. Restorers for *T. timopheevii* subsp. timopheevii cytoplasm

***Rf3*.** Add: **v:** R18 {10222}; R9034 {10222}.
ma: Mapped as a QTL in the region *Xbarc207-1BS – Xgwm131-1BL – Xbarc61-1BL* in crosses R18 / ND36 and R9034 / ND36 {10222}.

Add note at end of section: Minor restorer effects were associated with *Xbarc330-5A* in R18 and *Xgdm130-7D* in R9034 {10222}. The relationships of these QTL with previously located restorers in chromosomes 5A {860} and 7D (*Rf2*) are unknown.

67. Segregation Distortion

Add introductory note: 'See also, 24. Gametocidal Genes'

69. Stem Solidness

Insert introductory statement: Solid stem, caused by increased pith in normally hollow stem regions, is associated with resistance to wheat stem sawfly, *Cephus cinctus*.

72. Tiller Inhibition

At end of section add note: A QTL of large effect on spike number per plant in a DH population of Fukuho-Komugi / Oligoculm mapping to the *Hg – Xpsp2999(Glu3)-1A* region {10218} probably corresponds to *Tin1*.

75. Yield Components

75.1. Grain weight

75.1.2. 1,000-grain weight

QGwt.crc-3D {10287}.	3D {10287}.	**ma:** Linked to *Xgwm341-3D – Xwmc552-3D* (LOD 4.3) in RL4452 / AC Domain {10287}.
QGwt.crc-4A {10287}.	4A {10287}.	**ma:** Linked to *Xgwm494 – Xgwm162* (LOD 6.7) in RL4452 / AC Domain {10287}.
QGwt.crc-6D {10287}.	6D {10287}.	**ma:** Linked to *Xgwm325-6D – Xgwm55-6D* (LOD 3.9) in RL4452 / AC Domain {10287}.

5.1.3. Test weight (New subsection)

QTL:

QTwt.crc-1B {10287}.	1B {10287}.	**ma:** Linked to *Xgwm374.1-1B* (LOD 3.9) in RL4452 / AC Domain {10287}.
QTwt.crc-1D {10287}.	1D {10287}.	**ma:** Linked to *Xgdm126-1D* (LOD 5.8) in RL4452 / AC Domain {10287}.
QTwt.crc-2D {10287}.	2D {10287}.	**ma:** Linked to *Xgwm349-2D – Xbarc59-2D* (LOD 5.2) in RL4452 / AC Domain {10287}.
QTwt.crc-3B {10287}.	3B {10287}.	**ma:** Linked to *Xwmc635-3B – Xbarc164-3B* (LOD 15.4) in RL4452 / AC Domain {10287}.
QTwt.crc-3D {10287}.	3D {10287}.	**ma:** Linked to *Xbarc71-3D* (LOD 5.2) in RL4452 / AC Domain {10287}.
QTwt.crc-5D {10287}.	5D {10287}.	**ma:** Linked to *Xgdm63-5D – Xwmc765-5D* (LOD 5.3) in RL4452 / AC Domain {10287}.

75.4. Grain yield

QYld.crc-2B {10287}.	2B {10287}.	**ma:** Linked to *Xgwm257-2B* (LOD 9.4) in RL4452 / AC Domain {10287}.
QYld.crc-4A {10287}.	4A {10287}.	**ma:** Linked to *Xgwm130-4A* (LOD 4.4) in RL4452 / AC Domain {10287}.
QYld.crc-2A {10287}.	2A {10287}.	**ma:** Linked to *Xgwm339-2A* (LOD 3.0) in RL4452 / AC Domain {10287}.

77. Proteins

77.1. Grain protein content

Insert following entry *Pro2*:

Gpc-B1b {10296}. *QGpc.ndsu-6Bb* {632,0071}, *Gpc-6B1* {10229}. 6BS. **ma:** Mapped to a 0.3 cM interval flanked by *Xucw79-6B and Xucw71-6B* {10229}. *Xcdo365-6B* – 1.5 cM - *Gpc-B1* – 1.2 cM – *Xucw67-6B* {10296}. A high-throughput codominant marker, *Xuhw89-6B,* was then mapped less than 0.1 cM from *Gpc-B1* {10297}.
Gpc-B1 affects senescence and maturity in addition to grain protein content with *Gpc-B1b* from *T. turdigum* subsp. *dicoccoides* accelerating senescence and maturity {10298}.

77.2 Enzymes

77.2.1. Acid phosphatase

Acph-D2 [{10309}]. *Acph1*{10309}. 2DL {10309}.
dv: *Acph-D2*$_{100}$ and *Acph-D2*$_{95}$ alleles distinguished accessions of *Ae. tauschii* ssp. *tauschii* and *strangulata,* respectively {10309}.
ma: Cent . . . *Acph-D2* – 4 cM – *Xgwm157-2D* {10309}.

77.2.11. Lipoxygenase

Replace with the following: The wheat *Lpx-1* gene in wheat corresponds to barley *LoxA* (GenBank L35931). The *Lpx-B1* locus is duplicated, with the *Lpx-B1.1* and *Lpx-B1.2* loci corresponding to GenBank sequences DQ474240 and DQ474241, respectively. The *Lpx-B1b* allele corresponds to a deletion associated with a 4.5-fold reduction in lipoxygenase activity. The *Lpx-2* gene in wheat corresponds to the barley *LoxC* gene (GenBank L37358), whereas the *Lpx-3* gene in wheat corresponds to the barley *LoxB* gene (GenBank L37359).

Lpx-A1 {516}. [*Lpx-B1* {516}]. 4AL{516}. **v:** CS {516}.
ma: *Xksu919(Lpx-1)-4A* {0091}.
Lpx-B1 {516}. [*Lpx-A1* {516}]. 4BS{516}. **v:** CS {516}.
ma: *Xcn110(Lpx-1)-4B* {0269,0367}.
Lpx-B1a {1533}. [*Lpx-A1a* {936}]. **v:** CS.
Lpx-B1b {1533}. [*Lpx-A1b* {936}]. **v:** Bosanka{1533}.
Lpx-B1.1 {10303}. 4BS {10303}. **ma:** *Xksm62-4B* – 8 cM – *Lpx-B1.1* – 13 cM – *Xwmc617b-4B* {10303}.
Lpx-B1.1a {10303}. **tv:** UC1113 {10303}.
Lpx-B1.1b {10303}. **tv:** Kofa, deletion {10303}.
Lpx-B1.2 {10303}. 4B {10303}. **v:** CS.
Lpx-D1 {516}. 4DS {516}. **v:** CS.
Lpx-E1 {518}. 4ES {518}. **ad:** CS/*E. elongata*.
Lpx-H1 {716}. 4H {716}. **ad:** CS/Betzes.
Lpx-A2 {516}. 5AL {516,10303}. **v:** CS.
ma: *Xksu919(Lpx-2)-5A* {0091}.
Lpx-B2 {516}. 5BL {516,10303}. **v:** CS.
ma: *Xksu919(Lpx-2)-5B*{0091}; *Xcn111(Lpx-2)-5B* {0269}.
Lpx-D2 {516}. 5DL {516}. **v:** CS.
Lpx-E2 {518}. 5EL {518}. **ad:** CS/*E. elongata*.
Lpx-H2 {716}. 5H {716}. **ad:** CS/Betzes.
Lpx-S^{s}2 {1140}. 5S^s {1140}. **ad:** CS/*Ae. searsii*.
Lpx-V2 {242}. 5V. **ad:** CS/*D. villosum*.
Lpx-A3 {10303}. 4AL {10303}. **tv:** UC1113 (GenBank DQ474244) and Kofa (GenBank DQ474242) {10303}.
ma: *Xwmc617a-4A* – 10 cM – *Lpx-A3* – 15 cM – *Xgwm192b-4A* {10303}.
Lpx-B3{10303}. 4B {10303}. **tv:** UC1113 and Kofa (GenBank DQ474243) {10303}.

