

Table S1 Details of the primer sequences used in this study

No.	Primer name	Primer sequence (5'-3')	Physical position
1	KASP-AX-111018209	F-FAM:GAAGGTGACCAAGTTCATGCTAAGTACAATCTTGTCCCG G F-HEX:GAAGGTCGGAGTCAACGGATTAAGTACAATCTTGTCCCG A R:TTGGGTGGTTTCAGGCG	554391402
2	KASP-3DL-Cau1	F:ACAGACACCTCAATTAACAAACCT R-FAM:GAAGGTGACCAAGTTCATGCTCCGATCTGGGTTGCATCGT T R-HEX:GAAGGTCGGAGTCAACGGATTCCGATCTGGGTTGCATCGT G	555906572
3	KASP-AX-108822255	F-FAM:GAAGGTGACCAAGTTCATGCTTTACAAGCTTCTCACTTTTC G F-HEX:GAAGGTCGGAGTCAACGGATTTTACAAGCTTCTCACTTTTC A R:GTGAGGGGCTATTTTATCCCA	556905994
4	KASP-3DL-Cau2	F:AGCGTTCAACGACTTTGGAA R-FAM:GAAGGTGACCAAGTTCATGCTTCGATGGATGTTTCCCAAATTT G R-HEX:GAAGGTCGGAGTCAACGGATTTTCGATGGATGTTTCCCAAATTT A	560112705
5	KASP-3DL-Cau3	F-FAM:GAAGGTGACCAAGTTCATGCTTCTCTGCCAGCACAATCGAT T F-HEX:GAAGGTCGGAGTCAACGGATTTCTCTGCCAGCACAATCGAC C R:GGTTTGTCCAAGTCAATTTTCA	561631973
6	KASP-3DL-Cau4	F:TCGAGCTAGTTCCTACCCATA R-FAM:GAAGGTGACCAAGTTCATGCTTCTGGTCTCGATTAGCTGCA A R-HEX:GAAGGTCGGAGTCAACGGATTTCTGGTCTCGATTAGCTGCA G	563873762
7	KASP-3DL-Cau5	F:CACGATTGCGGGCTTCGG R-FAM:GAAGGTGACCAAGTTCATGCTCTGATTGGCTAGCTGGTTGT T R-HEX:GAAGGTCGGAGTCAACGGATTCTGATTGGCTAGCTGGTTGT C	565686577
8	InDel-3DL.cau1	F: G TCTGTAGGCGGTCTGTGTC R: C GCAAGACAAGCTCAGACCT	567447797- 567447993

Note: Physical position indicated the SNP's position located on IWGSC RefSeqv2.1

Table S2 The origin of the accessions utilized for haplotype analysis of *QTKw.cau-3DL*

No.	Acessions	Resource type	Origin	Wheat production zones	Haplotype group
1	Shannong20	Cultivar	Shandong	II	HapI
2	Yuejin5	Cultivar	Hebei	I	HapI
3	Yannong24	Cultivar	Shandong	II	HapI
4	Zimai12	Cultivar	Shandong	II	HapI
5	04zhong36	Cultivar	Henan	II	HapI
6	Guanmai1	Cultivar	Henan	II	HapI
7	Xun2016	Cultivar	Henan	II	HapI
8	Kaimai21	Cultivar	Henan	II	HapI
9	Luomai22	Cultivar	Henan	II	HapI
10	Tianmin198	Cultivar	Henan	II	HapI
11	Yangao21	Cultivar	Henan	II	HapI
12	Zhengmai113	Cultivar	Henan	II	HapI
13	Zhongjian49	Cultivar	Beijing	I	HapI
14	Zhongyu7410	Cultivar	Henan	II	HapI
15	Zhongyu8	Cultivar	Henan	II	HapI
16	Zhongyu9102	Cultivar	Henan	II	HapI
17	Zhongyuanzhixing	Breeding line	Henan	II	HapI
18	Zhoumai16	Cultivar	Henan	II	HapI
19	Zhoumai23	Cultivar	Henan	II	HapI
20	Zhoumai27	Cultivar	Henan	II	HapI
21	Ji38	Cultivar	Hebei	II	HapI
22	Jinhe9123	Cultivar	Hebei	II	HapI
23	Kenong1006	Cultivar	Hebei	II	HapI
24	Shih083-366	Breeding line	Hebei	II	HapI
25	Shimai12	Cultivar	Hebei	II	HapI
26	Shimai22	Cultivar	Hebei	II	HapI
27	Nongda3432	Cultivar	Beijing	I	HapI
28	Longmai330	Cultivar	Gansu	VIII	HapI
29	Taifa51-1673	Breeding line	Beijing	I	HapI
30	Taifen3/3097	Breeding line	Beijing	I	HapI
31	Shiluan02-1	Cultivar	Hebei	II	HapI
32	Tai441/212F5	Breeding line	Beijing	I	HapI
33	Nongda399	Cultivar	Beijing	II	HapI
34	Jinan9	Cultivar	Shandong	II	HapI
35	Laiyang4671	Cultivar	Shandong	II	HapI
36	Taishand44304	Breeding line	Shandong	II	HapI
37	Hansheng923	Cultivar	Hebei	II	HapI
38	Heng10s29-2	Breeding line	Hebei	II	HapI
39	Jinhe8431	Cultivar	Hebei	II	HapI
40	Luomai29	Cultivar	Henan	II	HapI
41	Quanmai890	Cultivar	Henan	II	HapI

