

Supplemental Table S1: The mean and ranges of progeny length/width (LW) of the parental and F1 population from 2014 to 2017.

Year	Male parent	Female parent	Population mean	Range of individual values
2014	0.91	2.04	1.27	0.62-2.62
2015	0.99	1.94	1.23	0.72-2.42
2016	1	1.95	1.28	0.72-2.58
2017	1	1.84	1.25	0.72-2.36

Supplemental Table S2: LW values of population I

Materials number	LW	Description
S400 (male parent)	1.01	round
S497 (female parent)	1.77	oval
S400497-60	0.75	compressed
S400497-64	0.78	compressed
S400497-20	0.91	round
S400497-89	0.94	round
S400497-83	1.00	round
S400497-66	1.01	round
S400497-45	1.02	round
S400497-90	1.02	round
S400497-47	1.05	round
S400497-56	1.06	round
S400497-30	1.07	round
S400497-50	1.08	round
S400497-1	1.09	round
S400497-73	1.10	round
S400497-32	1.11	round
S400497-7	1.13	round
S400497-49	1.14	round
S400497-34	1.15	round
S400497-55	1.17	round
S400497-68	1.18	round
S400497-82	1.20	round
S400497-11	1.25	round-oval
S400497-19	1.28	round-oval
S400497-63	1.31	round-oval
S400497-33	1.32	round-oval
S400497-84	1.32	round-oval
S400497-24	1.34	round-oval
S400497-74	1.36	round-oval
S400497-67	1.37	round-oval
S400497-61	1.42	round-oval
S400497-9	1.45	round-oval
S400497-23	1.48	round-oval
S400497-59	1.51	round-oval
S400497-72	1.55	round-oval

Materials number	LW	Description
S400497-26	1.57	round-oval
S400497-85	1.57	round-oval
S400497-76	1.58	round-oval
S400497-46	1.61	oval
S400497-88	1.64	oval
S400497-22	1.67	oval
S400497-3	1.67	oval
S400497-41	1.74	oval
S400497-97	1.74	oval
S400497-59	1.75	oval
S400497-2	1.78	oval
S400497-57	1.79	oval
S400497-71	1.80	oval
S400497-78	1.80	oval
S400497-79	1.85	oval
S400497-4	1.88	oval
S400497-48	1.96	oval
S400497-13	1.97	oval
S400497-25	2.01	long-oval
S400497-43	2.02	long-oval
S400497-29	2.07	long-oval
S400497-92	2.24	long-oval
S400497-81	2.31	long-oval
S400497-70	2.34	long-oval
S400497-58	2.37	long-oval
S400497-51	2.39	long-oval
S400497-28	2.41	long
S400497-86	2.45	long
S400497-75	2.66	long
S400497-21	2.89	long

Supplemental Table S3: LW values of population II

Materials number	LW	Description
S4 (inbred parent)	1.79	oval
S4-112	1.67	oval
S4-66	1.70	oval
S4-149	1.73	oval
S4-21	1.76	oval
S4-4	1.78	oval
S4-110	1.83	oval
S4-147	1.85	oval
S4-48	1.87	oval
S4-155	1.89	oval
S4-76	1.90	oval
S4-108	1.90	oval
S4-7	1.92	oval

Materials number	LW	Description
S4-1	1.93	oval
S4-191	1.93	oval
S4-107	1.93	oval
S4-168	1.96	oval
S4-39	1.97	oval
S4-63	1.99	oval
S4-12	2.00	oval
S4-167	2.00	oval
S4-148	2.02	long-oval
S4-27	2.03	long-oval
S4-178	2.05	long-oval
S4-171	2.08	long-oval
S4-109	2.09	long-oval
S4-195	2.09	long-oval
S4-182	2.09	long-oval
S4-115	2.10	long-oval
S4-187	2.10	long-oval
S4-75	2.14	long-oval
S4-119	2.14	long-oval
S4-16	2.14	long-oval
S4-196	2.15	long-oval
S4-8	2.15	long-oval
S4-98	2.16	long-oval
S4-77	2.16	long-oval
S4-26	2.17	long-oval
S4-9	2.21	long-oval
S4-170	2.24	long-oval
S4-142	2.28	long-oval
S4-154	2.30	long-oval
S4-17	2.30	long-oval
S4-133	2.30	long-oval
S4-6	2.32	long-oval
S4-73	2.35	long-oval
S4-176	2.36	long-oval
S4-161	2.38	long-oval
S4-192	2.39	long-oval
S4-151	2.39	long-oval
S4-163	2.43	long
S4-129	2.46	long
S4-69	2.47	long
S4-70	2.51	long
S4-136	2.55	long
S4-55	2.56	long
S4-183	2.63	long
S4-68	2.69	long
S4-101	2.77	long
S4-162	2.77	long

