

Supplementary Table S1 Comparison of amplification patterns and genotypes of the three *PmQ* linked makers, *Xicsq405*, *XicsK18* and *XicsK19* in 160 wheat cultivars or breeding lines.

No. of cultivars	Varieties	<i>Xicsq405</i>	<i>XicsK18</i>	<i>XicsK19</i>
1	Shi 4185	-	+	-
2	Yumai 18	-	-	-
3	Chuanmai 46	-	-	-
4	Zhoumai 20	-	-	-
5	Yannong 15	-	+	-
6	Zhongmai 1	-	-	-
7	Lumai 21	-	-	-
8	Lunxuan 154	-	-	-
9	Gaocheng 9415	-	-	-
10	Jingdong 18	-	-	-
11	Jimai 21	-	-	-
12	Pumai 9	-	-	-
13	Chuanmai 28	-	+	-
14	Huaimai 18	-	-	-
15	Lunxuan 136	-	+	-
16	Luomai 24	-	-	-
17	Zhoumai 26	-	-	-
18	Jingdong 12	-	-	-
19	Yumai 21	-	-	-
20	Shijiazhuang 8	-	-	-
21	Yangmai 13	-	-	-
22	Xiaoyan 81	-	-	-
23	Chuanmai 107	-	+	-
24	Jingdong 17	-	+	-
25	Jimai 22	+	+	+
26	Zimai 12	-	+	-
27	Gan 6172	-	-	-
28	Shannong 20	-	+	-
29	Lumai 23	-	-	-
30	Henong 326	-	+	-
31	Yannong 19	-	+	-
32	Jinan 17	-	-	-
33	Shimai 19	-	+	-
34	Machang 2	-	-	-
35	Zhengzhou 761	-	-	-
36	Zhoumai 22	-	+	-
37	Yimai 6	-	+	-
38	Luomai 4	-	-	-
39	Yumai 2	-	-	-
40	Yunong 202	-	+	-

No. of clutivars	Varieties	<i>Xicsq405</i>	<i>XicsK18</i>	<i>XicsK19</i>
41	Zhoumai 19	-	+	-
42	Zhengyumai 9987	-	+	-
43	Xinmai 4	-	-	-
44	Nongda 3432	-	+	-
45	Yumai 70	-	-	-
46	Zhongmai 875	-	-	-
47	Shan 229	-	-	-
48	Lunxuan 987	-	+	-
49	Jimai 26	-	-	-
50	Zhoumai 24	-	-	-
51	Fanmai 8	-	+	-
52	Xinkehan 9	-	-	-
53	Yangmai 158	-	-	-
54	Xiaoyan 54	-	-	-
55	Yanzhan 4110	-	-	-
56	Huaimai 20	-	+	-
57	Miannong 4	-	+	-
58	Jinan 13	-	-	-
59	Yangmai 15	-	-	-
60	Nanyang 756	-	-	-
61	Yumai 29	-	-	-
62	Zhoumai 23	-	+	-
63	Zhumai 4	-	-	-
64	Baiquan 3039	-	-	-
65	Zhongmai 998	-	-	-
66	Yunong 949	-	+	-
67	Lunxuan 66	-	-	-
68	Xian 8	-	+	-
69	Zhongmai 8	-	+	-
70	Jinfeng 3	-	-	-
71	Shimai 15	-	+	-
72	Fengwu 981	-	-	-
73	Huixianhong	-	+	-
74	Fengdecunmai 1	-	+	-
75	Shixin 733	-	-	-
76	Jimai 38	-	-	-
77	Yannong 836	-	+	-
78	Shunmai 1718	-	+	-
79	Lunxuan 199	-	-	-
80	Zhongmai 2	-	-	-
81	Taixue 7	-	-	-
82	Ganmai 13	-	+	-