No.	Acessions	Resource type	Origin	Wheat production zones	Haplotype group
42	Xinmai31	Breeding line	Henan	II	HapI
43	Yuzhan4	Cultivar	Henan	II	HapI
44	Zhengmai004	Cultivar	Henan	II	HapI
45	Zhongmai998	Cultivar	Henan	II	HapI
46	Zhoumai25	Cultivar	Henan	II	HapI
47	Shijiazhuang9	Cultivar	Hebei	II	HapI
48	Zhongyou206	Cultivar	Beijing	I	HapI
49	Wunong988	Cultivar	Shaanxi	II	HapI
50	Huadong6	Cultivar	Jiangsu	II	HapI
51	Yude1	Breeding line	Henan	II	HapII
52	Baigao38	Cultivar	Shandong	II	HapII
53	Bimai1	Cultivar	Shaanxi	II	HapII
54	Biansuimai	Landrace	Shandong	II	HapII
55	Changle5	Cultivar	Shandong	II	HapII
56	Dexuan1	Cultivar	Shandong	II	HapII
57	Fushanbanjiemang	Landrace	Shandong	II	HapII
58	Huanqun4	Cultivar	Shandong	II	HapII
59	Huangxiandalibanmang	Landrace	Shandong	II	HapII
60	Jimai19	Cultivar	Shandong	II	HapII
61	Jimai20	Cultivar	Shandong	II	HapII
62	Jimai21	Cultivar	Shandong	II	HapII
63	Jimai22	Cultivar	Shandong	II	HapII
64	Jimai23	Breeding line	Shandong	II	HapII
65	Jinan2	Cultivar	Shandong	II	HapII
66	Jinan4	Cultivar	Shandong	II	HapII
67	Jinan6	Cultivar	Shandong	II	HapII
68	Jinan8	Cultivar	Shandong	II	HapII
69	Jinan10	Cultivar	Shandong	II	HapII
70	Jinan13	Cultivar	Shandong	II	HapII
71	Jinan16	Cultivar	Shandong	II	HapII
72	Jinan17	Cultivar	Shandong	II	HapII
73	Jinai6	Cultivar	Shandong	II	HapII
74	Jining3	Cultivar	Shandong	II	HapII
75	Jining13	Cultivar	Shandong	II	HapII
76	Jining16	Cultivar	Shandong	II	HapII
77	Liangxing66	Cultivar	Shandong	II	HapII
78	Liangxing77	Cultivar	Shandong	II	HapII
79	Liaomai19	Cultivar	Shandong	II	HapII
80	Linmai2	Cultivar	Shandong	II	HapII
81	Linmai4	Breeding line	Hebei	VII	HapII
82	Lu215953	Cultivar	Shandong	II	HapII
83	Lumai1	Cultivar	Shandong	II	HapII
84	Lumai3	Cultivar	Shandong	II	HapII

No.	Acessions	Resource type	Origin	Wheat production zones	Haplotype group
85	Lumai5	Cultivar	Shandong	II	HapII
86	Lumai7	Cultivar	Shandong	II	HapII
87	Lumai8	Cultivar	Shandong	II	HapII
88	Lumai11	Cultivar	Shandong	II	HapII
89	Lumai12	Cultivar	Shandong	II	HapII
90	Lumai13	Cultivar	Shandong	II	HapII
91	Lumai14	Cultivar	Shandong	II	HapII
92	Lumai15	Cultivar	Shandong	II	HapII
93	Lumai16	Cultivar	Shandong	II	HapII
94	Lumai21	Cultivar	Shandong	II	HapII
95	Lumai22	Cultivar	Shandong	II	HapII
96	Lumai23	Cultivar	Shandong	II	HapII
97	Luteng1	Cultivar	Shandong	II	HapII
98	Pingyuan50	Landrace	Henan	II	HapII
99	Qida195	Landrace	Shandong	II	HapII
100	SN055849	Breeding line	Shandong	II	HapII
101	Shannong12	Cultivar	Shandong	II	HapII
102	Shannong15	Cultivar	Shandong	II	HapII
103	Shannong21	Cultivar	Shandong	II	HapII
104	Shannong22	Cultivar	Shandong	II	HapII
105	Shannong23	Cultivar	Shandong	II	HapII
106	Shannong587	Cultivar	Shandong	II	HapII
107	Shannong2149	Cultivar	Shandong	II	HapII
108	Shannongai2	Cultivar	Shandong	II	HapII
109	Shannongfu63	Cultivar	Shandong	II	HapII
110	Shannongyoumai3	Cultivar	Shandong	II	HapII
111	Sishuisanbamai	Landrace	Shandong	II	HapII
112	Taimai1	Cultivar	Shandong	II	HapII
113	Taimai18	Cultivar	Shandong	II	HapII
114	Tainong153	Cultivar	Shandong	II	HapII
115	Tainong2419	Cultivar	Shandong	II	HapII
116	Tainong2987	Breeding line	Shandong	II	HapII
117	Tainong7018	Breeding line	Shandong	II	HapII
118	Tainong8681	Breeding line	Shandong	II	HapII
119	Taishan4	Cultivar	Shandong	II	HapII
120	Taishan5	Cultivar	Shandong	II	HapII
121	Taishan21	Cultivar	Shandong	II	HapII
122	Taishan23	Cultivar	Shandong	II	HapII
123	Taishan24	Cultivar	Shandong	II	HapII
124	Taishan4606	Cultivar	Shandong	II	HapII
125	Taishan4682	Cultivar	Shandong	II	HapII
126	Taishan6002	Cultivar	Shandong	II	HapII
127	Taishan9818	Cultivar	Shandong	II	HapII

