

Supplementary figure legends:

Supplementary figure 1: Panels A-C: GISH on control lines (A) 99-247-4 (DA3CtL, $2n = 44$) and (B and C)TA7562 (DA1U, $2n = 44$) with probes produced from genomic DNA of *Ae. caudata* (pAc), *Ae. triuncialis* (pAtr) and *Ae. umbellulata* (pAu), respectively, that detected alien chromatin. Panels D-F: GISH on Tr129 with probes D - pAc, E - pAtr and F - pAu failed to detect presence of alien chromatin. Wheat chromatin counterstained with propidium iodide is shown in red, alien chromatin is green; E, F - GAA repeats are shown in white. Scale bars = 10 μ m.

Supplementary figure 2: Infection types (ITs) produced on seedlings of parents RL6071 and Tr129 and doubled haploid lines at 14 days post-inoculation with (a) *Pgt* race F (MCCFC) and (b) race E (TPMKC).

Supplementary figure 3: Infection types (ITs) produced on seedlings of parents RL6071 and Tr129 and wheat lines carrying either *Sr7a/7b* alleles at 14 days post-inoculation with *Pgt* race C (QTHJF). Lines 1-4 were DK3, Green Na 101X Mq*6, EgNa101/*6 Mq 1-4-3, and Mq*6/ K117A, respectively.

Supplementary tables legends

Supplementary table 1: Comparison of SSR size in Tr129, Neepawa, RL6071, and Marquis for the region carrying *Sr9*. The total number of alleles for stocks carrying *Sr9a*, *Sr9b*, *Sr9d*, *Sr9e*, *Sr9f*, *Sr9g* and *Sr9h* was also tabulated for each SSR marker

Supplementary table 2: Stem rust reaction of 95 RL6071×Tr129 doubled haploid lines for *Pgt* races D (TMRTF), A (TTKSK), B (RRTTF), C (QTHJF), F (MCCFC), and E (TPMKC)

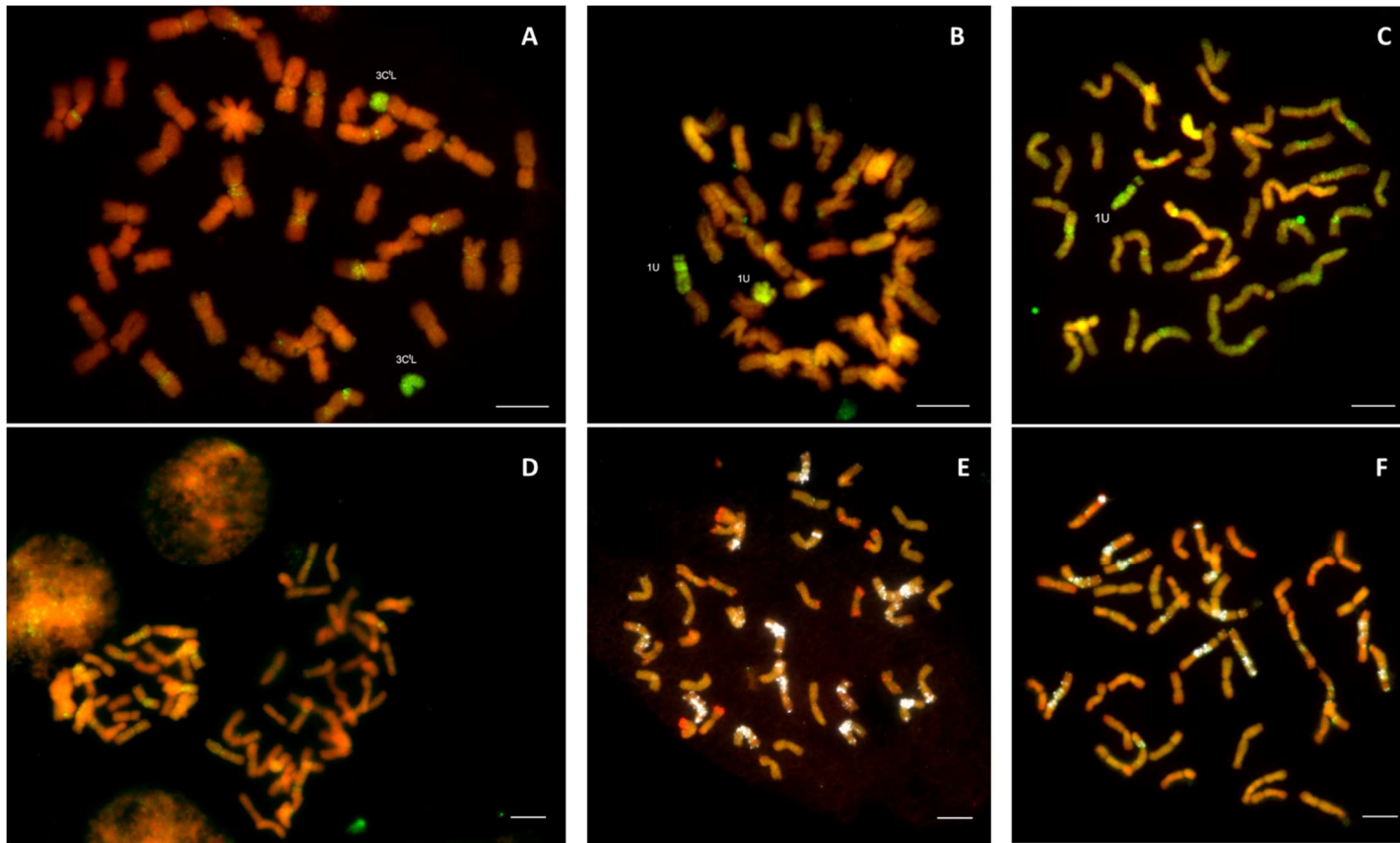
Supplementary table 3: Stem rust reactions of RL6071 × Peace doubled haploid population for *Pgt* races D (TMRTF), F (MCCFC), E (TPMKC), and A (TTKSK)

Supplementary table 4: Reference map locations (cM) of SNP markers flanking *SrTr129-4A*

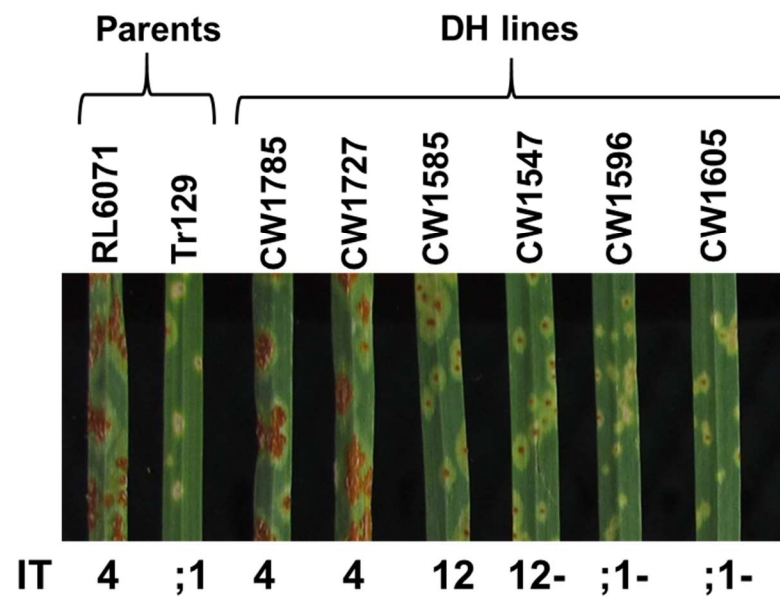
Supplementary table 5: Chromosome 2B linkage map developed for the RL6071×Tr129 doubled haploid Subset 2 population lacking resistance to race A (TTKSK)

Supplementary table 6: Comparison of consensus map locations of SNP markers located in the *Sr7*-region from three different mapping studies

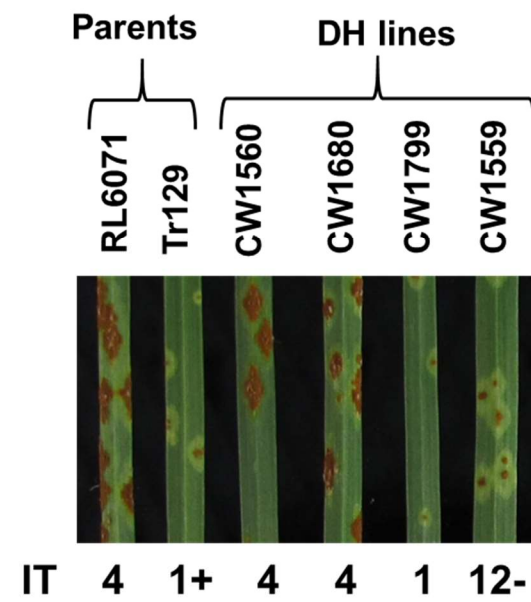
Supplementary table 7: Kompetitive allele specific (KASP) primer name, SNP name, chromosome location, and primer sequence information for markers in the *Sr7* (2BL), *Sr8a* (6A), and *Sr9* (2BL) chromosome regions



Supplementary figure 1: Panels A-C: GISH on control lines (A) 99-247-4 (DA3CtL, $2n = 44$) and (B and C)TA7562 (DA1U, $2n = 44$) with probes produced from genomic DNA of *Ae. caudata* (pAc), *Ae. triuncialis* (pAtr) and *Ae. umbellulata* (pAu), respectively, that detected alien chromatin. Panels D-F: GISH on Tr129 with probes D - pAc, E - pAtr and F - pAu failed to detect presence of alien chromatin. Wheat chromatin counterstained with propidium iodide is shown in red, alien chromatin is green; E, F - GAA repeats are shown in white. Scale bars = 10 μ m.

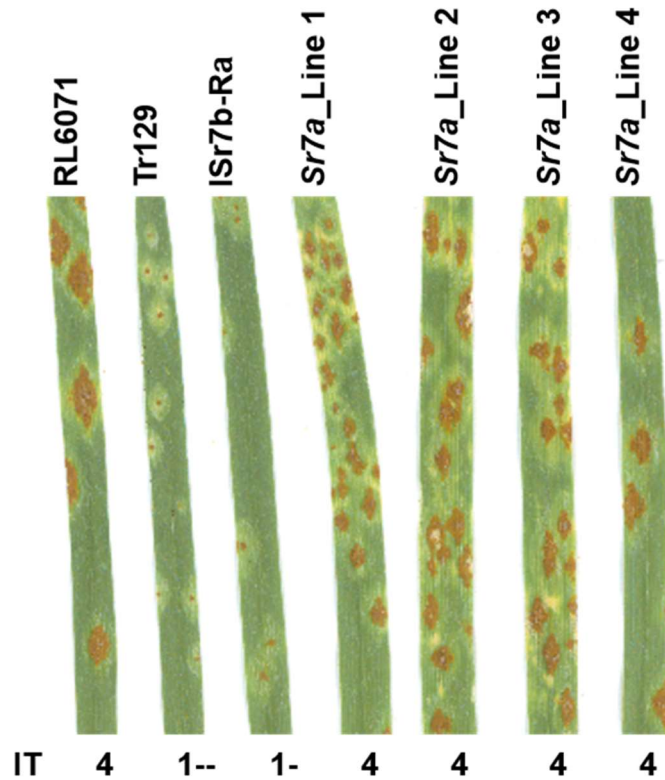


(a)



(b)

Supplementary figure 2: Infection types (ITs) produced on seedlings of parents RL6071 and Tr129 and doubled haploid (DH) lines at 14 days post-inoculation with (a) *Pgt* race F (MCCFC) and (b) race E (TPMKC).



Supplementary figure 3: Infection types (ITs) produced on seedlings of parents RL6071 and Tr129 and wheat lines carrying either *Sr7a/7b* alleles at 14 days post-inoculation with *Pgt* race C (QTHJF). Lines 1-4 were DK3, Green Na 101X Mq*6, EgNa101/*6 Mq 1-4-3, and Mq*6/ K117A, respectively.

