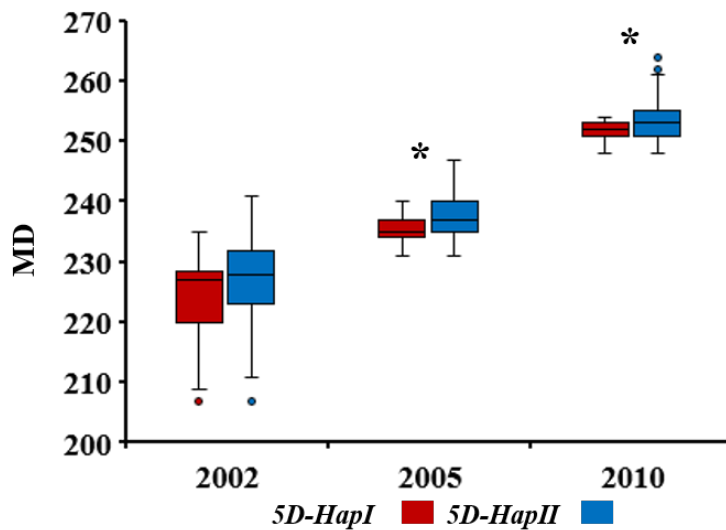


Supplementary Figure 1. Association of TaWUS-like-5D haplotypes with maturity days in the Chinese modern cultivars in three different environments; the x-axis represents different environments. The asterisks indicate significant differences between haplotypes (Student's t-test, *p<0.05, **p<0.01). **Note:** ■ 5D-HapI; ■ 5D-HapII.



Supplementary Table 1. Haplotypes of TaWUS-likes genes in eight wheat germplasm populations.

Haplotypes of TaWUS-likes genes in eight wheat germplasm populations								
Sr. #	Accession name	GRIN Accession ID	Year of Release	Wheat region	Population	TaWUS-like-5A	TaWUS-like-5B	TaWUS-like-5D
1	Xiaobaimai	-	-	VII	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
2	Hongpixiaomai	-	-	VII	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
3	Dabaipi	-	-	VII	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
4	Xiaohongpi	-	-	VII	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapI
5	Dingxingzhai	-	-	VII	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
6	Honglidangnian lao	-	-	VII	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
7	Chunxiaomai	-	-	VII	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
8	Huoliaomai	-	-	VII	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
9	Dahongmai	-	-	VII	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
10	Shaanxibaimai	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
11	Niuzhijia	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
12	Mahuaban	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
13	Jiahongmai	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
14	Hongjinmai	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapI
15	Baiqimai	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII

16	Xiaokouhong	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
17	Lanhuamai	-	-	I	Chinese wheat landraces	5A-HapI	5B-HapII	5D-HapI
18	Daimanghongmai	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapI
19	Zhuoludongmai	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapI
20	Hongmai	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
21	Honglaomai	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
22	Youmangbaifu	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
23	Hongpidongmai	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
24	Qingshiwumang	-	-	I	Chinese wheat landraces	5A-HapI	5B-HapII	5D-HapII
25	Youmangbaifu	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
26	Baiqiumai	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
27	Laomai	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
28	Xiaobaimang	-	-	I	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
29	Xianmai	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
30	Jiangxizao	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapI
31	Honghuazao	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
32	Jiangdongmen	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
33	Dahuangpi	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
34	Chongyanghongmai 1	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
35	Zaowutian	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
36	Liuzhutou	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
37	Chanbuzhi	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
38	Zhumaoyuanzitou	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
39	Shuilizhan	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
40	Huangshuibai	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
41	Baipu (luoqing)	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
42	Zaoxiaomai	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapI
43	Lanxizaoxiaomai	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapI
44	Wangshuibai	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
45	Wuyuanmai	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII

46	Chejianzi	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
47	Heshangmai	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
48	Nuomai	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
49	Mangxiaomai	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
50	Sankecun	-	-	III	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
51	Paozimai	-	-	III	Chinese wheat landraces	5A-HapI	5B-HapI	5D-HapII
52	Baiyoumai	-	-	VI	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
53	Yangmai	-	-	VI	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
54	Dunhuachunmai	-	-	VI	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
55	Huoqiu	-	-	VI	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
56	Daqingmang	-	-	VI	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
57	Guangtou	-	-	VI	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
58	Chaoanxiaomai	-	-	V	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
59	Chike	-	-	V	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
60	Songruimai	-	-	V	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
61	Shengen	-	-	V	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
62	Shanglinxiaomai	-	-	V	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
63	Baimangmai	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
64	Huangguaxian	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
65	Banjiemang	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
66	Laolaixia	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
67	Kulouding	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
68	Xishanbiansui	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
69	Honggoudou	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
70	Baihuomai	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
71	Sanyuehuang	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
72	Hongqiangchang	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
73	Youzimai	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
74	Pingyuan 50	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
75	Baibiansui	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapI

76	Baiqimai	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
77	Baituzitou	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
78	Youmangsaogudan	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
79	Fuyanghong	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
80	Mazhamai	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
81	Qiangchangmai	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
82	Huomai	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
83	Meiqianwu	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
84	Jianmai	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
85	Sanyuehuang	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
86	Xiaofuoshou	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
87	Hongheshangtuo	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
88	Dakoumai	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
89	Tumangmai	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
90	Baitiaoyu	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
91	Baimangmai	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
92	Dayuhua	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
93	Fumai	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
94	Laoqimai	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
95	Chushanbao	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
96	Zijiehong	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
97	dalibanmang	-	-	II	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapI
98	Liuyuehuang	-	-	IX	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
99	Gejiaxiang	-	-	IX	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapI
100	Geerhongmai	-	-	IX	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapI
101	Dachunbaisilengmai (2)	-	-	IX	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapI
102	Bailanghuimai	-	-	IX	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapI
103	Bendi Huanghuamai	-	-	IX	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
104	Zhahong	-	-	IX	Chinese wheat landraces	5A-HapI	5B-HapII	5D-HapI
105	Motuoxiaomai	-	-	IX	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII

106	Bianbachunmai-6	-	-	IX	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
107	Baimangxiaomai	-	-	IX	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapI
108	Wujiangzhuo	-	-	IX	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
109	Muzongzhuoga	-	-	IX	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
110	Kangdingxiaomai	-	-	IX	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
111	Shanmai	-	-	VIII	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
112	Yizhimai	-	-	VIII	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
113	Dabaimai	-	-	VIII	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapI
114	Galaohan	-	-	VIII	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
115	Huoliyan	-	-	VIII	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
116	Shanmai	-	-	VIII	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
117	Hongtuzi	-	-	VIII	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
118	Baidatou	-	-	VIII	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
119	Jinhuangmai	-	-	VIII	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
120	Hongmangmai	-	-	VIII	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
121	Dabaimai	-	-	VIII	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
122	Baiqitou	-	-	VIII	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
123	Baimazha	-	-	VIII	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
124	Laotutou	-	-	VIII	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
125	Tongjiabaxiaomai	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
126	Honghuamai	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
127	Baimaizi	-	-	IV	Chinese wheat landraces	5A-HapI	5B-HapI	5D-HapI
128	Chengduguangtuo	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
129	Jiangmai	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
130	Baihuamai	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
131	Huanxiangguo	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
132	Hanzhongbai	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
133	Xiaosanyuehuang	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
134	Suotiaohongmai	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
135	Hongxumai	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII

136	Zipi	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
137	Baimangmai	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
138	Hongmangzi	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
139	Yuqiumai	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
140	Yangmai	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
141	Yangmai	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
142	Zhushimai	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
143	Biantouguangk emai	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
144	Changmangshi biantou	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
145	Zhugoumai	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
146	Dianxihongkeya ngmai	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
147	Baidongmai	-	-	X	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
148	Hongchunmai	-	-	X	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
149	Chunmai	-	-	X	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
150	Hongdongmai	-	-	X	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
151	Hongdongmai	-	-	X	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
152	Wumangchunm ai	-	-	X	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
153	Hongchunmai	-	-	X	Chinese wheat landraces	5A-HapII	5B-HapI	5D-HapII
154	Hongjinbaoyin	-	-	X	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
155	Hongdongmai	-	-	X	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
156	Wumangchunm ai	-	-	X	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
157	Chinese Spring	-	-	IV	Chinese wheat landraces	5A-HapII	5B-HapII	5D-HapII
158	Dingxian 72	-	1936	I	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
159	Huabei 672	-	1956	I	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
160	Beijing 8	-	1963	I	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
161	Beijing 15	-	1970	I	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
162	Nongda 139	-	1968	I	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
163	Nongda 183	-	1955	I	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
164	Nongda 311	-	1963	I	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
165	Dongfanghong 3	-	1968	I	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII

166	Keyi 23	-	1962		Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
167	Jingnong 94-32	-	1994		Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
168	Jingnong 81-49	-	1980		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
169	Jinghua 1	-	1982		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapI
170	BeinongdaBL8	-	1980		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
171	Hebuyi 6068	-	1980		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapI
172	Jinghe 91-P19	-	1991		Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapI
173	Jingnong 86-89	-	1986		Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapI
174	Kecheng 1	-	1970		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
175	Xiaoshan 8	-	1980		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
176	Jingpin 12	-	1980		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
177	Pindong 904110-3	-	1990		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
178	Pinkang 244	-	1988		Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
179	Yuandong 821	-	1980		Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
180	Yuandong 822	-	1980		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
181	Fengkang 2	-	1979		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapI
182	Fengkang 8	-	1979		Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
183	An85zhong 124-1	-	1980		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
184	QiaoliangBW41	-	1980		Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
185	Zhongda89-60192-2	-	1989		Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
186	Beijing 8694	-	1985		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapI
187	Zhongyou 9507	-	1995		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
188	Lang 8302	-	1983		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
189	Jimai 17	-	1979		Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
190	Tang 85-5032	-	1980		Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
191	Tang 78042	-	1978		Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
192	Henong 3	-	1958		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
193	Taifu 1	-	1965		Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
194	Jinmai 8	-	1966		Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
195	Jinmai 16	-	1977		Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapI

196	Jinmai 31	-	1983	I	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
197	Jin 3052-5	-	1980	I	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
198	Jinzhong 103	-	1960	I	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
199	Changzhi 5557	-	1983	I	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
200	Changzhi 6406	-	1982	I	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-Hapl
201	Lvhan 328	-	1970	I	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
202	Jinmai 11	-	1977	I	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-Hapl
203	Taiyuan 351	-	1993	I	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
204	Jin 1410	-	-	I	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
205	Mingxian 169	-	1950	I	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
206	Gongnong 4	-	1968	I	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
207	Taiyuan 2112	-	1975	I	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
208	Yanan 11	-	1974	I	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
209	Yanan 18	-	1970	I	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
210	Pingliang 30	-	1968	I	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
211	Xifeng 16	-	1980	I	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
212	Pingliang 32	-	1977	I	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
213	Qingshui 15-41	-	1980	I	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-Hapl
214	Shite 14	-	1948	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
215	Shijiazhuang 407	-	1950	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
216	Shijiazhuang 4	-	1958	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
217	Shijiazhuang 34	-	1963	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
218	Shijiazhuang 54	-	1961	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
219	Zaoxinshi	-	1960	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
220	Pin 39	-	1974	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
221	Jimai 23	-	1983	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
222	Shi 82-5201	-	1982	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-HapII	5D-HapII
223	Cangzhou 1	-	1972	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
224	12040	-	1970	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
225	Hengshui 7004	-	1960	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII

22 6	Hengdalihong	-	1976	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
22 7	Ji93C6 156-2	-	1993	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
22 8	Jimai 20	-	1974	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-Hapl
22 9	Gaobi-13	-	-	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
23 0	Jimai 14	-	1974	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
23 1	Jimai 19	-	1981	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
23 2	Jishi 5032	-	1981	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
23 3	Han 4564	-	1998	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
23 4	1817	-	1936	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
23 5	Manjin 1	-	-	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
23 6	Jinyang 1045	-	-	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
23 7	Jinmai 20	-	1978	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
23 8	Jin 865096	-	1980	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
23 9	Jinmai 37	-	1988	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
24 0	Linyuan 129	-	1981	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
24 1	Pingyang 27	-	1980	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
24 2	Qida 195	-	1940	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
24 3	Jinan 2	-	1959	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
24 4	Jinan 9	-	1965	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-Hapl
24 5	Youbao	-	1964	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
24 6	Huangtai 103	-	-	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-Hapl
24 7	Tanshan 1	-	1971	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
24 8	Tanshan 4	-	1971	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
24 9	Jinan 17	-	1993	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
25 0	Lumai 22	-	1991	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
25 1	Jimai 19	-	2001	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
25 2	Lumai 10	-	1985	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
25 3	Lainongpinxi 22	-	1970	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-Hapl
25 4	Laizhou 953	-	1990	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-Hapl
25 5	Lumai 1	-	1975	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII

256	Lumai 5	-	1981	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-HaplII	5D-HaplII
257	ShannongPH 85-4	-	1980	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-Hapl	5D-HaplII
258	Lunong 784081	-	1970	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-HaplII	5D-HaplII
259	Lunong 86(5)174	-	1987	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-HaplII	5D-HaplII
260	Luzi 0863169	-	1987	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-Hapl	5D-HaplII
261	Luzi 0884142	-	1980	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HaplII
262	Tanshan 7	-	1970	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-HaplII	5D-HaplII
263	Teng 80-1-2	-	1980	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-HaplII	5D-Hapl
264	Changwei 20	-	1966	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-Hapl	5D-HaplII
265	Yanzhong 144	-	1984	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-Hapl	5D-HaplII
266	Yannong 3	-	1960	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-Hapl	5D-Hapl
267	Yannong 15	-	1976	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-Hapl	5D-HaplII
268	Lumai 7	-	1981	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-HaplII	5D-Hapl
269	Lumai 9	-	1981	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-Hapl	5D-HaplII
270	Neixiang 5	-	1958	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HaplII
271	Anxuan 2	-	1967	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-HaplII	5D-HaplII
272	Zhengzhou 6	-	1965	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-HaplII	5D-HaplII
273	Bonong 7023	-	1970	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-Hapl	5D-HaplII
274	Mengxian 2	-	1973	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-Hapl	5D-HaplII
275	Wan 7107	-	1971	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-Hapl	5D-HaplII
276	Yumai 18	-	1982	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HaplII
277	Yumai 54	-	1996	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-Hapl	5D-HaplII
278	Bainong 3217	-	1975	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-Hapl	5D-HaplII
279	Yumai 2	-	1977	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-HaplII	5D-Hapl
280	Lankao 906	-	1995	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HaplII
281	Yuanzhu 55	-	1962	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-HaplII	5D-HaplII
282	Zhengzhou 8761	-	1994	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-Hapl	5D-HaplII
283	Yumai 14	-	1982	II	Chinese Modern wheat Cultivars	5A-HaplII	5B-HaplII	5D-HaplII
284	Zhengzhou 4	-	1960	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HaplII
285	Yu 7106-0-22-1-3-2B	-	1978	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-HaplII	5D-HaplII