No.	Acessions	Resource type	Origin	Wheat production zones	Haplotype group
128	Weimai8	Cultivar	Shandong	II	HapII
129	Wennong19	Cultivar	Shandong	II	HapII
130	Youbaomai	Landrace	Shandong	II	HapII
131	Yuejin8	Cultivar	/	/	HapII
132	Yanfu188	Cultivar	Shandong	II	HapII
133	Yannong19	Cultivar	Shandong	II	HapII
134	Yannong25	Cultivar	Shandong	II	HapII
135	Yannong78	Cultivar	Shandong	II	HapII
136	Zhouyuan9369	Cultivar	Shandong	II	HapII
137	Yannong21	Cultivar	Shandong	II	HapII
138	Yannong23	Cultivar	Shandong	II	HapII
139	Yan09135	Cultivar	Shandong	II	HapII
140	Shanmai98	Cultivar	Shandong	II	HapII
141	07zhong36	Cultivar	Henan	II	HapII
142	L54223	Breeding line	Shanxi	VII	HapII
143	LS6109	Cultivar	Shandong	II	HapII
144	SH4300	Cultivar	Shandong	II	HapII
145	YX11-57	Breeding line	Shanxi	VII	HapII
146	Aikang58	Cultivar	Henan	II	HapII
147	Anmai1	Cultivar	Guizhou	IV	HapII
148	Anmai7	Cultivar	Guizhou	IV	HapII
149	Bonong6	Cultivar	Henan	II	HapII
150	Cunmai12	Cultivar	Henan	II	HapII
151	Cunmai1	Cultivar	Henan	II	HapII
152	Cunmai8	Cultivar	Henan	II	HapII
153	Dehongfumai6	Cultivar	Henan	II	HapII
154	Dehongfumai7	Breeding line	Henan	II	HapII
155	Dehongfumai8	Cultivar	Henan	II	HapII
156	Fanmai5	Cultivar	Henan	II	HapII
157	Fanmai8	Cultivar	Henan	II	HapII
158	Fengwu981	Cultivar	Henan	II	HapII
159	Fumai2008	Cultivar	Henan	II	HapII
160	Han09-41344	Cultivar	Hebei	II	HapII
161	Han105284	Breeding line	Hebei	II	HapII
162	Hannong2312	Cultivar	Hebei	II	HapII
163	Heng10-5218	Breeding line	Hebei	II	HapII
164	Huapei1	Cultivar	Henan	II	HapII
165	Huapei3	Cultivar	Henan	II	HapII
166	Huapei5	Cultivar	Henan	II	HapII
167	Huapei8	Cultivar	Henan	II	HapII
168	Huayu116	Cultivar	Henan	II	HapII
169	Huayu198	Cultivar	Henan	II	HapII
170	Jimai06039	Breeding line	Shandong	II	HapII

No.	Acessions	Resource type	Origin	Wheat production zones	Haplotype group
171	Ji729	Cultivar	Hebei	II	HapII
172	Jimai325	Cultivar	Hebei	II	HapII
173	Jinfeng7183	Breeding line	Hebei	II	HapII
174	Junda129	Cultivar	Henan	II	HapII
175	Kaimai18	Cultivar	Henan	II	HapII
176	Kaimai20	Cultivar	Henan	II	HapII
177	Kenong2009	Cultivar	Hebei	II	HapII
178	Lankao198	Cultivar	Henan	II	HapII
179	Lankao679	Cultivar	Henan	II	HapII
180	Liangxing99	Cultivar	Shandong	II	HapII
181	Luomai1	Cultivar	Henan	II	HapII
182	Luomai21	Cultivar	Henan	II	HapII
183	Luomai23	Cultivar	Henan	II	HapII
184	Luomai24	Cultivar	Henan	II	HapII
185	Luomai31	Cultivar	Henan	II	HapII
186	Luomai8	Cultivar	Henan	II	HapII
187	Luomai9	Cultivar	Henan	II	HapII
188	Pingan3	Cultivar	Henan	II	HapII
189	Pingan6	Cultivar	Henan	II	HapII
190	Pingan7	Cultivar	Henan	II	HapII
191	Pingan8	Cultivar	Henan	II	HapII
192	Pingan998	Cultivar	Henan	II	HapII
193	Pingan9	Cultivar	Henan	II	HapII
194	Pumai9	Cultivar	Henan	II	HapII
195	Puxing5	Cultivar	Henan	II	HapII
196	Qimai2	Cultivar	Shandong	II	HapII
197	Ru0319	Cultivar	Henan	II	HapII
198	Ruihua1101	Breeding line	Hubei	IV	HapII
199	Ruiquanmai168	Breeding line	Henan	II	HapII
200	Shannong0917	Breeding line	Shandong	II	HapII
201	Shenmai1	Cultivar	Henan	II	HapII
202	Shi1109-4366	Cultivar	Hebei	VII	HapII
203	Shi11-5139	Breeding line	Hebei	II	HapII
204	Taikong6	Cultivar	Henan	II	HapII
205	Taixue7	Cultivar	Henan	II	HapII
206	Tainong9862	Breeding line	Shandong	II	HapII
207	Tianhe3	Cultivar	Henan	II	HapII
208	Weike2	Cultivar	Henan	II	HapII
209	Weilai0818	Cultivar	Anhui	III	HapII
210	Wen9519	Cultivar	Henan	II	HapII
211	Wen9629	Cultivar	Henan	II	HapII
212	Xinong529	Cultivar	Shaanxi	II	HapII
213	Xinong585	Cultivar	Shaanxi	II	HapII