77.2.32 Phytoene synthase

Phytoene synthase, which condenses two molecules of geranyl geranyl diphosphate to produce phytoene, is the first of specific enzyme necessary for carotene biosynthesis in plants.

77.2.32.1 Phytoene synthase 1 (E.C. 2.5.1.32)
Homology with the same gene in rice (*Psy1*) {10230}.

Psy1-A1 {10230}.	7A {10230}.	**tv:** Kofa {10230}.
Psy1-B1 {10230}.	7B {10230}.	**tv:** Kofa {10230}.

77.2.32.2 Phytoene synthase 2 (E.C. 2.5.1.32)
Homology with the same gene in rice (*Psy2*) {10230}.

Psy2-A1 {10230}.	5A {10230}.	**tv:** Kofa {10230}.
Psy2-B1 {10230}.	5B {10230}.	**tv:** Kofa {10230}.

77.2.33 Isoamylase 1

Iso-1[{10295}].	*ISA-1* {10295}].	**dv:** *Ae. tauschii* {10295}.

Endosperm Storage Proteins
77.3.1.1 *Glu-1*

Glu-A1
Add:

Glu-A1w {10327}.		2.1* {10327}.	**v:** KU-1094, KU-1026, KU-1086, Grado, KU-1139 {10327}.
Glu-A1x [{10327}].		2' {10327}.	**v:** TRI14165/91 {10327}.

Glu-B1
Add:

Glu-B1bh {10327}.		13+22* {10327}.	**v:** KU-1094, KU-1026, KU-1086, Grado, KU-1139 {10327}.
Glu-B1bi {10327}.		13+22.1 {10327}.	**v:** KU-1135 {10327}.
Glu-B1bj {10327}.		14*+15* {10327}.	**v:** TRI11553/92 {10327}.
Glu-B1bk {10327}.	[*Glu-B1be* {10327}].	6.1+22.1 {10327}.	**v:** Steiners Roter Tiroler, Hercule, Schwabenkorn, SP3, Rouguin {10327}.
Glu-B1bl {10327}.	[*Glu-B1bf* {10327}].	6.1 {10327}.	**v:** KU-3418, KU-3446, TRI4613/75 {10327}.
Glu-B1bm {10327}.	[*Glu-B1bg* {10327}].	13*+19* {10327}.	**v:** Rechenbergs Früher Dinkel, Renval, Zeiners Weißer Schlegel, KU-3410, TRI9885/74, SP1 {10327}.

Add to the end of the section: Although alleles *Glu-B1i* encoding subunits 17+18, and *Glu-B1bc* encoding subunits 6+17, apparently share a common subunit (Ax17 and By17, respectively), it is not clear that this is in fact true. Primers were designed to distinguish subunit By8 from By8*, for distinguishing subunit By9-containing alleles from non-By9 alleles, and for diagnosing the presence of *Glu-B1f.*

Glu-D1
Add:

***Glu-D1bp* {10327}.**		2.1'+12 {10327}.	**v:** KU-1034 {10327}.
Glu-D1bq.	[*Glu-D1bp(t)* {10304}].	2.6+12 {10304}.	**v:** Jinbaojin, Hongkedongmai, Hongdongmai, Baidongmai {10304}.

At the end of the section for *Glu-D1* add:
The complete sequence of this subunit was determined {10319}.

Glu-A1-1
Add:

Glu-A1v {10327}.	2.1* {10327}.	**v:** KU-1094, KU-1026, KU-1086, Grado, KU-1139 {10327}.
Glu-A1w [{10327}].	2' {10327}.	**v:** TRI14165/91 {10327}.

Glu-B1-1
Add:

Glu-B1-1ae {10327}.	14* {10327}.	**v:** TRI11553/92 {10327}.
Glu-B1-1af {10327}.	6.1 {10327}.	**v:** Steiners Roter Tiroler, Hercule, Schwabenkorn, SP3, Rouguin, KU-3418, KU-3446, TRI4613/75 {10327}.

Glu-B1-2
Add:

Glu-B1-2ac {10327}.	22* {10327}.	**v:** KU-1094, KU-1026, KU-1086, Grado, KU-1139 {10327}.
Glu-B1-2ad {10327}.	22.1 {10327}.	**v:** KU-1135, Steiners Roter Tiroler, Hercule, Schwabenkorn, SP3, Rouguin {10327}.
Glu-B1-2ae {10327}.	15* {10327}.	**v:** TRI11553/92 {10327}.
Glu-B1-2af {10327}.	19* {10327}.	**v:** Rechenbergs Früher Dinkel, Renval, Zeiners Weißer Schlegel, KU-3410, TRI9885/74, SP1 {10327}.

Glu-D1-1
Glu-D1-1l. Replace the entry that currently reads: '*Glu-D1-1l*{1578}. 1.5{1578}. **dv:** *Ae. tauschii*' with:
Glu-D1-1l {1578}. 1.5{1578}, Dtx1.5 {10306}. **dv:** *Ae. tauschii* accession SQ-214{10306}.
A restriction enzyme based method named the 'restricted deletion method' was used to characterize the ORF of this subunit {10306} (as in the case of subunit Dty10 encoded by *Glu-D1-2u* {10306}. Allele-specific PCR markers were developed based upon SNPs located at the non-repetitive N-terminal {10320}.

Add:

Glu-D1-1t [{10304}].	2.6 {10304}.	**v:** Jinbaojin, Hongkedongmai, Hongdongmai, Baidongmai {10305}.
Glu-D1-1u **[{10327}].**	2.1'{10327}.	**v:** KU-1034 {10327}.

Glu-D1-2
Add:
Glu-D1-2u [{10306}]. Dty10 {10306}. **dv:** *Ae. tauschii* accession SQ-214{10306}.
A restriction enzyme based method named the 'restricted deletion method' was used to characterize the ORF of this subunit {10306} (as in the case of subunit 1.5 (or Dtx1.5 {10306}) encoded by *Glu-D1-1l* {10306}. This subunit was first recognized as being different from subunit 10 encoded by *Glu-D1-2b* in hexaploid wheat in {10307}.

77.3.1.2. *Glu-2*
Glu-B2
Add:

Glu-B2c {10215}.		12* {10215}.	**tv:** Alcala la Real {10215}.