286	Zhengzhou 741	-	1974	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapI
287	Huan 852895-2	-	1989	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
288	Yu 30691-1-3	-	1986	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
289	Zheng 87305-0-13	-	1991	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
290	Zhengzi R84019-0-7-4-0-1	-	1991	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
291	Wenmai 6	-	1993	II	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
292	Yumai 7	-	1982	II	Chinese Modern wheat Cultivars	5A-HapI	5B-HapII	5D-HapII
293	Anmai95zhong 35	-	1995	II	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
294	Jingyan 60	-	1941	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
295	Bima 1	-	1947	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
296	Bima 4	-	1947	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
297	Shannong 9	-	1956	II	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
298	Xinong 6028	-	1951	II	Chinese Modern wheat Cultivars	5A-HapI	5B-HapII	5D-HapII
299	Fengchan 3	-	1966	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
300	Jinguangmai	-	1965	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
301	Aifeng 3	-	1971	II	Chinese Modern wheat Cultivars	5A-HapI	5B-HapII	5D-HapII
302	Xiaoyan 4	-	1972	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
303	Jingyang 30	-	1950	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
304	Baomai 3	-	1974	II	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
305	Baomai 5	-	1978	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
306	Qinmai 8	-	1985	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapI
307	Liken 2	-	1992	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
308	Shan 8786-0-3	-	-	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
309	Shan 70-1	-	1970	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
310	Shaannong 7859	-	1982	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
311	Shaannong 229	-	1990	II	Chinese Modern wheat Cultivars	5A-HapI	5B-HapII	5D-HapII
312	Fuzhuang 30	-	1967	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
313	Qinmai 3	-	1980	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
314	Fen 33	-	1990	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
31	Xiannong 39	-	1964	II	Chinese Modern	5A-	5B-	5D-

5					wheat Cultivars	HapII	Hapl	HapII
31 6	Xiannong 151	-	1973	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
31 7	Shan 7219-8-11-2-1	-	1970	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
31 8	Xiaoyan 6	-	1979	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
31 9	Gaoyou 503	-	1993	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
32 0	Ningfengxiaomai	-	1971	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
32 1	Huaimai 11	-	1977	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-HapII	5D-HapII
32 2	Huaimai 12	-	1980	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-Hapl
32 3	Xuzhou 19	-	1983	II	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
32 4	Xuzhou 21	-	1986	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
32 5	Xuzhou 22	-	1991	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-Hapl
32 6	Fu 84111	-	1984	II	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
32 7	Wo 80	-	1980	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
32 8	Xiaonong 76189	-	1976	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-Hapl
32 9	Zhangdong 29	-	1976	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
33 0	Pingliang 35	-	1985	II	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
33 1	Wanyuan 28	-	1970	III	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
33 2	Anhui 11	-	1966	III	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
33 3	Anhui 3	-	1958	III	Chinese Modern wheat Cultivars	5A-Hapl	5B-HapII	5D-HapII
33 4	Mengfeng 8	-	1968	III	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
33 5	Anhui 9	-	1959	III	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
33 6	Wanpin 8203	-	1988	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
33 7	Wan 85-50-fan 3	-	1986	III	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-Hapl
33 8	Wan 89193	-	1990	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
33 9	Wanpin 8337	-	1989	III	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-Hapl
34 0	Wanpin 8410	-	1990	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
34 1	Huadong 6	-	1958	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
34 2	Siyang 117	-	1975	III	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
34 3	Sumai 3	-	1974	III	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
34 4	Wangmai 17	-	1959	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII

34 5	Kang R 16	-	1989	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapI
34 6	Ningmaizi 44	-	1996	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapI
34 7	Yangmai 158	-	1993	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
34 8	Huadong 10	-	1950	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
34 9	Ning 8343	-	1983	III	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
35 0	Ning 8537	-	1985	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
35 1	Ningmaizi 3	-	1986	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
35 2	Ningmaizi 13	-	1985	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
35 3	Ning 8924	-	1989	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
35 4	Ningmaizi 19	-	1989	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
35 5	Sujian 14	-	1970	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
35 6	Nanda 8910	-	1989	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
35 7	Nanong 2293xuan	-	1970	III	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
35 8	Liyang 1	-	1950	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
35 9	Liyang 5	-	1950	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
36 0	Zhongshan 9	-	1960	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
36 1	Jiulan	-	1959	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
36 2	Zhemai 1	-	1970	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
36 3	Limai 16	-	1984	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
36 4	Jiamai 25	-	1970	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
36 5	Nanzhongzao	-	1970	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
36 6	Zhemai 4	-	1985	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
36 7	Zhexuan 78-23	-	1970	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
36 8	Emai 6	-	1966	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
36 9	Jingzhou 2	-	1965	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
37 0	Exi 84-1031	-	1980	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
37 1	Exi 652	-	-	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
37 2	Enmai 4	-	1980	III	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
37 3	E 811	-	1980	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
37 4	Yimai 1	-	1958	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII

375	Yixi 102	-	-	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
376	Xiangmai 8	-	1978	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
377	Xiangmai 12	-	1984	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
378	Zhongjiwan	-	1960	III	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
379	Xiang 791-2	-	1970	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
380	Zhongana 875	-	1970	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
381	Gan 162	-	-	III	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
382	Hechang 45	-	1950	IV	Chinese Modern wheat Cultivars	5A-HapI	5B-HapII	5D-HapII
383	Shuwan 8	-	1958	IV	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
384	Sichuan 51	-	1951	IV	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
385	Chuanmai 10	-	1968	IV	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
386	Chuanmai 19	-	1977	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
387	Chuanmai 22	-	1986	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
388	Yaanzao	-	1962	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
389	Fan 6	-	1969	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapI
390	Hongai 1	-	1975	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
391	Xichangfanxiu ai	-	1969	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
392	Chuanyu 12	-	1987	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
393	Mianyang 11	-	1976	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
394	Mianyang 26	-	1991	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
395	Chuan 83C-1001	-	1980	IV	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
396	Chuan 7911	-	1970	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
397	Xichang 5548-9	-	1970	IV	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
398	Pan 86001-3	-	1980	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
399	Pan 88080-3-1-1	-	1980	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
400	Bimai 10	-	1986	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
401	Bimai 13	-	1980	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
402	Bimai 26	-	1979	IV	Chinese Modern wheat Cultivars	5A-HapI	5B-HapII	5D-HapII
403	Xingzhuai 3	-	1990	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
404	Qianjian 28	-	-	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII

405	Guinong 10	-	1984	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-Hapl
406	Guinong Y13	-	1990	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
407	Gui 775	-	1990	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
408	Xingyingwu 3	-	-	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-Hapl
409	Kengua 1	-	1980	IV	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-Hapl
410	Xingyi 4	-	1990	IV	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
411	Hemai 8052	-	1980	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
412	Yunmai 28	-	1970	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
413	Yunmai 29	-	1972	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
414	Yunmai 33	-	1982	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
415	Yunmai 34	-	1983	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-Hapl
416	Fengmai 11	-	1960	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
417	Nanyuan 1	-	1972	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
418	Jingmai 2	-	1987	IV	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
419	Pu 170	-	1970	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
420	Dian 622-525-2	-	-	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
421	Dian 8613	-	1980	IV	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
422	Kangxiu 10	-	1966	V	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
423	Dixiuza	-	1965	V	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
424	Jinmai 2148	-	1973	V	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
425	Longxi 35	-	1977	V	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
426	Fufan 904	-	1984	V	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
427	Yueshan	-	1960	V	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
428	Taizhongxuan 2	-	1983	V	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
429	Taizhong 23	-	1945	V	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
430	Dongnong 101	-	1953	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
431	Hezuo 3	-	1950	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
432	Hei 78-1259	-	1970	VI	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
433	Heifu 84S1378	-	1980	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
434	Jia 6268A-549	-	1960	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII

43 5	Jia 84-S437	-	1980	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
43 6	Kefeng 3	-	1976	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
43 7	Kelao 4	-	1970	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
43 8	Kequn	-	1963	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
43 9	Kenbei 1	-	1970	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
44 0	Kenda 1	-	1970	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
44 1	Kenhong 15	-	1995	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
44 2	Long 79-9468	-	1970	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
44 3	Longfumai 2	-	1980	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapI
44 4	Longmai 18	-	1987	VI	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapI
44 5	Longmai 19	-	1987	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
44 6	Xinkehan 9	-	1980	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
44 7	Xinshuguang 1	-	1966	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
44 8	Xinshuguang 6	-	1967	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
44 9	Fengqiang 3	-	1979	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
45 0	Jichun 1016	-	1980	VI	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
45 1	Xiaobingmai 33	-	1994	VI	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
45 2	Jinghong 5	-	1967	VII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
45 3	Pinchun 14	-	1985	VII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
45 4	Jiba 7529	-	1975	VII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
45 5	Jichun 8055-1	-	1980	VII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
45 6	Yanbei 8	-	1979	VII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
45 7	Jinchun 3	-	1975	VII	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
45 8	Lianglaiyoubaipi xiaomai	-	1950	VII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
45 9	Bihongsui	-	1959	VII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
46 0	Neimai 11	-	1978	VII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
46 1	Ganmai 6	-	1958	VIII	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
46 2	Ganmai 8	-	1964	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
46 3	Longchun 7	-	1974	VIII	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
46 4	Dingxi 24	-	1969	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII

46 5	Linnong 12	-	1976	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
46 6	Jinmai 4	-	1971	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
46 7	Wudu 5	-	1971	VIII	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
46 8	Longdong 1	-	1994	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
46 9	Xifeng 9	-	1971	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
47 0	Xifeng 10	-	1971	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
47 1	Qingfeng 1	-	1977	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
47 2	Zhangchun 9	-	1975	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
47 3	Ganmai 46	-	1960	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
47 4	Huining 5	-	1970	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
47 5	Huining 10	-	1970	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
47 6	Wuchun 1	-	1979	VIII	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
47 7	Jinmai 303	-	1973	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
47 8	Gan Tal21-10-2	-	1980	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
47 9	Gan 8221-1-1	-	1980	VIII	Chinese Modern wheat Cultivars	5A-HapI	5B-HapI	5D-HapII
48 0	Gan 8358-2	-	1980	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
48 1	Hongtu	-	1968	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
48 2	Ningchun 4	-	1976	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapI
48 3	Shi 886	-	1980	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
48 4	Ning 87N2801	-	1980	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
48 5	Jian 72	-	-	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
48 6	Xiangnong 3	-	1965	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
48 7	Gaoyuan 506	-	1971	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
48 8	Huzhuhong	-	1964	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
48 9	Qingchun 25	-	1972	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
49 0	Qingchun 28	-	1970	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
49 1	Gaoyuan 338	-	1976	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
49 2	Gaoyuan 602	-	1982	VIII	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
49 3	Zangdong 4	-	1973	IX	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII
49 4	Rikaze 7	-	1965	IX	Chinese Modern wheat Cultivars	5A-HapII	5B-HapI	5D-HapII

49 5	Rikaze 8	-	1965	IX	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
49 6	Rikaze 54	-	1970	IX	Chinese Modern wheat Cultivars	5A-Hapl	5B-Hapl	5D-HapII
49 7	Xindong 2	-	1966	X	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
49 8	Changdong 5	-	1982	X	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
49 9	Kashi 1	-	1970	X	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
50 0	Kashibaipi	-	1952	X	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
50 1	Tuokexun 1	-	1966	X	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
50 2	Tuchun 6	-	1980	X	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-Hapl
50 3	Xinchun 2	-	1984	X	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
50 4	Jiudong 2	-	1983	X	Chinese Modern wheat Cultivars	5A-HapII	5B-HapII	5D-HapII
50 5	Yinong 8	-	1974	X	Chinese Modern wheat Cultivars	5A-HapII	5B-Hapl	5D-HapII
50 6	AMADEUS	-	1985	Austria	European wheat cultivars	5A-HapII	5B-HapII	5D-Hapl
50 7	BRILLANT	-	1976	Austria	European wheat cultivars	5A-HapII	5B-HapII	5D-Hapl
50 8	DUCK	-	1985	Austria	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
50 9	ERLA KOLBEN	-	1961	Austria	European wheat cultivars	5A-HapII	5B-HapII	5D-Hapl
51 0	FERDINAND	-	1982	Austria	European wheat cultivars	5A-Hapl	5B-HapII	5D-HapII
51 1	HARRACH-6112	-	1978	Austria	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
51 2	LENTIA	-	1973	Austria	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
51 3	MULTIBRAUN	-	1964	Austria	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
51 4	NEUHOF 1	-	1969	Austria	European wheat cultivars	5A-Hapl	5B-HapII	5D-HapII
51 5	OENUS	-	1977	Austria	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
51 6	PRIMUS	-	1978	Austria	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
51 7	PROBSTDORFER ACCORD	-	1967	Austria	European wheat cultivars	5A-Hapl	5B-Hapl	5D-HapII
51 8	PROBSTDORFER MARTIN	-	1982	Austria	European wheat cultivars	5A-HapII	5B-Hapl	5D-HapII
51 9	PROBSTDORFER PERLO	-	1978	Austria	European wheat cultivars	5A-Hapl	5B-Hapl	5D-HapII
52 0	PROBSTDORFER POKAL	-	1979	Austria	European wheat cultivars	5A-HapII	5B-Hapl	5D-HapII
52 1	PROTECTOR	-	1974	Austria	European wheat cultivars	5A-HapII	5B-Hapl	5D-HapII
52 2	RINNER WINTERWEISEN	-	1972	Austria	European wheat cultivars	5A-HapII	5B-Hapl	5D-HapII
52 3	STABIL	-	1963	Austria	European wheat cultivars	5A-Hapl	5B-HapII	5D-HapII
52 4	SVENNO GRANNEN	-	1966	Austria	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII

52 5	VERBESSERTER -STJOHANNER	-	1962	Austria	European wheat cultivars	5A- HapII	5B- Hapl	5D- HapII
52 6	AROSO	-	1972	Belgium	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
52 7	CAMA	-	1967	Belgium	European wheat cultivars	5A- HapII	5B- Hapl	5D- Hapl
52 8	CELESTA	-	1977	Belgium	European wheat cultivars	5A- Hapl	5B- Hapl	5D- HapII
52 9	CORA	-	1979	Belgium	European wheat cultivars	5A- Hapl	5B- HapII	5D- HapII
53 0	HYBRIDE DU CENTENAIRE	-	1935	Belgium	European wheat cultivars	5A- Hapl	5B- HapII	5D- HapII
53 1	JUFY I	-	1954	Belgium	European wheat cultivars	5A- Hapl	5B- HapII	5D- Hapl
53 2	MARYSA	-	1975	Belgium	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
53 3	Odeon	-	1984	Belgium	European wheat cultivars	5A- Hapl	5B- HapII	5D- HapII
53 4	PANTER	-	1957	Belgium	European wheat cultivars	5A- Hapl	5B- HapII	5D- HapII
53 5	PHOEBUS	-	1954	Belgium	European wheat cultivars	5A- HapII	5B- Hapl	5D- HapII
53 6	PONY	-	1985	Belgium	European wheat cultivars	5A- Hapl	5B- Hapl	5D- HapII
53 7	PRIMA	-	1957	Belgium	European wheat cultivars	5A- HapII	5B- Hapl	5D- HapII
53 8	PROFESSEUR DELOS	-	1937	Belgium	European wheat cultivars	5A- HapII	5B- Hapl	5D- Hapl
53 9	RENVAL	-	1977	Belgium	European wheat cultivars	5A- HapII	5B- Hapl	5D- HapII
54 0	RUSTIQUE	-	1961	Belgium	European wheat cultivars	5A- Hapl	5B- HapII	5D- HapII
54 1	STELLA	-	1957	Belgium	European wheat cultivars	5A- Hapl	5B- HapII	5D- Hapl
54 2	TRESOR_DE_G EMBOUX	-	1983	Belgium	European wheat cultivars	5A- HapII	5B- Hapl	5D- HapII
54 3	BULGARIA301	-	-	Bulgaria	European wheat cultivars	5A- Hapl	5B- Hapl	5D- HapII
54 4	CARODEJKA'S'-	-	-	Bulgaria	European wheat cultivars	5A- Hapl	5B- Hapl	5D- HapII
54 5	COLOMBO	-	-	Bulgaria	European wheat cultivars	5A- HapII	5B- Hapl	5D- HapII
54 6	GUSSENKA	-	-	Bulgaria	European wheat cultivars	5A- Hapl	5B- HapII	5D- HapII
54 7	IANTER	-	-	Bulgaria	European wheat cultivars	5A- HapII	5B- Hapl	5D- HapII
54 8	IASEN	-	-	Bulgaria	European wheat cultivars	5A- HapII	5B- Hapl	5D- HapII
54 9	KS414	-	-	Bulgaria	European wheat cultivars	5A- HapII	5B- Hapl	5D- HapII
55 0	OAZIS	-	-	Bulgaria	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
55 1	PERLA 1	-	-	Bulgaria	European wheat cultivars	5A- HapII	5B- Hapl	5D- HapII
55 2	PLISKA	-	-	Bulgaria	European wheat cultivars	5A- Hapl	5B- HapII	5D- HapII
55 3	PLISKA	-	-	Bulgaria	European wheat cultivars	5A- HapII	5B- Hapl	5D- HapII
55 4	PLOUDIN 1015	-	-	Bulgaria	European wheat cultivars	5A- Hapl	5B- Hapl	5D- HapII

