Mutation in xyloglucan 6-xylosytransferase results in abnormal root hair development in Oryza sativa. Chuang Wang, Shuai Li, Sophia Ng, Baocai Zhang, Yihua Zhou, James Whelan, Ping Wu, and Huixia Shou

SUPPLEMENTARY DATA



Supplementary Figure S1. Growth performance of srh2 mutant and wild type (cv Kasalath, *kas*) plants. The seedlings were growth at nutrient solution (pH 5.5) for seven days and examined under an electron microscope examination.



Supplementary Figure S2. Confirmation the single nucleotide mutation of srh2 by dCAPS marker. A, The PCR fragment of WT contained three Nco I site while mutation of srh2 eliminate one Nco I site (red colour). B, Electrophoresis of Nco I digeted PCR product. The red arrows indicated specific digested fragment of wild type and mutant samples.

0	*	20 *	4.0	*	60	* 90	*	100
n+vvm1	. MIEKCICA	20 "	40			TROUTCROWECERD	PRETERIORUPEN	IUU MDKDCDDU 69
ALAATI	MIERCIGA		nki	TREQUENT	GRVIILCLVLIVIV	INGIIGAGAFGIP-	ENDIEEIREHFFI	NDKDCDDU 67
ATXXT2	:MIERCLGA-		YR(RKIQKALK	TRAILTCTTTLAA	RSTIGAGKFGTP-	EQULDEIRQH-FF	ARKRGEPH 67
OSXXTI	MWVAERVVGE-		KRI	MREIQRFAR	AKLIVVCLLLIVVV	RGTVGAGKFGTP-	QQDLIELKHK-FI	ISHPH 65
OSGTZ	:MGQEGMGYNNGKGGGGG	GGGLPMTAPRPRG	ASPLSSHGHHHR	SRKIHRTEN.	VKLTVLCGLVTILV	RGTIGLNLSLPI	NQPTDADALAG	-AKAVEDID 97
OSGT3	GGG	RP	AVRQQAAR	PROMORIEN	VKLILICGELILLIV	RGIVGINLLIYGV	GGGGGSDAVAAAEE	-ARVVEDIE //
AtG14	:MFQDGSRSSGS	-GRGLSTTAVSNG	GWR-TRG-FLRGV	NĞTÖNTTEN	IKEWITCCEALITI	LGTIRVGNLGSS-	NADSVNQS	FIKETI 84
AtXXT5	:MGQDGSPAHKRPSGS	-GGGLPTTTLTNG	GGRGGRGGLLPR	GRQMQKTFN:	NIKITILCGEVTILV	RGTIGVGNLGSS-	SADAVNQN	IIEETN 90
AtGT3	:MGKEDGFRTQKRVSTAS	SAAAGVLPTTMAS	GGVR-RPPPR	GRQIQKTFN	VKMTILCGFVTILV	RGTIGI-NFGTS-	DADVVNQN	IIEETN 89
OsGT4	:MSKLQDRHGGEAAADVG	RR	ARH(QRLLLSFPV	FPIVLILLAPOIIFF	FTSGDVPLP	RIRIEYARRD	APTI 69
OsGT5	:MEKHGGKVTSDRRAGRR		QHG(RCSASDAA	ELVVVVILIVAALFI	ILGPTGSSSFTVP	RIRVVFN	EPVH 68
AtGT6	:MG-		KPGGAI	KTRTAVCLS	GVFFLAGAFMSLTL	WSYFSI		FSPSF 43
AtGT7	:MVSPETSSSHYQSSPMA		KYAGTI	RTRPVVCIS.	VVIFIGGAFMSLIL	WSFFSFSS		ISPNL 60
OSGT6	MAASETAPFGVSAASKG	66	GVAGARAQHG	JLAVAGRVH.	ALVFAAGAVAAVLV	ILATASPLSPMPV-	TNLV	AFRSLEVS /8
OSGT/	MRATTGARHLHPPWRRG		LKHHKQSTMPI	PRASKGRLA	AAI FTAGAVI GSVI	LTLASPIS		60
	* 120	*	140	*	160 *	190	* 200	*
a+vvm1	• DTT 17 DT/ CS		CCNOVETEDIN	WI PUDPCD	PERCEDET NRE		POWER NEWA-E	
AUAATI A+VVm2	· PULERIONCC	DESEDGGN	CCCNNVETEDII	WALFVDEGD	EERONDRINNPISIG	DWISDWERON	RDAT AVADORDNETC-I	
OeVVT1	· PATARUUD	N.SBCCCS	SGGSNNIEIFDII SGG-SSCRADOR	DDEGE		P KISDNDEQN	ANUPPUPPT DEVN_T	WEDRVIII V133