Supplementary table 1: Comparison of SSR size in Tr129, Neepawa, RL6071, and Marquis for the region carrying *Sr9*. The total number of alleles for stocks carrying *Sr9a*, *Sr9b*, *Sr9d*, *Sr9e*, *Sr9f*, *Sr9g* and *Sr9h* was also tabulated for each SSR marker

SSR	Allele size (bp)				Number of alleles in <i>Sr9</i> stocks
	Tr129	Neepawa	RL6071	Marquis	
<i>gpw7506</i>	342	342	352	352	4
<i>gpw4396</i>	160	160	164	164	4
<i>cfid73</i>	302	302	300	290	6
<i>wmc175</i>	268	268	268	268	2
<i>gwm47</i>	160	160	164	164	4
<i>wmc332</i>	192	192	null	233	6
<i>gpw4112</i>	264	264	224	266	7
<i>gpw4103</i>	298	298	294	296	5

Supplementary table 2: Stem rust reaction of 95 RL6071×Tr129 doubled haploid lines for *Pgt* races D (TMRTF), A (TTKSK), B (RRTTF), C (QTHJF), F (MCCFC), and E (TPMKC)

DH Line no#	TMRTF (D)	TTKSK (A)	RRTTF (B)	QTHJF (C)	MCCFC (F)	TPMKC (E)
CW1535	S	R	R	R	S	S
CW1536	S	S	S	S	S	S
CW1537	S	S	S	S	S	S
CW1538	R	S	R	R	R	S
CW1540	R	S	R	S	R	S
CW1542	R	R	R	R	R	R
CW1548	S	R	R	R	S	S
CW1549	R	S	R	R	R	S
CW1550	S	S	S	S	S	S
CW1551	S	R	R	R	R	R
CW1557	R	R	R	R	R	R
CW1558	S	R	R	R	S	S
CW1559	R	R	R	R	R	R
CW1560	R	S	R	S	R	S
CW1565	R	R	R	R	R	R
CW1569	R	R	R	R	R	R
CW1571	S	R	R	R	R	R
CW1572	S	S	S	S	R	R
CW1575	S	S	C	R	S	S
CW1577	R	S	R	R	R	R
CW1579	R	R	R	R	R	R
CW1580	R	R	R	R	R	S
CW1581	S	S	S	S	R	R
CW1585	S	R	R	R	R	R
CW1586	S	S	S	S	S	S
CW1587	R	R	R	R	R	S
CW1588	S	S	S	R	S	S
CW1589	S	S	C	R	S	S
CW1591	R	S	R	S	R	S
CW1595	R	R	R	R	R	S
CW1596	R	R	R	R	R	R
CW1597	R	R	R	R	R	S
CW1598	S	R	R	R	R	R

CW1600	R	R	R	R	R	S
CW1601	R	R	R	R	R	R
CW1602	R	R	R	R	R	R
CW1608	S	R	R	R	R	R
CW1611	S	S	S	R	R	R
CW1612	S	R	R	R	S	S
CW1613	R	R	R	R	R	S
CW1614	S	R	R	R	R	R
CW1617	S	R	R	R	R	R
CW1618	S	R	R	R	R	R
CW1620	R	R	R	R	R	S
CW1621	S	R	R	R	C	S
CW1622	R	S	R	S	R	S
CW1625	R	R	R	R	R	S
CW1627	S	S	C	R	R	R
CW1628	S	S	S	R	S	S
CW1629	R	R	R	R	R	R
CW1632	R	R	R	R	R	S
CW1633	R	S	R	S	R	R
CW1634	R	S	R	R	R	R
CW1635	S	S	S	R	S	S
CW1636	S	S	S	S	S	S
CW1637	S	S	S	R	S	S
CW1639	R	R	R	R	R	S
CW1640	S	R	R	R	R	R
CW1642	S	S	S	R	S	S
CW1644	R	R	R	R	R	R
CW1645	R	R	R	R	R	S
CW1647	R	S	R	S	R	R
CW1648	R	R	R	R	R	S
CW1650	R	S	R	S	R	R
CW1657	S	S	S	R	S	S
CW1658	R	R	R	R	R	R
CW1660	R	R	R	R	R	R
CW1661	S	S	S	R	S	S
CW1663	R	S	R	S	R	S
CW1668	R	S	R	R	R	S
CW1670	R	S	R	R	R	S

CW1673	R	R	R	R	R	R
CW1675	S	R	R	R	S	S
CW1678	R	S	R	S	R	S
CW1681	S	S	C	S	S	S
CW1682	S	R	R	R	R	R
CW1686	R	R	R	R	R	R
CW1687	R	S	R	R	R	S
CW1688	S	R	R	R	R	R
CW1691	R	S	R	S	R	S
CW1693	R	R	R	R	R	R
CW1695	R	S	R	S	R	S
CW1698	S	S	C	S	S	S
CW1699	R	S	R	R	R	S
CW1700	R	S	R	S	R	R
CW1701	R	R	R	R	R	R
CW1702	R	S	R	S	R	S
CW1703	R	R	R	R	R	R
CW1704	S	S	C	R	S	S
CW1705	S	S	S	S	S	S
CW1710	S	S	S	S	S	S
CW1712	S	S	S	R	R	R
CW1716	S	S	S	S	S	R
CW1717	S	S	S	R	S	S
CW1719	S	S	S	R	S	S
Total R	51	47	68	70	67	41
Total S	44	48	21	25	27	54
Chi square (χ^2)	0.52	0.01	0.09	0.08	0.69	1.779
Probability (<i>p</i>)	0.47	0.92	0.76	0.77	0.4	0.18
No. of gene	1	1	2	2	2	

R = Resistant, S = Susceptible, C = Missing data

Supplementary table 3: Stem rust reactions of RL6071 × Peace doubled haploid population for *Pgt* races D (TMRTF), F (MCCFC), E (TPMKC), and A (TTKSK)

DH line no.	Source	TMRTF	MCCFC	TPMKC	TTKSK
CZ1041	06B01*A0002	S	R	R	S
CZ1042	06B01*A0015	S	R	R	S
CZ1043	06B01*A0016	R	S	S	S
CZ1045	06B01*A0021	R	S	S	R
CZ1046	06B01*A0034	S	R	R	R
CZ1047	06B01*A0037	R	R	R	S
CZ1048	06B01*A0038	R	S	S	S
CZ1050	06B01*A0046	R	S	S	R
CZ1051	06B01*A0054	R	R	R	R
CZ1052	06B01*A0076	R	S	S	S
CZ1053	06B01*A0080	S	S	S	R
CZ1054	06B01*A0092	S	S	S	S
CZ1055	06B01*A0098	R	S	S	S
CZ1056	06B01*A0190	R	R	R	R
CZ1058	06B01*A0197	S	S	S	S
CZ1060	06B01*A0205	R	R	R	R
CZ1062	06B01*A0266	S	S	S	R
CZ1063	06B01*A0282	S	S	S	R
CZ1064	06B01*A0313	R	R	R	S
CZ1065	06B01*A0318	S	R	R	S
CZ1070	06B01*B0104	R	R	R	R
CZ1072	06B01*B0209	R	S	S	R
CZ1075	06B01*B0330	R	R	R	R
CZ1076	06B01*B0331	R	R	R	S
CZ1080	06B01*B0441	S	S	S	S
CZ1083	06B01*B0618	S	R	R	S
CZ1085	06B01*B0738	R	S	S	R
CZ1086	06B01*B0779	R	S	S	S
CZ1090	06B01*C0072	C	R	R	S
CZ1091	06B01*C0112	R	R	R	S

CZ1092	06B01*C0237	S	S	S	R
CZ1093	06B01*C0238	R	S	S	S
CZ1096	06B01*C0366	S	S	S	S
CZ1097	06B01*C0459	S	S	S	S
CZ1098	06B01*C0465	S	S	S	R
CZ1099	06B01*C0467	S	R	R	S
CZ1100	06B01*C0474	S	S	S	S
CZ1101	06B01*C0477	R	S	S	S
CZ1102	06B01*C0487	R	R	R	S
CZ1103	06B01*C0489	S	R	R	R
CZ1104	06B01*C0642	R	S	S	R
CZ1106	06B01*C0792	S	R	R	R
CZ1107	06B01*D0130	R	R	R	R
CZ1108	06B01*D0136	R	S	S	S
CZ1109	06B01*D0137	R	R	R	R
CZ1111	06B01*D0256	S	R	R	R
CZ1112	06B01*D0260	S	S	S	S
CZ1114	06B01*D0492	S	S	S	R
CZ1116	06B01*D0505	S	R	R	R
CZ1119	06B01*D0653	C	S	S	R
CZ1123	06B01*D0748	R	R	R	S
CZ1124	06B01*D0751	S	R	R	R
CZ1127	06B01*E0184	S	R	R	S
CZ1128	06B01*E0185	S	R	R	R
CZ1129	06B01*E0187	S	R	R	S
CZ1130	06B01*E0188	S	S	S	R
CZ1132	06B01*E0300	S	R	R	R
CZ1133	06B01*E0303	S	S	S	R
CZ1134	06B01*E0383	R	S	S	R
CZ1135	06B01*E0388	R	S	S	S
CZ1136	06B01*E0391	S	S	S	S
CZ1137	06B01*E0392	R	R	R	S
CZ1138	06B01*E0548	S	R	R	R
CZ1139	06B01*E0554	S	R	R	S

CZ1140	06B01*E0561	R	R	R	R
CZ1141	06B01*E0574	R	C	C	S
CZ1142	06B01*E0583	R	R	R	R
CZ1143	06B01*E0587	R	S	S	R
CZ1146	06B01*E0765	R	R	R	S
CZ1147	06B01*E0766	S	R	R	S
CZ1148	06B01*E0774	R	R	R	S
CZ1149	06B01*E0804	R	R	R	S
CZ1150	06B01*A0007	R	R	R	S

R = Resistant, S = Susceptible, C = Missing data

Supplementary table 4: Reference map locations (cM) of SNP markers flanking *SrTr129-4A*

Index no.	SNP id	SNP Name	Chr.	cM
47901.00	IWB47901	Kukri_c81845_114	4A	52.1
11801.00	IWB11801	BS00093289_51	4A	52.1
8193.00	IWB8193	BS00039811_51	4A	52.1
71640.00	IWB71640	Tdurum_contig45738_670	4A	52.1
23841.00	IWB23841	Excalibur_c22708_625	4A	63.1
19553.00	IWB19553	Ex_c101560_2288	4A	63.1
24693.00	IWB24693.1	Excalibur_c2827_580	4A	63.1
34249.00	IWB34249	GENE-4923_84	4A	63.1
26814.00	IWB26814	Excalibur_c46812_161	4A	63.1
52406.00	IWB52406	Ra_c6672_1679	4A	63.1
12229.00	IWB12229	BS00104640_51	4A	63.1
76446.00	IWA1674	wsnp_Ex_c12725_20212708	4A	63.1
60692.00	IWB60692	RAC875_c82470_174	4A	63.1
71808.00	IWB71808	Tdurum_contig47476_441	4A	63.1
71979.00	IWB71979	Tdurum_contig49559_2160	4A	63.1
70303.00	IWB70303	Tdurum_contig31852_251	4A	63.1
80365.00	IWA6878	wsnp_Ku_c3056_5734773	4A	63.1
80004.00	IWA6392	wsnp_Ku_c10434_17255840	4A	63.1
8301.00	IWB8301	BS00042071_51	4A	63.1
76581.00	IWA1836	wsnp_Ex_c13953_21832185	4A	63.1
71693.00	IWB71693	Tdurum_contig46583_1275	4A	63.1
31512.00	IWB31512	Excalibur_s108810_150	4A	63.1
45728.00	IWB45728	Kukri_c4709_53	4A	63.1
71544.00	IWB71544	Tdurum_contig44771_984	4A	63.1
72931.00	IWB72931	Tdurum_contig63050_264	4A	63.1
77780.00	IWA3422	wsnp_Ex_c33012_41567026	4A	63.1
67739.00	IWB67739	Tdurum_contig12802_331	4A	63.1
73720.00	IWB73720	Tdurum_contig8712_129	4A	63.1
81157.00	IWA7939	wsnp_Ra_c4400_7986499	4A	63.1
70192.00	IWB70192	Tdurum_contig31218_208	4A	63.1
70193.00	IWB70193	Tdurum_contig31218_279	4A	63.1
29925.00	IWB29925	Excalibur_rep_c103261_161	4A	63.1
53285.00	IWB53285	RAC875_c11237_357	4A	63.1
6928.00	IWB6928	BS00022146_51	4A	63.1
73933.00	IWB73933	Tdurum_contig9530_69	4A	63.1
64428.00	IWB64428	RFL_Contig3621_947	4A	63.1
64422.00	IWB64422	RFL_Contig3621_1157	4A	63.1
70194.00	IWB70194	Tdurum_contig31218_344	4A	63.1