55 5	PRIASPA	-	-	Bulgaria	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI
55 6	RUSALKA	-	-	Bulgaria	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
55 7	SADOV08	-	-	Bulgaria	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI
55 8	SKITIA	-	-	Bulgaria	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
55 9	SLAVYANKA	-	-	Bulgaria	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
56 0	STEPNO	-	-	Bulgaria	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
56 1	TRAJANA	-	-	Bulgaria	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
56 2	UBILEI	-	-	Bulgaria	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
56 3	YANA	-	-	Bulgaria	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
56 4	ARDUS	-	1972	Switzerland	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
56 5	ARINA	-	1981	Switzerland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
56 6	BERNINA	-	1983	Switzerland	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
56 7	BESSO	-	1982	Switzerland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
56 8	Bretonnieres	-	1929	Switzerland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
56 9	EIGER	-	1980	Switzerland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
57 0	FERMO	-	1968	Switzerland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
57 1	GRANAT	-	1970	Switzerland	European wheat cultivars	5A-HapI	5B-HapII	5D-HapI
57 2	JUNZI	-	1987	Switzerland	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
57 3	LITA	-	1970	Switzerland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
57 4	Lona	-	1991	Switzerland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
57 5	MONT-CALME	-	1928	Switzerland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
57 6	PAILLY	-	1929	Switzerland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
57 7	PROBELLE	-	1965	Switzerland	European wheat cultivars	5A-HapI	5B-HapI	5D-HapI
57 8	Rouge de la Venoge	-	1929	Switzerland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
57 9	ROUGE DE SORAT	-	1929	Switzerland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
58 0	ROUGE DE VAUMARCUS	-	1929	Switzerland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
58 1	VUITEBOEUF	-	1929	Switzerland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
58 2	Wagenburger	-	1929	Switzerland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
58 3	ZENTA	-	1979	Switzerland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
58 4	ASTA	-	1994	Czechoslovakia	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII

58 5	Blava	-	1992	Czechoslovakia	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
58 6	BREA	-	1996	Czechoslovakia	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
58 7	BRUTA	-	1994	Czechoslovakia	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
58 8	DOBROVICKA	-	1936	Czechoslovakia	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
58 9	HODONINSKA_OSINATKA	-	1930	Czechoslovakia	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
59 0	KASTICKA_OSINATKA	-	1954	Czechoslovakia	European wheat cultivars	5A-HapI	5B-HapII	5D-HapI
59 1	Lada	-	1964	Czechoslovakia	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
59 2	Linda	-	1992	Czechoslovakia	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
59 3	Livia	-	1991	Czechoslovakia	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
59 4	Maja	-	1990	Czechoslovakia	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
59 5	Oska	-	1971	Czechoslovakia	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
59 6	Pavlina	-	1997	Czechoslovakia	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
59 7	Regina	-	1982	Czechoslovakia	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
59 8	Saxana	-	1987	Czechoslovakia	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
59 9	Senta	-	1991	Czechoslovakia	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
60 0	SLOVENSKA_INTENSIVNA	-	1946	Czechoslovakia	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
60 1	Viginta	-	1984	Czechoslovakia	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
60 2	Vlasta	-	1999	Czechoslovakia	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
60 3	ZDAR	-	1983	Czechoslovakia	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
60 4	ZIDLOCHOVICKA_OSINATKA	-	1938	Czechoslovakia	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
60 5	Zora	-	1971	Czechoslovakia	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
60 6	Almus	-	1973	Germany	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
60 7	CARDOS	-	1998	Germany	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
60 8	CARIMULTI	-	1975	Germany	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
60 9	CARPO	-	1962	Germany	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
61 0	CRIEWENER	-	1949	Germany	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
61 1	Fortschritt	-	1960	Germany	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI
61 2	GARANT	-	1981	Germany	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
61 3	Heines Kolben	-	1971	Germany	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
61 4	Ibis	-	1962	Germany	European wheat cultivars	5A-HapI	5B-HapI	5D-HapI

61 5	KOLIBRI	-	1966	Germany	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
61 6	Mikon	-	1988	Germany	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
61 7	MIRAS	-	1984	Germany	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
61 8	Ordeal	-	1997	Germany	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
61 9	PROBAT	-	1955	Germany	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
62 0	RECORD	-	1995	Germany	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI
62 1	Riebesel 47-51	-	1930	Germany	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
62 2	SIEGERLANDER	-	1917	Germany	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
62 3	Taras	-	1982	Germany	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
62 4	Trane	-	1992	Germany	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
62 5	TREND	-	1999	Germany	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
62 6	ARAGON 03	-	1967	Spain	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
62 7	ARGANDA	-	1983	Spain	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
62 8	AZULON	-	-	Spain	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
62 9	BIVONA	-	1960	Spain	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
63 0	CABEZON DE GONI	-	1929	Spain	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
63 1	CABEZON_DE_V ALDEGONI	-	1929	Spain	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
63 2	CAMPEADOR	-	1966	Spain	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
63 3	CANALEJA 46	-	1964	Spain	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI
63 4	Candeal	-	1927	Spain	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
63 5	CARRION-PIRON	-	-	Spain	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
63 6	CATALAN-COMPACTO	-	-	Spain	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
63 7	COMPADRE	-	-	Spain	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
63 8	JEJA DE VALENCIA	-	1929	Spain	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
63 9	MAIORCA	-	1959	Spain	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
64 0	MONTEJUICK	-	1971	Spain	European wheat cultivars	5A-HapI	5B-HapI	5D-HapI
64 1	PANE 14	-	-	Spain	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
64 2	PANE10	-	-	Spain	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
64 3	PANE-247	-	1960	Spain	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
64 4	TREMESINO MONTEROSA	-	1929	Spain	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII

645	TREMESINO XINZO DE LIMIA	-	1929	Spain	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
646	VILLAVERDE DE TRUCIOS	-	1929	Spain	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI
647	XEXA DEL VALL	-	1929	Spain	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
648	ANO48-19	-	-	Finland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
649	ANTTI	-	1955	Finland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
650	APU	-	1949	Finland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
651	JO3021	-	1971	Finland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
652	JOUKO	-	-	Finland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
653	JUVA	-	-	Finland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
654	KIMMO	-	1941	Finland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
655	NISU	-	1966	Finland	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
656	Olympia	-	1941	Finland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
657	SOPU 7	-	1935	Finland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI
658	ALIGRE	-	1995	France	European wheat cultivars	5A-HapI	5B-HapII	5D-HapI
659	ALLIES	-	1917	France	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
660	ARPEGE	-	1997	France	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
661	AZTEC	-	1994	France	European wheat cultivars	5A-HapI	5B-HapII	5D-HapI
662	BLE DES DOMES	-	1940	France	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
663	CAPITOLE	-	1964	France	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
664	CHAMPLEIN	-	1959	France	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
665	ELITE LEPEUPLE	-	1954	France	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
666	ETOILE DE_CHOISY	-	1950	France	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
667	EUREKA	-	1991	France	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
668	FLORENCE_AU RORE	-	1933	France	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
669	GOYA	-	1971	France	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
670	HYBRIDE_DE_BERSEE	-	1936	France	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
671	HYBRIDE_DE_LA_PAIX	-	1920	France	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
672	HYBRIDE_DU_TRESOR	-	1900	France	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
673	ISENGRAIN	-	1997	France	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
674	JAPHET	-	1906	France	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI

67 5	MAGALI BLONDEAU	-	1962	France	European wheat cultivars	5A- HapII	5B- Hapl	5D- HapII
67 6	MARNE DESPREZ	-	1954	France	European wheat cultivars	5A- Hapl	5B- Hapl	5D- HapII
67 7	MELBOR	-	1886	France	European wheat cultivars	5A- Hapl	5B- Hapl	5D- HapII
67 8	NORD-DESPREZ	-	1945	France	European wheat cultivars	5A- Hapl	5B- HapII	5D- HapII
67 9	PANIFOR	-	1996	France	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
68 0	SOISSONS	-	1987	France	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
68 1	TADEPI	-	1949	France	European wheat cultivars	5A- HapII	5B- Hapl	5D- HapII
68 2	VILMORIN 53	-	1952	France	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
68 3	VILMORIN23	-	1923	France	European wheat cultivars	5A- HapII	5B- Hapl	5D- HapII
68 4	VIRTUOSE	-	1998	France	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
68 5	YGA_BLONDEA U	-	1938	France	European wheat cultivars	5A- Hapl	5B- Hapl	5D- HapII
68 6	Banner	-	1972	Britain	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
68 7	BARON	-	1949	Britain	European wheat cultivars	5A- HapII	5B- Hapl	5D- Hapl
68 8	BENEFACTOR	-	1936	Britain	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
68 9	BRANDO	-	1999	Britain	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
69 0	BRIGADIER	-	1992	Britain	European wheat cultivars	5A- HapII	5B- Hapl	5D- HapII
69 1	Brock	-	1985	Britain	European wheat cultivars	5A- Hapl	5B- HapII	5D- HapII
69 2	GOLDENTROP	-	1836	Britain	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
69 3	HICKLING	-	1899	Britain	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
69 4	HICKLING BLANC DE MARS	-	1899	Britain	European wheat cultivars	5A- Hapl	5B- HapII	5D- Hapl
69 5	MALACCA	-	1997	Britain	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
69 6	Maris Beacon	-	1969	Britain	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
69 7	Maris Bilbo	-	1972	Britain	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
69 8	Maris Nimrod	-	1971	Britain	European wheat cultivars	5A- Hapl	5B- HapII	5D- HapII
69 9	MARKET	-	1999	Britain	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
70 0	Norman	-	1981	Britain	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
70 1	SCHIREFF_SQU AREHEAD	-	1899	Britain	European wheat cultivars	5A- HapII	5B- HapII	5D- Hapl
70 2	SHAMROCK	-	1998	Britain	European wheat cultivars	5A- HapII	5B- HapII	5D- Hapl
70 3	SHANGO	-	1994	Britain	European wheat cultivars	5A- HapII	5B- HapII	5D- HapII
70	SHIREFF-	-	1849	Britain	European wheat	5A-	5B-	5D-

4	BLANC-BARBU				cultivars	HapII	HapII	HapII
70 5	TORFIDA	-	1992	Britain	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
70 6	VICTOR	-	1908	Britain	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
70 7	Virtue	-	1979	Britain	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
70 8	ALFOLD	-	1990	Hungary	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
70 9	Banatka	-	1929	Hungary	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
71 0	BANATKA	-	1924	Hungary	European wheat cultivars	5A-HapI	5B-HapII	5D-HapI
71 1	BETA BANKUTI	-	1954	Hungary	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
71 2	ESTERHAZY	-	1929	Hungary	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
71 3	FERTODI293	-	1957	Hungary	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
71 4	GK Bank	-	1977	Hungary	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
71 5	GK BENCE	-	1985	Hungary	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
71 6	GK CSUROS	-	1991	Hungary	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
71 7	GK Istvan	-	1984	Hungary	European wheat cultivars	5A-HapI	5B-HapI	5D-HapI
71 8	GK ORZSE	-	1985	Hungary	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
71 9	GK Szeged	-	1976	Hungary	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
72 0	GK_BARNA	-	1990	Hungary	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
72 1	GK_SAGVARI	-	1982	Hungary	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
72 2	GKF2	-	1969	Hungary	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
72 3	KARCAGI 522	-	1959	Hungary	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
72 4	KOMPOLTI 169	-	1956	Hungary	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
72 5	LOVASZPATONA I 407	-	1953	Hungary	European wheat cultivars	5A-HapI	5B-HapI	5D-HapI
72 6	MARTONVASARI 23	-	1991	Hungary	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
72 7	Mv Magvas	-	1998	Hungary	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
72 8	MV SUMMA	-	1998	Hungary	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
72 9	Mv Tamara	-	1998	Hungary	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
73 0	Adria	-	1975	Italy	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
73 1	Aquila	-	1952	Italy	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
73 2	ARGELATO	-	1964	Italy	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
73 3	AUTONOMIA	-	1938	Italy	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII

73 4	CAMPODORO	-	1952	Italy	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
73 5	CARLOTTA STRAMPELLI	-	1905	Italy	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
73 6	CERVARO	-	1922	Italy	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
73 7	ELIA	-	1959	Italy	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
73 8	Falchetto	-	1955	Italy	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
73 9	FLAMINIO	-	1966	Italy	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
74 0	Fortunato	-	1948	Italy	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
74 1	FRASSINETTO 405	-	1927	Italy	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
74 2	FUNO	-	1944	Italy	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
74 3	Funone	-	1955	Italy	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
74 4	GENTILE ROSSO	-	1929	Italy	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
74 5	Lario	-	1969	Italy	European wheat cultivars	5A-HapI	5B-HapII	5D-HapI
74 6	LEONE	-	1955	Italy	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
74 7	LONTRA	-	1964	Italy	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
74 8	Loreto	-	1982	Italy	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
74 9	Maestra	-	1990	Italy	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
75 0	MARA	-	1947	Italy	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
75 1	Pegaso	-	1987	Italy	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
75 2	BALDUS	-	1992	Holland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
75 3	BERCY	-	1993	Holland	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
75 4	Cleo	-	1962	Holland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
75 5	Donata	-	1979	Holland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
75 6	DONG	-	1990	Holland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
75 7	EMMA	-	1903	Holland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
75 8	Flevina	-	1964	Holland	European wheat cultivars	5A-HapI	5B-HapII	5D-HapI
75 9	KNAL	-	1990	Holland	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
76 0	LOUVRE	-	1988	Holland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
76 1	MAGNUS	-	1978	Holland	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
76 2	MANSHOLTS-WITTE	-	1921	Holland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
76 3	MILDRESS	-	1979	Holland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII

76 4	ORCA	-	1962	Holland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
76 5	PANG	-	1990	Holland	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
76 6	PLOF	-	1990	Holland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
76 7	ROTONDE	-	1975	Holland	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
76 8	SAMBO	-	1962	Holland	European wheat cultivars	5A-HapI	5B-HapI	5D-HapI
76 9	Sarno	-	1984	Holland	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
77 0	STARING	-	1930	Holland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
77 1	VADA	-	1930	Holland	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
77 2	VASCO	-	1982	Holland	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
77 3	VERSAILLES	-	1997	Holland	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
77 4	Banatka	-	1930	Poland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
77 5	DANKOWSKA IDEALNA	-	1920	Poland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
77 6	EKA NOWA	-	1962	Poland	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
77 7	GRANIATKA ZACHODNIA	-	1936	Poland	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
77 8	JANA	-	1975	Poland	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
77 9	KOMOROWSKA-POL	-	1951	Poland	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
78 0	KUTNOWIANKA	-	1964	Poland	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
78 1	LUNA	-	1970	Poland	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
78 2	MODRA	-	1978	Poland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
78 3	OLZA	-	1955	Poland	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
78 4	OSTKA POPULARNA	-	1953	Poland	European wheat cultivars	5A-HapI	5B-HapII	5D-HapI
78 5	PODKOWIANKA	-	1957	Poland	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
78 6	POLANKA	-	1984	Poland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
78 7	Przodownica	-	1955	Poland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
78 8	ROZTOCKA	-	1964	Poland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
78 9	Slazaczka	-	1964	Poland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
79 0	Szelejewska	-	1955	Poland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
79 1	WENEDA	-	1984	Poland	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
79 2	WYSOKOLITEWKA 218	-	1935	Poland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
79 3	Wysokolitewka Sztynnosłoma	-	1951	Poland	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII

79 4	ZELAZNA	-	1955	Poland	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
79 5	ALMONSOR	-	-	Portugal	European wheat cultivars	5A-HapI	5B-HapII	5D-HapI
79 6	Amarelo de Barba Branca	-	1927	Portugal	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI
79 7	ELVAS 61P17	-	-	Portugal	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
79 8	ELVAS 62H12	-	-	Portugal	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
79 9	ELVAS 62H9	-	-	Portugal	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
80 0	ELVAS 63P16	-	-	Portugal	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
80 1	ELVAS 68H16	-	-	Portugal	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
80 2	ELVAS-60P24	-	-	Portugal	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
80 3	PADEIRA	-	-	Portugal	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
80 4	RIBEIRO INERME	-	-	Portugal	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
80 5	RIBEIRO~PI185 706	-	-	Portugal	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
80 6	RIBEIRO~PI192 624	-	-	Portugal	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
80 7	RIBEIRO~PI266 901	-	-	Portugal	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
80 8	RUIVO	-	1929	Portugal	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
80 9	TUA	-	1989	Portugal	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
81 0	ALBOTA	-	1986	Rumania	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
81 1	ARIESAN	-	1986	Rumania	European wheat cultivars	5A-HapI	5B-HapII	5D-HapII
81 2	BUCOVINA	-	1980	Rumania	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
81 3	CERES	-	1973	Rumania	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
81 4	DOINA	-	1977	Rumania	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
81 5	FAVORIT	-	1970	Rumania	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
81 6	FLAMURA 80	-	1980	Rumania	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII
81 7	FUNDULEA 4	-	1987	Rumania	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI
81 8	FUNDULEA 262	-	1983	Rumania	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
81 9	FUNDULEA133	-	1984	Rumania	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
82 0	IULIA-ROM	-	1973	Rumania	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
82 1	LOVRIN 10	-	1974	Rumania	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
82 2	LOVRIN 13	-	1973	Rumania	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
82 3	LOVRIN 29	-	1975	Rumania	European wheat cultivars	5A-HapI	5B-HapI	5D-HapII

82 4	LOVRIN 32	-	1979	Rumania	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
82 5	LOVRIN 34	-	1980	Rumania	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI
82 6	MAGURELE 7	-	1974	Rumania	European wheat cultivars	5A-HapI	5B-HapII	5D-HapI
82 7	ODVOS 5	-	1972	Rumania	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
82 8	POTAISSA	-	1976	Rumania	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
82 9	SILVANA	-	1976	Rumania	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI
83 0	TRANSILVANIA1	-	1982	Rumania	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI
83 1	TURDA 195	-	1973	Rumania	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
83 2	ALGOT	-	1964	Sweden	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
83 3	AROS	-	1947	Sweden	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
83 4	ATLE	-	1937	Sweden	European wheat cultivars	5A-HapII	5B-HapI	5D-HapI
83 5	BANCO	-	1953	Sweden	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
83 6	CROUSTY	-	1994	Sweden	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI
83 7	Diamant	-	1928	Sweden	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
83 8	ERGO II	-	1949	Sweden	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI
83 9	FAGOTT	-	1987	Sweden	European wheat cultivars	5A-HapII	5B-HapII	5D-HapI
84 0	IDUNA	-	1910	Sweden	European wheat cultivars	5A-HapII	5B-HapI	5D-HapII
84 1	KUBB	-	1922	Sweden	European wheat cultivars	5A-HapII	5B-HapII	5D-HapII
84 2	L21	K28582	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
84 3	L28	K28589	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
84 4	Φ2a	K28620	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapI
84 5	Φ3a	K28623	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
84 6	G7	K28702	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
84 7	G14	K28706	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
84 8	B55	K28872	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
84 9	D35	K28926	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
85 0	Ак-Урук	K43261	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapI
85 1	Чуиониозюахоп	K43943	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
85 2	Зунюодахапиау	K43944	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
85 3	Lvrin 37	-	-	Russia	Russian wheat cultivars	5A-HapI	5B-HapI	5D-HapII

85 4	Vilmorin 30	K21480	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
85 5	Волгоградская	-	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
85 6	Vencubbin/s	K35653s	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
85 7	Сорт-2	-	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
85 8	Зерноградская	K59987	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
85 9	Зимородок	K63040	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
86 0	Багра	K56401	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
86 1	Багра	-	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
86 2	Казанская 84	-	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
86 3	Сая 95009	-	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
86 4	Danchi Komugi	K57350	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
86 5	Gabo	K38575	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
86 6	Gabo-2	K38580	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
86 7	Gabo-3	K38570	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
86 8	Ellysee/s	K51950s	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
86 9	Эритроспермум 7291	K57487	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
87 0	Тарасовская 61	K57572	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
87 1	Куйбышевская	K57943	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
87 2	Черноземка 153	K57982	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
87 3	Югина	K60672	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
87 4	A33	K28777	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
87 5	Багра-9	-	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
87 6	Сорт-1	-	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
87 7	Erythrosperrnum 81	-	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
87 8	Безостая 2	K42791	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
87 9	Top/s	K50725s	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
88 0	Wim	K57731	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
88 1	Danchi Komugi /t	K57350t	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
88 2	Лютесценс 329	K6234	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl
88 3	Landrace	K7954	-	Russia	Russian wheat cultivars	5A-Hapl	5B-Hapl	5D-Hapl

884	Landrace	K19625	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
885	Bencubbin/wt	K35653 wt	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
886	Gabo	K38574	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
887	Донская юбилейная	K60718	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
888	Сибирская Нива	K61548	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
889	Даха	K61978	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
890	Бугдай	K14632	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapI
891	Банаткя	K37789	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
892	Gaba-1	K38579	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
893	Крымская.обл.	K9500	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
894	Сандомирка	K3011	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapI
895	Lvrin 36	-	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapI
896	Vilmorin 30	K21480	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
897	Волгоградская 84	-	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
898	Краснодарская 39	K45879	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapI
899	Мироновская 28	-	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
900	Сандомирка	K8447	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
901	A06/w	K59348 w	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
902	Анвхой11/s	K61274/s	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
903	Local	K58202	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapI
904	Local	K58203	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
905	Kavkaz	K58951	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
906	Ablaca	K58954	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
907	Wheaton	K59032	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
908	Прпобокяя	-	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapI
909	Cabezorro III	K59217	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapI
910	Liviongston	K19484	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
911	E68	K28535	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
912	S5	K29098	-	Russia	Russian wheat cultivars	5A-HapI	5B-HapII	5D-HapII
913	H3(a)1	K29126	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII

914	Саратовская 51	K58042	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
915	Боливия	K49465	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
916	Бурятская	K48773	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
917	ErythrospERM 59/r	K61160r	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapI
918	Norm	K62875	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
919	Yuriya 79	K62888	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
920	Red River	K46976	-	Russia	Russian wheat cultivars	5A-HapI	5B-HapII	5D-HapII
921	Ablaca-3	K58956	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
922	Wheaton-1	K59033	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapII	5D-HapII
923	Yuriya 80	K62889	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapII
924	Fortuna/t	K46963t	-	Russia	Russian wheat cultivars	5A-HapII	5B-HapI	5D-HapI
925	AS-2002	-	2011	SOUTH-PUNJAB	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
926	Auqab-2000	-	2000	PUNJAB-RAINFED	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapII
927	Bhakkar-2002(AZRI Bhakkar)	-	2002	-	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapII
928	Chakwal-86	-	1986	PUNJAB-RAINFED	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
929	Chakwal-97	-	1998	PUNJAB-RAINFED	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapII
930	Faisalabad-08	-	2008	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapI
931	Inqalab-91	-	1991	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapII
932	Lasani-2008	-	2008	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapI	5B-HapII	5D-HapII
933	Manthar-	-	2003	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapI	5B-HapII	5D-HapI
934	Seher-2006	-	2006	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapI
935	Shafaq-2006	-	2006	-	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapII
936	AARI-2011	-	2011	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapI
937	Ufaq	-	2002	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapI
938	BARS-09(BARI Sample)	-	2009	-	Pakistani wheat accessions	5A-HapI	5B-HapII	5D-HapII
939	Punjab-2011	-	2011	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
940	Millat-2011	-	2011	SOUTH-PUNJAB	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
941	Chenab-70	-	1970	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapII

94 2	Chenab-79	-	1979	-	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapII
94 3	Chenab-2000	-	2000	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapII
94 4	Faisalab-83	-	1983	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
94 5	Faislabad-85	-	1985	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapII
94 6	Iqbal-2000	-	2000	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
94 7	Karawan-2	-	-	-	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
94 8	Kohinoor-83	-	1983	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapII
94 9	Kohistan-97	-	1998	KPK-RAINFED	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapII
95 0	MexiPak-65	-	1965	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapII
95 1	MH-97	-	1998	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapII
95 2	Naeem-82	-	1982	-	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapII
95 3	Pak-81	-	1981	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapI
95 4	Parwaz-94	-	1995	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
95 5	Pasina-90	-	1990	-	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
95 6	Punjab-76	-	1976	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
95 7	Punjab-81	-	181	-	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
95 8	Punjab-85	-	1985	-	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
95 9	Punjab-96	-	1996	-	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapII
96 0	SA-42	-	1971	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapII
96 1	SA-75	-	1975	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapII
96 2	Sutluj-86	-	1987	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapII
96 3	Shahkar-95	-	1995	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
96 4	Shalimar-88	-	1988	-	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapII

96 5	SH-2002	-	2002	PUNJAB-IRRIGATE D	Pakistani wheat accessiosns	5A-Hapl	5B-Hapl	5D-Hapll
96 6	WATAN(V-87094)	-	1994	-	Pakistani wheat accessiosns	5A-Hapll	5B-Hapl	5D-Hapll
96 7	Galaxy-2013	-	2013	PUNJAB-IRRIGATE D	Pakistani wheat accessiosns	5A-Hapll	5B-Hapl	5D-Hapll
96 8	Blue Siver	-	1971	PUNJAB-IRRIGATE D	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapl
96 9	LU-26	-	1976	PUNJAB-IRRIGATE D	Pakistani wheat accessiosns	5A-Hapl	5B-Hapl	5D-Hapll
97 0	Lyp-73	-	1973	PUNJAB-IRRIGATE D	Pakistani wheat accessiosns	5A-Hapll	5B-Hapl	5D-Hapll
97 1	PARI-73	-	1973	PUNJAB-IRRIGATE D	Pakistani wheat accessiosns	5A-Hapll	5B-Hapl	5D-Hapll
97 2	Pasban-90	-	1990	PUNJAB-IRRIGATE D	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
97 3	Yecora-70	-	1974	PUNJAB-IRRIGATE D	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
97 4	C-217	-	1953	PUNJAB	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
97 5	C-228	-	1953	-	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
97 6	C-245	-	1953	-	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
97 7	C-247	-	1953	-	Pakistani wheat accessiosns	5A-Hapll	5B-Hapl	5D-Hapll
97 8	C-248	-	1953	-	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
97 9	C-250	-	1953	-	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
98 0	C-256	-	1953	-	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
98 1	C-258	-	1953	-	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
98 2	C-269	-	1953	-	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
98 3	C-271	-	1953	PUNJAB	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
98 4	C-273	-	1953	PUNJAB	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
98 5	C-288	-	1953	-	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
98 6	C-518	-	1953	PUNJAB	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
98 7	C-591	-	1953	-	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
98 8	V-8203 (Advanced)	-	-	-	Pakistani wheat accessiosns	5A-Hapll	5B-Hapll	5D-Hapll
98 9	V-11183(Advanced)	-	-	-	Pakistani wheat accessiosns	5A-Hapll	5B-Hapl	5D-Hapll
99	Dharabi-2011	-	2011	PUNJAB-	Pakistani wheat	5A-	5B-	5D-

