

Table S1. Phenotypic variation for the total soluble sugar (TSS) in two years.

Trait	Year	Max	Min	Mean	Median	Range	SD	CV
TSS	2019	13.62	0.76	5.68	5.10	12.86	3.23	56.8
	2020	13.99	0.58	5.71	5.14	13.41	3.25	56.9

TSS, the total soluble sugar; Max, maximum; Min, minimum; SD, standard deviation; CV, coefficient variations.

Table S2. Candidate genes on Chromosome.06.

Gene ID	Strat (bp)	Stop (bp)	Sequence size (bp)	Annotation
Glyma.06g146400	11943415	11949660	6245	disproportionating enzyme
Glyma.06g146500	11950838	11952275	1437	SKP1 interacting partner 6
Glyma.06g146600	11952842	11954841	1999	shikimate kinase 1
Glyma.06g146700	11959117	11966238	7121	GTP-binding protein-related
Glyma.06g146800	11967059	11970246	3187	Sorbin/SH3 domain protein
Glyma.06g146900	11976434	11981407	4973	general control non-repressible 5
Glyma.06g147000	11982014	11985343	3329	programmed cell death 2 C-terminal domain-containing protein
Glyma.06g147100	11987432	11990961	3529	Sorbin/SH3 domain protein
Glyma.06g147200	12001359	12002138	779	/
Glyma.06g147300	12005208	12007509	2301	O-Glycosyl hydrolases family 17 protein
Glyma.06g147400	12008717	12012895	4178	Tetratricopeptide repeat (TPR)-like superfamily protein
Glyma.06g147500	12032628	12036170	3542	WRKY DNA-binding protein 13
Glyma.06g147600	12052122	12056526	4404	Leucine-rich receptor-like protein kinase family protein
Glyma.06g147700	12068339	12068644	305	
Glyma.06g147800	12070691	12076927	6236	Nucleotide-sugar transporter family protein
Glyma.06g147900	12081868	12087436	5568	Protein kinase superfamily protein
Glyma.06g148000	12089141	12089765	624	Protein of unknown function (DUF3511)
Glyma.06g148100	12098930	12100315	1385	/
Glyma.06g148200	12108718	12109284	566	/
Glyma.06g148300	12113168	12118836	5668	26S proteasome regulatory subunit, putative (RPN5)
Glyma.06g148400	12120448	12122659	2211	Integrase-type DNA-binding superfamily protein
Glyma.06g148500	12136375	12141342	4967	ribonucleotide reductase 1
Glyma.06g148600	12143950	12148364	4414	like COV 2
Glyma.06g148700	12149262	12156679	7417	Splicing factor, CC1-like
Glyma.06g148800	12157484	12161057	3573	Alba DNA/RNA-binding protein
Glyma.06g148900	12161540	12162106	566	/

Table S3. Candidate genes on Chromosome.15.