275.00	IWB275	BobWhite_c11918_807	4A	63.1
44828.00	IWB44828	Kukri_c3866_1768	4A	63.1
4517.00	IWB4517	BobWhite_c877_1058	4A	63.1
48829.00	IWB48829	Kukri_rep_c102971_140	4A	63.1
6097.00	IWB6097	BS00009680_51	4A	63.1
72930.00	IWB72930	Tdurum_contig63050_181	4A	63.1
76237.00	IWA1410	wsnp_Ex_c10955_17794520	4A	63.1
79306.00	IWA5353	wsnp_Ex_rep_c67099_65575038	4A	63.1
67745.00	IWB67745.1	Tdurum_contig12832_116	4A	63.1
78768.00	IWA4689.1	wsnp_Ex_c7489_12810046	4A	63.1
63978.00	IWB63978.1	RFL_Contig2531_969	4A	63.1
34478.00	IWB34478	IAAV1943	4A	63.1
1867.00	IWB1867	BobWhite_c25015_1218	4A	63.1
77591.00	IWA3192	wsnp_Ex_c2886_5325103	4A	63.1
66655.00	IWB66655	Tdurum_contig10654_704	4A	63.1
73467.00	IWB73467	Tdurum_contig80287_71	4A	63.1
12146.00	IWB12146	BS00100763_51	4A	63.1
71695.00	IWB71695	Tdurum_contig46583_1457	4A	63.1
69385.00	IWB69385	Tdurum_contig27944_266	4A	63.1
5669.00	IWB5669	BobWhite_s64194_60	4A	63.1
61749.00	IWB61749	RAC875_rep_c107984_318	4A	63.1
74069.00	IWB74069	Tdurum_contig99556_220	4A	63.1
74014.00	IWB74014	Tdurum_contig97806_76	4A	63.1
80735.00	IWA7364	wsnp_Ku_c9746_16265584	4A	63.1
80736.00	IWA7365	wsnp_Ku_c9746_16265756	4A	63.1
25418.00	IWB25418.1	Excalibur_c34115_727	4A	63.1
27971.00	IWB27971	Excalibur_c6050_323	4A	63.1
63975.00	IWB63975	RFL_Contig2531_1872	4A	63.1
48738.00	IWB48738	Kukri_rep_c102191_135	4A	63.1
19550.00	IWB19550	Ex_c101546_376	4A	63.1
57180.00	IWB57180	RAC875_c36363_222	4A	63.1
19549.00	IWB19549	Ex_c101546_128	4A	63.1
76314.00	IWA1505	wsnp_Ex_c11474_18507872	4A	63.1
74281.00	IWB74281	tplb0026e22_471	4A	63.1
15031.00	IWB15031	CAP8_rep_c4703_313	4A	63.1
39026.00	IWB39026	Ku_c27642_444	4A	63.1
42226.00	IWB42226	Kukri_c19883_629	4A	63.1
22848.00	IWB22848	Excalibur_c16775_1734	4A	63.1
36777.00	IWB36777	Jagger_c8310_70	4A	63.1
42225.00	IWB42225	Kukri_c19883_365	4A	63.1
8552.00	IWB8552	BS00049695_51	4A	63.1
5608.00	IWB5608	BobWhite_rep_c66361_594	4A	63.1
71810.00	IWB71810	Tdurum_contig47476_528	4A	63.1
9157.00	IWB9157	BS00063943_51	4A	63.1
1158.00	IWB1158	BobWhite_c18267_473	4A	63.1

12593.00	IWB12593	BS00110758_51	4A	63.1
80101.00	IWA6518	wsnp_Ku_c14220_22456455	4A	63.1
22898.00	IWB22898	Excalibur_c17006_73	4A	63.1
50393.00	IWB50393	Kukri_rep_c80771_409	4A	63.1
59346.00	IWB59346	RAC875_c58134_239	4A	63.1
46888.00	IWB46888	Kukri_c6091_327	4A	63.1
71319.00	IWB71319	Tdurum_contig42638_531	4A	63.1
23333.00	IWB23333	Excalibur_c1952_994	4A	63.1
8062.00	IWB8062	BS00036649_51	4A	63.1
33887.00	IWB33887	GENE-4290_907	4A	63.1
34594.00	IWB34594	IAAV2678	4A	63.1
43885.00	IWB43885	Kukri_c30693_573	4A	63.1
47019.00	IWB47019	Kukri_c6282_1706	4A	63.1
24532.00	IWB24532	Excalibur_c27082_65	4A	63.1
1389.00	IWB1389	BobWhite_c20382_117	4A	63.1
57392.00	IWB57392	RAC875_c38350_106	4A	63.1
58574.00	IWB58574	RAC875_c4965_1523	4A	63.1
76580.00	IWA1835	wsnp_Ex_c13953_21831752	4A	63.1
22948.00	IWB22948	Excalibur_c17294_228	4A	63.1
60880.00	IWB60880	RAC875_c8714_1139	4A	63.1
23633.00	IWB23633	Excalibur_c21395_291	4A	63.1
29736.00	IWB29736	Excalibur_rep_c101560_1124	4A	63.1
11060.00	IWB11060	BS00079092_51	4A	63.1
11988.00	IWB11988	BS00097194_51	4A	63.1
30794.00	IWB30794	Excalibur_rep_c66939_124	4A	63.1
47252.00	IWB47252	Kukri_c65672_693	4A	63.1
55514.00	IWB55514	RAC875_c23471_298	4A	63.1
4478.00	IWB4478	BobWhite_c8436_391	4A	63.1
71767.00	IWB71767	Tdurum_contig47143_161	4A	63.1
71768.00	IWB71768	Tdurum_contig47143_241	4A	63.1
61748.00	IWB61748	RAC875_rep_c107984_187	4A	63.1
61552.00	IWB61552	RAC875_rep_c106158_701	4A	63.1
50440.00	IWB50440	Kukri_rep_c85536_598	4A	63.1
57528.00	IWB57528	RAC875_c39551_656	4A	63.1
2653.00	IWB2653	BobWhite_c33799_145	4A	63.1
44499.00	IWB44499	Kukri_c35948_758	4A	63.1
59773.00	IWB59773	RAC875_c63420_397	4A	63.1
44537.00	IWB44537	Kukri_c36204_152	4A	63.1
35545.00	IWB35545	IAAV883	4A	63.1
11490.00	IWB11490	BS00087276_51	4A	63.1
11491.00	IWB11491	BS00087277_51	4A	63.1
23864.00	IWB23864	Excalibur_c22830_1989	4A	63.1
28865.00	IWB28865	Excalibur_c780_508	4A	63.1
28866.00	IWB28866	Excalibur_c780_694	4A	63.1
43867.00	IWB43867	Kukri_c3056_4405	4A	63.1

44830.00	IWB44830	Kukri_c3866_718	4A	63.1
72383.00	IWB72383	Tdurum_contig54776_1396	4A	63.1
72384.00	IWB72384	Tdurum_contig54776_1489	4A	63.1
78296.00	IWA4084	wsnp_Ex_c5072_9006966	4A	63.1
78907.00	IWA4858	wsnp_Ex_c8976_14963826	4A	63.1
39523.00	IWB39523	Ku_c4868_489	4A	63.1
78769.00	IWA4690	wsnp_Ex_c7489_12810235	4A	63.1
59560.00	IWB59560	RAC875_c60861_95	4A	63.1
9476.00	IWB9476.1	BS00065188_51	4A	63.1
28864.00	IWB28864.1	Excalibur_c780_400	4A	63.1
22343.00	IWB22343.1	Excalibur_c13953_179	4A	63.1
1512.00	IWB1512.1	BobWhite_c21647_287	4A	63.1
53296.00	IWB53296.1	RAC875_c1126_1769	4A	63.1
65414.00	IWB65414.1	TA001522-0900	4A	63.1
57997.00	IWB57997.1	RAC875_c43902_71	4A	63.1
27531.00	IWB27531.1	Excalibur_c55058_182	4A	63.1
6186.00	IWB6186	BS00010202_51	4A	63.1
24690.00	IWB24690.1	Excalibur_c2827_107	4A	63.1
57683.00	IWB57683	RAC875_c41169_562	4A	63.1
34246.00	IWB34246	GENE-4923_281	4A	63.1
34365.00	IWB34365	IAAV136	4A	63.1
60881.00	IWB60881	RAC875_c8714_653	4A	63.1
21850.00	IWB21850	Excalibur_c113341_139	4A	63.1
30795.00	IWB30795	Excalibur_rep_c66939_849	4A	63.1
22422.00	IWB22422	Excalibur_c1439_880	4A	63.1
12444.00	IWB12444	BS00109911_51	4A	63.1
42399.00	IWB42399	Kukri_c20938_270	4A	63.1
11205.00	IWB11205	BS00081698_51	4A	63.1
31039.00	IWB31039	Excalibur_rep_c69170_425	4A	63.1
47103.00	IWB47103	Kukri_c63845_771	4A	63.1
78908.00	IWA4859	wsnp_Ex_c8976_14964359	4A	63.1
59345.00	IWB59345	RAC875_c58134_104	4A	63.1
23632.00	IWB23632	Excalibur_c21395_1464	4A	63.1
19596.00	IWB19596	Ex_c103537_874	4A	63.1
29737.00	IWB29737	Excalibur_rep_c101560_2243	4A	63.1
9058.00	IWB9058	BS00063433_51	4A	63.1
29950.00	IWB29950	Excalibur_rep_c103537_1054	4A	63.1
30571.00	IWB30571	Excalibur_rep_c112003_621	4A	63.1
39716.00	IWB39716	Ku_c61_424	4A	63.1
1405.00	IWB1405	BobWhite_c20558_209	4A	63.1
36673.00	IWB36673	Jagger_c6192_53	4A	63.1
67740.00	IWB67740	Tdurum_contig12802_393	4A	63.1

Supplementary table 5: Chromosome 2B linkage map developed for the RL6071×Tr129 doubled haploid Subset 2 population lacking resistance to race A (TTKSK)

	Locus	Wheat 90K	SNP	Chr location	CM	KASP marker
1	57369	IWB57369	RAC875_c38003_164	2B	0.0	Kwh599
2	10434	IWB10434	BS00070050_51	2B	2.2	
3	10435	IWB10435	BS00070051_51	2B	2.2	
4	10616	IWB10616	BS00072619_51	2B	2.2	
5	10617	IWB10617	BS00072620_51	2B	2.2	
6	10512	IWB10512	BS00070900_51	2B	3.3	
7	17530	IWB17530	D_F5XZDLF01CFO7W_135	2B	3.3	
8	43883	IWB43883	Kukri_c3067_398	2B	4.4	
9	45508	IWB45508	Kukri_c45103_371	2B	4.4	
10	9206	IWB9206	BS00064153_51	2B	4.4	
11	65267	IWB65267	RFL_Contig772_2612	2B/2D	4.4	
12	39393	IWB39393	Ku_c41677_924	2B	22.5	
13	27391	IWB27391	Excalibur_c53516_119	2B	22.5	
14	65494	IWB65494	TA002079-5951	2B	22.5	
15	78449	IWA4284	wsnp_Ex_c56027_58306755	2B	22.5	
16	23418	IWB23418	Excalibur_c20050_133	2B	22.5	
17	43573	IWB43573	Kukri_c28478_750	2B	22.5	
18	67043	IWB67043	Tdurum_contig11379_1047	2B	22.5	
19	32470	IWB32470	GENE-1421_706	2B	22.5	
20	31706	IWB31706	GENE-0137_469	2B	22.5	
21	43753	IWB43753	Kukri_c29640_212	2B	22.5	
22	43754	IWB43754	Kukri_c29640_92	2B	22.5	
23	67044	IWB67044	Tdurum_contig11379_468	2B	22.5	
24	39233	IWB39233	Ku_c34562_480	2B	22.5	
25	42859	IWB42859	Kukri_c23771_483	2B	22.5	
26	21110	IWB21110	Ex_c67274_1225	2B	22.5	
27	55258	IWB55258	RAC875_c21868_792	2B	22.5	
28	78450	IWA4285	wsnp_Ex_c56027_58308093	2B	22.5	
29	23421	IWB23421	Excalibur_c20050_748	2B	22.5	
30	24406	IWB24406	Excalibur_c26099_106	2B	22.5	