No. of clutivars	Varieties	<i>Xicsq405</i>	<i>XicsK18</i>	<i>XicsK19</i>
83	Ruzhou 0319	-	+	-
84	Jingdong 22	-	-	-
85	Xunong 5	-	+	-
86	Bonong 7023	-	-	-
87	Kaimai 18	-	-	-
88	Fan 6	-	-	-
89	Lumai 15	-	+	-
90	Kaimai 21	-	+	-
91	Zhou 8425B	-	-	-
92	Xuke 718	-	+	-
93	Shi 7221	-	+	-
94	Fengchan 3	-	-	-
95	Mianyang 26	-	-	-
96	Luomai 26	-	-	-
97	Yumai 49	-	+	-
98	Yumai 18-99	-	-	-
99	Yujiao 5	-	+	-
100	Huaimai 29	-	+	-
101	Zhongmai 175	-	-	-
102	Xinmai 18	-	-	-
103	Shimai 22	-	-	-
104	Wen 9519	-	-	-
105	92R137	-	-	-
106	Yubao 1	-	-	-
107	Luohan 6	-	-	-
108	Lankao 198	-	-	-
109	Zhoumai 32	-	+	-
110	Yumai 70-36	-	+	-
111	Xuzhou 25	-	-	-
112	Jimai 30	-	-	-
113	Huaichuan 916	-	-	-
114	Lunxuan 126	-	-	-
115	Xuke 1	-	+	-
116	Zhongmai 9	-	-	-
117	Luomai 22	-	+	-
118	Lunxuan 988	-	+	-
119	Pingan 8	-	+	-
120	Zhengmai 9023	-	+	-
121	Liangxin 66	-	+	-
122	Taikong 6	-	-	-
123	Heng 5229	-	-	-
124	Xinmai 11	-	-	-

No. of clutivars	Varieties	<i>Xicsq405</i>	<i>XicsK18</i>	<i>XicsK19</i>
125	Xindong 20	-	-	-
126	Huaimai 22	-	+	-
127	Shimai 14	-	+	-
128	Xinmai 9	-	-	-
129	Abo	-	-	-
130	Xuzhou 24	-	-	-
131	Yumai 49-198	-	+	-
132	Zhoumai 25	-	-	-
133	Kaimai 20	-	+	-
134	Luomai 21	-	+	-
135	Yangao 1	-	+	-
136	Xinong 979	-	-	-
137	Lu 98421	-	+	-
138	Chuanmai 42	-	+	-
139	Raomai 16	-	-	-
140	04 Zhong 36	-	+	-
141	Ji 5265	-	-	-
142	Jing 9428	-	+	-
143	Luyuan 502	-	-	-
144	Gao 2018	-	+	-
145	Pingmai 998	-	+	-
146	Mianyang 20	-	+	-
147	Cangmai 6005	-	-	-
148	Henong 822	-	+	-
149	Zhengmai 9962	-	-	-
150	Ruanmai52	-	-	-
151	Chuannong 16	-	-	-
152	Zhoumai 11	-	+	+
153	Huaimai 21	-	-	-
154	Xuke 316	-	+	-
155	Tainong 18	-	+	-
156	Yangmai 12	-	-	-
157	Wanmai 50	-	-	-
158	Fanmai 5	-	+	-
159	Zhongyu 9	-	-	-
160	Hengguan 35	-	-	-

Note: The genotypes for the KASP markers and the banding patterns for the SSR markers are identical to (+) or different (-) from Qingxinmai.

Table S2 Comparative genomic analysis of the high-confidence genes in the 2 Mb-target genomic region of *PmQ* in the Chinese Spring, wild emmer, durum wheat, *T. urartu*, and barley.