OPGT2	• RTT RETRS		ACDLACSE		AAAAVASAVERVALC		REAL BONSCEPSTUA-C	CKPRTLTV181
OSGT3	· RTTRETRS		FFPLGVDASTTT	TTNSTTTA	TAARRESSNHTYTTG	PKVII RWN AKRI	ROWLSENEGEPSEDA-E	GKPRITTY165
AtGT4	PTTARTPS	DSHSTDLAEP	PKADPRTAETPSI	SHLTDLLE	PERADISENATYTIG	PKTUNWDSOR	XVWINONBEFENTVN	GKARTITT171
A+XXT5	BTTAFTRS	DSDPTDLDEP	0		FODMNENATYVIG	PKTUDWDSOB	KVWINONBEERSTVN	GKARTITI 155
AtGT3	:RUTAEIRS	DSDPTDSNEP	• P		DSDLDLNMTYTIG	PKUUNWDOKR	KLWI TONEDFRSFIN	GRAKVILL 154
OsGT4	: TAWAADTSPPPPSPPSS	SPPPLSFPPPPPP	- PSSPPPPALPVVI	DDHSDTORS:	LRRLROLTESPYTTG	PAVII GYDARR	AEWI RDHTEFPASVG-F	GRPRVLMV169
OsGT5	:VAVAA	PPPPPP	PAQMQAGAN	ASSEEDSG	LPPPROLT	RTILGYDARB	SAWIAAHPEFPARVAPA	GRPRVLVV146
AtGT6	:TSLRHDGKPV	QCSGLDMOFD	P	S	EPGFYDDPDLSYSTE	KPIIKWDEKB	NOWFESHESFKPG	SENRIVMV111
AtGT7	TVKNEESSNK	CSSGIDMSOD	- P	T	DPVYYDDPDLTYTIE	KPVKNWDEKR	RRWINLHESFIPG	AENRTVMV128
OsGT6	:VASTSAASAA	IDADVGVRGG	PG	AA	GRTFYDDSRVSYAVE	VGRRGGI	AAWNRLRYPRGLNATAA	GRERVVMV156
OsGT7	:-SSSSPSSGV	GSGEVDRLGG		(GRTFYDDPGVAYIID	RPIVGWDEKR	AEWIRAHEELAGO	GGERVLMV125
	-							
	220	* 240	*	260	*	280 *	300	*
AtXXT1	: TGSAFKPCENPVGDHYL	LK <mark>SIKNKIDY</mark> CRI	H GIEIF YNMAL <mark>L</mark> I	DAE <mark>M</mark> AG FW AI	KLPLIRKI <mark>LI</mark> SHPDI	EFLWWMDSDAMFTD	MVFELPWERYKDYNLVM	1H <mark>GW</mark> NEMVY259
AtXXT2	: TGSAFKPCENPVGDHYL	LK <mark>SIKNKIDY</mark> CRL	H GIEIF YNMAL <mark>L</mark> I	DAE <mark>M</mark> AG FW AI	KLPLIRKI <mark>LI</mark> SHPEI	EFLWWMDSDAMFTD	M <mark>AFELPWERY</mark> KDYNLVM	1HGWNEMVY260
OsXXT1	:TGSSPKPCENPVGDHYL	LKSIKNKMDYCRV	H <mark>GLEI</mark> FYNMAL <mark>L</mark> I	DAEMAGEWA	KLPL <mark>LR</mark> AL <mark>LL</mark> AHPDI	EFLWWMDSDAMFSDI	M <mark>AFELP</mark> WERY <mark>GPY</mark> NLIM	1H <mark>GW</mark> DEMVY249
OsGT2	: TGSQFGPCDNPLGDHYL	lk <mark>tt</mark> knkidycri	H <mark>GIEI</mark> VHNLAH <mark>L</mark> I	DTELACYWA	KLPL <mark>LR</mark> RLMLS <mark>HP</mark> DV	EWIWWMDSDALFTD	MAFELPLSRYQDRNLII	H <mark>GY</mark> QDLLF286
OsGT3	: TGSQFAPCDDAAGDHYL	lk <mark>at</mark> knkidycri	H <mark>GIEI</mark> VHSMAH <mark>I</mark> I	DRELACYWA	KLPL <mark>LR</mark> RLMLS <mark>HP</mark> DV	EWVWWMDSDALFTD	MAFEL PLARYDTSNLVI	HGYPELLE270
AtGT4	: TGSSEGECDKPIGNYYL	lk <mark>avknkidy</mark> cri	HGIEIVYNMANLI	DEELSGYWT	KLPMIRTIMIS <mark>HP</mark> EV	EWIWWMDSDALFTD:	ILFEIPLPRYENHNLVI	HGYPDLLF276
AtXXT5	: TGSPEKECDNEIGDHYL	lksv <mark>knkidy</mark> cri	HGIEIVYNMAH <mark>I</mark> I	DKETAGYWA	KLPMIRRIMIS <mark>HP</mark> DV	EWIWWMDSDALFTD	ILEQIELARYQKHNIVI	HGYPDLLF260