77.3.1.3 *Glu-3*
Add at end of the preamble:
A novel storage protein gene with chimerical structure was isolated from the old Hungarian cultivar Bánkúti 1201, containing γ-gliadin sequences in the 5' region, LMW-glutenin sequences in the 3' region, and a frameshift mutation leading to a completely new polypeptide in the C-terminal region. A further seven recombinant prolamin genes were subsequently isolated. The eight genes, designated *Ch1* to *Ch8*, seem to derive from four γ-gliadin and three LMW-glutenin sequences and are probably the result of crossing over between the loci *Gli-1* and *Glu-3*. However, the precise recombinational mechanism that gave rise to them has yet to be elucidated {10307}.

Glu-A3
Add:

Glu-A3q {10215}.	[*Glu-A3i* {10215}].	5+20 {10215}.	**tv:** Fanfarron {10215}.

Glu-B3
Add:

Glu-B3aa {10215}.	[*Glu-B3l* {10215}].	1+3+13*+16 {10215}.	**tv:** Blancal de Nules {10215}.

77.3.2. Gliadins
Add to the end of the preamble:
A novel storage protein gene with chimerical structure was isolated from the old Hungarian cultivar Bánkúti 1201, containing γ-gliadin sequences in the 5' region, LMW-glutenin sequences in the 3' region, and a frameshift mutation leading to a completely new polypeptide in the C-terminal region. A further seven recombinant prolamin genes were subsequently isolated. The eight genes, designated *Ch1* to *Ch8*, seem to derive from four γ-gliadin and three LMW-glutenin sequences and are probably the result of crossing over between the loci *Gli-1* and *Glu-3*. However, the precise recombinational mechanism that gave rise to them has yet to be elucidated {10307}.

Transcriptome analysis showed the presence of proteins called avenin-like a and b. The former contained a duplicated sequence of about 120 residues and corresponded to the LMW-gliadins. The latter were not previously characterized, but may form part of the glutenin fraction and, hence, influence quality. These avenin-like proteins showed higher expression levels in three *Aegilops* species (*Ae. caudata*, *Ae. cylindrica*, and *Ae. tauschii*) than in common wheat {10321}.'

77.3.3. Other endosperm storage proteins
Before the preamble add the subheading:
'**77.3.3.1. Triticin proteins**'
Replace the preamble with:
'The triticin proteins {1360} or [Triplet proteins {1357}] are storage globulins with homology to pea legumins and related proteins in oats, rice, and several dicotyledonous species {1360}. Triticin gene segments including its hypervariable region were PCR-amplified, with preferential amplification of *Tri-D1* for the only pair of primers giving consistent results {10322}.

77.4.4. Inhibitors (dimeric) of heterologous alpha-amylases
Add to the end of the preamble:
'Three genome allele specific primer sets were designed for the 3BS and 3DS α-amylase inhibitors in cultivar Chinese Spring, based upon SNPs. Their validity was confirmed in 15 accessions of *T. urartu*, *T. monococcum* subsp. *monococcum*, *Ae. tauschii*, and *T. turgidum* subsp. *dicoccoides*. The results offered support that the 24 kDa dimeric α-amylase inhibitors in cultivated wheat are encoded by a multigene family {10323}, previously proposed, as the result of phylogenetic analysis of sequences characterised by cSNPs, in {10324}.'

77.5.6 Waxy proteins

Add after the ***Wx-B1b*** entry:

'An ELISA-based method was developed for distinguishing wheat lines carrying this null allele {10325}.'

77.5.8. Puroindolines and grain softness protein

Changes:

Under ***Pina-D1a***

Delete dv: 'TA1583 (GenBank AY252029) *Pinb-D1a, Gsp-D1b*{03105}'

Under ***Pina-D1c***

Delete dv: 'TA2536 (GenBank AY251998) *Pinb-D1i, Gsp-D1d*{03105}'

Under ***Pina-D1d***

Change: GenBank 'AY251963' to 'AY252012'; change 'AY251948' to 'AY251996'; add to dv: 'TA2536 (GenBank AY252043){03105}'.

Under ***Pina-S1***

Add after TA2368 '(GenBank AY622787)'; add after TA1789 '(GenBank AY622788)', add after TA1777 '(GenBank AY622789)'.

Under ***Pina-S^{sh}1***

Add after TA1999 '(GenBank AY622796)'.

Under ***Pina-S^{l}1***

Add after TA1912 ,(GenBank AY622790)'; add after TA1921 '(GenBank AY622791)'.

Under ***Pina-S^{s}1***

Add after TA1355 '(GenBank AY622792)'.

Under ***Pina-A^{m}1***

Add after TA2026 '(GenBank AY622786)'; add after TA2037 '(GenBank AJ242715)'; add after TA581 '(GenBank AY622786)'.

Add new allele after *Pina-D1n*:

Pina-D1o{10311}. **dv:** *Ae. tauschii* RM0182 (GenBank AY608595) {10311}.

Pina-D1p {10316}. **v:** *T. aestivum* Jing771 (GenBank AY599893) {10316}.

Pinb:

Make the following changes to current entries:

Under ***Pinb-D1h***

After TA2369 add '(GenBank AY251983)'; after TA2527 add '(GenBank AY251965)'; after TA1649 add '(GenBank AY251963)'.

Under ***Pinb-D1i***

After TA2436 add '(GenBank AY251947)'.

Under ***Pinb-D1j***

After TA1559 add '(GenBank AY251962)', after TA1691 add '(GenBank AY251964)'.

Under ***Pinb-D1q***

Add: '**v:** Jingdong 11 {10313 }.'.

Under ***Pinb-A^{m}1***

First entry should read, '**dv:** *T. monococcum* subsp. *monococcum* DV92 (cultivated) cds (GenBank AJ242716) complete BAC sequence (GenBank AY491681), G3116 (spp. aegilopoides){0083}'.

After second entry delete 'is identical to allele Pina-D1h{03105}'.

Add: '*T. monococcum* subsp. *monococcum* TA2025 (GenBank AY622797{10315}; *T. monococcum* subsp. *monococcum* TA2026 (GenBank AY622798){10315}, *T. monococcum* subsp. *monococcum* TA183 (GenBank AY622799){10315}'.

Under ***Pinb-S1***

After TA2368 add '(GenBank AY622797)', after TA1789 add '(GenBank AY622802)', after TA1777 add '(GenBank AY622803)'.

Under ***Pinb-S^{b}1***

After TA1954 add '(GenBank AY622807)' after TA1942 add '(GenBank AY622808)'.

Under ***Pinb-S^{l}1***

After TA1912 add '(GenBank AY622800)', after TA1921 add '(GenBank AY622804)'.

Under ***Pinb-S^{s}1***

After TA1837 add '(GenBank AY622805)'.

Change 'TA1355' to 'TA2355 (GenBank AY622806)'.

Under ***Pinb-S^{sh}1***
After TA1999 add '(GenBank AY622809)'.

New entries:

Pinb-D1v [{10305}]. [*Pinb-D1i(t)* {10305}]. **v:** Qingdao Landrace 1{10305}; Qitoubai {10305}; Shijiazhuang 34 {10305}; Zigan {10305}.