No.	Chinese Spring	Physical Location	Wild emmer	Durum wheat	<i>T. urartu</i>	Barley	Anotation
1	<i>TraesCS2B02G515800.1</i>	710744118	-	<i>TRITD2Bv1G230920.1</i>	<i>TuG1812G0200005351.01</i>	<i>HORVU2Hr1G109040.4</i>	Myb-like transcription factor family protein
2	<i>TraesCS2B02G515900.1</i>	710897577	<i>TRIDC2BG074440.1</i>	<i>TRITD2Bv1G230950.1</i>	<i>TuG1812G0200005352.01</i>	<i>HORVU2Hr1G109030.1</i>	SWIB/MDM2 domain
3	<i>TraesCS2B02G516000.1</i>	710976665	<i>TRIDC2BG074450.1</i>	-	<i>TuG1812G0200005353.01</i>	<i>HORVU2Hr1G109020.1</i>	Cell division protein ftsZ
4	<i>TraesCS2B02G516100.1</i>	710987746	-	<i>TRITD2Bv1G231080.1</i>	-	-	Cathepsin B-like cysteine proteinase
5	<i>TraesCS2B02G516200.1</i>	711161427	<i>TRIDC2BG074470.1</i>	<i>TRITD2Bv1G231110.1</i>	-	<i>HORVU2Hr1G097040.19</i>	Mitochondrial transcription termination factor family protein
6	<i>TraesCS2B02G516300.1</i>	711319344	<i>TRIDC2BG074520.1</i>	<i>TRITD2Bv1G231150.3</i>	<i>TuG1812G0200005355.01</i>	<i>HORVU2Hr1G109080.1</i>	Beta-fructofuranosidase
7	<i>TraesCS2B02G516400.1</i>	711442278	<i>TRIDC2BG074540.2</i>	<i>TRITD2Bv1G177160.1</i>	-	<i>HORVU2Hr1G109170.1</i>	Major facilitator superfamily protein
8	<i>TraesCS2B02G516500.1</i>	711530242	<i>TRIDC2BG074550.1</i>	-	-	-	Knotted 1-binding protein
9	<i>TraesCS2B02G516600.1</i>	711534505	<i>TRIDC2BG074560.2</i>	<i>TRITD2Bv1G231180.1</i>	-	-	Cox19 family protein (CHCH motif)
10	<i>TraesCS2B02G516700.1</i>	711723785	<i>TRIDC2BG074580.3</i>	<i>TRITD2Bv1G231230.1</i>	<i>TuG1812G0200005355.01</i>	<i>HORVU2Hr1G118910.2</i>	Beta-fructofuranosidase
11	<i>TraesCS2B02G516800.1</i>	711866847	<i>TRIDC2BG074580.7</i>	<i>TRITD2Bv1G231260.1</i>	<i>TuG1812G0200005357.01</i>	<i>HORVU2Hr1G118910.2</i>	Beta-fructofuranosidase
12	<i>TraesCS2B02G516900.1</i>	711981816	<i>TRIDC2BG074600.3</i>	<i>TRITD2Bv1G231270.1</i>	<i>TuG1812G0200005356.01</i>	-	Beta-fructofuranosidase
13	<i>TraesCS2B02G517000.1</i>	712000396	<i>TRIDC2BG074650.1</i>	<i>TRITD2Bv1G231310.1</i>	-	-	FBD domain
14	<i>TraesCS2B02G517100.1</i>	712002417	<i>TRIDC2BG074610.2</i>	<i>TRITD2Bv1G231320.1</i>	-	<i>HORVU2Hr1G102980.1</i>	F-box/RNI-like superfamily protein
15	<i>TraesCS2B02G517200.1</i>	712049476	<i>TRIDC2BG074650.1</i>	<i>TRITD2Bv1G231350.1</i>	<i>TuG1812G0200005363.01</i>	<i>HORVU2Hr1G109310.1</i>	F-box domain
16	<i>TraesCS2B02G517300.1</i>	712051205	<i>TRIDC2BG074610.1</i>	<i>TRITD2Bv1G231360.1</i>	-	-	F-box/RNI-like superfamily protein

17	<i>TraesCS2B02G517400.1</i>	712318276	<i>TRIDC2BG074660.3</i>	<i>TRITD2Bv1G231460.1</i>	<i>TuG1812G0200005369.01</i>	<i>HORVU2Hr1G109330.1</i>	WRKY family transcription factor
18	<i>TraesCS2B02G517500.1</i>	712597414	<i>TRIDC2BG074710.1</i>	<i>TRITD2Bv1G231510.1</i>	<i>TuG1812G0200005370.01</i>	<i>HORVU2Hr1G109370.1</i>	Adenosylhomocysteinase
19	<i>TraesCS2B02G517600.1</i>	712601647	<i>TRIDC2BG074720.1</i>	<i>TRITD2Bv1G231520.1</i>	-	<i>HORVU2Hr1G109380.3</i>	Carboxypeptidase Y
20	<i>TraesCS2B02G517700.1</i>	712616392	-	<i>TRITD2Bv1G231550.1</i>	-	<i>HORVU2Hr1G109380.3</i>	Leucine-rich repeat receptor-like protein kinase family protein
21	<i>TraesCS2B02G517800.1</i>	712640132	<i>TRIDC2BG074770.3</i>	<i>TRITD2Bv1G231350.1</i>	<i>TuG1812G0200005363.01</i>	<i>HORVU2Hr1G109390.1</i>	F-box/RNI-like superfamily protein
22	<i>TraesCS2B02G517900.1</i>	712770756	<i>TRIDC2BG074800.1</i>	<i>TRITD2Bv1G231590.1</i>	-	<i>HORVU2Hr1G109390.1</i>	F-box domain