Appendix A - The information of the environments

Environment	Location	Growing season	Latitude, longitude	Annual rainfall (mm)	Average daily temperature (℃)	Highest T (℃)
E1	Beijing, Beijing	2017	N40°08′32.06″, E116°10′56.46″	620.6	12.5	38.5
E2	Kaifeng, Henan	2017	N34°46′15.35″, E114°15′42.73″	490.7	16.2	37.2
E3	Beijing, Beijing	2018	N40°08′32.06″, E116°10′56.46″	575.5	11.9	38.2
E4	Kaifeng, Henan	2018	N34°46′15.35″, E114°15′42.73″	521.1	16.3	38.1

Appendix B - Summary of the ear-related traits and their measurements

Traits	Unit	Abbreviation	Measurement
Row number	count	RN	Average of six measurements of the count of the row number per ear
Kernel number per row	count	KNPR	Average of six measurements of the count of the kernel number in the longest row
Ear length	cm	EL	Average of six measurements of the length of an ear
Ear diameter	mm	ED	Average of six measurements of the diameter in the middle of an ear
Ear weight	g	EW	Average of six measurements of the weight per ear
Grain weight per ear	g	GW	Average of six measurements of the weight of the grains per ear
Cob diameter	mm	CD	Average of six measurements of the diameter in the middle of a cob
10-kernel thickness	mm	TKT	Average of six measurements of ten selected bulked kernels from the middle of the ears
Kernel length	mm	KL	Average of six measurements of the average mean of ten consecutive kernels' length selected from the middle of the ears
Kernel width	mm	KW	Average of six measurements of the average mean of ten consecutive kernels' width selected from the middle of the ears
100-kernel weight	g	HKW	Average of six measurements of the weight of a hundred kernels selected from the middle of the ears
Grain weight per plot	g	GY	Grain weight of twenty plants continuously harvested

Appendix C - The performance of the mid-parent heterosis in the IF$_2$ population

Trait[a]	MPH[b]		
	Mean±Se[c]	MPH (%)[d]	Range
RN	1.28±0.11	9.93	-4.01-5.80
EL (cm)	2.00±0.11	15.66	-4.03-6.61
EW (g)	42.69±1.44	46.87	-47.44-122.73
ED (mm)	3.20±0.18	7.86	-8.08-11.73

[a] For abbreviations, see "Materials and methods".

[b] MPH, mid-parent heterosis derived from the RILs and IF$_2$ population.

[c] Mean±SE represents mean across all environments ± standard error.

[d] MPH (%): MPH(%)=(F12-(P1+P2)/2)/((P1+P2)/2)*100%.

Appendix D - The matrix of p values of the Pearson correlation coefficients of combined analysis for 12 traits

RN	4.863E-06	0.129412	7.103E-23	6.562E-11	3.641E-13	4.584E-07	0.0003912	2.4429E-14	3.464E-50	6.259E-09	0.000176
0.2779979	KNPR	6.61E-46	3.513E-10	1.018E-41	1.263E-46	0.00055515	2.269E-06	5.8403E-05	0.5184539	0.1033713	9.072E-14
0.7706889	8.322E-49	EL	1.754E-06	1.544E-34	4.384E-35	5.6241E-07	0.0093347	0.31791112	0.0448343	0.000254	5.595E-15
3.441E-31	0.2186779	0.005292	ED	8.786E-46	9.407E-41	1.2462E-31	0.3039426	8.7831E-41	0.4886195	0.0005121	3.791E-20
1.709E-05	1.53E-33	2.95E-39	7.912E-28	EW	4.54E-158	1.4512E-14	0.2811962	1.0117E-23	0.0866755	1.496E-07	3.789E-35
2.429E-05	2.051E-35	2.52E-34	5.64E-25	4.36E-180	GW	8.9122E-10	0.1054194	1.5763E-26	0.5764379	1.415E-05	5.837E-37
4.554E-11	0.4920113	3.33E-06	2.33E-38	2.172E-10	2.027E-06	CD	0.0249038	0.75579435	0.1287345	0.0003063	1.402E-06
0.5206377	3.937E-05	0.049022	0.0380912	0.5030502	0.9478241	0.00166845	TKT	0.00032038	0.0002113	3.796E-14	0.5893379
2.409E-19	0.3037908	0.44308	4.755E-40	3.926E-17	2.677E-21	0.83279753	0.589859	KL	0.725339	0.0280113	4.194E-11
3.622E-78	0.0428583	0.062631	0.0012828	0.7307986	0.9385948	0.32329115	0.8259803	5.1747E-05	KW	7.192E-28	0.0743574
8.292E-08	0.0807993	0.019972	0.0010357	1.119E-08	7.237E-09	0.39755881	6.779E-11	0.00059963	5.9E-20	HKW	1.151E-05
0.0005353	3.2E-14	1.16E-08	2.064E-11	5.317E-28	4.15E-30	0.0095524	0.0605782	1.4666E-11	0.4090757	0.0103465	GY