No.	Acessions	Resource type	Origin	Wheat production zones	Haplotype group
214	Xinong979	Cultivar	Shaanxi	II	HapII
215	Xianmai68	Cultivar	Henan	II	HapII
216	Xiangmai969	Cultivar	Henan	II	HapII
217	Xinmai11	Cultivar	Henan	II	HapII
218	Xinmai12	Cultivar	Henan	II	HapII
219	Xinmai16	Cultivar	Henan	II	HapII
220	Xinmai19	Cultivar	Henan	II	HapII
221	Xinmai20	Cultivar	Henan	II	HapII
222	Xinmai208	Cultivar	Henan	II	HapII
223	Xinmai21	Cultivar	Henan	II	HapII
224	Xinmai2111	Cultivar	Henan	II	HapII
225	Xinmai26	Cultivar	Henan	II	HapII
226	Xinmai9	Cultivar	Henan	II	HapII
227	Xingmai33	Cultivar	Hebei	II	HapII
228	Xuke316	Cultivar	Henan	II	HapII
229	Xuke718	Cultivar	Henan	II	HapII
230	Xunong5	Cultivar	Henan	II	HapII
231	Yan99102	Cultivar	Shandong	II	HapII
232	Yangao1	Cultivar	Henan	II	HapII
233	Bainong207	Cultivar	Henan	II	HapII
234	Yanzhan4110	Cultivar	Henan	II	HapII
235	Yimai6	Cultivar	Henan	II	HapII
236	Yikemai5	Breeding line	Henan	II	HapII
237	Yuliang1688	Cultivar	Henan	II	HapII
238	Yuanx208	Breeding line	Henan	II	HapII
239	Yubao1	Cultivar	Henan	II	HapII
240	Yujiao5	Cultivar	Henan	II	HapII
241	Yujiao6	Cultivar	Henan	II	HapII
242	Yumai34	Cultivar	Henan	II	HapII
243	Yumai49-198	Cultivar	Henan	II	HapII
244	Yumai70-36	Cultivar	Henan	II	HapII
245	Yunong9901	Cultivar	Henan	II	HapII
246	Yunong201	Cultivar	Henan	II	HapII
247	Yunong202	Cultivar	Henan	II	HapII
248	Yunong982	Cultivar	Henan	II	HapII
249	Zhengmai0856	Cultivar	Henan	II	HapII
250	Zhengmai366	Cultivar	Henan	II	HapII
251	Zhengmai379	Cultivar	Henan	II	HapII
252	Zhengmai583	Cultivar	Henan	II	HapII
253	Zhengmai7698	Cultivar	Henan	II	HapII
254	Zhengmai9023	Cultivar	Henan	II	HapII
255	Zhengmai9045	Cultivar	Henan	II	HapII
256	Zhengmai9694	Cultivar	Henan	II	HapII

No.	Acessions	Resource type	Origin	Wheat production zones	Haplotype group
257	Zhengmai98	Cultivar	Henan	II	HapII
258	Zhengmai9962	Cultivar	Henan	II	HapII
259	Zhengnong17	Cultivar	Henan	II	HapII
260	Zhengnong46	Cultivar	Henan	II	HapII
261	Zhengpinmai8	Cultivar	Henan	II	HapII
262	Zhengyumai0519	Breeding line	Henan	II	HapII
263	Zhengyumai9987	Cultivar	Henan	II	HapII
264	Zhongzhongmai10	Cultivar	Beijing	I	HapII
265	Zhongyu10	Cultivar	Henan	II	HapII
266	Zhongyu1123	Cultivar	Henan	II	HapII
267	Zhongyu12	Cultivar	Henan	II	HapII
268	Zhongyu5	Cultivar	Henan	II	HapII
269	Zhongyu6	Cultivar	Henan	II	HapII
270	Zhongyu9398	Cultivar	Henan	II	HapII
271	Zhongyuan18	Cultivar	Henan	II	HapII
272	Zhongyuanmai	Landrace	Henan	II	HapII
273	Zhoumai17	Cultivar	Henan	II	HapII
274	Zhoumai18	Cultivar	Henan	II	HapII
275	Zhoumai19	Cultivar	Henan	II	HapII
276	Zhoumai20	Cultivar	Henan	II	HapII
277	Zhoumai22	Cultivar	Henan	II	HapII
278	Zhoumai24	Cultivar	Henan	II	HapII
279	Zhoumai26	Cultivar	Henan	II	HapII
280	Zhoumai30	Cultivar	Henan	II	HapII
281	Zhoumai31	Cultivar	Henan	II	HapII
282	Zhoumai32	Cultivar	Henan	II	HapII
283	Zhumai328	Cultivar	Henan	II	HapII
284	Xinxiangdasui	Landrace	Henan	II	HapII
285	Lankao926	Cultivar	Henan	II	HapII
286	Luoph02	Breeding line	Henan	II	HapII
287	Yunong416	Cultivar	Henan	II	HapII
288	Zhengmai1817	Cultivar	Henan	II	HapII
289	Luohan13	Cultivar	Henan	II	HapII
290	Lankaoaizao8	Cultivar	Henan	II	HapII
291	Xinmai0208	Cultivar	Henan	II	HapII
292	Luohan7	Cultivar	Henan	II	HapII
293	Chang4738	Cultivar	Shanxi	II	HapII
294	Jinmai31	Cultivar	Shanxi	VII	HapII
295	Jin47lp-81	Cultivar	Shanxi	VII	HapII
296	Jin50lp-82	Cultivar	Shanxi	VII	HapII
297	Jinmai61	Cultivar	Shanxi	VII	HapII
298	Linfen5064	Cultivar	Shanxi	II	HapII
299	Linfen138	Cultivar	Shanxi	II	HapII

No.	Acessions	Resource type	Origin	Wheat production zones	Haplotype group
300	Linhan536	Cultivar	Shanxi	II	HapII
301	Linkang22	Cultivar	Shanxi	II	HapII
302	Linkang5069	Cultivar	Shanxi	II	HapII
303	Linyou2069	Cultivar	Shanxi	II	HapII
304	Shunmai1718	Cultivar	Shanxi	II	HapII
305	Tai10604	Cultivar	Shanxi	II	HapII
306	Tai5902	Cultivar	Shanxi	II	HapII
307	Tai7209	Cultivar	Shanxi	II	HapII
308	Yunfeng175	Cultivar	Shanxi	II	HapII
309	Yunhan805	Cultivar	Shanxi	II	HapII
310	Yunhan2130	Cultivar	Shanxi	II	HapII
311	Yunhan2633	Cultivar	Shanxi	II	HapII
312	Yunhan20410	Cultivar	Shanxi	II	HapII
313	Yaomai16	Cultivar	Shanxi	II	HapII
314	Han6172	Cultivar	Hebei	II	HapII
315	Han6228	Breeding line	Hebei	II	HapII
316	Hannong351	Breeding line	Hebei	II	HapII
317	Gaoyou1533-1	Breeding line	Hebei	II	HapII
318	Gaoyou2018	Cultivar	Hebei	II	HapII
319	Gaoyou9618	Cultivar	Hebei	II	HapII
320	Heng562	Cultivar	Hebei	II	HapII
321	Heng4332	Breeding line	Hebei	II	HapII
322	Heng4399	Cultivar	Hebei	II	HapII
323	Heng4422	Cultivar	Hebei	II	HapII
324	Heng5108	Cultivar	Hebei	II	HapII
325	Heng5386	Cultivar	Hebei	II	HapII
326	Heng6632	Cultivar	Hebei	II	HapII
327	Hengguan33	Cultivar	Hebei	II	HapII
328	Hengguan35	Cultivar	Hebei	II	HapII
329	Hengai	Landrace	Hebei	II	HapII
330	Hemai58-3	Cultivar	Hebei	II	HapII
331	Shi4185	Cultivar	Hebei	II	HapII
332	Shimai15	Cultivar	Hebei	II	HapII
333	Shimai18	Cultivar	Hebei	II	HapII
334	Shiyou17	Cultivar	Hebei	II	HapII
335	Shiyou20	Cultivar	Hebei	II	HapII
336	Shixin633	Cultivar	Hebei	II	HapII
337	Shixin733	Cultivar	Hebei	II	HapII
338	Shijiazhuang8	Cultivar	Hebei	II	HapII
339	Xing531	Cultivar	Hebei	II	HapII
340	Xingmai17	Cultivar	Hebei	II	HapII
341	Xinke8	Breeding line	Hebei	VII	HapII
342	Nongda3097	Cultivar	Beijing	I	HapII

