Supplementary Table 1. Information for stage-specific marker genes during TE differentiation.

Tracheary element (TE) differentiation is defined as four main stages, (*i*) procambium (cell fate determination), (*ii*) xylem-specific initiation, (*iii*) secondary cell wall (SCW) formation, and (*iv*) programmed cell death (PCD) (Turner *et al*., 2007). Stage (*iii*) and (*iv*) act downstream of and are directly regulated by Stage (*ii*) cascade. Four representative marker genes for each stage were displayed as four rows in fig. S1.

Stage	Gene	Description and Function	Reference
Procambium	TMO6	TARGET OF MONOPTEROS (MP); Encoding Dof-type zinc-finger protein; Key auxin signaling factor; Preferentially expressed in procambium precursor and procambial cells.	Donner *et al*., 2009 Schlereth *et al*., 2010
	AtHB8	HOMEOBOX PROTEIN 8; HD-ZIP III Transcription Factor; Contribute to provascular differentiation.	Baima *et al*., 1995 Donner *et al*., 2009
	PXY	PHLOEM INTERCALATED WITH XYLEM; LRR-receptor kinase; Stem cell maintenance in procambium.	Fisher & Turner, 2007 Hirakawa *et al*., 2008
	PIN7	PIN-FORMED 7; Direct auxin flow toward the protoxylem.	Bishopp *et al*., 2011
Xylem-specific	VND6 VND7	VASCULAR-RELATED NAC DOMIAN 6/7; Transcription factors; Master switches for xylem TE formation.	Kubo *et al*., 2005 Ohashi-Ito *et al*., 2010
	VND5	VASCULAR-RELATED NAC DOMIAN 5; Transcription factor; Redundantly functions with VND6/7	Endo *et al*., 2015 Yamaguchi *et al*., 2008
	LBD15	LOB DOMAIN-CONTAINING PROTEIN 15; Transcription factor as the direct target of VND7.	Yamaguchi *et al*., 2011 Zhong *et al*., 2010
SCW formation	MYB46 MYB83	MYB DOMAIN PROTEIN 46/83; Transcription factors directly regulated by VND6/7; Activate SCW biosynthesis.	Zhong *et al*., 2007 Zhong *et al*., 2012
	IRX3	IRREGULAR XYLEM 3; Cellulose biosynthesis; Marker for the later stages of TE differentiation.	Taylor *et al*., 2000, 2003 Brown *et al*., 2005
	MYB85	MYB DOMAIN PROTEIN 85; Transcription factor; Lignin biosynthetic pathway.	Zhong *et al*., 2008 Zhou *et al*., 2009
PCD	XCP2	XYLEM CYSTEINE PEPTIDASE 2; Papain-like cysteine proteinase; Directly activated by both VND6 and VND7;	Avci *et al*., 2008 Funk *et al*., 2002

	Expressed in TEs and localized to vacuole.	
AtMC9	METACASPASE 9; Encodes a putative metacaspase; Clearance of cellular contents after cell death mediated by papain-like cysteine proteases.	Bollhoner *et al.*, 2013 Escamez *et al*., 2016
BFN1	BIFUNCTIONAL NUCLEASE I; Nuclease; Broad role during senescence and PCD.	Farage-Barhom *et al*., 2008 Perez-Amador *et al*., 2000
VPE	VACUOLAR PROCESSING ENZYME; Encodes a vacuolar processing enzyme belonging to a novel group of cysteine proteases involved in PCD.	Gruis *et al*., 2004 Hatsugai *et al*., 2004

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