[a] Right upper panel, Kaifeng; left lower panel, Beijing.

Appendix E - Bin map summary

Chr	Bins			Linkage (cM)			Rec	Crossover
	NO.	Mean	Max	Total	Mean	Max		
1	2593	0.11	3.23	406.8	0.14	9.70	1.3	7.9
2	1720	0.13	5.35	238.9	0.13	11.30	1.0	4.7
3	1896	0.12	3.00	282.6	0.15	3.20	1.2	5.6
4	1624	0.15	2.84	221.6	0.14	5.10	0.9	4.4
5	1719	0.10	2.65	304.3	0.15	9.90	1.6	5.9
6	1322	0.13	4.66	206.7	0.16	5.70	1.2	4.1
7	1207	0.15	4.68	207.4	0.17	3.60	1.2	4.1
8	1514	0.11	5.00	265.5	0.16	9.50	1.4	5.2
9	1086	0.12	3.99	195.9	0.16	12.80	1.3	3.8
10	1019	0.14	4.48	177.9	0.17	8.20	1.2	3.5
Total	15700	0.13	5.35	2507.7	0.15	12.80	1.2	4.9

Appendix F - Summary of the QTLs identified for ear-related traits in an immortalized F_2 population[1]

Trait[2]	Env.[3]	Chr	Linkage map (cM)		Physical map (Mb)		LOD	ADD	DOM	PVE
			Start	End	Start	End				(%)
CD	BJ2017	1	54.28	63.00	18.20	22.94	6.90	0.21	0.13	1.92
		2	88.45	93.92	36.91	41.77	3.63	-0.32	0.05	3.67
		7	125.15	130.41	147.34	151.22	3.01	-0.13	0.39	0.41
		10	9.41	23.23	2.66	4.53	4.26	0.26	-0.08	3.08
	BJ2018	1	197.57	203.02	174.30	176.18	3.00	0.02	0.54	0.06
		8	226.25	231.89	166.75	168.08	3.41	-0.40	0.04	5.41
	KF2017	1	96.38	103.89	40.88	45.00	5.08	0.53	-0.32	4.05
		2	231.55	238.90	233.79	236.67	3.70	0.34	-0.15	3.23
		5	29.27	36.41	5.93	7.27	4.16	-0.48	0.36	5.58
		7	98.13	103.12	123.19	125.86	3.12	0.36	-0.40	3.13
		9	138.79	141.99	138.80	140.22	5.56	-0.56	0.09	6.74
	KF2018	2	91.46	93.58	39.43	41.31	4.18	-0.63	0.44	3.86
		4	13.98	19.72	3.47	4.60	3.59	-0.62	0.13	4.15
		10	7.13	16.13	2.45	3.19	4.94	0.65	-0.04	4.71
		10	49.78	53.74	14.55	20.70	4.78	0.57	0.34	3.92
ED	BJ2017	1	336.72	339.58	272.27	274.42	3.73	0.41	-0.31	2.07
		2	166.88	183.72	203.25	209.48	3.87	-0.38	-0.50	2.66
		3	256.08	261.00	224.02	225.34	4.35	-0.45	0.09	2.84
		4	25.66	28.85	5.89	6.53	4.21	0.18	0.57	0.71
		10	83.47	95.97	112.08	121.47	3.73	0.51	-0.59	4.11
	BJ2018	2	65.06	68.78	18.77	20.12	4.78	-0.47	0.78	2.43
		3	3.26	9.88	1.77	2.82	8.53	0.29	-0.42	0.98
		3	169.34	175.71	180.00	183.12	6.17	0.48	-0.29	3.23