Pinb-D1w {10314}. **dv:** *Ae. tauschii* 002 (GenBank DQ257553){10314}; *Ae. tauschii* ssp. *tauschii* TA1704 (GenBank AY649747){ 10315}; *Ae. tauschii* spp. *anathera* TA2381 (GenBank AY649747){10315}.

Pinb-D1x {10316}. [*Pinb-D1q* {10316}]. **v:** Jing 771 (GenBank AY640304){10316}.

Pinb-D1y {10316}. [*Pinb-D1r* {10316}]. **v:** Tachun 3 (GenBank AY598029){10316}.

Pinb-D1z {10316}. [*Pinb-D1p* {10316}]. **v:** Dahuangpi (GenBank AY581889) {10316}.

General note at end of Puroindoline section: 'Ikeda et al {10305} reported a double-null with apparently no *Pina-D1* or *Pinb-D1* genes present in **v:** Bindokku, Cheyenne 'A', Chosen 68, Saiiku 18, Saiiku 44, and tentatively assigned it *Pina-D1b*/*Pinb-D1h(t)*. How this deletion compares with the double null mutation reported by Tranquilli et al. {10077} which was assigned *Pina-D1k*/*Pinb-D1q* is unknown'.

Pathogenic Disease/Pest Reaction

79. Reaction to *Blumeria tritici*
Pm3.
Pm3a. Sequence AY939880 {10292}.
Pm3d. Sequence AY939881 {10292}.
Pm3f. Sequence DQ071554 {10292}.
At the end of the *Pm3* section add: The *Pm3a*, *Pm3b*, *Pm3d*, and *Pm3f* alleles form a true allelic series based on sequence analysis {10292}.

Pm16. Add: 5B {10217}. **v:** Line 70281 = Norman /*3 Beijing 837 {10217}.
ma: *Pm16* – 5.3 cM – *Xgwm159-5B* (10217).
Add note: To account for the different chromosome locations a T4A–4B translocation was suggested {10217}. Based on the 5B location and similar disease responses *Pm16* and *Pm30* may be the same {10217}.

Pm30. Add note: *Pm30* could be the same as *Pm16* {10217}.

Pm33. **v:** Delete the present entry and enter the present v2 entry as v.
ma: *Xgwm536-2B* – 18.1 cM – *Pm33* – 1.1 cM – *Xwmc317-2B* – 1.1 cM – *Xgwm111-2B* – 1.8 cM – *Xgwm383-2B* {10205}.

Pm34 {10241}. 5DL {10241}. **v:** PI 604033 = NC97BGTD7 = Saluda*3 / *Ae. tauschii* TA2492 {10241}.
dv: *Ae. tauschii* TA2492 {10241}.
ma: *Xbarc177-5D* – 5.4 cM – *Pm34* – 2.6 cM – *Xbarc144-5D* {10241}.
Single resistance genes were identified on chromosome 7AL in hexaploid germ plasms NC96BGTA4 (a *T. monococcum* subsp. *monococcum* derivative) and NC99BGTAg11 (a *T. timopheevii* subsp. *armeniacum* derivative). The genes were proximal to *Pm1* and considered to be different from ach other, although possibly allelic {10274}.

79.3. Temporary designated genes for resistance to *Blumeria graminis*
PmPs5A {10205}. 2AL {10205}. **v:** AM4 {10205}.
tv2: *T. turgidum* subsp. *carthlicum* pS5 *Pm33* {10205}.
ma: *Xgwm356-2A* – 10.2 cM – *PmPS5A*. *PmPS5A* is located at or near the *Pm4* locus {10205}.

Mlzec1 {10227}. Update symbol: previously listed in 2005 as *MlZec*. **ma:** *Xwmc356-2B* – 2.0 cM – *PmZec1* {10227}.

Add general note at end of section: 'APR to powdery mildew was completely associated with *Yr18*/*Lr34* in a population of Thatcher / RL6058.

XX. Reaction to *Cephus cinctus*
Insect pest: Wheat stem sawfly.
See 69: Stem solidness.

81. Reaction to *Diuraphis noxia*
Insert the relevant PI numbers and add reference '10277' for the following **i:** entries:
***Dn1*.** Betta-Dn1: PI 634768, Tugela-Dn1: PI 591932.
***Dn2*.** Betta-Dn2: PI 634769, Karee-Dn2: PI 663774, Tugela-Dn2: PI 634772.
***Dn5*.** Add reference 10310 to the 7DL chromosome location, i.e., 7DL {287,10310}.
Insert the following note: Issues relating to the confused arm location and mapping of *Dn5* is discussed in {10310}.
***Dn8*.** Karee-Dn8: PI 634775.
***Dn9*.** Betta-Dn9: PI 634770.
QTL: A QTL, *QDn.unlp.6A*, for antixenosis was associated with *Xgwm1393-6AL* and *Xgwm1150-6Al* in a CS / CS (Synthetic 6A) DH population {10216}.

82. Reaction to *Fusarium spp.*
82.1. Disease: Fusarium head scab, scab.
Fhb1 {10214}. *QFhs.ndsu-3BS* (9925,0175}. 3BS {9925}.
i: Lines to be named.
v: At least one reference genotype
Fhb2 {10225}**.** 6B {10225}. **v:** Two contrasting stocks to be placed in a national germ plasm collection. Please advise pedigree designations and accession numbers.
v2: BW278 *Fhb1* {10225}.
ma: *Xgwm-6B* – 2.6 cM – *Fhb2* – 3.1 cM – *Xgwm644-6B* {10225}.

Add to notes following *Fhb1*: W14 (R) / Pioneer 2684 (S) population: QTL in 3BS and 5AS accounted for 33 %, 35 %, and 31 % of the phenotypic variation for disease spread, kernel infection, and DON accumulation in greenhouse experiments, and 34 % and 26 % of variation for FHB incidence and severity in the field {10239}. Flanking markers were *Xbarc133-3B* and *Xgwm493-3B* and *Xbarc117-5A* and *Xbarc56-5A* {10239}.

QTL: Dream (R) / Lynx (S) RIL population. Following inoculation with *F. culmorum* four QTL for AUDPC were identified on chromosomes 6AL (R^2 = 19 %), 1B (12 %), 2BL (11 %), and 7BS (21 %). The resistance allele in 1B came from Lynx and was associated with T1BL·1RS {10260}.

Insert at end of Nanda2419 (S) / Wangshuibai (R): 'Type-I resistance (% infected plants) in this cross was attributed to 10 chromosome regions among which *Qfhi.nau-4B* (*Xwmc349-4B – Xgwm149-4B* – R^2 = 0.175), *XFhi.nau-5A* (*Xwmc96-5A – Xgwm304-5A* – R^2 = 0.27) and *Qfhi.nau-5B* (*Xgwm408-5B – Xbarc140-5B*) from Wangshuibai were detected in at least 3 of 4 years {10282}. A significant additive effect of QTL on 6D and 2A also was observed {10282}.'

Insert following Wangshuibai / Wheaton: 'Wangshuibai / Seri 82: F3:F5 population: QTL on chromosomes 3BS (*Xgwm533-3B – Xs18*/*m12-3B*) and 2DL (*Xgwm539-2D – Xs15*/*m24-2D*) accounted for 17 % and 11 %, respectively, of the phenotypic variance (10264).