No.	Acessions	Resource type	Origin	Wheat production zones	Haplotype group
343	Nongda3588	Cultivar	Beijing	I	HapII
344	Nongda5182	Cultivar	Beijing	I	HapII
345	Aiganzao	Landrace	Hubei	III	HapII
346	Beijing0045	Cultivar	Beijing	I	HapII
347	CA206	Breeding line	Beijing	I	HapII
348	CA0415	Breeding line	Beijing	I	HapII
349	CA0629	Breeding line	Beijing	I	HapII
350	CA9553	Cultivar	Beijing	I	HapII
351	CA9722	Cultivar	Beijing	I	HapII
352	Changfeng1	Cultivar	Shaanxi	II	HapII
353	Fengkang2	Cultivar	Beijing	I	HapII
354	Jingdong8	Cultivar	Beijing	I	HapII
355	Jinghua9	Cultivar	Beijing	I	HapII
356	Jingdong17	Cultivar	Beijing	I	HapII
357	Jing411	Cultivar	Beijing	I	HapII
358	Jing428	Breeding line	Beijing	I	HapII
359	Jing9428	Cultivar	Beijing	I	HapII
360	Jingnong02-56	Cultivar	Beijing	I	HapII
361	Keyi5214	Cultivar	Beijing	I	HapII
362	Leting639	Breeding line	Hebei	VII	HapII
363	Lunxuan987	Cultivar	Beijing	I	HapII
364	Nongda37	Breeding line	Beijing	I	HapII
365	Nongda38	Breeding line	Beijing	I	HapII
366	Nongda41	Breeding line	Beijing	I	HapII
367	Nongda135	Cultivar	Beijing	I	HapII
368	Nongda152	Cultivar	Beijing	I	HapII
369	Nongda179	Cultivar	Beijing	I	HapII
370	Nongda189	Cultivar	Beijing	I	HapII
371	Nongda193	Cultivar	Beijing	I	HapII
372	Nongda211	Cultivar	Beijing	I	HapII
373	Nongda212	Cultivar	Beijing	I	HapII
374	Nongda285	Cultivar	Beijing	I	HapII
375	Nongda408	Cultivar	Beijing	I	HapII
376	Nongda413	Cultivar	Beijing	I	HapII
377	Nongda3492	Cultivar	Beijing	I	HapII
378	Nongda3634	Cultivar	Beijing	I	HapII
379	Nongda3753	Cultivar	Beijing	I	HapII
380	Nongdayou89	Cultivar	Beijing	I	HapII
381	Youmangbai4	Cultivar	Beijing	I	HapII
382	Zhonghan110	Cultivar	Beijing	I	HapII
383	Zhongmai12	Cultivar	Beijing	I	HapII
384	Zhongmai175	Cultivar	Beijing	I	HapII
385	Zhongmai349	Cultivar	Shanxi	VII	HapII

No.	Acessions	Resource type	Origin	Wheat production zones	Haplotype group
386	Zhongmai415	Cultivar	Beijing	I	HapII
387	Zhongmai875	Cultivar	Henan	II	HapII
388	Zhongyou629	Cultivar	Beijing	I	HapII
389	Longmai212	Cultivar	Gansu	VIII	HapII
390	Longmai479	Cultivar	Gansu	VIII	HapII
391	Longmai488	Cultivar	Gansu	VIII	HapII
392	Longmai517	Cultivar	Gansu	VIII	HapII
393	Longmai939	Cultivar	Gansu	VIII	HapII
394	Longyuan082	Cultivar	Gansu	VIII	HapII
395	Pingliang44	Cultivar	Gansu	VIII	HapII
396	Longfu2	Cultivar	Gansu	IV	HapII
397	Changfeng2112	Cultivar	Shaanxi	II	HapII
398	Hangmai6	Cultivar	Shaanxi	II	HapII
399	Qinnong142	Cultivar	Shaanxi	II	HapII
400	Shan02-3	Breeding line	Shaanxi	II	HapII
401	Shanmai139	Cultivar	Shaanxi	II	HapII
402	Shanmai159	Cultivar	Shaanxi	II	HapII
403	Shanmai175	Breeding line	Shaanxi	II	HapII
404	Xinong158	Breeding line	Shaanxi	II	HapII
405	Shan225-aixi11	Cultivar	Shaanxi	II	HapII
406	Shan627	Cultivar	Shaanxi	II	HapII
407	Shannong66	Breeding line	Shaanxi	II	HapII
408	Shannong70	Breeding line	Shaanxi	II	HapII
409	Shannong138	Cultivar	Shaanxi	II	HapII
410	Shannong981	Breeding line	Shaanxi	II	HapII
411	Tongmai3	Cultivar	Shaanxi	VII	HapII
412	Wunong6	Cultivar	Shaanxi	II	HapII
413	Wunong986	Cultivar	Shaanxi	II	HapII
414	Xinong94	Cultivar	Shaanxi	II	HapII
415	Xinong165	Cultivar	Shaanxi	II	HapII
416	Xinong213	Cultivar	Shaanxi	II	HapII
417	Xinong538	Cultivar	Shaanxi	II	HapII
418	Xinong556	Cultivar	Shaanxi	II	HapII
419	Xinong558	Cultivar	Shaanxi	II	HapII
420	Xinong822	Cultivar	Shaanxi	II	HapII
421	Xinong889	Cultivar	Shaanxi	II	HapII
422	Xinong928	Cultivar	Shaanxi	II	HapII
423	Xinong2000	Cultivar	Shaanxi	II	HapII
424	Xinong2208	Cultivar	Shaanxi	II	HapII
425	Xinong2611	Cultivar	Shaanxi	II	HapII
426	Xinong3517	Cultivar	Shaanxi	II	HapII
427	Xinong9718	Cultivar	Shaanxi	II	HapII
428	Xinong9766	Cultivar	Shaanxi	II	HapII