AtGT3	: TGSPEKECDNPIGDHYL	lksv <mark>knkidy</mark> cri	HGIEIVYNMAH <mark>I</mark> I	DKELAGYWA	KLPMIRRIMIS <mark>HP</mark> DI	EWIWWMDSDALFTD	MVFEIPLSRYENHNIVI	HGYPDLLF259
OsGT4	: TGSAERRCKDEEGDHLL	LRAI KNKVDYCRV	HGFDIFYSNTVII	DAEMSGEWT	KLPLLRAIMDAHPDT	BLLWWVDSDWVFTD	MLFEPPWGRYRRHNIVI	HGWDGAVY274
OsGT5	: TGSAEARC PDEDGDELT	LRAFKNKVDYCRI	HCILDVFYNTAFILI	DAEMSGEWA	KLPLLRMIMWAHPDA	BI IWWVDSDAVFTDI	MIFEIPWERYAVHNIVI	HGWEAKVF251
AtGT6	: TGSQSSPCKNPIGDHLI	I RCFKNKVDYARI	HCHDIFYSNSLIP	HPKMNSYWA	KL PVVKAAMLAH PDA	EWIWWVDSDAIFTD	MEEKPELHRYRQHNLW	HGWPNIIY216
AtGT7	: TGSQSAPCKNEIGDHLI	RFFKNKVDYCRI	HGHDIFYSNALII	HPKMNSYWA	KLEAVKAAMIAH EDA	EWIWWVDSDALFTD	MDFTFFWRRYKEHNIV	HGWPGVIY233
OsGT6	:SGSQAPPCRGEGGDHLL	FRFIKNKVDYCRL	HGVELLYNNALL(PRNLAYWA	KI PAVRAAMI AHPDA	EWVWWVDADAVFTD	MDESI PLHKYKDHNI VV	YGWNKEVY261
OsGT7	SCSQEEECGSEACDSLI	IRLIKNKLDYCRI	NGVQLLYNTALLI	RPSMDRYWA	KIPVVR <mark>AAMV</mark> AHPDA	EWVWWVDSDAV <mark>I</mark> IDI	DERIELS <u>Ry</u> rdhn fwa	HEGW PHILVY 230
							G to R	
	320 *	340	*	360	* 390	*	400 🗸 *	420
AtXXT1	: DOKNOT GINTESET IRN	SOWSTITTTAWAP	MGEKGKTREEA		RPARFADDOSAMVYL	TATEREKWGGKVYT	SGYTEGYNGTUDRY	EEMTENHK364
AtXXT2	DOWNWIGTNTGSFLIRN	NOWATIDITID	MGPKGKTREEAG	XVI.TREI KD	REVERADDOSAMVYL	TATORDAWGNKVYL	SGYYTHGYWGTUVDRY	EEMTENYH365
OSXXT1	DOWNWIGTNTCSFTTRN	COWSTIDETDTWAP	MGEKGEVRTEAG	XYLTKYT KD	REVERADDOSAMVYT	TATEREKWODKVYL	NGYYTHGYWGTUVDRY	EENLENYH354
OsGT2	: EKHSWIALNTCSELERN	COWSIDIIDAWAR	MGEKGFIRDEACH	TLTANTKG	REAFEADDOSALIYL	ILSOKEKWMNKVEI	NSYYLHGEWAGLVDKY	EENMPNHH391
OsGT3	:AKRSWIALNTGSFLIRN	COWSIELLDAWAP	MGEKGRVRDEA <mark>G</mark> H	VITASITG	RPAFEADDOSALIHI	LLTOKERWMEKVYV	DKYFLHGFWAGLVDKY	EENMORHH375
AtGT4	:NOKSWVALNTGIFLLRN	COWSIDLIDAWAP	MGPKGKIRDET <mark>G</mark> H	TILTAYLKG	RPAFEADDOSALIYL	LLSOKEKWIEKVYV	NOYYLHGFWEGLVDRY	EENIPKYH381
AtXXT5	: DOKSWIALNTCSFLLRN	C <mark>QWSIDLID</mark> AWAP	MGEKGPIRDEA <mark>G</mark> H	K <mark>VLTAY</mark> LK <mark>G</mark>	RPAFEADDQSALIYL	LLSOKDTWMEKVFV	NOYYLH GFW<mark>EG</mark>LVDRY	EEMIEKYH365
AtGT3	: DOKSWIALNTCSFLFRN	CQWSIDL <mark>ID</mark> AWAF	MGEKGPIREEA <mark>C</mark> H	K <mark>ILTAN</mark> IKG	RPAFEADDQSALIYL	LLSOKETWMEKVFV	NQYYLH GFW<mark>EG</mark>LVDKY	EEMMEKYH364
OsGT4	: GAKTWIGINAGSFIIRN	C <mark>QWSLDLLD</mark> AWAP	MGE PG PVRDMY <mark>C</mark> I	TFAETITN	RPPY <mark>E</mark> ADDQSALVFL	LVTQRHRWGAKVFL	<mark>NSYNLHGFW</mark> AD <mark>I</mark> VDRY	EEMRRQWR379
OsGT5	: DEKSWIGVNTGSFLIRN	C <mark>QW</mark> SLDL <mark>LD</mark> AWAP	MGERGPVRDRY <mark>G</mark> I	FAEEISG	RPPFEADDQSALIYL	IVTQRQR <mark>W</mark> GD <mark>KVFI</mark>	SS <mark>YD</mark> I <mark>NGFW</mark> EGIVDKY	EEIRRAGR356