Wangshuibai / Alondra 'S': A stable QTL was associated with *Xgwm533-3B* in each of 3 years, QTL in 5B (*Xgwm335-5B*), 2D, and 7A were detected in 2 years {10268}.'

Chokwang (R) / Clark (S):
Qfhb.ksu-5DL.1 associated with *Xbarc239-5D* (R^2 = 0.24) {10276}, *Qfhb.ksu-4BL.1* associated with *Xbarc1096-4B* (R^2 = 0.13){10276}, and *Qfhs.ksu-3BS.1* marginally associated with the region of *Fhb1* (R^2 = 0.1) {10276}.

Add at end of section: Bobwhite plants transformed with AtNPR1, an *Arabidopsis thaliana* gene that regulates activities of SAR, displayed a heritable type II response equal to that of Sumai 3 {10237}.

DH 181 (R) (Sumai 3 / HY 386 Sel.)

Type I Res. 2DS, 3AS, 3BS, 3B centromere region, 4DL, 5AS, 6BS {10213}.
In cross Patterson (open) / Goldfield (closed) RILs, narrow flower opening width was correlated with FHB resistance. The major QTL effect associated with narrow flower opening and low FHB incidence occurred in map interval *Xbarc200 – Xgwm210* (29 % of variation in FHB incidence); these genes were probably located in chromosome 2BS {10243}.

Insert before 'Field resistance:'
Type 1 resistance and DON accumulation: Hobbit Sib / *T. macha* 4A DH population: Both traits were assigned to a small region distal to *Xgwm601-4A* and co-segregating with *Xgwm165-4A* {10254}.

New Section: Reaction to *Fusarium pseudograminearum*
Disease: Crown rot
QTL: Analysis of partial seedling resistance in a DH population of 2-49 (partially Resistant) / Janz (susceptible) indicated major QTL in chromosomes 1D ($R^2 = 0.21$) and 1A ($R^2 = 0.09$) and minor QTL in 2A, 2B (from Janz), 4B and 7B {10132}.

85. Reaction to *Mayetiola destructor*
H3. Insert note after chromosome location: Based on the location of *H9* on chromosome 1AS, *H3* also may be located on chromosome 1AS {10231,10252}. **v:** Ike {10252}.
H5. **v:** Magnum {10252}.
H6. Insert note after chromosome location. Based on the location of *H9* on chromosome 1AS, *H6* also may be located on chromosome 1AS {10231,10252}.
H9. Add: '1AS {10231,10252}.' **ma:** *STS-Pm3* – 1.7 cM – $SOP005_{909}$ – 0.6 cM – *Xksu11/Xcnl76/Xgdm33-1A* – 0.5 cM – *Xgwm176/Xpsp2999/Xcfa2153-1A* – 0.5 cM – *Xbarc263-1A* – 1.2 cM – *H9* – *Xwmc24-1A* {10231}. *Xcfa2153-1A* – 0.5 cM – *H9* – 0.3 cM – *Xbarc263-1A* {10252}.
H10. May be identical to H9 {10252}. Add: , 1AS {10252}. **ma:** *Xcfa2153-1A* – 0.5 cM – *H10* – 1.3 cM – *Xbarc263-1A* {10252}. *Xrapd9-2-1000/Xpsp2999-1A/Xgpw7072-1A* – 2.2 cM – *H10* {10252}.
H11. Add: , 1AS {10252}. **ma:** *Xcfa2153-1A* - 0.3 cM – *H11* – 1.7 cM – *Xbarc363-1A* {10252}.
H13. Add: , 6DS {10251}. **ma:** *Xgdm36-6D* – 2.7 cM – *H13/Xcfd132-6D* – 1.1 cM – *Xcfd213-6D* {10251}.
H23. Add: , 6DS {10251}. **v:** Change to: KS89WGRC03 = TA1642 /2*Wichita {442,10251}. **al:** *Ae. tauschii* TA1642 {10251}. **ma:** Maps to same region as *H13* {10262}.
H15. Insert note after chromosome location. Based on the location of *H9* on chromosome 1AS, *H15* also may be located on chromosome 1AS {10231}.
H32. **ma:** Modify entry to: *Xgwm3-3D* – 1.7 cM – *H32* – 1.7 cM – *Xcfd-3D* {10137}.
Hdic {10262}. 1AS {10262}. **v:** KS99WGRC42 {10262}. **tv:** *T. turgidum* subsp. *dicoccum* PI 94641 {10262}. **ma:** *Xcfa2153-1A* - 1.4 cM – *Hdic* – 0.6 cM – *Xgwm33-1A* {10262}.
H_{WGRC4} {10251}. 6DS 10251}. **v:** KS89WGRC04 = TA1695 /3*Wichita {10251}. **ma:** Allelic with *H13* {10251}.

87. Reaction to *Mycosphaerella graminicola*
Stb6. **v2:** Kavkaz-K4500 *Stb7 Stb10 Stb12* {10011}; TE 9111 *Stb7 Stb11*{10012}.
Stb7. **v2:** Kavkaz-K4500 *Stb6 Stb10 Stb12* {10011}; TE 9111 *Stb6 Stb11* {10012}. **ma:** *Stb7* was closer to *Xwmc313-4A* than to *Xwmc219-4A* {10011}.
Stb10. 1D {10011}. Confers resistance to cultures IPO94269 and ISR8036, but not to IPO87019 {10011}. **v2:** Kavkaz –K4500 L.6.A.4 *Stb6 Stb7 Stb12* JIC.W9995 {10011}. **ma:** Associated with *Xwmc848-1D* {10011}.
Stb11. 1BS {10012}. Confers resistance to isolate IPO90012 {10012}. **v2:** TE 9111 {10012} *Stb6 Stb7* {10012}. **ma:** Distal to *Xbarc008-1B* {10012}.
Stb12 {10011}. 4AL {10011}. Confers resistance to cultures ISR398, ISR8036, and IPO87019 {10011}. **v2:** Kavkaz-K4500 *Stb6 Stb7 Stb10* {10011}.º **ma:** *Stb12* was closer to *Xwmc219-4A* than to *Xwmc313-4A* {10011}.

89. Reaction to *Phaeophaeria nodorum*

Add to list of QTL: Forno (S) / Oberkulmer spelt (R). Among 204 RILs, leaf and glume responses were genetically different but correlated ($R^2 = 0.52$). Ten QTL for glume blotch (SNG) were detected, six from Forno. A major QTL ($R^2 = 35.8$ %) was associated with *q*. Eleven QTL (four from Forno) affected leaf blotch; three of these (chromosomes 3D, 4B and 7B) with $R^2 > 13$ % were considered potential candidates for MAS {10250}.

90. Reaction to *Puccinia graminis*

Sr22. **ma:** *Xcfa2123-7A* – 6 cM – *Sr22* – 5.9 cM – *Xcfa2019-7A* {10263}.

Sr26. **ma:** A PCR marker, Sr26#43 was reported in {10257}.

Sr31. Add at end of section: *Sr31* seems to be different from the rye-derived gene in Amigo and related materials {10270}.

Genotype lists: Add ',10270'.