Trait	Env.	Chr	Linkage map (cM)		Physical map (Mb)		LOD	ADD	DOM	PVE
			Start	End	Start	End				(%)
	KF2017	1	99.55	102.95	41.38	44.33	4.27	0.58	-0.27	4.25
		3	125.13	132.21	152.06	158.79	5.65	0.21	-0.78	0.66
		6	157.06	168.04	155.74	159.15	5.85	-0.49	0.43	2.53
		7	35.05	39.07	9.71	10.97	3.95	0.71	0.78	4.95
		7	72.38	77.88	88.57	101.12	3.46	-0.55	0.34	3.74
	KF2018	1	359.86	376.20	283.24	289.79	3.33	-0.86	-0.53	6.54
		4	207.99	212.01	238.28	238.93	6.68	0.56	0.81	1.86
		5	189.73	198.50	174.32	178.81	3.64	-0.82	0.48	5.72
EL	BJ2017	7	35.05	40.57	9.71	11.46	3.59	-0.08	0.56	0.25
		9	139.87	144.28	139.53	141.38	5.22	-0.06	-0.57	0.11
	BJ2018	5	177.14	186.57	168.04	172.48	6.42	0.45	0.22	4.48
	KF2017	2	186.93	187.52	211.66	212.35	3.56	0.01	-0.47	3.88
		3	247.78	249.60	220.03	221.23	3.81	0.36	-0.28	4.31
		9	82.22	82.27	47.07	50.27	4.19	-0.13	0.56	2.84
	KF2018	1	198.41	212.97	174.64	182.39	5.00	-0.37	0.54	2.58
		3	144.13	148.94	169.12	171.03	3.86	0.05	0.55	0.00
		6	61.29	67.86	96.68	98.31	7.23	-0.58	-0.12	6.28
EW	BJ2017	7	24.73	33.12	6.31	9.20	3.03	1.28	9.07	0.22
		8	247.74	254.38	171.58	172.41	2.72	1.72	5.52	0.62
		9	10.34	16.08	4.28	6.30	3.52	5.17	2.86	3.94
	BJ2018	3	144.13	151.70	169.12	172.86	3.06	-0.82	5.30	0.03
		4	68.41	75.23	39.60	65.59	3.24	1.23	5.63	0.17
		7	76.78	86.18	100.81	110.13	3.89	3.11	4.77	1.26

Trait	Env.	Chr	Linkage map (cM)		Physical map (Mb)		LOD	ADD	DOM	PVE
			Start	End	Start	End				(%)
	KF2017	9	73.14	85.73	28.61	73.25	3.23	-0.80	7.64	0.08
	KF2018	1	372.21	376.74	288.21	290.12	3.13	-5.54	-3.85	4.58
		3	54.28	58.45	12.65	15.44	3.63	-1.66	3.87	0.39
		5	266.49	272.26	209.00	210.74	4.07	2.12	7.88	0.40
		9	185.32	192.62	151.77	154.31	3.84	-4.06	-6.17	2.35
GW	BJ2017	8	247.74	254.38	171.58	172.41	5.74	1.73	5.55	0.74
		9	9.44	16.53	4.01	6.47	3.17	5.33	1.93	4.92
	BJ2018	2	28.83	37.18	6.56	9.44	3.35	-5.96	0.85	5.93
		7	77.93	86.18	101.82	110.13	3.10	3.16	4.40	1.71
	KF2017	3	240.93	247.78	217.43	220.03	8.92	4.32	1.14	4.79
		8	175.56	179.30	149.44	152.59	3.10	2.67	-5.55	1.54
		10	10.25	19.14	2.69	3.91	4.08	2.48	-4.84	1.40
	KF2018	1	41.46	52.51	12.48	16.97	3.97	-3.26	4.42	2.65
		1	370.33	376.74	287.58	290.12	4.10	-5.15	-3.31	5.18
		3	154.49	164.95	175.54	178.01	7.68	0.60	6.42	0.09
		5	266.49	273.15	209.00	210.87	4.02	0.68	7.15	0.04
		9	185.32	192.62	151.77	154.31	4.77	-2.78	-6.16	1.32
GY	BJ2017	9	0.18	0.33	0.18	1.26	4.10	100.79	77.67	5.62
	BJ2018	4	139.32	146.39	178.89	182.06	3.04	172.64	-30.22	5.48
		9	51.28	66.22	19.66	24.60	3.09	-93.39	122.21	1.63
		9	180.12	184.88	151.15	151.73	3.65	-130.66	-215.55	3.15
	KF2017	3	154.83	159.77	175.64	176.43	3.13	31.10	129.03	0.66
		4	63.30	66.04	31.12	34.93	3.77	-122.88	11.97	7.72