AtGT6	: EKQSWTALNAGVELIRN	C <mark>QW</mark> SMDLID <mark>TW</mark> KS	MGEVS PDYKKW <mark>G</mark> I	PIQRSIFKD	K <mark>LFPESDDQTALI</mark> YL	LYKHKELYYPKIYLI	AEYYL <mark>QGYW</mark> IG <mark>V</mark> FGDF	ANVTERYL321
AtGT7	:NDRSWTALNACVELIRN	C <mark>QWSMELID</mark> TWTG	MGEVS PEYAKW <mark>G</mark> (QRSIFKD	KLFPESDDQTALL YL	LYKHREVYYPKIYL	GDFY <mark>FEGYW</mark> LEIVPGI	SNVTERYL338
OsGT6	:GERSWVGLNAGVFLIRN	C <mark>QWSIDFMD</mark> AWAR	MGEAS PEYARW <mark>G</mark> S	SVLHDTLR <mark>G</mark>	K <mark>SDK<mark>E</mark>S<mark>DDQSALV</mark>YL</mark>	ISEHEEKWGAKTYLI	KGYF <mark>FQGYWVE</mark> VVDRI	DD <mark>I</mark> AARYE366
OsGT7	:ESRSWTSINACVFLIRN	C <mark>QW</mark> SLDFMDAWAA	MGPDSPEYQHW <mark>G</mark> A	AVLTSTFKD	KVFN <mark>E</mark> SDDQSALVYM	LLQSGSPWRDKVYL1	SDYYFEGYWLEIAGRI	GN <mark>I</mark> TERYE335
						. –	_	
	*	440 *	460	*	480	* 500	*	520
AtXXT1	:P-GEGDHRWELVTHEVG	CKPCGK-FGD-YP	VERCLRONDRAFI	TECNNUTIO	YCE THKSI GSRRVK	PTRNQTDRPLDA1	KDEFGLLHPPFKAAKLS	STTTT460
AtXXT2	:P-GLGDHRWPIVTHFVG	OKPOGK-FGD-YP	VERCLKONDRAF	VEGDNQIIQ	YGETHKSI ASRKVK	RVRNETSNPLEM1	KUELGLLHPAFKAVKVÇ	2TNQV461
OSXXT1	:P-GLGDHRWPIVTHFVG	OKPOGK-FGD-YP	VERCLKOMERAFI	VFCDNQTTQI	YGETHKSUGSRKVK	RIRNETSNPLDV	KDELGLLHPAFKAMKTI	sr448
OSGT2	: P-GLGDERWEFVTHEVG	OKPOGS-YGD-YP	VERCLESMERAFI	NEADNOVI R	YGRAHKGTESPKIK	RVRNQTTKPIDD1	KENLDVKAKISTTS-	480
OSGT3	: P-GLGDERWPFVTHFVG	CKPCGG-YGD-YP	KERCLGGNERAFI	ADNOVI R	YGERERSTASARVR	RVANRTDNPLVN	KEAA-LKMDAKIES	463
AtGT4	P-GLGDERWEFVTHEVG	APOGS-YAD-YA	VERGEKSMERAFI	ADNOVIK	NGRSERG LSPKIK	RIENETVSPLES	VUKFUIRR-MHMETKP-	471
ALXXID	· P-GLGDERWERVIHEVG	CAPCES-IAD-IA	VERCLKSVERAFI	ADNOVIK.	YCHCHPCHISPKIK	DIDNETVSPLEF	VUARUIRK-TPVETKPQ	2N457
ALGT3	· P - GLGDLKWEFLIEFVG	CRECCS-IAU-YA	CERCERSPERAE		YCDAN POINT DEMAND	DUDNDUCDDIDIDIDI	VUAPUIKKTTPLAIEAP	
OSGT4	· DESCRIPTION CONTRACTOR	CRECCC-DDASYD	GERCERGULKAEN		ACTANEST DIMAVR	RVENDIGRPLDADNO	2616K11HFTFKARKKF	TSRAARPM483
DSGT5	· DDGRWEEVTHEVG	CORCERN-MAUSYP	CDTOWNEN TRAF	ADDOLLK.	VCYUNED CZECT	ODI DEDVDNEAM	LLIGRULHPTFRAARPI	448
ALGT0 Atcm7	· EMERCORRECTED TO THE IG	ODC SCDHNPSYD	GD TOWN DW TRAL		Y CONVESSION SKTSPL	QPLPFDIPNEAW		
ALGT/	· AAFRON - PREFUG	ODOGGEDNKMYD	GDICMNCMIKAT		VCVPCKDD_T CD TT	SEALDEDADAP		416
OsGT0	· AMERCH-REPERVISION	ODOSCHENNIN Meescrenvii 2	GKSODECTERAT		AACDEH7CD-TODAA	SDIDEDDIEAAK		441
1000	The second se	CASE OF CONTRACT OF CONTRACT		- CONTRACTOR IN	TODAY			