Gene ID	Strat (bp)	Stop (bp)	Sequence size (bp)	Annotation
Glyma.15g133500	10727488	10735828	8340	Protein of unknown function (DUF185)
Glyma.15g133600	10739290	10743519	4229	Glycosyl hydrolases family 31 protein
Glyma.15g133700	10744186	10748830	4644	Glycosyl hydrolases family 31 protein
Glyma.15g133800	10754838	10756823	1985	Glycosyl hydrolases family 31 protein
Glyma.15g133900	10760416	10762557	2141	FAD-binding Berberine family protein
Glyma.15g134000	10766247	10768012	1765	HAD superfamily, subfamily IIIB acid phosphatase
Glyma.15g134100	10768837	10769589	752	myb domain protein 305
Glyma.15g134200	10772015	10773640	1625	FAD-binding Berberine family protein
Glyma.15g134300	10777151	10779066	1915	FAD-binding Berberine family protein
Glyma.15g134400	10795047	10797469	2422	Sec14p-like phosphatidylinositol transfer family protein
Glyma.15g134500	10803856	10817438	13582	toprim domain-containing protein
Glyma.15g134600	10819933	10823069	3136	cytomatrix protein-related
Glyma.15g134700	10827685	10828142	457	Protein with RING/U-box and TRAF-like domains
Glyma.15g134800	10831146	10833232	2086	Ribosomal protein L12/ ATP-dependent Clp protease
Glyma.15g134900	10834904	10838273	3369	adaptor protein ClpS family protein
Glyma.15g135000	10842068	10842582	514	Major facilitator superfamily protein
Glyma.15g135100	10845919	10851256	5337	polymerase delta 4
Glyma.15g135200	10854612	10861709	7097	telomere repeat binding factor 1
Glyma.15g135300	10886957	10888185	1228	ent-kaurenoic acid hydroxylase 2
Glyma.15g135400	10891692	10894920	3228	Ubiquitin carboxyl-terminal hydrolase family protein
Glyma.15g135500	10899550	10905335	5785	annexin 8
Glyma.15g135600	10921330	10925581	4251	NAD(P)-binding Rossmann-fold superfamily protein
Glyma.15g135700	10946064	10948465	2401	WRKY DNA-binding protein 14
Glyma.15g135800	10949697	10959522	9825	acyl-activating enzyme 7
Glyma.15g135900	10962970	10969792	6822	cell division control 2
				hydroxyproline-rich glycoprotein family protein

Table S4. The expression levels of candidate genes in NPS004, NPS251, NPS040 and NPS096.

Gene ID	Low TSS content		High TSS content	
	NPS004	NPS251	NPS040	NPS096
Glyma.06g146500	4.82	8.92	13.61	10.34
Glyma.06g147600	12.05	20.19	28.61	27.74
Glyma.06g148300	5.78	7.87	3.33	4.82
Glyma.06g148600	10.84	16.26	8.33	8.62
Glyma.06g148700	6.75	8.13	3.89	6.2
Glyma.06g148800	21.69	9.44	32.63	29.64
Glyma.06g148900	1.2	0.52	2.92	1.9
Glyma.15g133700	4.58	4.2	1.11	1.72
Glyma.15g134400	2.89	2.1	1.11	1.38
Glyma.15g135100	10.12	11.54	13.47	12.06
Glyma.15g135200	10.12	15.21	9.17	6.55

Table S5. The expression levels of candidate genes in14,21 and 28 DAF.

Gene ID	14 DAF				21 DAF				28 DAF			
	I	II	III	Mean	I	II	III	Mean	I	II	III	Mean
Glyma.06g146500	20.93	23.14	16.55	20.2	20.71	20.36	11.93	17.67	13.22	12.95	10.95	12.38
Glyma.06g147600	22.92	15.74	11.25	16.64	15.01	19.67	16.48	17.05	14.43	9.71	14.74	12.96
Glyma.06g148300	17.94	12.5	10.92	13.78	6.99	8.97	8.52	8.16	6.01	8.09	4.63	6.25
Glyma.06g148600	37.86	28.69	23.83	30.13	18.64	31.4	20.46	23.5	13.46	10.52	17.69	13.89
Glyma.06g148700	20.93	16.2	14.56	17.23	9.84	20.53	3.98	11.45	7.23	10.52	5.48	7.74
Glyma.06g148800	22.42	22.68	25.49	23.53	24.59	20.53	12.5	19.21	18.03	23.47	11.79	17.77
Glyma.06g148900	8.97	2.31	4.63	5.31	3.36	2.76	3.98	3.37	4.81	3.27	2.11	3.4
Glyma.15g133700	37.37	42.58	41.28	40.41	6.47	8.28	5.4	6.72	3.48	3.64	2.95	3.36
Glyma.15g134400	87.47	87.38	87.4	87.42	9.83	8.98	5.68	8.16	4.03	4.45	3.94	4.14
Glyma.15g135100	22.92	20.36	21	21.43	18.23	20.53	16.48	18.41	15.25	13.76	16.85	15.29
Glyma.15g135200	2.49	5.96	5.09	4.51	8.82	9.32	8.28	8.81	10.17	9.71	12.64	10.84