Trait	Env.	Chr	Linkage map (cM)		Physical map (Mb)		LOD	ADD	DOM	PVE
			Start	End	Start	End				(%)
		5	57.10	66.11	13.25	16.84	3.75	-3.95	38.50	0.01
		8	11.92	18.96	4.15	5.50	3.83	13.68	129.79	0.08
	KF2018	2	0.65	4.40	1.27	1.92	3.84	-92.36	-74.78	4.64
		5	265.46	267.63	208.89	209.47	3.05	63.11	93.74	2.21
		6	176.79	184.61	161.87	163.10	5.84	-71.04	46.99	3.77
		9	185.32	195.04	151.77	154.64	3.22	-57.30	-53.91	2.48
HKW	BJ2017	2	43.21	50.74	11.42	13.38	3.78	0.74	0.40	3.75
		6	24.00	31.46	28.15	57.54	3.13	0.37	1.18	0.47
		7	198.97	203.81	173.67	174.52	3.62	-0.73	0.65	3.57
		9	14.02	23.25	5.46	8.43	4.14	0.52	-0.30	2.43
	BJ2018	1	109.80	112.72	49.81	51.44	3.65	-0.46	0.96	0.98
		2	20.74	34.56	4.58	8.91	3.84	-0.74	-0.23	4.24
		2	92.49	96.84	40.01	43.76	3.42	0.24	1.09	0.47
		2	110.16	114.36	72.10	107.42	3.78	-0.03	-0.38	0.00
		3	197.45	201.75	198.56	200.70	4.64	-0.22	-1.15	0.73
		5	216.99	239.90	189.07	201.46	5.17	-0.54	-0.36	1.65
		6	64.77	72.20	97.71	103.41	3.72	0.81	-0.10	4.82
	KF2017	2	14.37	17.58	3.34	3.98	3.51	0.95	-0.75	5.69
		5	38.28	46.23	7.88	10.21	6.07	-0.49	0.38	1.65
		7	190.56	196.65	172.12	173.18	3.14	-0.46	0.86	1.31
	KF2018	2	18.81	23.05	4.21	5.08	4.70	-0.98	-0.49	4.18
		2	94.17	97.58	41.89	44.04	4.12	0.61	0.94	2.14
		4	142.43	151.68	180.55	185.47	4.60	-0.83	-0.04	4.47

Trait	Env.	Chr	Linkage map (cM)		Physical map (Mb)		LOD	ADD	DOM	PVE
			Start	End	Start	End				(%)
KL	BJ2017	8	209.02	217.36	160.61	163.91	4.36	0.18	-0.10	4.44
		10	107.90	114.35	131.84	137.32	4.00	0.19	-0.28	4.80
	BJ2018	1	31.70	41.21	10.02	12.36	7.80	-0.04	0.27	0.50
		2	57.89	60.42	15.69	16.65	4.02	-0.26	0.22	7.94
		4	47.42	53.39	14.43	18.69	3.27	0.08	-0.14	0.64
	KF2017	1	274.25	280.88	216.68	229.19	7.26	-0.15	-0.25	1.38
		1	353.03	359.27	279.91	282.54	4.50	-0.02	0.26	0.00
		3	129.69	132.65	156.37	159.38	5.81	0.09	-0.32	0.71
		5	26.22	32.37	5.20	6.44	3.66	-0.06	0.24	0.37
		8	209.02	220.73	160.61	164.90	4.23	0.22	-0.16	3.69
	KF2018	2	80.57	85.83	29.06	33.62	4.60	-0.30	0.11	7.09
		2	229.17	236.34	232.88	234.82	3.00	-0.15	0.30	2.10
		3	11.46	18.64	3.22	3.82	3.08	-0.03	-0.20	0.04
		5	264.76	268.12	208.68	209.70	3.44	0.09	0.26	0.77
KNPR	BJ2017	7	83.69	91.22	108.81	118.43	3.47	0.72	0.58	3.34
		8	97.01	103.16	101.88	104.27	3.13	0.63	-0.69	2.18
	BJ2018	3	145.97	147.15	170.06	170.45	5.17	0.40	1.47	0.18
		3	265.54	269.46	226.87	227.62	4.48	0.06	-1.01	0.08
		7	19.32	25.76	5.27	6.91	6.56	-0.51	0.91	0.84
		7	142.18	148.65	157.38	159.47	3.74	0.56	-0.59	1.53
		8	30.14	35.00	10.13	12.35	3.29	0.84	-0.84	2.86
	KF2017	1	387.43	392.16	294.08	296.00	3.53	-0.69	-0.55	2.12
		7	90.18	97.79	117.85	122.07	3.35	0.73	0.41	3.59