91. Reaction to *Puccinia striiformis*

Yr1. **v2:** Parula *Yr29* {10281}. **ma:** *Xgwm120-7D* – 0.9 cM – *Yr18* – 0.7 cM – *Xgwm295-7D* {10259}.

Yr29. **s:** Lalbahadur(Parula 1B) {10281}. **v2:** Attila *Yr27* {10281}; Parula *Yr18* {10281}.
ma: *Xwmc44-1B* – 1.4 cM – *Xbac24prot* – 9.5 cM – *Yr29* – 2.9 cM – *Xbac17R . . . Xgwm140-1B* {10281}. *Xgwmc44-1B* – 3.6 cM – *Yr29* – 2.1 cM – *XtG818/XBac17R . . . Xgwm140-1B* {10281}.

Associated with *Ltn2* and *Lr46*.

Yr36. For gene name insert additional reference, i.e., {10138,10272}.
ma: *Nor-B . . . Xucw68-6B – Xucw69-6B/Xbarc101-6B/Yr36 – Xucw66-6B* {10272}. *Yr36* is 2–4 cM proximal to *Gpc-B1* {10272}.

Yr38 {10224}. *YrS12* {10204}. 6A (6AL-6L^S•6S^S) {10224}.
v: Line 0352-4 = *Ae. sharonensis*-174 / 9*CS // 3*W84-17 /3/ CS /4/ W84-17 {10224}.
al: *Ae. sharonensis*-174 {10224}.

91.2 Temporarily designated genes for resistance to stripe rust

YrCK {10220.10221}.	Temperature sensitive (10219).	2DS {10220}.	**v:** Cook *Yr34* {10219, 10220,10221}; Sunco *Yr34* {10220}.
YrCN19 {10228}.		2BS {10228}.	**v:** AIM {10228}; AIM6 {10228}; Chuannong 19{10228}.

ma: Complete linkage to a 391-bp allele of *Xgwm410-2BS* {10228}.

91.3. Stripe rust QTLs

QTL: Insert as the second paragraph:
Camp Remy / Recital: 217 RILs. Six QTL for APR were detected over 4 years. *QYr.inra-2BL* ($R^2 = 0.42$–0.61) corresponded largely to seedling resistance gene *Rsp* and possibly *Yr7*. The other genes were *Qyr.inra-2AL, QYr.inra-2BL, QYr.inra-2DS* (perhaps *Yr16*), *QYr.inra-5BL.1*, and *QYr.inra-5BL.2* {10279}.

Insert at end of section: 'Four QTL were detected in a multiple cross analysis {10283}: Chromosome 2AL (probably *Yr32* in Deben, Kris and Soloist), 2AS (probably *Yr17* in Kris), 2BL (*Xwmc149-2B – Xwmc317a-2B* in Deben) and 6BL (*Xwmc397-6B –Xwmc105b-6B* in Soloist and Kris).'

92. Reaction to *Puccinia triticina*

Lr3a. **ma:** $UBC840_{540}$ – *Lr3a*, 6 cM {10263}.

Lr9. **i:** Add: Lines listed in {10244}. **ma:** Before the last entry insert: 'SCAR markers were developed in {10244}'. The last entry in this section should appear as a separate note at the end of the *Lr9* section.

Lr13. **v2:** Add '*Lr46*' to genotype of Parula.

Lr19. 7DL. **i:** Sears'transfer 7D–7Ag no. 1 {10255}. **ma:** Located in the *Xwg420-7Ag – Xmwg2062-7Ag* interval {10255}.

Add note at end of this entry: 'Secondary translocation line I-96 derived from Sears' 7D-7Ag no. 1 involved *Lr19* being located in an intercalary segment with low yellow pigment and lacking *Sd1* {10255}.'

7AL. **v:** Lines I-22 and I-23 {10255}.
Add note: '*Lr19* in lines I-22 and I-23 retaining yellow pigment but lacking *Sd1* was transferred to durum {10255}.'

7BL.Add: One of these lines with the shortest 7Ag segment, Lr19-149-299, was used in a further cycle of recombination {10278}.

***Lr20*.** **ma:** *Lr20 – STS638,* 7.1 cM {10263}.
***Lr24*.** Add at end of section: **'**A PCR marker, Sr24#12 was confirmed across all sources of Lr24 {10257}.'
***Lr28*.** **ma:** A linked RAPD marker, $S421_{640}$ was converted to a TPSCAR, $SCS421_{570}$ {10236}.
***Lr34*.** **v2:** Parula *Lr13 Lr46* {1374}.
ma: *Xgwm120-7D* – 0.9 cM – *Lr34* – 2.7 cM – *Xgwm295-7D* {10259}.
***Lr46*.** **s:** Lalbahadur (Parula 1B) {10281}. **v:** Attila {10281}.
v2: Parula *Lr13 Lr34* {10281}.
ma: *Xwmc44-1B* – 1.4 cM – *Xbac24prot* – 9.5 cM – *Lr46* – 2.9 cM – *Xbac17R . . . Xgwm140-1B* {10281}. *Xgwmc44-1B* – 3.6 cM – *Lr46* – 2.1 cM – *XtG818/XBac17R . . . Xgwm140-1B* {10281}. *XSTS1BL2* – 2.2 cM – *Lr46* / *XSTS1BL9* – 2.2 cM – *XSTS1BL17* {10326}.
Associated with *Ltn2* and *Yr29*.

***Lr51*.** **ma:** A CAPS marker was developed from *XAga7-1B* {0308}.
***Lr52*.** **ma:** *Lr52* – 16.5 cM – *Xgwm443-5B* {10035}.
Lr56 {10224}. *LrS12* {10204}. 6A (T6AL-6L^{s}·6S^{s}) {10224}.
v: Line 0352-4 = *Ae. sharonensis*-174 / 9*CS // 3*W84-17 /3/ CS /4/ W84-17 {10224}.
al: *Ae. sharonensis*-174 {10224}.
LrKr1 {10233}. **v:** Thatcher {10233}. **v2:** Kanred *LrKr2* {10233}.
LrKr2 {10233}. **v2:** Kanred *LrKr1* {10233}.
LrMq1 {10233}. **v:** Marquis {10233}.

Add following the temporary designations: 'A potentially novel resistance gene was located in chromosome 5BS of Iranian landrace PI 289824. *Xgwm234-5B* – 8.9 cM – *Lr* – 2.3 cM – STS $Xtxw_{200}$ {10253}.

Under 'Complex genotypes' at end of section add:
Alsen: *Lr2a Lr10 Lr13 Lr23 Lr34* {10223}.
Norm: *Lr1 Lr10 Lr16 Lr13 Lr23 Lr34* {10223}.

93. Reaction to *Pyrenophora tritici repentis*
93.2. QTL
Grandin (S) / BR34 (R) RILs: QTL in 1BS, *QTs.fcu-1BS*,(13–29 % of variation depending on race) and 3BL, (13–41 %) were involved in resistance to four races. Five other QTL showed race specific responses {10248}.

94. Reaction to *Sitodiplosis mosellana* (Gehin)
***Sm1*.** **ma:** Add: *Sm1* was mapped to a 2.5 cM interval on chromosome 2BS flanked proximally by AFLP-derived SCAR marker *WM1* and distally by SSR *Xgwm210-2B* {10291}.