Supplementary Figure S3. Protein sequence alignment of putative xyloglucan 6-xylosyltransferase in Arabidopsis and rice. The transmembrane and glycosyltransferase domains were indicated by red box and black line, respectively.



Supplementary Figure S4. The expression of *OsXXT1* in complementation Arabidopsis by RT-PCR.



Supplementary Figure S5. A, Transverse section of root mature region of OsXXT1::promoter GUS plants. Bar = $20 \ \mu m$.

Primer name	Forward (5' to 3')	Reverse (5' to 3')						
OsXXT1-Ox	ACCCAAACTCCCTTGTCAACC	CGCGTTGGCTGGCTATTC						
OsXXT1-	ATCGAAGCTTCCATGAAGAAGAACAA	GCGATGGATCCCCTCTCCTGCCCCT						
Promoter	TGCTGA	TCCTC						
STS274-03-04	CATCCACATTGTCTGCGGTC	CTCGCTGAAACTCTTGACTG						
STS274-04	TGTGGTTAGCCAGCTCCTGG	AACACTCCAGCCAGCGAGCG						
STS274-04-06	GATGCAATCTCACCTCAATAC	GGTGATGCAAAGACCTGGTAA						
STS274-08	CGCTGTATACTGCATAGCAGTAG	TGAGGTAAGTCATTAGCTCATG						

Supplementary Table S1 Primers used in this research