Appendix F (Continued on preceding page)

Trait	Env.	Chr	Linkage map (cM)		Physical map (Mb)		LOD	ADD	DOM	PVE
			Start	End	Start	End				(%)
		9	12.56	21.27	5.08	7.72	3.70	-0.02	1.02	0.05
		10	14.82	23.23	3.18	4.53	3.62	0.68	-0.31	2.54
	KF2018	3	0.01	2.57	0.01	1.60	3.24	0.58	1.10	0.99
		3	154.83	164.95	175.64	178.01	3.65	0.32	1.40	0.00
		6	61.20	69.88	96.67	102.46	3.31	-1.30	-0.08	7.76
		7	49.69	56.48	17.18	25.80	3.13	-0.83	0.69	0.72
		7	106.70	113.03	128.93	132.39	4.11	0.84	-0.75	2.45
		8	29.89	35.69	10.08	12.61	3.32	0.91	0.93	3.03
		10	168.68	172.78	147.58	148.30	3.47	0.24	1.12	0.17
KW	BJ2017	1	32.55	42.89	10.04	12.85	4.19	0.18	0.08	4.29
		1	181.73	189.89	163.62	166.93	4.93	-0.02	0.17	0.05
		4	142.43	146.78	180.55	182.30	4.90	-0.13	-0.17	2.35
	BJ2018	1	387.63	402.23	294.17	298.14	3.66	-0.16	0.19	2.30
		3	106.53	114.37	129.31	138.56	3.77	0.14	0.13	1.96
		6	168.34	187.97	159.18	163.84	3.59	0.03	0.19	0.10
		8	133.06	140.01	122.91	127.34	5.65	-0.04	-0.17	0.28
		10	48.34	52.71	13.90	18.73	3.69	-0.17	-0.17	3.18
	KF2017	2	13.12	17.58	3.23	3.98	3.27	0.27	-0.25	5.69
		4	212.01	221.61	238.93	241.01	3.88	-0.07	0.21	0.40
	KF2018	2	233.32	238.90	234.73	236.67	4.11	0.01	0.27	0.30
		6	183.53	191.29	162.93	164.37	3.43	0.22	0.11	4.55
		8	75.31	75.95	77.73	78.07	4.52	-0.22	-0.02	5.06
RN	BJ2017	2	64.08	70.27	18.21	20.72	3.30	-0.28	0.09	3.73