31	32469	IWB32469	GENE-1421_124	2B	22.5
32	79883	IWA6184	wsnp_JD_c8085_9129899	2B	22.5
33	55434	IWB55434	RAC875_c22997_534	2B	22.5
34	49164	IWB49164	Kukri_rep_c106290_204	2B	22.5
35	8063	IWB8063	BS00036721_51	2B	22.5
36	28920	IWB28920	Excalibur_c7963_1722	2B	22.5
37	32471	IWB32471	GENE-1421_802	2B	22.5
38	31710	IWB31710	GENE-0137_782	2B	22.5
39	23439	IWB23439	Excalibur_c20196_503	2B	24.8
40	23438	IWB23438	Excalibur_c20196_264	2B	24.8
41	61709	IWB61709	RAC875_rep_c107531_66	2B	24.8
42	67443	IWB67443	Tdurum_contig12095_76	2B	24.8
43	77007	IWA2391	wsnp_Ex_c19260_28187434	2B	24.8
44	76198	IWA1359	wsnp_Ex_c10596_17293192	2B	24.8
45	76199	IWA1360	wsnp_Ex_c10596_17293363	2B	24.8
46	54531	IWB54531	RAC875_c17720_570	2B	24.8
47	54530	IWB54530	RAC875_c17720_501	2B	24.8
48	54529	IWB54529	RAC875_c17720_436	2B	24.8
49	55506	IWB55506	RAC875_c23425_208	2B	24.8
50	75619	IWA413	wsnp_BF146221B_Ta_2_2	2B	24.8
51	64186	IWB64186	RFL_Contig3027_1269	2B	24.8
52	19719	IWB19719	Ex_c12051_875	2B	24.8
53	34527	IWB34527	IAAV2277	2B	24.8
54	34849	IWB34849	IAAV4206	2B	24.8
55	53589	IWB53589	RAC875_c12766_461	2B	24.8
56	8280	IWB8280	BS00041585_51	2B	24.8
57	8281	IWB8281	BS00041587_51	2B	24.8
58	35959	IWB35959	IACX445	2B	24.8
59	59781	IWB59781	RAC875_c6358_1091	2B	24.8
60	28247	IWB28247	Excalibur_c63941_83	2B	24.8
61	1748	IWB1748	BobWhite_c23790_98	2B	24.8
62	11939	IWB11939	BS00095573_51	2B	24.8
63	23172	IWB23172	Excalibur_c18630_268	2B	24.8
64	29273	IWB29273	Excalibur_c89477_207	2B	24.8
65	34673	IWB34673	IAAV3165	2B	24.8
66	44675	IWB44675	Kukri_c37311_136	2B	24.8

Kwh598

67	6117	IWB6117	BS00009807_51	2B	24.8	
68	80066	IWA6474	wsnp_Ku_c12721_20478606	2B	24.8	
69	167	IWB167	BobWhite_c11059_169	2B	24.8	
70	40572	IWB40572	Kukri_c11318_591	2B	24.8	
71	6525	IWB6525	BS00012078_51	2B	24.8	
72	69541	IWB69541	Tdurum_contig28494_288	2B	24.8	
73	9207	IWB9207	BS00064155_51	2B	24.8	
74	46832	IWB46832	Kukri_c59939_94	2B	24.8	
75	32171	IWB32171	GENE-0989_875	2B	24.8	
76	70198	IWB70198	Tdurum_contig31244_181	2B	24.8	
77	46423	IWB46423	Kukri_c54262_436	2B	24.8	
78	23173	IWB23173	Excalibur_c18630_283	2B	24.8	
79	61653	IWB61653	RAC875_rep_c107031_84	2B	24.8	
80	6886	IWB6886	BS00022060_51	2B/5B	24.8	
81	77147	IWA2571	wsnp_Ex_c21092_30220342	2B	29.3	
82	35644	IWB35644	IACX1098	2B	29.3	
83	3178	IWB3178	BobWhite_c41535_52	2B	29.3	
84	77148	IWA2572	wsnp_Ex_c21092_30220702	2B	29.3	
85	46469	IWB46469	Kukri_c5497_312	2B	29.3	
86	29319	IWB29319	Excalibur_c9093_1469	2B	33.7	
87	55936	IWB55936	RAC875_c26469_480	2B	33.7	
88	56961	IWB56961	RAC875_c34516_316	2B	33.7	Kwh596
89	11952	IWB11952	BS00096182_51	2B	33.7	
90	62309	IWB62309	RAC875_rep_c115152_90	2B	49.4	
91	31001	IWB31001	Excalibur_rep_c68899_1400	2B	49.4	
92	32627	IWB32627	GENE-1741_103	2B	49.4	
93	72307	IWB72307	Tdurum_contig53156_111	2B	49.4	
94	60831	IWB60831	RAC875_c86069_65	2B	49.4	
95	36124	IWB36124	IACX6223	2B	49.4	
96	7346	IWB7346	BS00022966_51	2B	49.4	
97	24614	IWB24614	Excalibur_c27716_544	2B	58.2	
98	32327	IWB32327	GENE-1246_417	2B	58.2	
99	64716	IWB64716	RFL_Contig4542_1281	2B	58.2	
100	73543	IWB73543	Tdurum_contig81917_141	2B	58.2	
101	73598	IWB73598	Tdurum_contig82821_324	2B	58.2	
102	70370	IWB70370	Tdurum_contig32621_437	2B/2D	58.2	

103	45820	IWB45820	Kukri_c4790_1137	2B/2D	58.2	
104	39513	IWB39513	Ku_c4790_797	2B	58.2	
105	47380	IWB47380	Kukri_c67276_76	2B	58.2	
106	10568	IWB10568	BS00071690_51	2B	58.2	
107	47379	IWB47379	Kukri_c67276_103	2B	58.2	
108	45822	IWB45822	Kukri_c4790_154	2B	58.2	
109	45825	IWB45825	Kukri_c4790_923	2B	58.2	
110	71006	IWB71006	Tdurum_contig42214_2997	2B	62.5	
111	18439	IWB18439	D_GBFI1XID02GVTKX_76	2B	62.5	
112	42992	IWB42992	Kukri_c24586_1089	2B	62.5	
113	55177	IWB55177	RAC875_c21378_474	2B	62.5	
114	42993	IWB42993	Kukri_c24586_923	2B	62.5	
115	63700	IWB63700	RFL_Contig1633_304	2B	63.6	
116	58853	IWB58853	RAC875_c52566_551	2B	63.6	
117	6607	IWB6607	BS00014923_51	2B	63.6	
118	58852	IWB58852	RAC875_c52566_447	2B	63.6	
119	78794	IWA4720	wsnp_Ex_c7738_13195349	2B	63.6	
120	58854	IWB58854	RAC875_c52566_644	2B	63.6	
121	4100	IWB4100	BobWhite_c6166_319	2B	63.6	
122	45644	IWB45644	Kukri_c4632_115	2B	63.6	
123	50839	IWB50839	Ra_c107358_279	2B	63.6	
124	34697	IWB34697	IAAV3305	2B/7A	63.6	
125	12643	IWB12643	BS00111325_51	2B/7D	64.7	Kwh593
126	11568	IWB11568	BS00088575_51	2B	64.7	
127	22202	IWB22202	Excalibur_c1305_662	2B	64.7	
128	32005	IWB32005	GENE-0644_370	2B	64.7	
129	32007	IWB32007	GENE-0644_421	2B	64.7	
130	34545	IWB34545	IAAV2381	2B	64.7	
131	53910	IWB53910	RAC875_c14362_529	2B	64.7	
132	61587	IWB61587	RAC875_rep_c106400_276	2B	64.7	
133	1602	IWB1602	BobWhite_c22503_605	2B	64.7	
134	77647	IWA3257	wsnp_Ex_c30_66389	2B	64.7	
135	24382	IWB24382	Excalibur_c25921_230	2B	64.7	
136	61926	IWB61926	RAC875_rep_c109975_192	2B	64.7	
137	23131	IWB23131	Excalibur_c18417_285	2B	64.7	
138	10805	IWB10805	BS00075410_51	2B	64.7	

139	43295	IWB43295	Kukri_c26474_540	2B	64.7
140	74681	IWB74681	tplb0040e02_1293	2B	64.7
141	41645	IWB41645	Kukri_c16760_1086	2B	64.7
142	41647	IWB41647	Kukri_c16760_259	2B	64.7
143	22020	IWB22020	Excalibur_c12004_73	2B	64.7
144	24397	IWB24397	Excalibur_c26042_260	2B	64.7
145	32006	IWB32006	GENE-0644_42	2B	64.7
146	62221	IWB62221	RAC875_rep_c113555_122	2B	64.7
147	62870	IWB62870	RAC875_rep_c72435_90	2B	64.7
148	22543	IWB22543	Excalibur_c15031_73	2B	64.7
149	32009	IWB32009	GENE-0652_360	2B	64.7
150	74034	IWB74034	Tdurum_contig98206_211	2B	64.7
151	44605	IWB44605	Kukri_c36756_316	2B	64.7
152	61973	IWB61973	RAC875_rep_c110493_512	2B	64.7
153	73607	IWB73607	Tdurum_contig83066_276	2B	64.7
154	79320	IWA5377	wsnp_Ex_rep_c67257_65786614	2B	64.7
155	75564	IWA328	wsnp_BE499478B_Ta_2_1	2B	64.7
156	78174	IWA3924	wsnp_Ex_c45094_50985067	2B	64.7
157	65801	IWB65801	TA004199-0831	2B	64.7
158	22235	IWB22235	Excalibur_c13239_687	2B	64.7
159	78732	IWA4642	wsnp_Ex_c7246_12443506	2B	64.7
160	19714	IWB19714	Ex_c12004_1006	2B	64.7
161	37419	IWB37419	JD_c39990_130	2B	64.7
162	40383	IWB40383	Kukri_c106282_114	2B	64.7
163	78480	IWA4323	wsnp_Ex_c57_116914	2B	64.7
164	80030	IWA6427	wsnp_Ku_c11665_18999583	2B	64.7
165	47487	IWB47487	Kukri_c6973_344	2B	64.7
166	40021	IWB40021	Ku_c7740_879	2B	64.7
167	44610	IWB44610	Kukri_c36783_91	2B	64.7
168	8214	IWB8214	BS00040251_51	2B	64.7
169	10669	IWB10669	BS00073426_51	2B	64.7
170	32069	IWB32069	GENE-0724_612	2B	64.7
171	29391	IWB29391	Excalibur_c9248_771	2B	64.7
172	30179	IWB30179	Excalibur_rep_c106124_239	2B	64.7
173	32441	IWB32441	GENE-1389_59	2B	64.7
174	35747	IWB35747	IACX1412	2B	64.7

175	42613	IWB42613	Kukri_c22200_1171	2B	64.7
176	75339	IWA10	wsnp_BE399688B_Ta_2_1	2B	64.7
177	78933	IWA4894	wsnp_Ex_c9248_15372536	2B	64.7
178	11751	IWB11751	BS00092275_51	2B	64.7
179	21988	IWB21988	Excalibur_c11863_289	2B	64.7
180	37811	IWB37811	JD_c767_567	2B	64.7
181	53512	IWB53512	RAC875_c1226_652	2B	64.7
182	5274	IWB5274	BobWhite_rep_c61602_139	2B	64.7
183	8834	IWB8834	BS00061268_51	2B	64.7
184	27810	IWB27810	Excalibur_c584_726	2B	64.7
185	7755	IWB7755	BS00030090_51	2B	64.7
186	11725	IWB11725	BS00091671_51	2B	64.7
187	23529	IWB23529	Excalibur_c20647_643	2B	64.7
188	59779	IWB59779	RAC875_c63545_85	2B	64.7
189	42648	IWB42648	Kukri_c22419_541	2B	64.7
190	12642	IWB12642	BS00111324_51	2B/7D	64.7
191	8772	IWB8772	BS00059315_51	2B	64.7
192	29853	IWB29853	Excalibur_rep_c102657_575	2B	64.7
193	60585	IWB60585	RAC875_c79857_301	2B	64.7
194	12041	IWB12041	BS00098490_51	2B	64.7
195	62112	IWB62112	RAC875_rep_c112008_519	2B	64.7
196	38861	IWB38861	Ku_c23446_2209	2B	64.7
197	9690	IWB9690	BS00065994_51	2B	64.7
198	9689	IWB9689	BS00065993_51	2B	64.7
199	25795	IWB25795	Excalibur_c37239_916	2B	64.7
200	28615	IWB28615	Excalibur_c721_484	2B	64.7
201	44515	IWB44515	Kukri_c36026_68	2B	64.7
202	55876	IWB55876	RAC875_c2600_188	2B	64.7
203	22236	IWB22236	Excalibur_c13239_85	2B	64.7
204	8922	IWB8922	BS00062774_51	2B/2D	64.7
205	41646	IWB41646	Kukri_c16760_1427	2B	64.7
206	12187	IWB12187	BS00102480_51	2B	64.7
207	58034	IWB58034	RAC875_c4430_2213	2B	64.7
208	59183	IWB59183	RAC875_c5638_1010	2B	64.7
209	11750	IWB11750	BS00092273_51	2B	64.7
210	32439	IWB32439	GENE-1389_396	2B	64.7