95. Reaction to *Schizaphis graminum*
***Gb4*.** 7DL {10267}.
Gb4 is either closely linked or allelic to *Gb3* {10267}.
Gba {10267}. 7DL {10267}. **v:** TA4152L94 = CETA / *Ae. taushii* Wx1027 (10267).
ma: *Xwmc671-7D* – 34.3 cM – *Gba* – 20.7 cM – *Xbarc53-7D* {10267}.
Gbb {10267}. 7DL {10267}. **v:** TA4252L24 = CROC 1 / *Ae. tauschii* Wx224 {10267}.
ma: *Xwmc671-7D* – 5.4 cM – *Gbb* – 20.2 cM – *Xbarc53-7D* {10267}.
Gbc {10267}. 7DL {10267}. **v:** TA4063.1 = 68111 / Rugby // Ward // *Ae. tauschii* TA2477 {10289}.
ma: *Xgwm671-7D* – 13.7 cM – *Gbc* – 17.9 cM – *Xgdm150-7D* {10267}.
Gbd {10267}. **v:** TA4064.2 = Altar 84 / *Ae. tauscii* TA2841 {10267}.
ma: *Xgwm671-7D* – 7.9 cM – *Gbd* – 1.9 cM – *Xwmc157-7D* {10267}.

Gbx1 {10267}. *Gbx* [[10267]]**.** 7DL (10267).
v: KS89WGRC4 = Wichita / TA1695 // 2*Wichita {10267}.
dv: *Ae. tauschii* TA1695 {10267}.
ma: *Xwmc157-7D* – 2.7 cM – *Xgdm150-7D* {10267}.
Gbx2 {10267}. *Gbx* [{10267}]. **v:** W7984 [{10267}].
ma: *Gbx2* was located 8.8 cM from *Gb3* {10267}.
Gbz. **ma:** *Xwmc671-7D* – 3.9 cM – *Gbz*/*Xwmc157-7D* – 5.1 cM – *Xbarc53* {10267}.
QTL: A QTL, *QGb.unlp.6A*, for antixenosis was associated with *Xgwm1009-6A* and *Xgwm1185-6A* in a CS / CS (Synthetic 6A) DH population {10216}.

96. Reaction to Soil-Borne Cereal Mosaic
Syn.: Soilborne wheat mosaic.
Add at end of section: 'A major QTL, *QSbv.ksu-5D*, (R^2 = 0.38) was found in Karl 92*2 / TA 4152-4 {10273}; the resistance was contributed by Karl 92'.

93. Reaction to *Tapesia yallundae*
***Pch1*.** Add: **ma:** *Ep-d1b* was a more reliable marker than the STS for selecting *Pch1* {10238}.

102. Reaction to Wheat Streak Mosaic Virus
Insert introductory note: Vectored by wheat curl mites, *Eriophyes tulipae* and *E. tosichella*. See: Resistance to colonization by *Eriophyes tulipae*. According to {10226}, WSMV also may be seed-borne.

101. Reaction to Wheat Spindle Streak Mosaic Bymovirus
Insert introductory note: 'WSSMV is soil-borne and vectored by the fungus *Polymxa graminis*. This virus has some sequence similarity to Wheat Yellow Mosaic {10258}.'

Wss1 {10271}. Derived from *D. villosa*. 4D = T4VS·4DL {10271}. **v:** NAU413 {10271}.

XX. Reaction to Wheat Yellow Mosaic Virus
WYMV is soil-borne and vectored by the fungus *Polymxa graminis*. This virus has some sequence similarity to Wheat Spindle Streak Mosaic {10258}.

YmYF {10258}. 2DL {10258}. **v:** Yangfu 9311 {10258}.
ma: *Xpsp3039-2D*/*Xwmc181-2D* – 0.7 cM – *Xwmc41-3D* – 8.1 cM – *Xgwm349-2D* {10258}.

GENETIC LINKAGES

Chromosome 7AL

Sr22	—	*Lr20*/*Sr15*/*Pm1*	42 cM	{10263}

References

Updates

0308 Replace present entry with: Helguera M, Vanzetti L, Soria M, Khan IA, Kolmer J & Dubcovsky J 2005 PCR markers for *Triticum speltoides* leaf rust resistance gene *Lr51* and their use to develop isogenic hard red spring wheat lines. Crop Science 45: 728-734.
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New.

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VI. ABBREVIATIONS USED IN THIS VOLUME.

PLANT DISEASES, PESTS, AND PATHOGENS:

BYDV = barley yellow dwarf virus
BMV = barley mosaic virus
CCN = cereal cyst nematode, *Heterodera avenae*
FHB = Fusarium head blight
RWA = Russian wheat aphid
SBMV = soilborne mosaic virus
SLB = Septoria leaf blotch
WDF = wheat dwarf mosaic
WSBMV = wheat soilborne mosaic virus
WSMV = wheat streak mosaic virus
WSSMV = wheat spindle streak mosaci virus
WYMV = wheat yellow mosaic virus
E. graminis* f.sp. *tritici = *Erysiphe graminis* f.sp. *tritici* = the powdery mildew fungus
F. graminearum = *Fusarium graminearum* = head scab fungus
F. nivale = **Fusarium nivale** = snow mold fungus
H. avenae = *Heterodera avenae* = cereal cyst nematode
P. recondita* f.sp. *tritici = *Puccinia recondita* f.sp. *tritici* = leaf rust fungus
P. striiformis* f.sp. *tritici = *Puccinia striiformis* f.sp. *tritici* = strip rust fungus
P. graminis = *Polymyxa graminis* = wheat soilborne mosaic virus vector
R. cerealis = *Rhizoctonia cerealis* = sharp eyespot
R. solani = *Rhizoctonia solani* = Rhizoctonia root rot
R. padi = *Rhonpalosiphum padi* = bird cherry-oat aphid
S. tritici = *Septorai tritici* = Septoria leaf spot fungus
S. graminearum = *Schizaphus graminearum* = greenbug
St. nodorum = *Stagonospora nodorum* = Stagonospora glume blotch
T. indica = *Tilletia indica* = Karnal bunt fungus

SCIENTIFIC NAMES AND SYNONYMS OF GRASS SPECIES (NOTE: CLASSIFICATION ACCORDING TO VAN SLAGEREN, 1994):