Materials number	LW	Description
S4-127	2.78	long
S4-88	2.85	long
S4-3	2.89	long
S4-93	2.89	long
S4-175	3.03	long
S4-57	3.05	long
S4-121	3.16	long
S4-125	3.17	long
S4-116	3.21	long
S4-47	3.21	long
S4-152	3.29	long
S4-139	3.32	long
S4-96	3.42	long
S4-53	3.82	long
S4-145	3.86	long
S4-124	3.98	long
S4-89	4.03	long
S4-156	4.40	long
S4-64	4.57	long
S4-80	5.08	long
S4-84	6.28	long

Supplemental Table S4: Primers for qRT-PCR

Number	Gene ID	Primer Name	Primer
1	Soltu.DM.12G026390.1	Glucose-1-F	ACTTCTCGTACTCCGAAACGG
		Glucose-1-R	AACCAATCCCCCTTAGCCGTG
2	Soltu.DM.07G027830.1	Glucose-2-F	TCAGTGGCGTACAACACCAT
		Glucose-2-R	GTGCTGCTCCGTGGTATTCA
3	Soltu.DM.07G003310.1	Glucose-3-F	CATCACGGAGGCGATAAGGG
		Glucose-3-R	GACTTTCGAGTCCGGCTTCA
4	Soltu.DM.12G000940.1	Glucose-4-F	TCTTGCTCCTTCCATCGGGT
		Glucose-4-R	CAACGCCTGTCTCATCTGCT
5	Soltu.DM.04G027260.1	ABA-1-F	ACATCACCGTTTGTTCACC
		ABA-1-R	TTGCTTGTGCTTCTCATGC
6	Soltu.DM.06G010300.2	ABA-2-F	CGCCGATTCGATAACCCACA
		ABA-2-R	CGGAAGTCCCGATAACAACCA
7	Soltu.DM.02G017330.1	IAA-1-F	TGGTCCCAGCCCTGATAAAG
		IAA-1-R	TTGTCGGCATCGACAGAGAC
8	Soltu.DM.03G001970.1	IAA-2-F	GGAGCAAGCAAGAGCTACCA
		IAA-2-R	GGATTGAACACGCTCCTCCA
9	Soltu.DM.09G025690.1	IAA-3-F	TGAGCTGAGGTTAGGTTTGCC
		IAA-3-R	GGCAACAGGTGGGGTTTTGA
10	Soltu.DM.01G032750.1	GA--1-F	GAGGCATGTCGAAAGCATGG
		GA-1-R	ACAAGGGGCTTCCCAAAGAA
11	Soltu.DM.02G023870.1	GA--2-F	GAGGTGCAGCAAATCGTCTC
		GA-2-R	AGCAAGGGCATGCTTCGTAA