0				RAINFED	accessiosns	HapII	Hapl	HapII
99 1	GA-2002	-	2002	PUNJAB- RAINFED	Pakistani wheat accessiosns	5A- HapII	5B- Hapl	5D- HapII
99 2	Kohsar-95	-	1995	-	Pakistani wheat accessiosns	5A- Hapl	5B- HapII	5D- HapII
99 3	Chakwal-50	-	2008	PUNJAB- RAINFED	Pakistani wheat accessiosns	5A- HapII	5B- Hapl	5D- Hapl
99 4	Aas-2011	-	2011	SOUTH- PUNJAB	Pakistani wheat accessiosns	5A- Hapl	5B- Hapl	5D- HapII
99 5	Mairaj-08	-	2008	PUNJAB- IRRIGATE D	Pakistani wheat accessiosns	5A- HapII	5B- Hapl	5D- HapII
99 6	Fareed-2006	-	2006	PUNJAB- IRRIGATE D	Pakistani wheat accessiosns	5A- HapII	5B- Hapl	5D- HapII
99 7	Derawar-97	-	1997	SOUTH- PUNJAB	Pakistani wheat accessiosns	5A- Hapl	5B- Hapl	5D- HapII
99 8	Punjnad-1	-	2000	-	Pakistani wheat accessiosns	5A- HapII	5B- HapII	5D- HapII
99 9	Bwp-97	-	1998	PUNJAB- IRRIGATE D	Pakistani wheat accessiosns	5A- Hapl	5B- HapII	5D- HapII
10 00	Mehran-89	-	1988	-	Pakistani wheat accessiosns	5A- HapII	5B- HapII	5D- HapII
10 01	Imdad-2005	-	2005	-	Pakistani wheat accessiosns	5A- HapII	5B- Hapl	5D- HapII
10 02	Hamal-2012	-	2012	-	Pakistani wheat accessiosns	5A- Hapl	5B- Hapl	5D- HapII
10 03	TD-01	-	2004	SINDH- IRRIGATE D	Pakistani wheat accessiosns	5A- Hapl	5B- HapII	5D- HapII
10 04	Anmol-91	-	1993	PUNJAB- IRRIGATE D	Pakistani wheat accessiosns	5A- Hapl	5B- Hapl	5D- HapII
10 05	Moomal-2002	-	2006	SINDH- IRRIGATE D	Pakistani wheat accessiosns	5A- HapII	5B- HapII	5D- HapII
10 06	SKD-1	-	2006	SINDH- IRRIGATE D	Pakistani wheat accessiosns	5A- Hapl	5B- HapII	5D- HapII
10 07	HB11	-	-	-	Pakistani wheat accessiosns	5A- HapII	5B- Hapl	5D- HapII
10 08	Benazir-2012	-	2012	-	Pakistani wheat accessiosns	5A- HapII	5B- Hapl	5D- HapII
10 09	Abadgar-93	-	1996	PUNJAB- IRRIGATE D	Pakistani wheat accessiosns	5A- HapII	5B- Hapl	5D- HapII
10 10	Jauhar-78	-	1978	-	Pakistani wheat accessiosns	5A- HapII	5B- Hapl	5D- HapII
10 11	Sarsabz	-	1985	PUNJAB- IRRIGATE D	Pakistani wheat accessiosns	5A- HapII	5B- Hapl	5D- HapII
10 12	Bhittai	-	2004	SINDH- IRRIGATE D	Pakistani wheat accessiosns	5A- HapII	5B- Hapl	5D- HapII
10 13	Kiran-95	-	1996	-	Pakistani wheat accessiosns	5A- Hapl	5B- Hapl	5D- HapII
10 14	Khirman	-	2006	PUNJAB- IRRIGATE D	Pakistani wheat accessiosns	5A- HapII	5B- HapII	5D- HapII

10 15	sassui	-	2006	SINDH-IRRIGATE D	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
10 16	Sindh-81	-	1981	SINDH-IRRIGATE D	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapII
10 17	Marvi-2000	-	2000	SINDH-IRRIGATE D	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
10 18	Nia-Sundar	-	-	SINDH-IRRIGATE D	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapI
10 19	Nia-Sunhari	-	2010	SINDH-IRRIGATE D	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapI
10 20	Nia-Sarang	-	2012	SINDH-IRRIGATE D	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapI
10 21	Nia-Amber	-	2010	SINDH-IRRIGATE D	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapII
10 22	Soghar-90	-	1991	PUNJAB-IRRIGATE D	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapII
10 23	Zardana-89	-	1989	KPK	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapII
10 24	Zarlashta-99	-	1999	KPK	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapII
10 25	Zarghoon-79	-	1979	KPK	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapII
10 26	Raskoh	-	2005	-	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
10 27	Sariab-92	-	1993	PUNJAB-RAINFED	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapII
10 28	Shahkar-2013	-	2013	PUNJAB-IRRIGATE D	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapI
10 29	Pirsabak-2013	-	2013	KPK-RAINFED	Pakistani wheat accessions	5A-HapI	5B-HapII	5D-HapII
10 30	Pirsabak-2008	-	2008	KPK-RAINFED	Pakistani wheat accessions	5A-HapI	5B-HapII	5D-HapI
10 31	Pirsabak-2005	-	2005	KPK-RAINFED	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapII
10 32	Pirsabak-85	-	1985	KPK-RAINFED	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
10 33	Pirsabak-2004	-	2004	KPK-RAINFED	Pakistani wheat accessions	5A-HapI	5B-HapII	5D-HapII
10 34	Saleem-2000	-	2000	PUNJAB-RAINFED	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
10 35	Suliaman-96	-	1996	PUNJAB-IRRIGATE D	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
10 36	Nowshera-96	-	1996	KPK-RAINFED	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapII
10 37	Pak-81	-	1981	PUNJAB-IRRIGATE D	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
10 38	Khyber-87	-	1987	KPK-IRRIGATE D	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapI

10 39	Pirsabak-103(Advanced)	-	-	KPK-RAINFED	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 40	Pirsabak-105(Advanced)	-	-	KPK-RAINFED	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 41	Azri-96	-	1996	-	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 42	Shalkot	-	-	-	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 43	Tijaban-10	-	-	-	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 44	Tatara	-	1996	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 45	Lalma	-	-	-	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 46	Nifa-Bathoor	-	2010	KPK-RAINFED	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 47	Fakhre-Sarhad	-	1997	KPK-RAINFED	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 48	Barsat	-	2010	-	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 49	NARC-2009	-	2009	PUNJAB-RAINFED	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 50	NARC-2011	-	2011	PUNJAB-RAINFED	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 51	PAK-2013	-	2013	PUNJAB-RAINFED	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 52	NR-399(Advanced)	-	-	-	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 53	NR-421(Advanced)	-	-	-	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 54	S24	-	-	-	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 55	Barlog 2016	-	2016	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 56	Pastor	-	-	-	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 57	Margalla 99	-	1999	-	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 58	KPK 2015	-	2015	KPK-IRRIGATED	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 59	Paroula	-	-	-	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 60	Ahsan 2016	-	2016	-	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 61	Faisalabad-08	-	2008	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 62	WL-711	-	1978	-	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 63	Zincol-2016	-	2016	-	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 64	Gold-2016	-	2016	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl
10 65	Johar-2016	-	2016	PUNJAB-IRRIGATED	Pakistani wheat accessions	5A-Hapl	5B-Hapl	5D-Hapl

1066	Atta Habib	-	-	PUNJAB-IRRIGATE D	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapI
1067	Wafaq-2001	-	2011	PUNJAB-RAINFED	Pakistani wheat accessions	5A-HapI	5B-HapII	5D-HapI
1068	Bakhatawar-94	-	1994	-	Pakistani wheat accessions	5A-HapI	5B-HapII	5D-HapI
1069	Local white	-	-	PUNJAB-IRRIGATE D	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapI
1070	Ujala	-	2006	-	Pakistani wheat accessions	5A-HapI	5B-HapII	5D-HapI
1071	Bathor	-	2008	PUNJAB-IRRIGATE D	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
1072	Dirk	-	1958	-	Pakistani wheat accessions	5A-HapI	5B-HapII	5D-HapI
1073	Bakhar	-	2000	-	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapI
1074	Barani-83	-	1983	PUNJAB-RAINFED	Pakistani wheat accessions	5A-HapII	5B-HapI	5D-HapII
1075	C-518	-	1953	-	Pakistani wheat accessions	5A-HapII	5B-HapII	5D-HapI
1076	Rawal-87	-	1987	PUNJAB-RAINFED	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapII
1077	T9	-	-	-	Pakistani wheat accessions	5A-HapI	5B-HapI	5D-HapI
1078	ZIMMERMAN	PI 11226	01-10-1926	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
1079	Pride of Genesee	Cltr 3365	01-10-1926	-	North American wheat	5A-HapII	5B-HapI	5D-HapII
1080	Democrat	Cltr 3384	01-10-1926	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
1081	Red Chief	Cltr 3392	01-10-1926	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
1082	Gipsy	Cltr 3436	01-10-1926	-	North American wheat	5A-HapII	5B-HapI	5D-HapI
1083	Power	Cltr 3697	01-10-1926	-	North American wheat	5A-HapII	5B-HapI	5D-HapI
1084	Sherman	Cltr 4430	01-10-1926	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
1085	Kanred	Cltr 5146	01-10-1926	-	North American wheat	5A-HapII	5B-HapI	5D-HapI
1086	Nebraska No. 28	Cltr 5147	01-10-1926	-	North American wheat	5A-HapII	5B-HapI	5D-HapII
1087	Minhardi	Cltr 5149	01-10-1926	-	North American wheat	5A-HapI	5B-HapI	5D-HapI
1088	Mediterranean	Cltr 5303	01-10-1926	-	North American wheat	5A-HapI	5B-HapI	5D-HapI
1089	Red May	Cltr 5336	01-10-1926	-	North American wheat	5A-HapI	5B-HapI	5D-HapII
1090	Illini Chief	Cltr 5406	01-10-1926	-	North American wheat	5A-HapI	5B-HapI	5D-HapII
1091	Red Rock	Cltr 5597	01-10-1926	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
1092	Rice	Cltr 5734	01-10-1926	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
1093	Penquite	Cltr 5948	01-10-1926	-	North American wheat	5A-HapII	-	-
1094	Minturki	Cltr 6155	01-10-	-	North American	5A-	5B-	5D-

94			1926		wheat	HapII	HapII	HapI
10 95	Nebraska No. 60	Cltr 6250	01-10- 1926	-	North American wheat	5A- HapII	5B- HapI	5D- HapII
10 96	Blackhull	Cltr 6251	01-10- 1926	-	North American wheat	5A- HapII	5B- HapI	5D- HapI
10 97	Wisconsin Pedigree No. 2	Cltr 6683	01-10- 1926	-	North American wheat	5A- HapII	5B- HapI	5D- HapII
10 98	Forward	Cltr 6691	01-10- 1926	-	North American wheat	5A- HapI	5B- HapI	5D- HapI
10 99	Marquillo	Cltr 6887	01-10- 1926	-	North American wheat	5A- HapI	5B- HapII	5D- HapII
11 00	Ceres	Cltr 6900	01-10- 1926	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
11 01	Iobred	Cltr 6934	01-10- 1926	-	North American wheat	5A- HapII	5B- HapI	5D- HapI
11 02	Tenmarq	Cltr 6936	01-12- 1929	-	North American wheat	5A- HapII	5B- HapI	5D- HapII
11 03	Yogo	Cltr 8033	01-12- 1932	-	North American wheat	5A- HapII	5B- HapI	5D- HapII
11 04	Kawvale	Cltr 8180	01-12- 1929	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
11 05	Ilred	Cltr 8219	01-10- 1926	-	North American wheat	5A- HapI	5B- HapII	5D- HapII
11 06	Oro	Cltr 8220	01-12- 1928	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
11 07	Purkof	Cltr 8381	01-12- 1929	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
11 08	Red Indian	Cltr 8382	01-01- 1936	-	North American wheat	5A- HapII	5B- HapI	5D- HapII
11 09	Early Blackhull	Cltr 8856	01-01- 1936	-	North American wheat	5A- HapII	5B- HapI	5D- HapII
11 10	Nabob	Cltr 8869	01-12- 1928	-	North American wheat	5A- HapII	5B- HapI	5D- HapII
11 11	Cheyenne	Cltr 8885	01-12- 1931	-	North American wheat	5A- HapII	5B- HapI	5D- HapII
11 12	Quivira	Cltr 8886	01-12- 1932	-	North American wheat	5A- HapI	5B- HapII	5D- HapII
11 13	Thatcher	Cltr 10003	01-01- 1935	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
11 14	Rio	Cltr 10061	01-01- 1935	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
11 15	Golden	Cltr 10063	01-01- 1936	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
11 16	Relief	Cltr 10082	01-01- 1935	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
11 17	Nebred	Cltr 10094	01-12- 1938	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
11 18	Wabash	Cltr 11384	01-01- 1940	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
11 19	Ioturk	Cltr 11388	01-12- 1930	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
11 20	Lemhi	Cltr 11415	01-11- 1959	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
11 21	Pilot	Cltr 11428	01-12- 1938	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
11 22	Marmin	Cltr 11502	01-03- 1941	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
11 23	Enid	Cltr 11508	01-01- 1936	-	North American wheat	5A- HapI	5B- HapI	5D- HapII

11 24	Baldrock	Cltr 11538	01-12- 1932	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
11 25	Utah Kanred	Cltr 11608	01-01- 1936	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
11 26	Pawnee	Cltr 11669	01-03- 1943	-	North American wheat	5A- Hapl	5B- Hapll	5D- Hapll
11 27	Comanche	Cltr 11673	01-03- 1943	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
11 28	Thorne	Cltr 11856	01-12- 1938	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
11 29	Marfed	Cltr 11919	01-11- 1959	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
11 30	Mida	Cltr 12008	01-04- 1945	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
11 31	Cadet	Cltr 12053	01-08- 1950	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
11 32	Westar	Cltr 12110	01-08- 1950	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
11 33	Ponca	Cltr 12128	01-11- 1958	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
11 34	Triumph	Cltr 12132	01-11- 1958	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
11 35	Kiowa	Cltr 12133	01-03- 1952	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
11 36	Minter	Cltr 12138	01-11- 1958	-	North American wheat	5A- Hapll	5B- Hapll	5D- Hapll
11 37	Sioux	Cltr 12142	01-07- 1953	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
11 38	Quanah	Cltr 12145	01-11- 1955	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
11 39	Chancellor	Cltr 12333	01-07- 1958	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
11 40	Austin	Cltr 12346	01-08- 1950	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
11 41	Brevor	Cltr 12385	01-11- 1959	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
11 42	Ramona 50	Cltr 12390	01-07- 1964	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
11 43	Nured	Cltr 12455	01-11- 1960	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
11 44	Taylor	Cltr 12461	01-11- 1958	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
11 45	Lee	Cltr 12488	01-11- 1958	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
11 46	Concho	Cltr 12517	01-11- 1955	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
11 47	Bison	Cltr 12518	01-11- 1958	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
11 48	Butler	Cltr 12527	01-07- 1958	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
11 49	Seneca	Cltr 12529	01-07- 1958	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
11 50	Atlas 50	Cltr 12534	01-07- 1958	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
11 51	LaPorte	Cltr 12557	01-07- 1958	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
11 52	Atlas 66	Cltr 12561	01-07- 1958	-	North American wheat	5A- Hapl	5B- Hapll	5D- Hapll
11 53	Coker 47-27	Cltr 12563	01-11- 1960	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll

11 54	Genesee	Cltr 12653	01-11- 1960	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 55	Saline	Cltr 12674	01-11- 1960	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
11 56	Vermillion	Cltr 12748	01-07- 1958	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
11 57	Tayland	Cltr 12761	01-11- 1964	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 58	Westmont	Cltr 12930	01-05- 1966	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 59	Itana	Cltr 12933	01-05- 1966	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 60	Centana	Cltr 12974	01-11- 1959	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 61	Tascosa	Cltr 13023	01-07- 1962	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 62	Onas 53	Cltr 13069	01-11- 1955	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 63	Dual	Cltr 13083	01-07- 1958	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 64	Conley	Cltr 13157	01-11- 1960	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 65	Racine	Cltr 13172	01-11- 1974	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 66	Warrior	Cltr 13190	01-07- 1963	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 67	Monon	Cltr 13278	01-05- 1978	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 68	Georgia 1123	Cltr 13292	01-07- 1963	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 69	Wakeland	Cltr 13382	01-07- 1963	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 70	Ace	Cltr 13384	01-11- 1962	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 71	Delmar	Cltr 13442	01-07- 1963	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
11 72	Gaines	Cltr 13448	01-01- 1964	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
11 73	Avon	Cltr 13477	01-11- 1960	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 74	Reed	Cltr 13513	01-05- 1978	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 75	Hume	Cltr 13526	01-01- 1966	-	North American wheat	5A- HapII	-	-
11 76	Gage	Cltr 13532	01-09- 1965	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 77	Caddo	Cltr 13536	01-11- 1964	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 78	Scout	Cltr 13546	01-09- 1965	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 79	Triumph 64	Cltr 13679	01-11- 1965	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
11 80	Sturdy	Cltr 13684	01-07- 1967	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 81	Moro	Cltr 13740	01-09- 1966	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 82	Polk	Cltr 13773	01-07- 1971	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 83	Timwin	Cltr 13787	01-11- 1974	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII

11 84	Wanser	Cltr 13844	01-09- 1972	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 85	Guide	Cltr 13856	01-01- 1971	-	North American wheat	5A- Hapl	5B- HapII	5D- HapII
11 86	Fletcher	Cltr 13985	01-07- 1971	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
11 87	Era	Cltr 13986	01-07- 1971	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
11 88	Scout 66	Cltr 13996	01-01- 1971	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
11 89	Trader	Cltr 13998	01-01- 1971	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
11 90	Trapper	Cltr 13999	01-01- 1971	-	North American wheat	5A- Hapl	5B- HapII	5D- HapII
11 91	Kenosha	Cltr 14025	01-11- 1974	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 92	Blueboy	Cltr 14031	01-01- 1967	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 93	Pronto	Cltr 14078	01-11- 1971	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 94	Logan	Cltr 14156	01-07- 1968	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
11 95	Ionia	Cltr 14469	01-09- 1972	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
11 96	Paha	Cltr 14485	01-03- 1972	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 97	Caprock	Cltr 14516	01-11- 1969	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 98	Bridger	Cltr 14580	01-01- 1972	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
11 99	Chanute	Cltr 14581	01-07- 1970	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 00	Satanta	Cltr 14582	01-07- 1970	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 01	Yukon	Cltr 14583	01-07- 1970	-	North American wheat	5A- Hapl	-	-
12 02	Luke	Cltr 14586	01-01- 1974	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 03	Centurk	Cltr 15075	01-11- 1973	-	North American wheat	5A- Hapl	-	-
12 04	Bounty 208	Cltr 15078	01-07- 1973	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 05	Shortana	Cltr 15233	01-11- 1971	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 06	Blueboy II	Cltr 15281	01-05- 1972	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 07	Anza	Cltr 15284	01-07- 1984	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 08	Potomac	Cltr 15292	01-07- 1978	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 09	Ranger	Cltr 15316	01-03- 1973	-	North American wheat	5A- Hapl	-	-
12 10	Sprague	Cltr 15376	01-07- 1978	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 11	Baca	Cltr 15891	01-09- 1973	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 12	Oasis	Cltr 15929	01-09- 1975	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 13	Hiplains	Cltr 17262	01-09- 1976	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII

12 14	Cloud	Cltr 17276	01-11- 1974	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 15	Sage	Cltr 17277	01-09- 1978	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 16	Ticonderoga	Cltr 17290	01-07- 1977	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 17	Gent	Cltr 17293	01-09- 1977	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 18	Lancota	Cltr 17389	01-09- 1979	-	North American wheat	5A- Hapl	5B- HapII	5D- HapII
12 19	Newana	Cltr 17430	01-07- 1977	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
12 20	Roughrider	Cltr 17439	01-11- 1977	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 21	Agate	Cltr 17463	01-09- 1979	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
12 22	Larned	Cltr 17650	01-09- 1978	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 23	Tyee	Cltr 17773	01-11- 1980	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 24	TAM 105	Cltr 17826	01-01- 1980	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 25	Pike	Cltr 17878	01-09- 1981	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
12 26	Tyler	Cltr 17899	01-07- 1984	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapl
12 27	Arkan	PI 475771	01-11- 1983	-	North American wheat	5A- Hapl	5B- HapII	5D- Hapl
12 28	TAM 107	PI 495594	01-07- 1987	-	North American wheat	5A- Hapl	5B- HapII	5D- Hapl
12 29	TAM 108	PI 495595	01-07- 1987	-	North American wheat	5A- Hapl	5B- HapII	5D- Hapl
12 30	Kitt	PI 518818	01-09- 1976	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
12 31	Huron	Cltr 3315	01-10- 1926	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
12 32	Preston	Cltr 3328	01-10- 1926	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
12 33	Dawson	Cltr 3342	01-10- 1926	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
12 34	Marquis	Cltr 3641	01-10- 1926	-	North American wheat	5A- Hapl	5B- HapII	5D- Hapl
12 35	Pioneer	Cltr 4324	01-10- 1926	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
12 36	White Fife	Cltr 4412	01-10- 1926	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
12 37	Stanley	Cltr 4796	01-10- 1926	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
12 38	Kitchener	Cltr 4800	01-10- 1926	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
12 39	Early Red Fife	Cltr 4932	01-10- 1926	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapl
12 40	Ruby	Cltr 6047	01-10- 1926	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
12 41	Nebraska No. 6	Cltr 6249	01-01- 1936	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
12 42	Red Bobs	Cltr 6255	01-10- 1926	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
12 43	Sea Island	Cltr 6551	01-01- 1936	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl

12 44	Kharkov MC22	Cltr 6938	01-03-1964	-	North American wheat	5A-HapII	5B-HapII	5D-HapII
12 45	Oregon Zimmerman	Cltr 7359	01-01-1936	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
12 46	Supreme	Cltr 8026	01-11-1927	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
12 47	Reward	Cltr 8182	01-12-1928	-	North American wheat	5A-HapII	5B-HapII	-
12 48	Renfrew	Cltr 8194	01-01-1936	-	North American wheat	5A-HapI	5B-HapII	5D-HapI
12 49	Axminster	Cltr 8195	01-01-1936	-	North American wheat	5A-HapII	-	5D-HapI
12 50	Escondido	Cltr 8240	01-01-1936	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
12 51	Ramona	Cltr 8241	01-12-1936	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
12 52	Arco	Cltr 8246	01-01-1936	-	North American wheat	5A-HapII	5B-HapII	5D-HapII
12 53	Hard Federation 31	Cltr 8255	01-01-1936	-	North American wheat	5A-HapII	5B-HapII	5D-HapII
12 54	Berkeley Rock	Cltr 8272	01-01-1936	-	North American wheat	5A-HapII	5B-HapII	5D-HapII
12 55	Powerclub	Cltr 8276	01-01-1936	-	North American wheat	5A-HapI	5B-HapII	5D-HapI
12 56	Whiteman	Cltr 8379	01-01-1936	-	North American wheat	5A-HapI	5B-HapII	5D-HapI
12 57	Clarkan	Cltr 8858	01-01-1936	-	North American wheat	5A-HapI	5B-HapII	5D-HapI
12 58	Eagle Chief	Cltr 8868	01-01-1936	-	North American wheat	5A-HapI	5B-HapII	5D-HapI
12 59	Hyper	Cltr 8875	01-01-1936	-	North American wheat	5A-HapI	5B-HapII	5D-HapI
12 60	Marvel	Cltr 8876	01-01-1936	-	North American wheat	5A-HapI	5B-HapII	5D-HapI
12 61	Montana King	Cltr 8878	01-01-1936	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
12 62	Poso	Cltr 8891	01-01-1936	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
12 63	Redhart	Cltr 8898	01-01-1936	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
12 64	Missouri Valley	Cltr 10046	01-01-1936	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
12 65	V.P.I. 131	Cltr 10047	01-01-1936	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
12 66	V.P.I. 112	Cltr 11397	01-01-1936	-	North American wheat	5A-HapII	5B-HapII	5D-HapII
12 67	Hood	Cltr 11456	01-01-1936	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
12 68	Comet	Cltr 11465	01-01-1936	-	North American wheat	5A-HapII	5B-HapII	5D-HapI
12 69	Coronation	Cltr 11475	01-01-1940	-	North American wheat	5A-HapI	5B-HapI	5D-HapII
12 70	Kruse	Cltr 11524	01-01-1936	-	North American wheat	5A-HapII	5B-HapI	5D-HapII
12 71	Redhull	Cltr 11534	01-01-1936	-	North American wheat	5A-HapI	5B-HapI	5D-HapII
12 72	Genro	Cltr 11535	01-01-1936	-	North American wheat	5A-HapI	5B-HapII	5D-HapII
12 73	Erect	Cltr 11544	01-12-1936	-	North American wheat	5A-HapI	5B-HapII	5D-HapII

12 74	Hymar	Cltr 11605	01-01- 1936	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
12 75	Renown	Cltr 11635	01-01- 1940	-	North American wheat	5A- Hapl	5B- Hapll	5D- Hapll
12 76	Apex	Cltr 11636	01-12- 1937	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
12 77	Rival	Cltr 11708	01-03- 1941	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
12 78	Regent	Cltr 11869	01-01- 1940	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
12 79	Orfed	Cltr 11913	01-04- 1945	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
12 80	Fairfield	Cltr 12013	01-05- 1944	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
12 81	Sanford	Cltr 12026	01-04- 1945	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
12 82	Newthatch	Cltr 12318	01-05- 1944	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
12 83	Cascade	Cltr 12376	01-08- 1950	-	North American wheat	5A- Hapll	5B- Hapll	5D- Hapll
12 84	Rescue	Cltr 12435	01-11- 1959	-	North American wheat	5A- Hapll	5B- Hapll	5D- Hapll
12 85	Saunders	Cltr 12567	01-08- 1950	-	North American wheat	5A- Hapll	-	5D- Hapll
12 86	Redman	Cltr 12638	01-09- 1963	-	North American wheat	5A- Hapll	5B- Hapll	5D- Hapll
12 87	Selkirk	Cltr 13100	01-11- 1960	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
12 88	Chinook	Cltr 13220	01-03- 1964	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
12 89	Kenhi	Cltr 13268	01-07- 1964	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
12 90	Cypress	Cltr 13344	01-03- 1965	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
12 91	Canthatch	Cltr 13345	01-09- 1963	-	North American wheat	5A- Hapl	5B- Hapll	5D- Hapll
12 92	Lake	Cltr 13413	01-09- 1963	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
12 93	Winalta	Cltr 13670	01-03- 1964	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
12 94	Manitou	Cltr 13775	01-07- 1967	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
12 95	Talbot	Cltr 13781	01-11- 1964	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
12 96	Park	Cltr 14158	01-09- 1968	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
12 97	Neepawa	Cltr 15073	01-07- 1973	-	North American wheat	5A- Hapl	5B- Hapll	5D- Hapll
12 98	McNair 1813	Cltr 15289	01-11- 1980	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
12 99	Sundance	Cltr 15327	01-09- 1972	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 00	Inia 66R	Cltr 15328	01-11- 1985	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 01	Canuck	Cltr 17342	01-09- 1981	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 02	Yecora Rojo	Cltr 17414	01-11- 1985	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 03	Portola	Cltr 17415	01-11- 1985	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll

13 04	Downy	Cltr 17421	01-03- 1981	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
13 05	Sinton	Cltr 17573	01-09- 1981	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 06	Rosen	Cltr 17607	01-09- 1986	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 07	Shasta	Cltr 17651	01-05- 1987	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 08	Roland	Cltr 17716	01-09- 1983	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 09	Payne	Cltr 17717	01-07- 1981	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 10	Bennett	Cltr 17723	01-11- 1981	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 11	Centurk 78	Cltr 17724	01-11- 1981	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 12	Maverick	Cltr 17728	01-05- 1982	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 13	Texred	Cltr 17729	01-05- 1982	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 14	Norstar	Cltr 17735	01-07- 1980	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 15	Dirkwin	Cltr 17745	01-11- 1980	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 16	Powell	Cltr 17761	01-11- 1981	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 17	Nelson	Cltr 17770	01-03- 1987	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 18	Purcell	Cltr 17787	01-09- 1980	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
13 19	James	Cltr 17791	01-11- 1980	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 20	Rose	Cltr 17795	01-11- 1982	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 21	Rita	Cltr 17799	01-01- 1982	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 22	Dawn	Cltr 17801	01-01- 1982	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 23	Nell	Cltr 17803	01-07- 1983	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 24	TAM 106	Cltr 17827	01-01- 1980	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 25	Pondera	Cltr 17828	01-11- 1980	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 26	Frankenmuth	Cltr 17830	01-01- 1986	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 27	Augusta	Cltr 17831	01-01- 1986	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 28	Redwin	Cltr 17844	01-11- 1983	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
13 29	Manning	Cltr 17846	01-07- 1981	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 30	Crestone	Cltr 17858	01-05- 1982	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 31	Sterling	Cltr 17859	01-05- 1984	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
13 32	Neeley	Cltr 17860	01-01- 1983	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
13 33	Wings	Cltr 17880	01-11- 1980	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII

13 34	Tamex	Cltr 17889	01-01- 1982	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
13 35	Mit	Cltr 17896	01-05- 1982	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 36	Caldwell	Cltr 17897	01-05- 1982	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 37	Auburn	Cltr 17898	01-01- 1982	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
13 38	Winridge	Cltr 17902	01-11- 1983	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 39	McKay	Cltr 17903	01-01- 1984	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 40	Owens	Cltr 17904	01-01- 1984	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 41	Lewjain	Cltr 17909	01-09- 1983	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 42	Tres	Cltr 17917	01-01- 1986	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 43	Marshall	Cltr 17920	01-01- 1983	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
13 44	Guard	Cltr 17934	01-11- 1984	-	North American wheat	5A- Hapll	5B- Hapll	5D- Hapll
13 45	Centa	Cltr 17935	01-05- 1983	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 46	Severn	Cltr 17939	01-11- 1982	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
13 47	Crew	Cltr 17951	01-09- 1983	-	North American wheat	5A- Hapll	5B- Hapll	5D- Hapll
13 48	Massey	Cltr 17953	01-09- 1984	-	North American wheat	5A- Hapll	5B- Hapll	5D- Hapll
13 49	Hill 81	Cltr 17954	01-11- 1982	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 50	Phoenix	Cltr 17962	01-05- 1985	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 51	Brule	PI 466739	01-11- 1983	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
13 52	Treasure	PI 468962	01-05- 1988	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 53	Wheaton	PI 469271	01-05- 1984	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 54	Fillmore	PI 469272	01-03- 1985	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 55	Scotty	PI 469294	01-11- 1989	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 56	Bradford	PI 470925	01-07- 1985	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 57	Susquehanna	PI 474581	01-01- 1990	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 58	Centura	PI 476974	01-05- 1985	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 59	Colt	PI 476975	01-05- 1985	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
13 60	Agassiz	PI 478771	01-09- 1984	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 61	Compton	PI 478892	01-07- 1985	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
13 62	Saluda	PI 480474	01-01- 1986	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapl
13 63	Adena	PI 481852	01-11- 1985	-	North American wheat	5A- Hapll	5B- Hapll	5D- Hapll