Trait	Env.	Chr	Linkage map (cM)		Physical map (Mb)		LOD	ADD	DOM	PVE
			Start	End	Start	End				(%)
		7	137.42	145.18	154.70	158.24	3.35	0.34	-0.01	4.46
		7	186.34	193.38	171.21	172.71	3.88	-0.11	-0.25	0.51
		10	126.08	132.94	139.75	140.85	3.18	0.31	0.13	4.00
	KF2017	2	13.12	17.58	3.23	3.98	4.03	-0.16	0.37	0.91
		4	218.37	221.61	240.05	241.01	3.95	0.12	-0.34	0.52
		8	216.96	220.24	163.90	164.74	3.34	0.32	-0.06	4.80
	KF2018	1	32.55	42.89	10.04	12.85	3.11	-0.17	0.51	1.10
		3	132.65	138.91	159.38	165.41	3.58	-0.42	0.21	2.50
		3	165.84	170.48	178.31	180.51	4.39	0.48	0.35	7.14
TKT	BJ2017	1	250.92	260.10	199.73	206.12	2.91	0.59	0.25	3.39
		2	131.03	136.88	169.82	178.61	6.37	1.29	-0.27	12.66
		4	0.00	5.68	0.00	2.40	4.65	-0.69	0.35	9.43
		4	118.99	127.45	167.09	173.18	5.73	-0.26	0.51	2.95
		4	171.26	174.87	212.22	221.52	4.22	-0.34	-0.14	0.98
		5	117.26	125.20	74.50	81.27	3.86	0.70	0.07	6.09
		6	25.48	31.06	31.42	57.41	3.71	0.77	0.69	5.91
	BJ2018	3	273.53	282.62	229.19	231.68	3.61	0.74	0.65	2.73
		6	16.43	20.85	10.35	14.17	3.03	0.82	0.48	4.86
	KF2017	2	58.04	63.58	15.71	17.87	4.03	0.61	-0.19	3.82
		5	95.85	105.98	39.82	63.19	3.00	-0.19	-0.87	0.33
	KF2018	1	0.54	7.00	2.80	3.65	4.39	-0.43	-1.24	0.66
		3	166.58	169.53	178.87	180.20	3.67	-1.11	-0.39	9.32
		4	31.66	37.33	7.34	10.46	3.26	-0.92	-0.23	2.20

Appendix F (Continued on preceding page)

Trait	Env.	Chr	Linkage map (cM)		Physical map (Mb)		LOD	ADD	DOM	PVE
			Start	End	Start	End				(%)
		5	131.30	141.77	90.78	106.79	6.39	1.18	0.51	7.16
		7	15.47	21.75	4.55	5.53	7.43	-0.38	-0.43	0.45
		7	187.23	194.96	171.57	172.88	3.72	-0.67	0.38	2.43
		10	51.06	55.86	16.36	26.14	3.06	0.92	0.38	5.20

[1] Chr, chromosome; linkage map, genetic map locations of QTLs; physical map, physical positions of QTLs; LOD, the logarithm of the odds ratio; ADD, the additive effect; DOM, the dominant effect; PVE, the proportion of phenotypic variance explained by each QTL.

[2] CD, cob diameter; ED, ear diameter; EL, ear length; EW, ear weight; GW, grain weight per ear; GY, grain yield per plot; HKW, 100-kernel weight; KL, kernel length; KNPR, kernel number per row; KW, kernel width; RN, row number; TKT, ten-kernel thickness.

[3] Env., environment. BJ, Beijing; KF, Kaifeng, Henan Province.

Appendix G - Summary of the environmentally stable QTLs

Traits	QTL	Env.	Chr	Peak Bin	Peak LOD	Left Bin	Right Bin	Left (cM)	Right (cM)	PVE (%)	Add	Dom	Gene action
CD	*qCD2*	E1	2	Bin2_519	3.56	Bin2_482	Bin2_527	88.45	93.92	4.64	-0.37	0.31	D
		E4	2	Bin2_519	3.81	Bin2_507	Bin2_522	91.46	93.58				
		C	2	Bin2_512	4.86	Bin2_482	Bin2_522	88.45	93.58				
ED	*qED1*	E4	1	Bin1_2641	3.87	Bin1_2558	Bin1_2660	359.86	376.20	1.61	-2.63	-0.28	A
		C	1	Bin1_2641	3.56	Bin1_2637	Bin1_2647	372.20	374.63				
EW	*qEW1*	E4	1	Bin1_2645	4.21	Bin1_2637	Bin1_2664	372.20	376.74	1.61	-2.63	-2.29	D
		C	1	Bin1_2641	3.56	Bin1_2637	Bin1_2647	372.20	374.63				
	qEW7	E1	7	Bin7_105	4.48	Bin7_86	Bin7_117	24.73	33.12	0.02	-0.42	6.05	OD
		C	7	Bin7_83	3.00	Bin7_71	Bin7_94	19.32	28.10				
GW	*qGW10*	E2	10	Bin10_38	4.03	Bin10_30	Bin10_43	10.25	19.14	2.16	2.54	-3.96	OD
		C	10	Bin10_50	3.74	Bin10_42	Bin10_53	16.12	23.23				
HKW	*qHKW1*	E3	1	Bin1_641	4.16	Bin1_638	Bin1_658	109.80	112.72	0.19	-0.10	0.72	OD
		C	1	Bin1_641	6.83	Bin1_631	Bin1_644	109.50	110.95				
	qHKW2b	E3	2	Bin2_542	4.19	Bin2_513	Bin2_547	92.49	96.84	1.22	0.29	0.92	OD
		E4	2	Bin2_542	5.00	Bin2_528	Bin2_548	94.17	97.58				
		C	2	Bin2_542	5.05	Bin2_526	Bin2_548	93.82	97.58				
	qHKW6	E1	6	Bin6_171	4.50	Bin6_125	Bin6_242	24.00	31.45	0.25	0.22	0.83	OD
		C	6	Bin6_171	3.49	Bin6_125	Bin6_279	24.00	34.27				
	qHKW7	E2	7	Bin7_1147	4.93	Bin7_1135	Bin7_1159	190.56	196.65	3.09	-0.51	0.56	D
		C	7	Bin7_1152	4.73	Bin7_1135	Bin7_1172	190.56	199.37				
KL	*qKL8*	E1	8	Bin8_1307	4.11	Bin8_1281	Bin8_1329	209.02	217.36	6.45	0.18	-0.13	PD
		E2	8	Bin8_1314	3.43	Bin8_1281	Bin8_1347	209.02	220.73				