No.	Acessions	Resource type	Origin	Wheat production zones	Haplotype group
429	Xinong9833	Breeding line	Shaanxi	II	HapII
430	Xinong9871	Cultivar	Shaanxi	II	HapII
431	Xinong9872	Cultivar	Shaanxi	II	HapII
432	Xiaoyan166	Cultivar	Shaanxi	II	HapII
433	Xiaoyan216	Cultivar	Shaanxi	II	HapII
434	Xiaoyan534	Cultivar	Shaanxi	II	HapII
435	Xiaoyan886	Breeding line	Shaanxi	II	HapII
436	Songyanghongmai	Landrace	Henan	II	HapII
437	Sankecun	Landrace	Hubei	IV	HapII
438	Changzhi6404	Breeding line	Shanxi	II	HapII
439	Dabaipi	Landrace	Hebei	VII	HapII
440	Fan6	Cultivar	Sichuan	IV	HapII
441	Wangshuibai	Landrace	Jiangsu	III	HapII
442	Xiaoyan6	Cultivar	Shaanxi	II	HapII
443	Mangxiaomai	Landrace	Jiangsu	III	HapII
444	Baimangmai	Landrace	Zhejiang	III	HapII
445	Huangshuibai	Landrace	Zhejiang	III	HapII
446	Laomai	Landrace	Shaanxi	VII	HapII
447	Ganmai8	Cultivar	Gansu	VIII	HapII
448	Baihuamai	Landrace	Sichuan	IX	HapII
449	Dabaimai	Landrace	Hebei	VII	HapII
450	Laizhou953	Cultivar	Shandong	II	HapII
451	Biantouguangkemai	Landrace	Yunnan	V	HapII
452	Chengdouguangtou	Landrace	Sichuan	IX	HapII
453	Zhongyou9507	Cultivar	Beijing	I	HapII
454	Zhugoumai	Landrace	Yunnan	IV	HapII
455	Zangdong4	Breeding line	Tibet	IX	HapII
456	Zaowutian	Landrace	Jiangsu	III	HapII
457	Zipi	Landrace	Sichuan	IX	HapII
458	Zhuozhouxiaomai	Landrace	Hebei	II	HapII
459	Hongmangzi	Landrace	Hubei	IV	HapII
460	Honggoudou	Landrace	Henan	II	HapII
461	Hongmangmai	Landrace	Gansu	VIII	HapII
462	Hongmai	Landrace	Hebei	II	HapII
463	Hongxumai	Landrace	Jiangsu	III	HapII
464	Fumai	Landrace	Henan	II	HapII
465	Baiqimai	Landrace	Gansu	IV	HapII
466	Beijing8	Cultivar	Beijing	I	HapII
467	Baituzitou	Landrace	Hebei	II	HapII
468	Banjiemang	Landrace	Shandong	II	HapII
469	Baipu	Landrace	Zhejiang	III	HapII
470	Xiazhuang30	Breeding line	Ningxia	VIII	HapII
471	Xishanbiansui	Landrace	Shandong	II	HapII

No.	Acessions	Resource type	Origin	Wheat production zones	Haplotype group
472	Zhemai1	Cultivar	Zhejiang	III	HapII
473	Xinong6028	Cultivar	Shaanxi	II	HapII
474	Yuqiumai	Landrace	Sichuan	IV	HapII
475	Nongda139	Cultivar	Beijing	I	HapII
476	Louguding	Landrace	Shandong	II	HapII
477	Lanhuamai	Landrace	Gansu	VIII	HapII
478	Nongda311	Cultivar	Beijing	I	HapII
479	Laolaixia	Landrace	Shandong	II	HapII
480	Sanyuehuang	Landrace	Shandong	II	HapII
481	Shannong7859	Cultivar	Jiangsu	III	HapII
482	Shuiyuan86-Smooth	Cultivar	/	/	HapII
483	Shuiyuan86-Awn	Cultivar	/	/	HapII
484	Xindong2	Cultivar	Xinjiang	X	HapII
485	Xiaofoshou	Landrace	Henan	II	HapII
486	Xianmai	Landrace	Fujian	V	HapII
487	Yanxia1	Cultivar	Henan	II	HapII
488	Zaoxiaomai	Landrace	Zhejiang	III	HapII
489	Hongheshangtou	Landrace	Anhui	III	HapII
490	Honghuamai	Landrace	Guizhou	IV	HapII
491	Hongqiangchang	Landrace	Shaanxi	VII	HapII
492	Huanxiangguo	Landrace	Sichuan	IX	HapII
493	357-1	Breeding line	Beijing	I	HapII
494	Bihongmai	Landrace	/	/	HapII
495	Baibiansui	Landrace	Shandong	II	HapII
496	Dinghou24	Cultivar	Tibet	IX	HapII
497	Dixiuzao	Landrace	Fujian	V	HapII
498	Dongnong101	Cultivar	Heilongjiang	VI	HapII
499	Kangdingxiaomai	Landrace	Sichuan	IX	HapII
500	Jinmai8	Cultivar	Shanxi	VII	HapII
501	Lumai1-Aimengniu	Cultivar	Shandong	II	HapII
502	Shijiazhuang54	Cultivar	Hebei	II	HapII
503	Shijiazhuang407	Cultivar	Hebei	VII	HapII
504	Fuyanghong	Landrace	Anhui	III	HapII
505	Fengchan3	Cultivar	Hebei	VII	HapII
506	Enmai4	Cultivar	Hubei	IV	HapII
507	Pingyuan60	Cultivar	Henan	II	HapII
508	Pingyang27	Cultivar	Zhejiang	III	HapII
509	Paozimai	Landrace	Jiangsu	III	HapII
510	Gaoyuan506-Awn	Cultivar	Qinghai	VIII	HapII
511	Gaoyuan506-Smooth	Cultivar	Qinghai	VIII	HapII
512	Qiangchangmai	Landrace	Shaanxi	VII	HapII
513	Jimai2	Cultivar	Hebei	II	HapII
514	Zhengyin4	Cultivar	Henan	II	HapII