12	Soltu.DM.02G013470.1	GA--3-F GA-3-R	AGTCCCACCTGATCCCTACTC TGGCCCTCCAAAGTAAACCA
13	Soltu.DM.10G018490.1	490qPCR-F 490qPCR-R	AATGGAACCTTTGCGAAACTGGC TTGGTGATGAGCTTCTGTATG
14	Soltu.DM.10G018500.1	500qPCR-F 500qPCR-R	GACGGAGGTGAAGAGTATGGAG ATGTGGTGGAAGTCTGAAATG
15	Soltu.DM.10G018530.1	530-RLK-qPCR-F 530-RLK-qPCR-R	GCCATGCCATGTTGACTGAT AAAGGAGGCTTGCCCGTGAG
16	Soltu.DM.10G018560.1	560-WRKY-qPCR-F 560-WRKY-qPCR-R	TCTCCGAATTTATTCTACCC CTGATGACAATGCTGCTCTA
17	Soltu.DM.10G018550.1	550-AAase-qPCR-F 550-AAase-qPCR-R	AAGCCACCACGACATACAAA TTGCCACTCATCCAGTTCTTC
18	Soltu.DM.10G018580.1	580-lung-qPCR-F 581-lung-qPCR-R	TTTCAATGGGTTATGGTGTC TTTCAATGGGTTATGGTGTC
19	Soltu.DM.10G018610.1	610-EF-P-qPCR-F 610-EF-P-qPCR-R	CAGGGAACAGCGTTGAGAAA TGAAGACATACTGGGCACCA
20	Soltu.DM.10G018650.1	650-Kinase-qPCR-F 650-Kinase-qPCR-R	GTAACAACGAGTAGGGCACG GAGGCTGAGGAAGTATGAC
21	Soltu.DM.10G018840.1	840-nsLTP-qPCR-F 840-nsLTP-qPCR-R	AGGCATTAAGTTGTGGTCAA TCGATCCGCGGTAGTCTTGGCTGA

Supplemental Table S5: Information of the markers used in this study

	Name	Primer sequence	Product size (bp)	Tm (°C)	Restriction enzyme
1	SCAR10-134	CTTGGAGACGAGTTATGAACG AAAGAGAGAAAGGGGTGGC	530	55	
2	SCAR24S1	TGAGGTCAAATAGAACATAATGATA ATCTAATAACTGTATGTTTATATAGATATCAA	620	52	
3	13F-SCAR	CGAACCATCTCCTATTCCG CGTTGAAGAAGACGACAAAG	330	55	
4	PA28-dCAPS	ATTACCAACGTCAACCTCTGA GAGTCTGGAACCTAAATAATGAAA	500	55	AflIII
5	336-CAPS	TTGAACACGTAGTCCACTGCCACT TTATGCGCTACTCGCGGGTAAACT	900	61	SspI
6	1137-CAPS	ATGGTTGACACCCTCTCCATGTGT AGTGGCCAGTAAATGGCTCCCATA	908	60	PvuII
7	1137-CAPSIII	GGCGTTCATATGGAACACTAGGTC GATCCTACCAGTACACTGTGGTTG	928	61	BsaBI
8	1137-CAPSIV	CAAACCCAAGACCTCCTTATC ACCAACAAACTCCAGTCTTC	727	60	FokI

	Name	Primer sequence	Product size (bp)	Tm (°C)	Restriction enzyme
9	1137-CAPSVI	GTGTCTCCTGTGAGAGATTTG TATAGATTGGAATGCGAGAACC	806	60	AflIII
10	1874-CAPS	GGCAAAGAGCAGTTGGTTCCCATTT TCGTAATTGGTGGCATCACGAGGA	833	60	BstYI
11	1137CAPS II	AGTTCTCATGGTGGGCCTTTCAGA TATGTAGCCTGAGCTGTGTTGCCT	773	61	AflIII
12	8-CAPS	TCAAGGTCGACGCAACTCAAGTCT ACCAAGCTAGCTGGAACCTTCGGA	800	60	SpeI
13	Eyd4	GGTGAACCTCTCTCAATTC CCTAATATAGCTGATTCCTTGTTC	574	55	BsaXI
14	Eyd15	GCTCCTTGAGTATTGTCCTATCAGC CAGTCCACCGTACATGAAGCTATAC	632	60	BsaXI
15	Eyd17	GTGATGTACGCGAACTTTAC CAAGACATCTCATTCGTTGG	586	60	BsaXI
16	Eyd41	CGAGTAGTCACATTGAAAG CTAATAGCATGTGACCTAGTATGC	485	55	BsaXI
17	Eyd42	GACATCTTGTCAATCAACACTTCAC CAACACATGTTGACCATGTAAGGG	771	55	BsaXI
18	Eyd49	GTACACCCCTACACAATAGAGTG ACCTCTTACATCTCCTCACTTGGG	706	55	BsaXI
19	LRo82	TAGGTTGTTAATATGTGCCCAAAA AAAAGAAAACCTGAGCGCATCG	172	55	