13 64	Glenman	PI 483235	01-05- 1985	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
13 65	Siouxland	PI 483469	01-11- 1985	-	North American wheat	5A- Hapl	5B- Hapl	-
13 66	Cody	PI 486212	01-03- 1989	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 67	Chisholm	PI 486219	01-03- 1985	-	North American wheat	5A- HapII	-	5D- HapII
13 68	Bliss	PI 486350	01-09- 1986	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 69	Dusty	PI 486429	01-11- 1987	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
13 70	Hillsdale	PI 489688	01-01- 1986	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
13 71	Ute	PI 490017	01-09- 1985	-	North American wheat	5A- Hapl	5B- HapII	5D- HapII
13 72	Adder	PI 491396	01-01- 1986	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
13 73	Cree	PI 491532	01-09- 1986	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
13 74	Norwin	PI 491533	01-09- 1986	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
13 75	Prospect	PI 491568	01-01- 1990	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
13 76	Shield	PI 491570	01-07- 1988	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
13 77	Tadinia	PI 494096	01-11- 1990	-	North American wheat	5A- Hapl	5B- HapII	5D- HapII
13 78	Becker	PI 494524	01-03- 1988	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
13 79	Batum	PI 495013	01-09- 1991	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 80	Leader	PI 496259	01-11- 1982	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 81	Blanca	PI 501533	01-05- 1988	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 82	Copper	PI 502644	01-05- 1988	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
13 83	Redland	PI 502907	01-03- 1989	-	North American wheat	5A- HapII	5B- Hapl	5D- Hapl
13 84	Century	PI 502912	01-07- 1989	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 85	Cardinal	PI 502973	01-03- 1988	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 86	Geneva	PI 505819	01-11- 1987	-	North American wheat	5A- HapII	5B- HapII	-
13 87	Dodge	PI 506344	01-01- 1988	-	North American wheat	5A- Hapl	5B- HapII	5D- HapII
13 88	Norkan	PI 506345	01-01- 1988	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 89	Dynasty	PI 506409	01-05- 1989	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 90	Williams	PI 508082	01-11- 1987	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 91	Lancer	PI 508271	01-09- 1987	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 92	GR855	PI 508286	01-03- 1988	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 93	GR863	PI 508287	01-05- 1993	-	North American wheat	5A- HapII	-	5D- HapII

13 94	GR860	PI 508288	01-05- 1993	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 95	Survivor	PI 509503	01-05- 1992	-	North American wheat	5A- HapII	-	5D- HapII
13 96	Madsen	PI 511673	01-11- 1989	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
13 97	Hyak	PI 511674	01-01- 1990	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 98	Collin	PI 511849	01-09- 1988	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
13 99	Andrews	PI 512282	01-09- 1991	-	North American wheat	5A- Hapl	5B- Hapl	-
14 00	Blizzard	PI 512302	01-03- 1991	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
14 01	Clark	PI 512337	01-11- 1988	-	North American wheat	5A- Hapl	-	5D- HapII
14 02	Oveson	PI 512338	01-11- 1988	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
14 03	GR876	PI 515951	01-05- 1993	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
14 04	Keiser	PI 515970	01-03- 1989	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
14 05	Tiber	PI 517194	01-09- 1992	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
14 06	Arapahoe	PI 518591	01-05- 1989	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
14 07	Laura	PI 518648	01-11- 1988	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
14 08	Marberg	PI 518816	01-11- 1980	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
14 09	Karl	PI 527480	01-09- 1991	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
14 10	Minnpro	PI 532149	01-05- 1990	-	North American wheat	5A- Hapl	5B- HapII	5D- HapII
14 11	Vance	PI 532150	01-05- 1990	-	North American wheat	5A- Hapl	5B- HapII	5D- HapII
14 12	2548	PI 532913	01-05- 1991	-	North American wheat	5A- Hapl	5B- Hapl	5D- HapII
14 13	2555	PI 532914	01-05- 1991	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
14 14	Buchanan	PI 532994	01-07- 1993	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
14 15	Eltan	PI 536994	01-11- 1991	-	North American wheat	5A- HapII	5B- Hapl	5D- HapII
14 16	Kmor	PI 536995	01-11- 1991	-	North American wheat	5A- HapII	5B- Hapl	5D- Hapl
14 17	Centennial	PI 537303	01-07- 1991	-	North American wheat	5A- HapII	5B- Hapl	5D- Hapl
14 18	SWS-52	PI 537307	01-03- 1991	-	North American wheat	5A- HapII	5B- Hapl	5D- Hapl
14 19	Sharp	PI 540401	01-01- 1992	-	North American wheat	5A- Hapl	5B- HapII	5D- Hapl
14 20	Rely	PI 542401	01-01- 1993	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 21	Rawhide	PI 543893	01-01- 1992	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
14 22	Vandal	PI 546056	01-05- 1992	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
14 23	Wakefield	PI 547040	01-11- 1991	-	North American wheat	5A- HapII	5B- HapII	5D- HapII

14 24	Madison	PI 547041	01-11- 1991	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 25	Verne	PI 547901	01-09- 1991	-	North American wheat	5A- HapII	5B- Hapl	5D- Hapl
14 26	Hi-Line	PI 549275	01-01- 1992	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 27	Howell	PI 552816	01-09- 1992	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 28	McNair 1003	PI 552975	01-11- 1980	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 29	TAM 109	PI 554606	31-12- 1994	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 30	Promontory	PI 555458	30-09- 1994	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 31	Excel	PI 555465	01-05- 1993	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapl
14 32	Fairview	PI 557017	01-07- 1993	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
14 33	Rod	PI 558510	31-07- 1994	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 34	Hoff	PI 560128	01-03- 1994	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
14 35	Gene	PI 560129	01-03- 1994	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 36	AC Reed	PI 560334	01-07- 1993	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 37	GA-Gore	PI 561842	01-07- 1993	-	North American wheat	5A- HapII	5B- HapII	-
14 38	GA-Andy	PI 561843	01-07- 1993	-	North American wheat	5A- Hapl	5B- HapII	5D- Hapl
14 39	GR915	PI 562383	01-05- 1997	-	North American wheat	5A- Hapl	5B- HapII	5D- Hapl
14 40	Vista	PI 562653	01-11- 1993	-	North American wheat	5A- Hapl	5B- HapII	5D- Hapl
14 41	Erhardt	PI 564761	01-05- 1997	-	North American wheat	5A- Hapl	-	5D- Hapl
14 42	Jules	PI 564851	01-01- 1996	-	North American wheat	5A- Hapl	5B- HapII	5D- HapII
14 43	AC Taber	PI 566823	01-01- 1994	-	North American wheat	5A- Hapl	5B- HapII	5D- HapII
14 44	Alliance	PI 573096	30-09- 1994	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
14 45	McNeal	PI 574642	01-07- 1994	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 46	TAM-200	PI 578255	31-12- 1994	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 47	TAM-201	PI 578256	31-12- 1994	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 48	Sylvan	PI 578867	01-05- 1996	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 49	Lambert	PI 583372	31-12- 1994	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 50	AC Michael	PI 583978	31-03- 1995	-	North American wheat	5A- Hapl	5B- HapII	5D- Hapl
14 51	Akron	PI 584504	01-01- 1996	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 52	Halt	PI 584505	01-01- 1996	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl
14 53	Judith	PI 584526	30-04- 1995	-	North American wheat	5A- HapII	5B- HapII	5D- Hapl

14 54	Niobrara	PI 584996	01-05- 1996	-	North American wheat	5A- HapII	5B- HapII	5D- HapI
14 55	Nekota	PI 584997	01-05- 1996	-	North American wheat	5A- HapI	5B- HapII	5D- HapI
14 56	Clemson 201	PI 585044	01-03- 1996	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
14 57	IL 84-4046	PI 586682	01-03- 1996	-	North American wheat	5A- HapII	5B- HapII	5D- HapI
14 58	IL 85-3132-1	PI 586683	01-03- 1996	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
14 59	Finley	PI 586757	01-07- 2000	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
14 60	Hazen	PI 587171	01-01- 1996	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
14 61	Glory	PI 592750	01-05- 1997	-	North American wheat	5A- HapII	5B- HapI	5D- HapII
14 62	Pomerelle	PI 592983	01-05- 1997	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
14 63	Pronghorn	PI 593047	01-05- 1997	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
14 64	AC Barrie	PI 593658	01-01- 1997	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
14 65	AC Karma	PI 593659	01-01- 1997	-	North American wheat	5A- HapII	5B- HapI	5D- HapII
14 66	Rampart	PI 593889	01-05- 1997	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
14 67	McGuire	PI 593890	01-05- 1997	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
14 68	Vanguard	PI 593891	01-01- 1997	-	North American wheat	5A- HapI	5B- HapII	5D- HapII
14 69	Coda	PI 594372	01-03- 2000	-	North American wheat	5A- HapI	5B- HapII	5D- HapII
14 70	Utah-100	PI 594920	01-05- 1997	-	North American wheat	5A- HapI	5B- HapII	5D- HapI
14 71	Cayuga	PI 595848	01-03- 1998	-	North American wheat	5A- HapI	5B- HapII	5D- HapI
14 72	BacUp	PI 596533	01-03- 1998	-	North American wheat	5A- HapI	5B- HapI	5D- HapI
14 73	Boundary	PI 603039	01-01- 1999	-	North American wheat	5A- HapII	5B- HapII	5D- HapI
14 74	Jefferson	PI 603040	01-01- 1999	-	North American wheat	5A- HapII	5B- HapII	5D- HapI
14 75	AC Nanda	PI 604603	01-03- 2000	-	North American wheat	5A- HapII	5B- HapII	5D- HapII
14 76	AC Phil	PI 604604	01-03- 2000	-	North American wheat	5A- HapI	5B- HapI	5D- HapII
14 77	Yumar	PI 605388	01-07- 2001	-	North American wheat	5A- HapII	5B- HapI	5D- HapII
14 78	Prowers	PI 605389	01-05- 2001	-	North American wheat	5A- HapII	5B- HapI	5D- HapI
14 79	Prairie Red	PI 605390	01-07- 2001	-	North American wheat	5A- HapI	5B- HapII	5D- HapI
14 80	Wesley	PI 605742	01-01- 2001	-	North American wheat	5A- HapII	5B- HapII	5D- HapI
14 81	Edwin	PI 606765	01-07- 2000	-	North American wheat	5A- HapI	5B- HapI	5D- HapI
14 82	Hayden	PI 608040	01-05- 2001	-	North American wheat	5A- HapI	5B- HapI	5D- HapI
14 83	Harding	PI 608049	01-09- 2000	-	North American wheat	5A- HapI	5B- HapI	5D- HapI

14 84	Caledonia	PI 610188	01-07- 2004	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapl
14 85	Prowers 99	PI 612420	01-05- 2001	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapl
14 86	Millennium	PI 613099	01-07- 2001	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
14 87	Rick	PI 614834	01-07- 2001	-	North American wheat	5A- Hapll	5B- Hapll	5D- Hapl
14 88	Wynne	PI 614835	01-07- 2001	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
14 89	Jubilee	PI 614839	01-03- 2003	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
14 90	Lolo	PI 614840	01-03- 2003	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
14 91	Iona	PI 618734	01-09- 2002	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
14 92	Wahoo	PI 619098	01-09- 2002	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
14 93	NuSky	PI 619167	01-03- 2003	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
14 94	Avalanche	PI 620766	01-01- 2003	-	North American wheat	5A- Hapl	5B- Hapll	5D- Hapll
14 95	Finch	PI 628640	01-07- 2005	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
14 96	Intrada	PI 631402	01-05- 2003	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
14 97	Deloris	PI 631447	01-03- 2004	-	North American wheat	5A- Hapll	5B- Hapl	5D- Hapll
14 98	Ok101	PI 631493	01-11- 2003	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
14 99	Ankor	PI 632275	01-05- 2004	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
15 00	Richland	PI 632399	01-07- 2004	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapl
15 01	Jerry	PI 632433	01-05- 2004	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
15 02	Goodstreak	PI 632434	01-07- 2004	-	North American wheat	5A- Hapl	5B- Hapll	5D- Hapll
15 03	Harry	PI 632435	01-07- 2004	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
15 04	Ok102	PI 632635	01-07- 2004	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
15 05	Hollis	PI 632857	01-09- 2004	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
15 06	AC Andrew	PI 632907	01-03- 2004	-	North American wheat	5A- Hapl	5B- Hapl	5D- Hapll
15 07	YAQUI 48	119	-	-	CIMMYT	5A- Hapll	5B- Hapll	5D- Hapll
15 08	LERMA 50	575	-	-	CIMMYT	5A- Hapl	5B- Hapl	5D- Hapll
15 09	GABO 54	369	-	-	CIMMYT	5A- Hapll	5B- Hapl	5D- Hapll
15 10	PENJAMO T 62	356	-	-	CIMMYT	5A- Hapl	5B- Hapl	5D- Hapll
15 11	PITIC S62	381	-	-	CIMMYT	5A- Hapll	5B- Hapl	5D- Hapll
15 12	NADADORES M 63	2567	-	-	CIMMYT	5A- Hapll	5B- Hapll	5D- Hapll
15 13	LERMA ROJO 64	589	-	-	CIMMYT	5A- Hapll	5B- Hapl	5D- Hapll

15 14	SONORA 64	398	-	-	CIMMYT	5A- HapII	5B- HapII	5D- HapII
15 15	INIA F 66	596	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 16	SIETE CERROS T66	775	-	-	CIMMYT	5A- Hapl	5B- Hapl	5D- HapII
15 17	SONALIKA	6387	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 18	YECORA F 70	2158	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 19	MARCOS JUAREZ INTA	12289	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 20	ANZA	11088	-	-	CIMMYT	5A- HapII	5B- HapII	5D- HapII
15 21	JUPATECO F 73	12689	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 22	NACOZARI F 76	3881	-	-	CIMMYT	5A- Hapl	5B- Hapl	5D- HapII
15 23	PAVON F 76	2465	-	-	CIMMYT	5A- Hapl	5B- Hapl	5D- HapII
15 24	CIANO T 79	4248	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 25	SERI M 82	3895	-	-	CIMMYT	5A- HapII	5B- HapII	5D- HapII
15 26	PUNJAB 85	16263	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- Hapl
15 27	DON ERNESTO INTA	22661	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- Hapl
15 28	BACANORA T 88	16122	-	-	CIMMYT	5A- Hapl	5B- Hapl	5D- HapII
15 29	CUMPAS T 88	19630	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 30	NESSER	684967	-	-	CIMMYT	5A- Hapl	5B- Hapl	5D- HapII
15 31	BAVIACORA M 92	447647	-	-	CIMMYT	5A- Hapl	5B- HapII	5D- HapII
15 32	SUPER KAUZ	3827748	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 33	MISR 1	4902859	-	-	CIMMYT	5A- Hapl	5B- HapII	5D- HapII
15 34	EMBRAPA 16	4960650	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- Hapl
15 35	KINGBIRD #1	4799764	-	-	CIMMYT	5A- HapII	5B- HapII	5D- HapII
15 36	THELIN#2/TUK URU	5390826	-	-	CIMMYT	5A- Hapl	5B- Hapl	5D- HapII
15 37	BABAX/LR42	5398643	-	-	CIMMYT	5A- Hapl	5B- Hapl	5D- HapII
15 38	ND643/2*WBL L1	5535274	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 39	ND643/2*WBL L1	5535357	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 40	DANPHE #1	5535410	-	-	CIMMYT	5A- HapII	5B- HapII	5D- HapII
15 41	PICAFLO #1	5390631	-	-	CIMMYT	5A- HapII	5B- HapII	5D- HapII
15 42	YANAC/3/PARU LA	5343322	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 43	SHANGHAI#7	5793549	-	-	CIMMYT	5A- Hapl	5B- Hapl	5D- HapII

15 44	QUAIU	5793757	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 45	PARULA/2 PASTOR	5794455	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 46	NELOKI	5794465	-	-	CIMMYT	5A- HapII	5B- HapII	5D- HapII
15 47	HUW234+LR34 /PRINIA	5794494	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 48	WHEATEAR/SO KOLL	5794687	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 49	FRET2*2/4/SO NOITA F	5995469	-	-	CIMMYT	5A- Hapl	5B- Hapl	5D- HapII
15 50	PBW343*2/KU KUNA	5994312	-	-	CIMMYT	5A- HapII	5B- HapII	5D- HapII
15 51	WEEBILL1*2/B RAM	6177020	-	-	CIMMYT	5A- Hapl	5B- Hapl	5D- HapII
15 52	ALTAR 84/AE.SQUARR OSA	6174896	-	-	CIMMYT	5A- HapII	5B- HapII	5D- HapII
15 53	UP2338*2/4/S ONOITA	6176174	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 54	PARUS/FRANC OLIN #1	6177851	-	-	CIMMYT	5A- HapII	5B- HapII	5D- HapII
15 55	PFAU/SERI.1B/ /AMADINA	6178973	-	-	CIMMYT	5A- HapII	5B- HapII	5D- HapII
15 56	NACUZARI F 76	6175076	-	-	CIMMYT	5A- HapII	5B- HapII	5D- HapII
15 57	NACUZARI F 76	6175063	-	-	CIMMYT	5A- HapII	5B- Hapl	5D- HapII
15 58	ALTAR 84/AE.SQUARR OSA	6175135	-	-	CIMMYT	5A- HapII	5B- HapII	5D- HapII
15 59	PBW343	2430154	-	-	CIMMYT	5A- HapII	5B- HapII	5D- HapII

Supplementary Table 2. Primer sequences used for chromosomal location and genome amplification of TaWUS-likes.