211	32440	IWB32440	GENE-1389_458	2B	64.7	
212	36599	IWB36599	Jagger_c4412_103	2B	64.7	
213	36600	IWB36600	Jagger_c4412_265	2B	64.7	
214	36153	IWB36153	IACX6411	2B	64.7	
215	57258	IWB57258	RAC875_c37191_584	2B/2D	64.7	
216	7198	IWB7198	BS00022657_51	2B	64.7	
217	8835	IWB8835	BS00061269_51	2B	64.7	
218	13310	IWB13310	CAP12_c2565_239	2B	64.7	
219	27246	IWB27246	Excalibur_c5169_598	2B	64.7	
220	3522	IWB3522	BobWhite_c4661_500	2B	64.7	
221	36708	IWB36708	Jagger_c6853_60	2B	68.0	Kwh592
222	8535	IWB8535	BS00049378_51	2B/5B	72.5	
223	27601	IWB27601	Excalibur_c55781_129	2B/5B	72.5	
224	8536	IWB8536	BS00049380_51	2B/5B	72.5	
225	42187	IWB42187	Kukri_c19751_873	2B	72.5	
226	73264	IWB73264	Tdurum_contig7529_227	2B	72.5	
227	52584	IWB52584	Ra_c72477_2165	2B	72.5	
228	50388	IWB50388	Kukri_rep_c80379_398	2B	72.5	
229	26404	IWB26404	Excalibur_c43037_831	2B	72.5	
230	38293	IWB38293	Ku_c12037_482	2B	72.5	
231	53996	IWB53996	RAC875_c14775_1048	2B	72.5	
232	75491	IWA226	wsnp_BE490267A_Ta_2_1	2B	72.5	
233	43186	IWB43186	Kukri_c25815_263	2B	72.5	
234	11849	IWB11849	BS00093993_51	2B	72.5	
235	76157	IWA1305	wsnp_Ex_c10251_16815792	2B/7B	72.5	Kwh588
236	36605	IWB36605	Jagger_c4502_69	2B	72.5	
237	57202	IWB57202	RAC875_c36614_344	2B	72.5	
238	20275	IWB20275	Ex_c2510_477	2B	72.5	
239	50067	IWB50067	Kukri_rep_c70870_919	2B	72.5	
240	13303	IWB13303	CAP12_c2472_60	2B	72.5	
241	61287	IWB61287	RAC875_c9932_705	2B	72.5	
242	56572	IWB56572	RAC875_c31162_706	2B	72.5	
243	52361	IWB52361	Ra_c6367_387	2B	72.5	
244	43954	IWB43954	Kukri_c31165_835	2B	72.5	
245	44123	IWB44123	Kukri_c32700_104	2B	72.5	
246	36041	IWB36041	IACX5850	2B	72.5	Kwh589

247	34989	IWB34989	IAAV5226	2B	72.5	
248	80048	IWA6453	wsnp_Ku_c12037_19549078	2B	72.5	Kwh572
249	77479	IWA3037	wsnp_Ex_c26281_35525999	2B	72.5	
250	77478	IWA3035	wsnp_Ex_c26281_35525243	2B	72.5	
251	76863	IWA2189	wsnp_Ex_c17127_25756019	2B	72.5	
252	70131	IWB70131	Tdurum_contig30930_184	2B	72.5	
253	79347	IWA5411	wsnp_Ex_rep_c67543_66165372	2B	72.5	
254	7263	IWB7263	BS00022800_51	2B	72.5	
255	38254	IWB38254	Ku_c11652_1720	2B	72.5	
256	64817	IWB64817	RFL_Contig4856_71	2B	72.5	Kwh590
257	76156	IWA1304	wsnp_Ex_c10251_16815404	2B	72.5	
258	76223	IWA1393	wsnp_Ex_c10838_17631243	2B	72.5	
259	30854	IWB30854	Excalibur_rep_c67411_210	2B	73.6	
260	34696	IWB34696	IAAV3303	2B	73.6	
261	50859	IWB50859	Ra_c108387_863	2B	73.6	
262	60039	IWB60039	RAC875_c66657_91	2B	73.6	
263	21140	IWB21140	Ex_c68194_1994	2B	73.6	
264	73040	IWB73040	Tdurum_contig66317_77	2B	73.6	
265	51104	IWB51104	Ra_c14316_850	2B	73.6	
266	53902	IWB53902	RAC875_c14316_584	2B	73.6	
267	60374	IWB60374	RAC875_c7540_366	2B	73.6	
268	59086	IWB59086	RAC875_c54947_108	2B	73.6	
269	49862	IWB49862	Kukri_rep_c69169_334	2B	73.6	
270	49783	IWB49783	Kukri_rep_c68360_1476	2B	73.6	
271	48280	IWB48280	Kukri_c920_319	2B	73.6	
272	48279	IWB48279	Kukri_c920_1379	2B	73.6	
273	48278	IWB48278	Kukri_c920_128	2B	73.6	
274	47243	IWB47243	Kukri_c6552_4243	2B	73.6	
275	40823	IWB40823	Kukri_c12442_454	2B	73.6	
276	35867	IWB35867	IACX2626	2B	73.6	
277	28487	IWB28487	Excalibur_c6807_464	2B	73.6	
278	28486	IWB28486	Excalibur_c6807_1155	2B	73.6	
279	27166	IWB27166	Excalibur_c5064_765	2B	73.6	
280	27165	IWB27165	Excalibur_c5064_284	2B	73.6	
281	23356	IWB23356	Excalibur_c19649_1500	2B	73.6	
282	21199	IWB21199	Ex_c69493_1208	2B	73.6	

283	21139	IWB21139	Ex_c68194_1532	2B	73.6	
284	43015	IWB43015	Kukri_c24669_1235	2B	73.6	
285	70826	IWB70826	Tdurum_contig42095_3235	2B	73.6	
286	76898	IWA2237	wsnp_Ex_c1758_3326792	2B	73.6	
287	81070	IWA7825	wsnp_Ra_c28955_38371323	2B	73.6	
288	62675	IWB62675	RAC875_rep_c70342_1644	2B	73.6	
289	43016	IWB43016	Kukri_c24669_51	2B	73.6	
290	73022	IWB73022	Tdurum_contig65349_140	2B	73.6	
291	60373	IWB60373	RAC875_c7540_118	2B	73.6	
292	79422	IWA5513	wsnp_Ex_rep_c68194_66973531	2B	73.6	
293	79333	IWA5397	wsnp_Ex_rep_c67411_65994109	2B	73.6	
294	79421	IWA5512	wsnp_Ex_rep_c68194_66973114	2B	73.6	
295	78431	IWA4256	wsnp_Ex_c54998_57670603	2B	73.6	
296	55916	IWB55916	RAC875_c26278_459	2B	73.6	
297	37941	IWB37941	JG_c2092_196	2B	73.6	
298	53595	IWB53595	RAC875_c12803_916	2B	73.6	
299	46616	IWB46616	Kukri_c56872_402	2B	73.6	
300	70825	IWB70825	Tdurum_contig42095_2454	2B	73.6	
301	29225	IWB29225	Excalibur_c88037_341	2B	73.6	
302	22798	IWB22798	Excalibur_c16532_499	2B	73.6	
303	25132	IWB25132	Excalibur_c31737_169	2B	73.6	
304	10411	IWB10411	BS00069685_51	2B	74.7	
305	79813	IWA6076	wsnp_JD_c47318_32176833	2B	75.9	Kwh574
306	45296	IWB45296	Kukri_c4294_371	2B	75.9	Kwh570
307	27578	IWB27578	Excalibur_c5557_201	2B	77.0	
308	31274	IWB31274	Excalibur_rep_c77221_93	2B	77.0	
309	29491	IWB29491	Excalibur_c94980_51	2B	77.0	
310	28337	IWB28337	Excalibur_c64983_65	2B	77.0	Kwh576
311	23831	IWB23831	Excalibur_c22637_235	2B/2D	77.0	
312	102	IWB102	BobWhite_c1072_100	2B	77.0	
313	2452	IWB2452	BobWhite_c3146_128	2B	77.0	
314	11652	IWB11652	BS00090235_51	2B	77.0	
315	45055	IWB45055	Kukri_c40719_491	2B	77.0	
316	68759	IWB68759	Tdurum_contig18858_324	2B	77.0	
317	7403	IWB7403	BS00023060_51	2B	77.0	
318	7226	IWB7226	BS00022717_51	2B	77.0	

319	5666	IWB5666	BobWhite_s64174_145	2B	77.0	Kwh575
320	47198	IWB47198	Kukri_c64930_353	2B	77.0	
321	31015	IWB31015	Excalibur_rep_c68985_110	2B	77.0	
322	67207	IWB67207	Tdurum_contig11653_370	2B	77.0	
323	13168	IWB13168	CAP12_c1037_120	2B	77.0	
324	67208	IWB67208	Tdurum_contig11653_371	2B	77.0	
325	11092	IWB11092	BS00079621_51	2B	77.0	
326	60488	IWB60488	RAC875_c77816_365	2Dx	77.0	
327	25842	IWB25842	Excalibur_c3762_829	2B/6B	77.0	
328	45652	IWB45652	Kukri_c46361_295	2B	77.0	
329	73241	IWB73241	Tdurum_contig74826_330	2B	77.0	
330	8717	IWB8717	BS00057475_51	2B	77.0	
331	32221	IWB32221	GENE-1080_39	2B	77.0	
332	25841	IWB25841	Excalibur_c3762_715	2B	77.0	
333	28850	IWB28850	Excalibur_c7755_1321	2B	77.0	
334	28849	IWB28849	Excalibur_c7755_1057	2B	77.0	
335	4501	IWB4501	BobWhite_c8664_94	2B	77.0	
336	36229	IWB36229	IACX7718	2B	77.0	
337	12298	IWB12298	BS00106901_51	2B	79.2	
338	43278	IWB43278	Kukri_c26311_891	2B	79.2	
339	9117	IWB9117	BS00063727_51	2B	79.2	
340	48248	IWB48248	Kukri_c9118_1774	2B	79.2	
341	32189	IWB32189	GENE-1012_303	2B	79.2	
342	43934	IWB43934	Kukri_c31059_130	2B	79.2	
343	60406	IWB60406	RAC875_c76186_353	2B	79.2	
344	13421	IWB13421	CAP12_c4899_191	2B	79.2	
345	39379	IWB39379	Ku_c40808_718	2B	79.2	
346	13162	IWB13162	CAP11_s8679_211	2B	79.2	
347	9247	IWB9247	BS00064318_51	2B	79.2	
348	6453	IWB6453	BS00011630_51	2B	79.2	
349	1190	IWB1190	BobWhite_c18540_97	2B	79.2	
350	1188	IWB1188	BobWhite_c18540_351	2B	79.2	
351	54520	IWB54520	RAC875_c17658_1419	2B	79.2	
352	32190	IWB32190	GENE-1012_680	2B	79.2	
353	10081	IWB10081	BS00067572_51	2B	79.2	
354	30560	IWB30560	Excalibur_rep_c111801_55	2B	79.2	