Appendix G (Continued on preceding page)

Traits	QTL	Env	Chr	Peak Bin	Peak LOD	Left Bin	Right Bin	Left (cM)	Right (cM)	PVE (%)	Add	Dom	Gene action
		C	8	Bin8_1331	4.64	Bin8_1306	Bin8_1336	215.29	218.54				
KNPR	*qKNPR7*	E1	7	Bin7_603	3.62	Bin7_577	Bin7_633	83.69	91.22	3.76	0.63	0.46	PD
		E2	7	Bin7_646	3.24	Bin7_630	Bin7_665	90.18	97.79				
		C	7	Bin7_578	3.31	Bin7_541	Bin7_621	78.91	89.20				
	qKNPR9	E2	9	Bin9_62	3.34	Bin9_45	Bin9_75	12.56	21.27	0.04	0.07	1.12	OD
		C	9	Bin9_46	4.38	Bin9_36	Bin9_52	10.34	15.05				
RN	*qRN7*	E1	7	Bin7_911	4.11	Bin7_890	Bin7_936	137.42	145.18	0.13	0.09	-0.28	OD
		C	7	Bin7_1144	3.36	Bin7_1135	Bin7_1153	190.56	194.96				
	qRN10	E1	10	Bin10_861	3.72	Bin10_856	Bin10_871	126.08	132.94	4.13	0.27	0.04	A
		C	10	Bin10_880	3.37	Bin10_856	Bin10_889	126.08	136.89				
TKT	*qTKT1*	E4	1	Bin1_18	6.90	Bin1_9	Bin1_28	0.54	7.00	0.98	-0.28	-0.66	OD
		C	1	Bin1_27	6.54	Bin1_20	Bin1_29	3.87	7.29				
	qTKT3a	E4	3	Bin3_1264	7.67	Bin3_1257	Bin3_1277	166.58	169.53	5.69	-0.64	0.21	PD
		C	3	Bin3_1264	5.21	Bin3_1238	Bin3_1278	160.95	170.48				
	qTKT3b	E3	3	Bin3_1872	3.13	Bin3_1859	Bin3_1896	273.53	282.62	2.86	0.38	0.34	D
		C	3	Bin3_1863	3.28	Bin3_1838	Bin3_1896	267.92	282.62				
	qTKT4a	E1	4	Bin4_12	3.77	Bin4_1	Bin4_26	0.00	5.68	6.79	-0.68	0.32	PD
		C	4	Bin4_13	5.97	Bin4_6	Bin4_26	0.19	5.68				
	qTKT4b	E1	4	Bin4_1361	3.65	Bin4_1335	Bin4_1396	171.26	174.87	0.69	-0.25	-0.22	D
		C	4	Bin4_1365	3.62	Bin4_1345	Bin4_1406	171.31	175.26				