Primer sequences used for chromosomal location and genome amplification of TaWUS-likes			
Primer Name	Nucleotide Sequence (5`-3`)	Objective	PCR conditions
TaWUS-like-5A-F	GAACCGTCAGTGGGGCACCCCTTGTGA	To Amplify TaWUS-like-5A	95°C for 5 min; 34 cycles of 95°C for 30 s, 62°C for 45 s, 72°C for 3 min; followed by a final extension of 72°C for 10 min
TaWUS-like-5A-R	CTCAACTCCATAGCCATATCGGTG		
TaWUS-like-5B-F	CACATGGTACCACAGCGTCA	To Amplify TaWUS-like-5B	95°C for 5 min; 34 cycles of 95°C for 30 s, 59°C for 45 s, 72°C for 3 min; followed by a final extension of 72°C for 10 min
TaWUS-like-5B-R	GACCGTAGCAAAACCTTGCC		
TaWUS-like-5D-F	GTACGTTGCTATCTGTAGTGCCTC	To Amplify TaWUS-like-5D	95°C for 5 min; 34 cycles of 95°C for 30 s, 60°C for 45 s, 72°C for 3 min; followed by a final extension of 72°C for 10 min
TaWUS-like-5D-R	GTAGGAGAGGTTGGACAAGTGAG		

			min
M13-F	TGAAAACGACGGCCAGT	Universal sequence walking primer used for TaWUS-like-5A/TaWUS-like-5B/TaWUS-like-5D	-
M13-R	CAGGAAACAGCTATGACC		-
TaWUS-like-5A-W1-F	AACAGGTTCCAGGGTCTCG	Sequence walking primer to get the desired full length sequence for TaWUS-like-5A	-
TaWUS-like-5A-W1-R	AGTGGGCGAGCGAGAAGCT		-
TaWUS-like-5A-W2-F	AGCGGACGCTACATAGGC		-
TaWUS-like-5A-W2-R	CTCCCATGCACCTTTTAA		-
TaWUS-like-5B-W1	ATGCGACAGGTTGAGCAC	Sequence walking primer to get the desired full length sequence for TaWUS-like-5B	-
TaWUS-like-5B-W2	CCCCATCGAGGGCAAGAA		-
TaWUS-like-5D-W1-F	AGATTACAATTCTTCGGGACT	Sequence walking primer to get the desired full length sequence for TaWUS-like-5D	-
TaWUS-like-5D-W1-R	CCATCGAGGGCAAGAACG		-
TaWUS-like-5D-W2-R	CCTCAGTTCCGATGTGC		-

Supplementary Table 3. KASP primers used for genotyping of TaWUS-likes in wheat germplasm.

KASP primers used for genotyping of TaWUS-likes in wheat germplasm												
	Gene	Primer Name	Forward primers for KASP	Reverse primers for KASP	Common primers for KASP	F A M allele	H E X allele	D i r e c t i o n	D o m i n a n c e	E v i d e n c e	comment	Sequence
25 ng/μL of DNA was used for each sample to do genotyping	TaWUS-like-5A	TaWUS-like-5A-764 bp	GAAG GTGA CCAA GTTT ATGC TCAC TTCC GCGA CATT CGTT AATTT CTA	GAAGG TCGGA GTCAA CGGAT TCACTT CCGCG ACATTC GTTAAT TTCTG	GTG TCA TCC TCG TTG AG GTG GA GGT CAC G	T	C	R	c	a	5A-Hapl (AT) is favored higher grain number	GAGCTTTGTAAGCGG ACGCCGTGGAGTAAA ACCCACTAGCGGTGC GCTTTCACACAGTGTG ATCCTCGTTGAGGTG GAGGTCACGCAAAGT GTCC[C/T]AGAAATTA ACGAATGTGCGGAA GTGGGCGAGCGAGAA GCTTGAGGTTATCATG ATTTTGGAGATGAGA
		TaWUS-like-5A-112 6bp	GAAG GTGA CCAA GTTT ATGC TTAG CGGA TCAC ATGA	GAAGG TCGGA GTCAA CGGAT TTAGC GGATC ACATG AGGTG CCATG	GG CTT TGG GAC ATG ATC AAG GAT AG	G	A	F	c	a		TGTTACCACCGCCTTG CGATTTGGATGTTGCT GTCGGGGAGGCCAAC CCACCAATCTTTAGCG GATCACATGAGGTG CATGTGGAG[A/G]TG TCACGATGCCAACTA GTAGCCTATCCTTGAT CATGTCCCAAAGCCTA

		GGTG CCAT GTGG AGG	TGGAG A	GC					n t d		GCCGTGTA
TaWU S- like- 5B	Ta WU S- like- 5B- 883 bp	GAAG GTGA CCAA GTTC ATGC TGCG CATC GGAA ACTG AACA ACAA CCAA GC	GAAGG TCGGA GTCAA CGGAT TGCGC ATCGG AAACT GAACA ACAAC CAAGT	GTA TGA AAG CGC ACA CAC GA GAC ACG ACA CG		G	A	R	c o s o c i a n t	5B-Hapl (AG) are favored for higher thousand grain weight and grain numbers	TGCATGATGCAACACA GTGGCTGGCTGTACT ATTCGTCGCTGTTTT GTGCTGTTCTTGGTT CGTATCGTATGAAAGC GCACACACGAGACAC GACACGGTTTGCTTT[G/A]CTTGGTTGTTGT TCAGTTTCCGATGCG CATGCAATGCATGCA CGCATGGCCCTGTGCG TTTCTCCTCTTGACCC TGCGGTCTGTGGAGT GTCAGTGGGA
	Ta WU S- like- 5B- 167 2bp	GAAG GTGA CCAA GTTC ATGC TGAG CGGG CGGC GGGC GGCC CGTG C	GAAGG TCGGA GTCAA CGGAT TGAGC GGGCG GCGGG CGGCC CGTGG	CAG CCG CGC GC GCT ACA GCT CCC TCC G (DM SO was use d inst ead of Mg Cl2)		G	C	R	c o s o c i a n t		CCATGTACCACCAAG CACCAGCTCAGAACA ACGCCGGCACTCAAC AGCCGCGCGCGCTAC AGCTCCCTCCGGCCG CCGGCAC[G/C]CACG GGCCGCCCGCCGCC CGCTCCCGCCGCCA GAGACCCTGAACCTG TTCCCCTGCACCCC ACCTTCGCG
TaWU S- like- 5D	Ta WU S- like- 5D- 226 bp	GAAG GTGA CCAA GTTC ATGC TCAA ATCT TCTG AAGT GTAG TGTG CCAT GGAC	GAAGG TCGGA GTCAA CGGAT TCAAAT CTTCTG AAGTG TAGTG TGCCA TGGAG	CCA GAA ACA GC GCC AGC CAT CG GTG ATA C		C	G	F	c o s o c i a n t	5D-Hapl (C) are favored for higher thousand grain weight	ATCTTCTAGATGAGTG ATGGGCCGAGCTTTT ACCCTTTTCGAAAAA CAAATCTTCTGAAGTG TAGTGTCCATGGA[C /G]AACAGGACAAGTC CCGAAAGAATTGTAAT CTACAGTATCACCGAT GGCTGGCGCTGTTTC TGGTTTTCGTATACAT GCTC
<p>Note: Blue and green nucleoside base indicate FAM and Hex fluorescence-based reporter sequence respectively, and the black nucleoside base indicate the genomic sequence of TaWUS-likes; Red single nucleoside base in box indicate the allelic avariation of TaWUS-likes</p>											

Supplementary Table 4. Genotyping of TaWUS-likes in diploid and tetraploid wheat.

Genotyping of TaWUS-likes in diploid and tetraploid wheat

Name/Accession	Species	Genome	TaWUS-like-5A	TaWUS-like-5B	TaWUS-like-5D
UR-200-1	<i>T.urartu</i>	AA	GC	-	-
UR-201	<i>Triticum urartu</i>	AA	GC	-	-
UR-202	<i>Triticum urartu</i>	AA	GC	-	-
UR-203	<i>Triticum urartu</i>	AA	GC	-	-
UR-204	<i>Triticum urartu</i>	AA	GC	-	-
UR-205	<i>Triticum urartu</i>	AA	GC	-	-
UR-205-1	<i>T.urartu</i>	AA	GC	-	-
UR-208	<i>T.urartu</i>	AA	GC	-	-
UR-209	<i>T.urartu</i>	AA	GC	-	-
M02	<i>T.urartu</i>	AA	GC	-	-
M05	<i>T.urartu</i>	AA	GC	-	-
MO-101	<i>Triticum monococcum</i>	AA	GC	-	-
MO-102	<i>Triticum monococcum</i>	AA	GC	-	-
BO-104	<i>T.boeoticum</i> Bioss	AA	GC	-	-
BO-103	<i>T.boeoticum</i> Bioss	AA	GC	-	-
BO-8	<i>T.boeoticum</i> Bioss	AA	GC	-	-
Y-2001	<i>Aegilops speltoides</i>	BB	-	GC	-
Y2008	<i>Aegilops speltoides</i>	BB	-	GC	-
Y2009	<i>Aegilops speltoides</i>	BB	-	GC	-
Y-2017	<i>Aegilops speltoides</i>	BB	-	GC	-
Y2018	<i>Aegilops speltoides</i>	BB	-	GC	-
Y2019	<i>Aegilops speltoides</i>	BB	-	GC	-
Y2020	<i>Aegilops speltoides</i>	BB	-	GC	-
Y2021	<i>Aegilops speltoides</i>	BB	-	GC	-
Y2022	<i>Aegilops speltoides</i>	BB	-	GC	-
Y2023	<i>Aegilops speltoides</i>	BB	-	GC	-
Y2035	<i>Aegilops speltoides</i>	BB	-	GC	-
Y-2041	<i>Aegilops speltoides</i>	BB	-	GC	-
Y-85	<i>Aegilops tauschii</i>	DD	-	-	G
Y-296	<i>Aegilops tauschii</i>	DD	-	-	G
Y225-1	<i>Aegilops tauschii</i>	DD	-	-	G
Y225-2	<i>Aegilops tauschii</i>	DD	-	-	G
Y225-3	<i>Aegilops tauschii</i>	DD	-	-	G
Y225-4	<i>Aegilops tauschii</i>	DD	-	-	G
AE-37	<i>Aegilops tauschii</i>	DD	-	-	G
AE-38	<i>Aegilops tauschii</i>	DD	-	-	G
AE-46	<i>Aegilops tauschii</i>	DD	-	-	G
AE-69-1	<i>Aegilops tauschii</i>	DD	-	-	G
AE-69-2	<i>Aegilops tauschii</i>	DD	-	-	G
Kronos	<i>Triticum turgidum</i>	AABB	GC	GC	-
DS-1-1	<i>T.dicoccoides</i> Koern	AABB	AT	AG	-
DS-1-2	<i>T.dicoccoides</i> Koern	AABB	AT	AG	-
DS6	<i>Triticum dicoccoides</i> Koern	AABB	AT	AG	-
DS10	<i>Triticum dicoccoides</i> Koern	AABB	GC	GC	-
DS-10-1	<i>T.dicoccoides</i> Koern	AABB	AT	GC	-

DS-10-2	<i>T.dicoccoides</i> Koern	AABB	AT	GC	-
DM-49-1	<i>T.dicoccum</i> L.	AABB	GC	GC	-
DM-49-2	<i>T.dicoccum</i> L.	AABB	GC	GC	-
DM-50	<i>Triticum dicoccum</i>	AABB	GC	GC	-
DM-51-1	<i>T.dicoccum</i> L.	AABB	AT	AG	-
DM-51-2	<i>T.dicoccum</i> L.	AABB	AT	AG	-
AR-1	<i>Triticum araraticum</i>	AABB	AT	GC	-
PS-9	<i>Triticum persicum</i>	AABB	GC	GC	-
PS-5-1	<i>T.persicum</i> vav	AABB	GC	GC	-
PS-5-2	<i>T.persicum</i> vav	AABB	GC	GC	-
PO-9-1	<i>Triticum polonicum</i>	AABB	GC	GC	-
PO-9-2	<i>T.polonicum</i> L.	AABB	GC	AG	-
PO-9-3	<i>T.polonicum</i> L.	AABB	GC	AG	-
PO-9-4	<i>T.polonicum</i> L.	AABB	GC	AG	-
PO-9-5	<i>T.polonicum</i> L.	AABB	GC	AG	-
Diploid			Tetraploid		
TaWUS-like-5A			TaWUS-like-5B		
GC	16	Ratio	GC	13	Ratio
AT	0	-	AT	8	-
100	1	1	61.9047619	0.619047619 9	0.62
0	0	0	38.0952381	0.38095238 1	0.38
Diploid			Tetraploid		
TaWUS-like-5B			TaWUS-like-5B		
GC	12	Ratio	GC	13	Ratio
AG	0	-	AG	8	-
100	1	1	61.9047619	0.619047619 9	0.62
0	0	0	38.0952381	0.38095238 1	0.38

Note: AA, BB and DD indicates diploid wheat genome; AABB indicates tetraploid wheat genome; / denotes not presented in diploid and tetraploid genome

Supplementary Table 5. Domestication and polyploidization analysis of TaWUS-like-5A/TaWUS-like-5B/TaWUS-like-5D.

Domestication and polyploidization analysis of TaWUS-like-5A/TaWUS-like-5B/TaWUS-like-5D						
Gene	AABB		AABBDD		AABBDD	
	PIC	He	PIC in CLR	He in CLR	PIC in CMC	He in CMC
TaWUS-like-5A	0.2688	0.32	0.06*	0.062	0.277*	0.332
TaWUS-like-5B	0.1638	0.18	0.62*	0.672	0.577	0.626
TaWUS-like-5D	-	-	0.183	0.204	0.172	0.19

Note: CLR-Chinese Wheat Landraces; CMC-Chinese Modern wheat Cultivars; PIC-Polymorphism Information Content; He-Heterogosity; *-Statistic is significant at P<0.05 level by student t-test