355	43169	IWB43169	Kukri_c25716_284	2B	79.2	
356	15068	IWB15068	CAP8_rep_c8162_101	2B	79.2	
357	37862	IWB37862	JD_c8871_331	2B	79.2	
358	8789	IWB8789	BS00059896_51	2B	79.2	
359	81194	IWA7996	wsnp_Ra_c54256_57628288	2B	79.2	
360	77103	IWA2514	wsnp_Ex_c20182_29230528	2B	79.2	
361	9248	IWB9248	BS00064322_51	2B	79.2	
362	81334	IWA8195	wsnp_Ra_rep_c74497_72390803	2B	79.2	
363	81396	IWA8295	wsnp_RFL_Contig2123_1397739	2B	79.2	
364	21691	IWB21691	Excalibur_c10634_156	2B	79.2	
365	78034	IWA3742	wsnp_Ex_c40976_47910672	2B	79.2	
366	51068	IWB51068	Ra_c13679_2284	2B	79.2	Kwh577
367	40155	IWB40155	Ku_c9369_1726	2Dx	79.2	
368	28807	IWB28807	Excalibur_c76665_98	2B	79.2	
369	1630	IWB1630	BobWhite_c22728_257	2B	79.2	
370	46242	IWB46242	Kukri_c52356_96	2B	79.2	
371	78033	IWA3741	wsnp_Ex_c40976_47910144	2B	79.2	
372	64008	IWB64008	RFL_Contig2612_826	2B	79.2	
373	76474	IWA1708	wsnp_Ex_c12922_20473104	2B	79.2	
374	78457	IWA4294	wsnp_Ex_c5619_9884202	2B	79.2	
375	60670	IWB60670	RAC875_c8197_810	2B	79.2	
376	4571	IWB4571	BobWhite_c908_64	2B	79.2	
377	61802	IWB61802	RAC875_rep_c108548_163	2B/2D	79.2	
378	74910	IWB74910	tplb0048g05_866	2B	79.2	
379	68283	IWB68283	Tdurum_contig14707_251	2B	79.2	
380	79841	IWA6122	wsnp_JD_c6010_7167159	2B	79.2	
381	65989	IWB65989	TA005601-0686	2B	79.2	
382	55526	IWB55526	RAC875_c23538_1517	2B	79.2	
383	26191	IWB26191	Excalibur_c40976_87	2B	79.2	
384	26189	IWB26189	Excalibur_c40976_111	2B	79.2	
385	1631	IWB1631	BobWhite_c22728_78	2B	79.2	
386	318	IWB318	BobWhite_c12157_747	2B	79.2	
387		IWA7659	wsnp_Ra_c16333_24961476	2B	80.3	Kwh28
388	2286	IWB2286	BobWhite_c29596_649	2B	82.6	
389	8386	IWB8386	BS00044983_51	2B	82.6	
390	28962	IWB28962	Excalibur_c80601_308	2B	82.6	

391	75246	IWB75246	tplb0060d11_1137	2B	82.6	
392	34664	IWB34664	IAAV3100	2B	82.6	
393	28963	IWB28963	Excalibur_c80601_83	2B	82.6	
394	36072	IWB36072	IACX5941	2B	82.6	Kwh578
395	2943	IWB2943	BobWhite_c38001_528	2B	82.6	
396	77576	IWA3176	wsnp_Ex_c28627_37743031	2B	82.6	Kwh32
397	75247	IWB75247	tplb0060d11_435	2B	82.6	
398	77358	IWA2873	wsnp_Ex_c24135_33382521	2B	82.6	
399	77359	IWA2874	wsnp_Ex_c24135_33382700	2B	82.6	
400	73211	IWB73211	Tdurum_contig72054_94	2B	82.6	
401	2593	IWB2593	BobWhite_c32938_264	2B	82.6	
402	74201	IWB74201	tplb0024l03_910	2B	82.6	
403	80132	IWA6561	wsnp_Ku_c15498_24122936	2B	82.6	
404	44545	IWB44545	Kukri_c36266_120	2B	82.6	
405	56400	IWB56400	RAC875_c29937_325	2B	82.6	
406	26416	IWB26416	Excalibur_c43102_132	2B	82.6	
407	25544	IWB25544	Excalibur_c3506_610	2B	82.6	
408	24230	IWB24230	Excalibur_c2484_2113	2B	83.7	
409	58747	IWB58747	RAC875_c51420_237	2B/2D	84.8	
410		IWA2215	wsnp_Ex_c174_340829		84.8	Kwh29
411	14677	IWB14677	CAP8_c3234_216	2B/2D	85.9	
412	59956	IWB59956	RAC875_c65495_424	2B/2D	85.9	
413	23010	IWB23010	Excalibur_c17745_493	2B/2D	85.9	
414	10251	IWB10251	BS00068181_51	2B	85.9	
415	11888	IWB11888	BS00094578_51	2B	85.9	
416	60041	IWB60041	RAC875_c66695_560	2B	85.9	
417	79641	IWA5809	wsnp_JD_c12346_12606967	2B	85.9	
418	80550	IWA7112	wsnp_Ku_c48694_54811376	2B	85.9	
419	39525	IWB39525	Ku_c48694_1284	2B	85.9	
420	79078	IWA5081	wsnp_Ex_rep_c103064_88104690	2B	85.9	
421	80551	IWA7113	wsnp_Ku_c48694_54811423	2B	85.9	
422	72654	IWB72654	Tdurum_contig59546_695	2B	85.9	
423	54357	IWB54357	RAC875_c16752_283	2B	85.9	
424	7265	IWB7265	BS00022805_51	2B	85.9	
425	43633	IWB43633	Kukri_c29052_75	2B	85.9	
426	4648	IWB4648	BobWhite_c9690_94	2B	85.9	

427	9514	IWB9514	BS00065327_51	2B	85.9
428	39394	IWB39394	Ku_c4168_1399	2B	85.9
429	63201	IWB63201	RAC875_rep_c83093_126	2B/2D	85.9
430	69628	IWB69628	Tdurum_contig28795_219	2B	85.9
431	25868	IWB25868	Excalibur_c37753_655	2B	85.9
432	46631	IWB46631	Kukri_c57014_168	2B	85.9
433	49829	IWB49829	Kukri_rep_c68903_708	2B	85.9
434	29532	IWB29532	Excalibur_c95944_641	2B	85.9
435	69431	IWB69431	Tdurum_contig28113_579	2B/2D	85.9
436	27746	IWB27746	Excalibur_c57713_81	2B	85.9
437	25546	IWB25546	Excalibur_c35074_257	2B	85.9
438	48386	IWB48386	Kukri_c9478_2764	2B/2D	85.9
439	25281	IWB25281	Excalibur_c32980_169	2B/2D	85.9
440	7223	IWB7223	BS00022713_51	2B/2D	85.9
441	49827	IWB49827	Kukri_rep_c68903_159	2B/2D	85.9
442	25869	IWB25869	Excalibur_c37753_754	2B	85.9
443	23660	IWB23660	Excalibur_c2157_173	2B	85.9
444	44694	IWB44694	Kukri_c37462_459	2B	85.9
445	73407	IWB73407	Tdurum_contig77036_338	2B	85.9
446	69631	IWB69631	Tdurum_contig28795_381	2B	85.9
447	73196	IWB73196	Tdurum_contig71365_233	2B	85.9
448	25313	IWB25313	Excalibur_c33221_681	2B	85.9
449	516	IWB516	BobWhite_c13525_262	2B	85.9
450	49828	IWB49828	Kukri_rep_c68903_301	2B	85.9
451	22381	IWB22381	Excalibur_c14201_111	2B	85.9
452	51053	IWB51053	Ra_c13298_783	2B	85.9
453	58646	IWB58646	RAC875_c50422_299	2B/2D	85.9
454	9560	IWB9560	BS00065471_51	2B	85.9
455	5957	IWB5957	BS00004224_51	2B	85.9
456	27744	IWB27744	Excalibur_c57713_105	2B	85.9
457	73846	IWB73846	Tdurum_contig93103_284	2B	85.9
458	73567	IWB73567	Tdurum_contig82393_581	2B	85.9
459	73057	IWB73057	Tdurum_contig67254_504	2B	85.9
460	68692	IWB68692	Tdurum_contig17826_338	2B	85.9
461	19788	IWB19788	Ex_c13213_2992	2B	85.9
462	19787	IWB19787	Ex_c13213_2594	2B	85.9

463	76570	IWA1821	wsnp_Ex_c13865_21720307	2B/2D	85.9	
464	81534	IWA8534	wsnp_RFL_Contig3917_4326857	2B	85.9	
465	41823	IWB41823	Kukri_c17832_1029	2B	85.9	
466	71742	IWB71742	Tdurum_contig47_185	2B	85.9	
467	74179	IWB74179	tplb0024e19_1029	2B	85.9	
468	71741	IWB71741	Tdurum_contig47_148	2B	85.9	
469	9328	IWB9328	BS00064607_51	2B	85.9	
470	54447	IWB54447	RAC875_c17331_129	2B	85.9	
471	77821	IWA3478	wsnp_Ex_c34419_42734849	2B/2D	87.0	
472	26300	IWB26300	Excalibur_c42146_266	2B	87.0	Kwh580
473	38059	IWB38059	Ku_c102096_268	2B	87.0	
474	32354	IWB32354	GENE-1280_188	2B	87.0	
475	10846	IWB10846	BS00076003_51	2B	87.0	Kwh579
476	10845	IWB10845	BS00076000_51	2B	87.0	
477	7514	IWB7514	BS00023902_51	2B	87.0	
478	60866	IWB60866	RAC875_c8684_1668	2Dx	87.0	
479	34617	IWB34617	IAAV283	2B	89.2	
480	11174	IWB11174	BS00081189_51	2B/2D	89.2	
481	10162	IWB10162	BS00067828_51	2B	90.4	
482	25863	IWB25863	Excalibur_c37727_66	2B/2D	90.4	
483	12574	IWB12574	BS00110611_51	2B	90.4	
484	10455	IWB10455	BS00070301_51	2B	108.3	
485	28108	IWB28108	Excalibur_c62234_105	2B	108.3	
486	36334	IWB36334	IACX8947	2B	108.3	
487	32417	IWB32417	GENE-1355_265	2B	108.3	
488	23797	IWB23797	Excalibur_c224_1383	2B	108.3	
489	28191	IWB28191	Excalibur_c63327_110	2B	108.3	
490	11366	IWB11366	BS00084417_51	2B	108.3	
491	32416	IWB32416	GENE-1355_130	2B	108.3	
492	76172	IWA1324	wsnp_Ex_c10441_17078853	2B	108.3	
493	65636	IWB65636	TA003025-1611	2B	108.3	
494	59983	IWB59983	RAC875_c65882_668	2B	108.3	
495	120	IWB120	BobWhite_c10864_436	2B	108.3	
496	22835	IWB22835	Excalibur_c16679_215	2B	108.3	
497	11123	IWB11123	BS00080318_51	2B	108.3	
498	28651	IWB28651	Excalibur_c73027_267	2B	108.3	

499	2534	IWB2534	BobWhite_c32319_268	2B	110.6
500	73380	IWB73380	Tdurum_contig76550_500	2B	110.6
501	52360	IWB52360	Ra_c6355_647	2B	110.6
502	46445	IWB46445	Kukri_c54653_270	2B/5A	110.6
503	34542	IWB34542	IAAV237	2B	110.6
504	33668	IWB33668	GENE-3921_131	2B	110.6
505	36223	IWB36223	IACX7683	2B	110.6
506	33669	IWB33669	GENE-3921_24	2B	110.6
507	44343	IWB44343	Kukri_c34553_188	2B	110.6
508	28561	IWB28561	Excalibur_c7051_1027	2B	110.6
509	8894	IWB8894	BS00062699_51	2B	110.6
510	6107	IWB6107	BS00009763_51	2B	110.6
511	55345	IWB55345	RAC875_c22463_416	2B	110.6
512	3749	IWB3749	BobWhite_c5191_362	2B	110.6
513	30535	IWB30535	Excalibur_rep_c111477_175	2B	110.6
514	2535	IWB2535	BobWhite_c32319_313	2B	110.6
515	8607	IWB8607	BS00051965_51	2B	110.6
516	6113	IWB6113	BS00009791_51	2B	110.6
517	25152	IWB25152	Excalibur_c31864_713	2B	110.6
518	25008	IWB25008	Excalibur_c30729_152	2B	110.6
519	1770	IWB1770	BobWhite_c23950_203	2B	110.6
520	13585	IWB13585	CAP12_rep_c3989_324	2B	110.6
521	7380	IWB7380	BS00023025_51	2B/3D	110.6
522	64863	IWB64863	RFL_Contig5005_761	2B/2D	110.6
523	25016	IWB25016	Excalibur_c30744_181	2B	110.6
524	61339	IWB61339	RAC875_rep_c102485_468	2B	110.6
525	26482	IWB26482	Excalibur_c4372_262	2B	110.6
526	57295	IWB57295	RAC875_c37540_583	2B	110.6
527	55346	IWB55346	RAC875_c22463_494	2B	110.6
528	55615	IWB55615	RAC875_c24205_110	2B	110.6
529	76795	IWA2104	wsnp_Ex_c16144_24583060	2B/3D	110.6
530	69000	IWB69000	Tdurum_contig234_843	2B	110.6
531	8813	IWB8813	BS00060618_51	2B	110.6
532	6379	IWB6379	BS00011276_51	2B	110.6
533	6130	IWB6130	BS00009882_51	2B	110.6
534	58126	IWB58126	RAC875_c45209_331	2B	110.6