No.	Acessions	Resource type	Origin	Wheat production zones	Haplotype group
515	04luo7671	Breeding line	Henan	II	HapII
516	04luo7427	Breeding line	Henan	II	HapII
517	Wenmai6	Cultivar	Henan	II	HapII
518	Taishan1	Cultivar	Shandong	II	HapII
519	Tongjiabaxiaomai	Landrace	Sichuan	IX	HapII
520	Shuilizhan	Landrace	Jiangsu	III	HapII
521	Mingxian169	Cultivar	Shanxi	II	HapII
522	Anhui3	Cultivar	Anhui	III	HapII
523	Chetongzi	Landrace	Jiangsu	III	HapII
524	Chanbuzhi	Landrace	Anhui	III	HapII
525	Baihuomai	Landrace	Shanxi	II	HapII
526	Bima4	Cultivar	Shaanxi	II	HapII
527	Baimaizi	Landrace	Shaanxi	VII	HapII
528	Zijiehong	Landrace	Shandong	II	HapII
529	Yannong15	Cultivar	Shandong	II	HapII
530	Neixiang5	Cultivar	Henan	II	HapII
531	Fengmai11	Cultivar	Yunnan	IV	HapII
532	Tieganmai	Landrace	Heilongjiang	VI	HapII
533	Luzi238	Cultivar	Shandong	II	HapII
534	Tai3266/974011-1	Breeding line	Beijing	I	HapII
535	Y415/AK58-2	Breeding line	Beijing	I	HapII
536	Nongda6812	Cultivar	Beijing	I	HapII
537	Tai(TR2)	Breeding line	Beijing	I	HapII
538	Taifa51-1643	Breeding line	Beijing	I	HapII
539	Taifa51-1323	Breeding line	Beijing	I	HapII
540	Tai(w1698)	Breeding line	Beijing	I	HapII
541	Tai(w1708)	Breeding line	Beijing	I	HapII
542	Tai(1710)	Breeding line	Beijing	I	HapII
543	Nongda2427	Cultivar	Beijing	I	HapII
544	Taisongfen/fen841-4	Breeding line	Beijing	I	HapII
545	Taisongfen3/songfen3-3	Breeding line	Beijing	I	HapII
546	Taisongfen3/songfen3-4	Breeding line	Beijing	I	HapII
547	Taisongfen3/songfen3-6	Breeding line	Beijing	I	HapII
548	Taisongfen3/songfen3-9	Breeding line	Beijing	I	HapII
549	Taisongfen3/songfen3-10	Breeding line	Beijing	I	HapII
550	Tai3205/211-3	Breeding line	Beijing	I	HapII
551	Tai3205/211-5	Breeding line	Beijing	I	HapII
552	Taifa51-1236	Breeding line	Beijing	I	HapII
553	Tai440/212-4	Breeding line	Beijing	I	HapII
554	Tai440/212-5	Breeding line	Beijing	I	HapII
555	Tai440/212-6	Breeding line	Beijing	I	HapII
556	Tai440/212-11	Breeding line	Beijing	I	HapII
557	TaiH9021/3735	Breeding line	Beijing	I	HapII

No.	Acessions	Resource type	Origin	Wheat production zones	Haplotype group
558	Tai440/212-1	Breeding line	Beijing	I	HapII
559	Tai440/212-2	Breeding line	Beijing	I	HapII
560	Tai3205/211-4	Breeding line	Beijing	I	HapII
561	Tai440/212	Breeding line	Beijing	I	HapII
562	Tai8901/240557-2	Breeding line	Beijing	I	HapII
563	Tai974011/260361-1	Breeding line	Beijing	I	HapII
564	Tai3266/974011-3	Breeding line	Beijing	I	HapII
565	Tai189/2552	Breeding line	Beijing	I	HapII
566	Tai189/9507	Breeding line	Beijing	I	HapII
567	Tai110281/2552-1	Breeding line	Beijing	I	HapII
568	Tai110281/2552-2	Breeding line	Beijing	I	HapII
569	Tai110281/2552-3	Breeding line	Beijing	I	HapII
570	Tai8901/240557	Breeding line	Beijing	I	HapII
571	Taisongfen/fen841	Breeding line	Beijing	I	HapII
572	Tai974011/260361	Breeding line	Beijing	I	HapII
573	Tai3205/211-1	Breeding line	Beijing	I	HapII
574	Tai974011/260361-2	Breeding line	Beijing	I	HapII
575	Taiserld/wsc	Breeding line	Beijing	I	HapII
576	TaiBalmegg/D313-2	Breeding line	Beijing	I	HapII
577	TaiBalmegg/D313-1	Breeding line	Beijing	I	HapII
578	TaiBalmegg/D313-3	Breeding line	Beijing	I	HapII
579	Tai3519/1817-3	Breeding line	Beijing	I	HapII
580	Tai3519/1817-4	Breeding line	Beijing	I	HapII
581	Nongda6017	Breeding line	Beijing	I	HapII
582	Tai8901/2552	Breeding line	Beijing	I	HapII
583	Tai10281/2552	Breeding line	Beijing	I	HapII
584	Tai3266/974011-2	Breeding line	Beijing	I	HapII
585	Y415/AK58	Breeding line	Beijing	I	HapII
586	Tai3205/211-2	Breeding line	Beijing	I	HapII
587	Jinfen3	Breeding line	Shanxi	VII	HapII
588	Fen841	Breeding line	Shanxi	VII	HapII
589	Songfen	Breeding line	Beijing	I	HapII
590	Fen1	Breeding line	Beijing	I	HapII
591	Fen3	Breeding line	Beijing	I	HapII
592	Fen2	Breeding line	Beijing	I	HapII
593	Nongda5183	Cultivar	Beijing	I	HapII
594	Tai3025/211F7-1	Breeding line	Beijing	I	HapII
595	Tai3025/211F7-2	Breeding line	Beijing	I	HapII
596	Tai3025/211F7-3	Breeding line	Beijing	I	HapII
597	Taifen3/3097F7-1	Breeding line	Beijing	I	HapII
598	Taifen3/3097F7-2	Breeding line	Beijing	I	HapII
599	TaiBalmegg/Di13F6-1	Breeding line	Beijing	I	HapII
600	TaiBalmegg/Di13F6-2	Breeding line	Beijing	I	HapII