A. strigosa = *Avena strigosa*
Ae. cylindrica = *Aegilops cylindrica* = *Triticum cylindricum*
Ae. geniculata = *Aegilops geniculata* = *Aegilops ovata* = *Triticum ovatum*
Ae. speltoides = *Aegilops speltoides* = *Triticum speltoides*
Ae. tauschii = *Aegilops tauschii* = *Aegilops squarrosa* = *Triticum tauschii*
Ae. triuncialis = *Aegilops triuncialis* = *Triticum triunciale*
Ae. umbellulata = *Aegilops umbellulata* = *Triticum umbellulatum*
Ae. peregrina = *Aegilops peregrina* = *Aegilops variabilis* = *Triticum peregrinum*
Ae. ventricosa = *Aegilops ventricosa* = *Triticum ventricosum*
S. cereale = *Secale cereale* = rye
T. aestivum = *Triticum aestivum* = hexaploid, bread, or common wheat
T. monococcum* subsp. *aegilopoides = *Triticum boeoticum*
T. dicoccon = *Triticum dicoccon* = *T. dicoccom*
T. durum = *Triticum durum* = durum, pasta, or macaroni wheat
T. macha = *Triticum macha*
T. militinae = *Triticum militinae*
T. spelta = *Triticum spelta*
T. timopheevii* subsp. *timopheevii = *Triticum timopheevii*
T. timopheevii* subsp. *armeniacum = *Triticum araraticum* = *T. araraticum*
T. turgidum* subsp. *dicoccoides = *Triticum dicoccoides* = wild emmer wheat
T. turgidum* subsp. *dicoccom = *Triticum dicoccum*
T. urartu = *Triticum urartu*
Th. bessarabicum = *Thinopyrum bassarabicum*

SCIENTIFIC JOURNALS AND PUBLICATIONS:

Agron Abstr = Agronomy Abstracts
Ann Wheat Newslet = *Annual Wheat Newsletter*
Cereal Res Commun = *Cereal Research Communications*
Curr Biol = *Current Biology*
Eur J Plant Path = *European Journal of Plant Pathology*
Funct Integ Genomics = *Functional Integrative Genomics*
Int J Plant Sci = *International Journal of Plant Science*
J Cereal Sci = *Journal of Cereal Science*
J Hered = *Journal of Heredity*
J Phytopath = *Journal of Phytopathology*
J Plant Phys = *Journal of Plant Physiology*
Mol Gen Genet = *Molecular and General Genetics*
PAG = Plant and Animal Genome (abstracts from meetings)
Phytopath = *Phytopathology*
Plant Breed = *Plant Breeding*
Plant, Cell and Envir = *Plant, Cell and Environment*
Plant Cell Rep = *Plant Cell Reporter*
Plant Physiol = *Plant Physiology*
Sci Agric Sinica = *Scientia Agricultura Sinica*
Theor Appl Genet = *Theoretical and Applied Genetics*
Wheat Inf Serv = *Wheat Information Service*

UNITS OF MEASUREMENT:

bp = base pairs
bu = bushels
cM = centimorgan
ha = hectares
kDa = kiloDaltons
m^2 = square meters
m^3 = cubic meters
μ = micron
me = milli-equivalents
mmt = million metric tons
mt = metric tons
Q = quintals
T = tons

MISCELLANEOUS TERMS:

Al = aluminum
AFLP = amplified fragment length polymorphism
ANOVA = analysis of variance
A-PAGE = acid polyacrylamide gel electrophoresis
AUDPC = area under the disease progress curve
BW = bread wheat
CHA = chemical hybridizing agent
CMS = cytoplasmic male sterile
CPS = Canadian Prairie spring wheat
DH = doubled haploid
DON = deoxynivalenol
ELISA = enzyme-linked immunosorbent assay
EMS = ethyl methanesulfonate
EST = expressed sequence tag

FAWWON = Facultative and Winter Wheat Observation Nursery
GA = gibberellic acid
GIS = geographic-information system
GM = genetically modified
HPLC = high pressure liquid chromatography
HMW = high-molecular weight (glutenins)
HRSW = hard red spring wheat
HRRW = hard red winter wheat
HWSW = hard white spring wheat
HWWW = hard white winter wheat
ISSR = inter-simple sequence repeat
kD = kilodalton
LMW = low molecular weight (glutenins)
MAS = marker-assisted selection
NSF = National Science Foundation
NILs = near-isogenic lines
NIR = near infrared
NSW = New South Wales, region of Australia
PAGE = polyacrylamide gel electrophoresis
PCR = polymerase chain reaction
PFGE = pulsed-field gel electrophoresis
PMCs = pollen mother cells
PNW = Pacific Northwest (a region of North America including the states of Oregon and Washington in the U.S. and the province of Vancouver in Canada)
PPO = polyphenol oxidase
QTL = quantative trait loci
RAPD = random amplified polymorphic DNA
RCB = randomized-complete block
RFLP = restriction fragment length polymorphism
RILs = recombinant inbred lines
RT-PCR = real-time polymerase-chain reaction
SAMPL = selective amplification of microsatellite polymorphic loci
SAUDPC = standardized area under the disease progress curve
SCAR = sequence-characterized amplified region
SDS-PAGE = sodium dodecyl sulphate polyacrylamide gel electrophoresis
SE-HPLE = size-exclusion high-performance liquid chromatography
SH = synthetic hexaploid
SNP = single nucleotide polymorphism
SRPN = Southern Regional Performance Nursery
SRWW = soft red winter wheat
SRSW = soft red spring wheat
STMA = sequence tagges microsatellite site
SWWW = soft white winter wheat
SSD = single-seed descent
SSR = simple-sequence repeat
STS = sequence-tagged site
TKW = 1,000-kernel weight
UESRWWN = Uniform Experimental Soft Red Winter Wheat Nursery
VIGS = virus-induced gene silencing

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X. VOLUME 53 MANUSCRIPT GUIDELINES.

Manuscript guidelines for the *Annual Wheat Newsletter*, volume 53. The required format for Volume 53 of the *Annual Wheat Newsletter* will be similar to Volume 52 and previous editions edited from Kansas State University.

CONTRIBUTIONS MAY INCLUDE:

—Current activities on your projects.
—New cultivars and germ plasm released.
—Special reports of particular interest, new ideas, etc., normally not acceptable for scientific journals.
—A list of recent publications.
—News: new positions, advancements, retirements, necrology.
—Wheat stocks; lines for distribution, special equipment, computer software, breeding procedures, techniques, etc.

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Follow the format in volume 44–52 of the *Newsletter* in coördinating and preparing your contribution, particularly for state, station, contributor names, and headings. Limited editing is done. Use Microsoft Word™ or send an RTF file that can be converted. Use Times 12 CPI and 1.0" (2.5 cm) margins. DO NOT use the table or column setting functions, create tables with tabs and spaces. Double space the text of your contribution if you must use a typewriter.

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DISTRIBUTION:

The primary method of distribution of Volume 53 will be CD-ROM in HTML format. These files can be read with any internet browser. A hard copy will be sent only if requested by 1 March, 2007, and will cost $40.

The *Annual Wheat Newsletter* will continue to be available (Vol. 37–53) through the Internet on GrainGenes, the USDA–ARS Wheat Database at http://wheat.pw.usda.gov/ggpages/awn/ and Internet gopher access at "http://wheat.pw.usda.gov/GG2/index.shtml".

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In the interest of remaining solvent, the NWIC has approved future distribution primarily by computer diskette. We are asking that you renew your contribution or, if you have not contributed in the past, to join the list of contributors. Contributions from individuals in the range of $25 to $50 play a significant role in financing the *Newsletter*. An increase in the number of individual contributors is very important, and we are confident that, with continued corporate support, we will be able to meet our financial obligations in 2007. The address for contibutions is Dr. Brett Carver, Department of Agronomy, Oklahoma State University, Stillwater, OK 74078, U.S.A.