535	42028	IWB42028	Kukri_c18754_67	2B	110.6
536	10107	IWB10107	BS00067641_51	2B	110.6
537	43525	IWB43525	Kukri_c28077_282	2B/5A	110.6
538	72571	IWB72571	Tdurum_contig57254_254	2B/4B	110.6
539	28921	IWB28921	Excalibur_c7964_1290	2B/4B	110.6
540	1663	IWB1663	BobWhite_c23052_196	2B/3B	110.6
541	6334	IWB6334	BS00011047_51	2B/2D	110.6
542	5839	IWB5839	BS00003589_51	2B	110.6
543	36009	IWB36009	IACX5726	2B	110.6
544	47254	IWB47254	Kukri_c657_1514	2B	110.6
545	23686	IWB23686	Excalibur_c2174_1681	2B	110.6
546	22586	IWB22586	Excalibur_c15242_306	2B	110.6
547	40501	IWB40501	Kukri_c11040_787	2B	110.6
548	34773	IWB34773	IAAV3800	2B	110.6
549	61956	IWB61956	RAC875_rep_c110344_370	2B	110.6
550	2628	IWB2628	BobWhite_c33464_133	2B	110.6
551	34394	IWB34394	IAAV1502	2B	110.6
552	54597	IWB54597	RAC875_c18063_771	2B	110.6
553	36295	IWB36295	IACX8386	2B	110.6
554	64461	IWB64461	RFL_Contig3713_280	2B	110.6
555	64463	IWB64463	RFL_Contig3713_538	2B	110.6
556	54212	IWB54212	RAC875_c16064_217	2B	110.6
557	43464	IWB43464	Kukri_c27631_1329	2B	110.6
558	28565	IWB28565	Excalibur_c7051_590	2B	110.6
559	28564	IWB28564	Excalibur_c7051_537	2B	110.6
560	1769	IWB1769	BobWhite_c23950_145	2B	110.6
561	9088	IWB9088	BS00063589_51	2B	110.6
562	51555	IWB51555	Ra_c23972_327	2B	110.6
563	8430	IWB8430	BS00046601_51	2B	110.6
564	6223	IWB6223	BS00010438_51	2B	110.6
565	61824	IWB61824	RAC875_rep_c108836_55	2B	110.6
566	61239	IWB61239	RAC875_c98387_145	2B	110.6
567	5976	IWB5976	BS00004405_51	2B	110.6
568	59281	IWB59281	RAC875_c57353_245	2B	110.6
569	5864	IWB5864	BS00003673_51	2B	110.6
570	56526	IWB56526	RAC875_c30797_179	2B	110.6

571	55806	IWB55806	RAC875_c25512_888	2B	110.6
572	54596	IWB54596	RAC875_c18063_665	2B	110.6
573	54594	IWB54594	RAC875_c18063_497	2B	110.6
574	46716	IWB46716	Kukri_c58096_480	2B	110.6
575	44342	IWB44342	Kukri_c34553_110	2B	110.6
576	43052	IWB43052	Kukri_c24939_378	2B	110.6
577	41498	IWB41498	Kukri_c15985_1277	2B	110.6
578	3750	IWB3750	BobWhite_c5191_563	2B	110.6
579	36753	IWB36753	Jagger_c7688_98	2B	110.6
580	36642	IWB36642	Jagger_c5526_105	2B	110.6
581	20875	IWB20875	Ex_c52711_584	2B	110.6
582	46560	IWB46560	Kukri_c55909_1109	2B	110.6
583	54701	IWB54701	RAC875_c1858_2693	2B	110.6
584	59661	IWB59661	RAC875_c62155_156	2B	110.6
585	61988	IWB61988	RAC875_rep_c110690_104	2B	110.6
586	64515	IWB64515	RFL_Contig385_761	2B	110.6
587	61112	IWB61112	RAC875_c9500_1796	2B	110.6
588	36279	IWB36279	IACX8202	2B	110.6
589	36243	IWB36243	IACX7803	2B	110.6
590	29809	IWB29809	Excalibur_rep_c102228_810	2B	110.6
591	28375	IWB28375	Excalibur_c65466_714	2B	110.6
592	25151	IWB25151	Excalibur_c31864_179	2B	110.6
593	25015	IWB25015	Excalibur_c30744_1195	2B	110.6
594	24984	IWB24984	Excalibur_c30571_176	2B	110.6
595	23209	IWB23209	Excalibur_c1883_340	2B	110.6
596	1710	IWB1710	BobWhite_c23443_337	2B	110.6
597	13680	IWB13680	CAP12_s9114_61	2B	110.6
598	64675	IWB64675	RFL_Contig4423_529	2B	110.6
599	64462	IWB64462	RFL_Contig3713_316	2B	110.6
600	6194	IWB6194	BS00010264_51	2B	110.6
601	56596	IWB56596	RAC875_c31328_381	2B	110.6
602	36327	IWB36327	IACX8828	2B	110.6
603	36158	IWB36158	IACX6480	2B	110.6
604	13584	IWB13584	CAP12_rep_c3989_239	2B	110.6
605	12294	IWB12294	BS00106695_51	2B	110.6
606	10418	IWB10418	BS00069756_51	2B	110.6

607	10417	IWB10417	BS00069754_51	2B	110.6	
608	10706	IWB10706	BS00074091_51	2B	110.6	
609	35156	IWB35156	IAAV6151	2B	110.6	
610	42430	IWB42430	Kukri_c21087_79	2B	110.6	
611	43166	IWB43166	Kukri_c25702_948	2B	110.6	
612	11101	IWB11101	BS00079941_51	2B	110.6	
613	40742	IWB40742	Kukri_c12117_134	2B	110.6	
614	36286	IWB36286	IACX8298	2B	110.6	
615	54348	IWB54348	RAC875_c16727_1826	2B	111.7	
616	27661	IWB27661	Excalibur_c56550_71	2B	111.7	
617	5438	IWB5438	BobWhite_rep_c64068_213	2B	111.7	
618	62356	IWB62356	RAC875_rep_c116263_97	2B	111.7	
619	40458	IWB40458	Kukri_c10869_489	2B	111.7	
620	40456	IWB40456	Kukri_c10869_1591	2B	111.7	
621	40455	IWB40455	Kukri_c10869_1366	2B	111.7	Kwh587
622	27660	IWB27660	Excalibur_c56550_425	2B	111.7	
623	9919	IWB9919	BS00066949_51	2B	111.7	
624	5439	IWB5439	BobWhite_rep_c64068_241	2B	111.7	
625	64039	IWB64039	RFL_Contig2751_1562	2B	111.7	
626	40514	IWB40514	Kukri_c11099_1033	2B	111.7	
627	50532	IWB50532	Kukri_rep_c95118_467	2B	121.6	
628	49462	IWB49462	Kukri_rep_c110602_283	2B	131.5	
629	10173	IWB10173	BS00067878_51	2B	131.5	Kwh586
630	5978	IWB5978	BS00004413_51	2B	131.5	
631	77643	IWA3252	wsnp_Ex_c298_580660	2B	132.6	Kwh585
632	24255	IWB24255	Excalibur_c25043_357	2B	140.4	
633	11171	IWB11171	BS00081138_51	2B	140.4	
634	54548	IWB54548	RAC875_c17798_66	2B	140.4	
635	60398	IWB60398	RAC875_c7602_1205	2B	140.4	
636	48531	IWB48531	Kukri_c9898_1766	2B	140.4	
637	29461	IWB29461	Excalibur_c94383_157	2B	140.4	
638	36519	IWB36519	Jagger_c2989_134	2B	140.4	
639	43915	IWB43915	Kukri_c30917_250	2B	140.4	
640	2181	IWB2181	BobWhite_c2822_228	2B	140.4	
641	54766	IWB54766	RAC875_c19042_2102	2B	140.4	
642	12118	IWB12118	BS00100118_51	2B	140.4	Kwh583

643	3970	IWB3970	BobWhite_c5756_532	2B	140.4
644	34450	IWB34450	IAAV1798	2B	140.4
645	28691	IWB28691	Excalibur_c73791_215	2B	140.4
646	48533	IWB48533	Kukri_c9898_328	2B	140.4
647	44399	IWB44399	Kukri_c3501_1175	2B	140.4
648	48532	IWB48532	Kukri_c9898_2063	2B	140.4
649	24806	IWB24806	Excalibur_c29221_311	2B	140.4
650	28692	IWB28692	Excalibur_c73791_296	2B	140.4
651	59762	IWB59762	RAC875_c63343_52	2B	140.4
652	44889	IWB44889	Kukri_c39136_675	2B	140.4
653	38972	IWB38972	Ku_c25908_277	2B/6B	140.4
654	19318	IWB19318	D_GDS7LZN01D8KK0_75	2B	140.4
655	23770	IWB23770	Excalibur_c22201_907	2B	140.4
656	21063	IWB21063	Ex_c66300_924	2B	140.4
657	57127	IWB57127	RAC875_c35873_1894	2B	140.4
658	28533	IWB28533	Excalibur_c6937_1065	2B	140.4
659	22131	IWB22131	Excalibur_c12675_1147	2B	140.4
660	46023	IWB46023	Kukri_c49784_86	2B	140.4
661	46022	IWB46022	Kukri_c49784_56	2B	140.4
662	15636	IWB15636	D_contig12069_831	2B	140.4
663	8699	IWB8699	BS00056645_51	2B	140.4
664	8698	IWB8698	BS00056642_51	2B	140.4
665	65021	IWB65021	RFL_Contig5495_682	2B	140.4
666	65019	IWB65019	RFL_Contig5495_464	2B	140.4
667	48530	IWB48530	Kukri_c9898_1618	2B	140.4
668	13362	IWB13362	CAP12_c3254_366	2B	140.4
669	10624	IWB10624	BS00072840_51	2B	140.4
670	27000	IWB27000	Excalibur_c48871_625	2B	140.4
671	74748	IWB74748	tplb0042o21_419	2B	140.4
672	50794	IWB50794	Ra_c105904_187	2B	140.4
673	50793	IWB50793	Ra_c105904_1191	2B	140.4
674	26914	IWB26914	Excalibur_c47996_509	2B	140.4
675	41613	IWB41613	Kukri_c16621_417	2B	140.4
676	29266	IWB29266	Excalibur_c8919_345	2B	140.4
677	13403	IWB13403	CAP12_c449_277	2B	140.4
678	166	IWB166	BobWhite_c1105_745	2B	140.4

679	63909	IWB63909	RFL_Contig2324_884	2B	140.4
680	79867	IWA6164	wsnp_JD_c7305_8404286	2B	140.4
681	54767	IWB54767	RAC875_c19042_443	2B	140.4
682	48199	IWB48199	Kukri_c900_1334	2B	140.4
683	30139	IWB30139	Excalibur_rep_c105614_172	2B	140.4
684	9733	IWB9733	BS00066148_51	2B	140.4
685	75990	IWA988	wsnp_CAP12_c80_46551	2B	140.4
686	74736	IWB74736	tplb0042a21_1091	2B	140.4
687	63563	IWB63563	RFL_Contig1115_407	2B	140.4
688	10623	IWB10623	BS00072839_51	2B	140.4
689	77695	IWA3315	wsnp_Ex_c31064_39902843	2B	140.4
690	81209	IWA8018	wsnp_Ra_c58860_60407020	2B	140.4
691	32375	IWB32375	GENE-1304_735	2B	140.4
692	35082	IWB35082	IAAV5743	2B	140.4
693	23590	IWB23590	Excalibur_c21117_99	2B	140.4
694	12117	IWB12117	BS00100117_51	2B	140.4
695	80345	IWA6852	wsnp_Ku_c28820_38731137	2B	140.4
696	758	IWB758	BobWhite_c1523_269	2B	140.4
697	56745	IWB56745	RAC875_c3259_276	2B	140.4
698	50358	IWB50358	Kukri_rep_c78353_161	2B	140.4
699	45069	IWB45069	Kukri_c408_154	2B	140.4
700	42373	IWB42373	Kukri_c20793_249	2B	140.4
701	41512	IWB41512	Kukri_c16035_685	2B	140.4
702	32031	IWB32031	GENE-0676_715	2B	140.4
703	32030	IWB32030	GENE-0676_649	2B	140.4
704	28681	IWB28681	Excalibur_c7366_1926	2B	140.4
705	22135	IWB22135	Excalibur_c12675_1789	2B	140.4
706	48653	IWB48653	Kukri_rep_c101484_438	2B	140.4
707	30221	IWB30221	Excalibur_rep_c106698_235	2B	140.4
708	76440	IWA1667	wsnp_Ex_c12675_20144479	2B	140.4
709	8650	IWB8650	BS00054751_51	2B	140.4
710	77407	IWA2946	wsnp_Ex_c25043_34305764	2B	140.4
711	77133	IWA2551	wsnp_Ex_c2066_3877373	2B	140.4
712	70683	IWB70683	Tdurum_contig41912_402	2B	140.4
713	24252	IWB24252	Excalibur_c25043_1020	2B	140.4
714	11314	IWB11314	BS00083626_51	2B	140.4