No.	Acessions	Resource type	Origin	Wheat production zones	Haplotype group
601	TaiBalmegg/Di13F6-3	Breeding line	Beijing	I	HapII
602	Nongda3338	Cultivar	Beijing	I	HapII
603	Nongda981	Cultivar	Beijing	I	HapII
604	Xiaoheimai/2052	Breeding line	Beijing	I	HapII
605	Xiaoheimai	Cultivar	Beijing	I	HapII
606	Nongda3234	Cultivar	Beijing	I	HapII
607	F390	Breeding line	Beijing	I	HapII
608	Changzhi6878	Cultivar	Shanxi	II	HapII
609	Linkang6180	Cultivar	Shanxi	II	HapII
610	Han708610p61	Cultivar	Hebei	II	HapIII
611	Hanmai13	Cultivar	Hebei	II	HapIII
612	Heng5364	Cultivar	Hebei	II	HapIII
613	Taishan22	Cultivar	Shandong	II	HapIII
614	Youzimai	Landrace	Hebei	II	HapIII
615	Shannong055843	Cultivar	Shandong	II	HapIII
616	Tianmin298	Breeding line	Henan	II	HapIII
617	Xinyuan9558	Cultivar	Henan	II	HapIII
618	Henong5290	Cultivar	Hebei	II	HapIII
619	Jimai585	Cultivar	Hebei	II	HapIII
620	Jiayou	Landrace	Shaanxi	II	HapIII
621	Xinong6049	Cultivar	Shaanxi	II	HapIII
622	Shanxibaimai	Landrace	Gansu	VIII	HapIII
623	Jiangdongmen	Landrace	Jiangsu	III	HapIII
624	Honglaomai	Landrace	Shaanxi	VII	HapIII
625	Shite14	Cultivar	Hebei	VII	HapIII
626	Emai6	Cultivar	Hubei	IV	HapIII
627	Tai3266/974011-4	Breeding line	Beijing	I	HapIII
628	TaiH9021/3753F7	Breeding line	Beijing	I	HapIII
629	Han60-7086	Breeding line	Hebei	II	HapIII
630	Henghe1	Cultivar	Hebei	II	HapIII

Table S3 The location of reported QTLs associated with TKW and its components on chromosome 3DL in previous study.

Traits	QTL	Chr.	Flanking markers	Position/Interval (cM/bp)	PVE (%)	Reference
Thousand grain weight	Qgw.cgb-3D.2	3D	Xgdm8-Xgwm645	-	13.02	Li et al.2012
Thousand grain weight	QTGW.cgb-3D.1	3D	Xgdm72	57.6-66.7	7.69	Wu et al.2011
Thousand grain weight	QTGW.cgb-3D.2	3D	Xgwm456	66.7-80	7.45	Wu et al.2011
Thousand grain weight	QTgw.cau-3D2	3D	Excalibur_c32309_395	531.05	1.98	Chen et al. 2020
Thousand grain weight	QTgw.cau-3D2	3D	D_GDRF1KQ02GV96X 70	552.95	3.23	Chen et al. 2020
Thousand grain weight	QTGW.ahau-3D	3D	T31 32, Xbarc1162	3.5-4.2	38.20	Lu et al. 2015
Thousand grain weight	QTkw.hwwgr-3DL	3D	IWA5230	0-6.7	4.20	Li et al. 2015
Thousand grain weight	QTkw.cas-3D.1	3D	AX-9559833 - AX-08859112	59.316-60.103	4.44	Li et al. 2020
Thousand grain weight	QTkw.cas-3D.2	3D	AX-09822373 - AX-08891293	69.678-70.655	5.00	Li et al.2020
Thousand grain weight	QTkw.cas-3D.3	3D	AX-09998069 - AX-09135381	76.357-78.103	4.80	Li et al. 2020
Thousand grain weight	QGwt.crc-3D	3D	Xgwm341	171-214	6.00	McCartney et al. 2006
Grain length	QGL.cau-3D.2	3D	Xbarc342-Xgdm72	165	3.97	Wu et al. 2015
Grain length	QGL.ahau-3D	3D	T31, 32, Xbarc1162	3.5-4.2	34.20	Lu et al. 2015
Grain width	QGw.cau-3D.1-2	3D	RAC875_c494_436	421.31	5.74	Chen et al. 2020
Grain width	QGw.cau-3D.2	3D	D_GDRF1KQ02GV96X 70	552.95	5.03	Chen et al. 2020
Grain width	QGW.ahau-3D	3D	T31 32, Xbarc1162	3.5-4.2	26.70	Lu et al. 2015

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