715	7605	IWB7605	BS00026032_51	2B	140.4
716	76786	IWA2094	wsnp_Ex_c16074_24502385	2B	140.4
717	79557	IWA5694	wsnp_Ex_rep_c70525_69448648	2B	140.4
718	69974	IWB69974	Tdurum_contig30201_63	2B	140.4
719	1124	IWB1124	BobWhite_c18071_171	2B	140.4
720	22132	IWB22132	Excalibur_c12675_1395	2B	140.4
721	36702	IWB36702	Jagger_c6714_68	2B/2D	143.7

Supplementary table 6: Comparison of consensus map locations of SNP markers located in the *Sr7*-region from three different mapping studies

90K SNP ID	Rescaled 90K Consensus map distance (cM)	KASP/STARP markers ^a	Reference/ Source
<i>IWB47901</i>	137.9	- ^b	Current study
<i>IWB24693</i>	145.3	-	Current study
<i>IWB71467</i>	136.3	<i>Xrwgsnp10</i>	Saini et al. 2018
<i>IWB73323</i>	137.0	<i>Xrwgsnp11/kwh703</i>	Saini et al. 2018
<i>IWA1067</i>	136.8	-	Turner et al. 2016

^aKASP- Kompetitive allele specific polymerase chain reaction (PCR) markers, STARP-SNP-based semi-thermal asymmetric reverse PCR markers

^bNo KASP marker was developed

Supplementary table 7:. Kompetitive allele specific (KASP) primer name, SNP name, chromosome location, and primer sequence information for markers in the *Sr7* (2BL), *Sr8a* (6A), and *Sr9* (2BL) chromosome regions

Primer name	SNP ID	Chr. ^c	Primer A1 (Tail1 at 5'-end) ^d	Primer A2 (Tail 2 at 5'-end) ^e	Primer C
<i>kwh28</i>	IWA7659	2BL	GTGACACCACTGAACCATAGGCA	GACACCACTGAACCATAGGCC	GTGATGTTGGATGGTGGCAAAAGGAT
<i>kwh29</i>	IWA2215	2BL	ACCCATCCCTACTAACAAACGACAA	CCATCCCTACTAACAAACGACAC	GTGACCTTGGGGTCACTGAAGATT
<i>kwh32</i>	IWA3176	2BL	TGATCAGCATTGTCAGACTTGGA	GATCAGCATTGTCAGACTTGCG	TAATCTGTCAAAGGATTATAAGCATGCGAA
<i>kwh53^a</i>	IWB5029	6A	AAGCTCCGGCTCTACTCCATC	CAAGCTCCGGCTCTACTCCATT	AGTCCCCCAGCGCGCTGCT
<i>kwh54^a</i>	IWB22036	6A	ATTCGCTCAGTATCTGTTCTTCTTG	CTATTCGCTCAGTATCTGTTCTTCTTA	ATTGGAGACAGTTGCAGCCAGTGTT
<i>kwh58^a</i>	IWB26414	6A	GTGCCGCCGAGCATCCTG	GGTGCCGCCGAGCATCCTA	GAAGATTATCCTCTCCAGGCCAA
<i>kwh62^a</i>	IWB72429	6A	CATCCGTAAGGTTAAATAAACTATCTACAA	ATCCGTAAGGTTAAATAAACTATCTACAC	CTGAAGCAGATGTTCTACTCTCAGGAA
<i>kwh63^a</i>	IWB64918	6A	GCACTTGCGACTCGAGGGTT	GCACTTGCGACTCGAGGGTC	GGCCCGGAATCCGCCACCAT
<i>kwh221^a</i>	IWB9013.2	6A	CGTCCGAACAAATTCATGGAATTTGT	GTCCGAACAAATTCATGGAATTTGC	TCACCCATGCTGAGAGGCAACAAT
<i>kwh222^a</i>	IWB50596	6A	ACAAGAAGCAGCTTGCAATTCTCATAT	CAAGAAGCAGCTTGCAATTCTCATAC	TTTGTAAGTACAGTGAAAAAATGTCAGTT
<i>kwh223^a</i>	IWA705	6A	GTGGACGCATCAATCTGTGGAC	CGTGGACGCATCAATCTGTGGAT	GAACAAATACGATGGACAGACACGTATAA
<i>kwh225^a</i>	IWB28338	6A	GAGTTATCTTGAAGAGGCCCTG	CCTGAGTTATCTTGAAGAGGCCCTA	TATCCAATCACTGATCTGCTACAGATGAT
<i>kwh227^a</i>	IWB42506.1	6A	GGCGGAGCGACGACTCACA	GCGGAGCGACGACTCACG	ACAATGTCGACACGAGCCTCAGAAA
<i>kwh228^a</i>	IWB34187.1	6A	AGCAAACCCTAACCTAGCCTG	CAGCAAACCCTAACCTAGCCTT	ATCGGTCGACGGAGAAGCCGAT
<i>kwh231^a</i>	IWB2817	6A	GAAATTAAGTGGGTGCTTTGGAGCT	AAATTAAGTGGGTGCTTTGGAGCG	CCGAGGCAAAGACGAATACACGTTT
<i>kwh232^a</i>	IWB36255	6A	AGACCAAGAATAATGTTGCTG	GGCTAGACCAAGAATAATGTTGCTA	GACTGTTGGCCATTTACCGCTCTAA
<i>kwh233^a</i>	IWB40518	6A	AGCAAGTATCTTGAGCGATGCAACA	CAAGTATCTTGAGCGATGCAACG	TTCAGCTTTTCGGTCTCACCTCTGA
<i>kwh570</i>	IWB45296	2BL	CAGGAGCTTGATGAGGCTACAT	AGGAGCTTGATGAGGCTACAC	TGGAGGCTACAACGCTATACTGCAT
<i>kwh572</i>	IWA6453	2BL	CCAGCCATTCTGAAGGTGGAA	CCAGCCATTCTGAAGGTGGAG	TCCTTCGGTCGCACTTTTCT
<i>kwh574</i>	IWA6076	2BL	GCGAAACAAAATCTGAAGCTATTCT	GCGAAACAAAATCTGAAGCTATTCC	GCAAAAAGCTCTGATGTACCG
<i>kwh575</i>	IWB11092	2BL	ACAGATGAAGCGTTCTGTTACA	ACAGATGAAGCGTTCTGTTACC	CCCCGACACAACCATGGTAA
<i>kwh576</i>	IWB28337	2BL	AGAGTCACACAAGTGAAGATAGTAA	AGAGTCACACAAGTGAAGATAGTAG	TGATCATCCTCAAACAGTGTATCA
<i>kwh577</i>	IWB51068	2BL	AGGTTTCTACTTCTGTCTCGAT	AGGTTTCTACTTCTGTCTCGAC	CCTCCATGAAAGAGGTCGCT
<i>kwh578</i>	IWB36072	2BL	CCACCACACCCTCACCGA	CCACCACACCCTCACCGG	CTTAGGCCGAGGATTTGTCAT
<i>kwh579</i>	IWB10846	2BL	CGAGTCCTATGAGAGCCATGAA	CGAGTCCTATGAGAGCCATGAG	TGAACCACTGCTCACCATT
<i>kwh580</i>	IWB26300	2BL	GTCGAATACGGGGCAGCAA	GTCGAATACGGGGCAGCAG	GAGAAATCGACTCACCGCT
<i>kwh583</i>	IWB12118	2BL	CCCCAAGGCCTCTTTCGT	CCCCAAGGCCTCTTTCGG	GCCAGTTTGATGTCGAAGAGAT
<i>kwh585</i>	IWA3252	2BL	GAGCCACTGATCTGATCACTT	GAGCCACTGATCTGATCACTC	TCGTCGGTGTTCCTGTTT
<i>kwh586</i>	IWB10173	2BL	CAAAACAGGGCTGCTGCAAT	CAAAACAGGGCTGCTGCAAC	CTCCTGTGTGGCAGCTATGA
<i>kwh587</i>	IWB40455	2BL	CTGACCAGTTTCAATGTACCAAAT	CTGACCAGTTTCAATGTACCAAAG	TACACTGCAGTCTGGGGT
<i>kwh588</i>	IWA1305.1	2BL	CATTACACAAAGAGGAGCAAGTTT	CATTACACAAAGAGGAGCAAGTTC	TCCGTCAGTTGCTTCCATGT
<i>kwh589</i>	IWB36041	2BL	CAAGGACCTACTGAAAGA	GCTCAAGGACCTACTGAAAGG	GTAGCTCGTTGACCACCTCA
<i>kwh590</i>	IWB64817	2BL	AGTAGCATTTGGCCATGATTCA	AGTAGCATTTGGCCATGATTCTG	GCAGGATAAGGTGCCTTCA
<i>kwh592</i>	IWB36708	2BL	CCAATCAAGCCGGAGTACA	CCAATCAAGCCGGAGTACG	TGATCAGATCACATATGAGATGGAT

<i>kwh593</i>	IWB12643.1	2BL	ATGGGGTGGTTCTCTAATTCAT	ATGGGGTGGTTCTCTAATTCAC	TGGGAGTACTTCTCATATTACTCG
<i>kwh596</i>	IWB56961	2BL	CATTCCATTCTATCAAATTGCCGT	CATTCCATTCTATCAAATTGCCGC	CACTGCCGACACTTGCATAG
<i>kwh598</i>	IWB8280	2BL	TGACTTTAACTTTATTGGTACCCTT	TGACTTTAACTTTATTGGTACCCTG	CCGCAATCCATATGTGCGAC
<i>kwh599</i>	IWB10434	2BL	TGATTGCGGAGTATGTGCA	TGATTGCGGAGTATGTGCG	GCAATGCGTGTCCTGTAAATA
<i>kwh696</i>	IWB19553	4AL	CCATAACTGAGACGACGAACTCT	CCATAACTGAGACGACGAACTCG	CCCGTTTCCTTGGAGTAATGCCAAA
<i>kwh697</i>	IWB52406	4AL	GACCTGCAAAATAGCTCAGTGAAGA	ACCTGCAAAATAGCTCAGTGAAGG	TACCCAGTTCCTCAGATTGGTCAA
<i>kwh698</i>	IWB12229	4AL	GAAGTCTACCCTTGAATACAAATCATAATTAA	AGTCTACCCTTGAATACAAATCATAATTAG	CGTACAACAATATGCATAATACGTATAGAT
<i>kwh699</i>	IWA1674	4AL	AACTCAAAAGGATGTGAAGGTTTGTC	CTCAAAAGGATGTGAAGGTTTGTCG	GAAGCAACAAACCAGTGAAGCTTCCTT
<i>kwh703^b</i>	IWB73323	4AL	GTCAGTTTCAGATGAAAAGGCCAGT	CAGTTTCAGATGAAAAGGCCAGC	AACTCATTTGATGGTTTCTGTATAATGGAT

^a and ^bReferences- Hiebert et al . 2017and Saini et al. 2018; ^cChromosome name;

^dTail-1 has a 5'- FAM tail- GAAGGTGACCAAGTTCATGCT and ^eTail-2 has a VIC tail- GAAGGTGCGAGTCAACGGATT