

Supplemental Table S1. The differentially expressed genes related to stomata closure under drought stress.

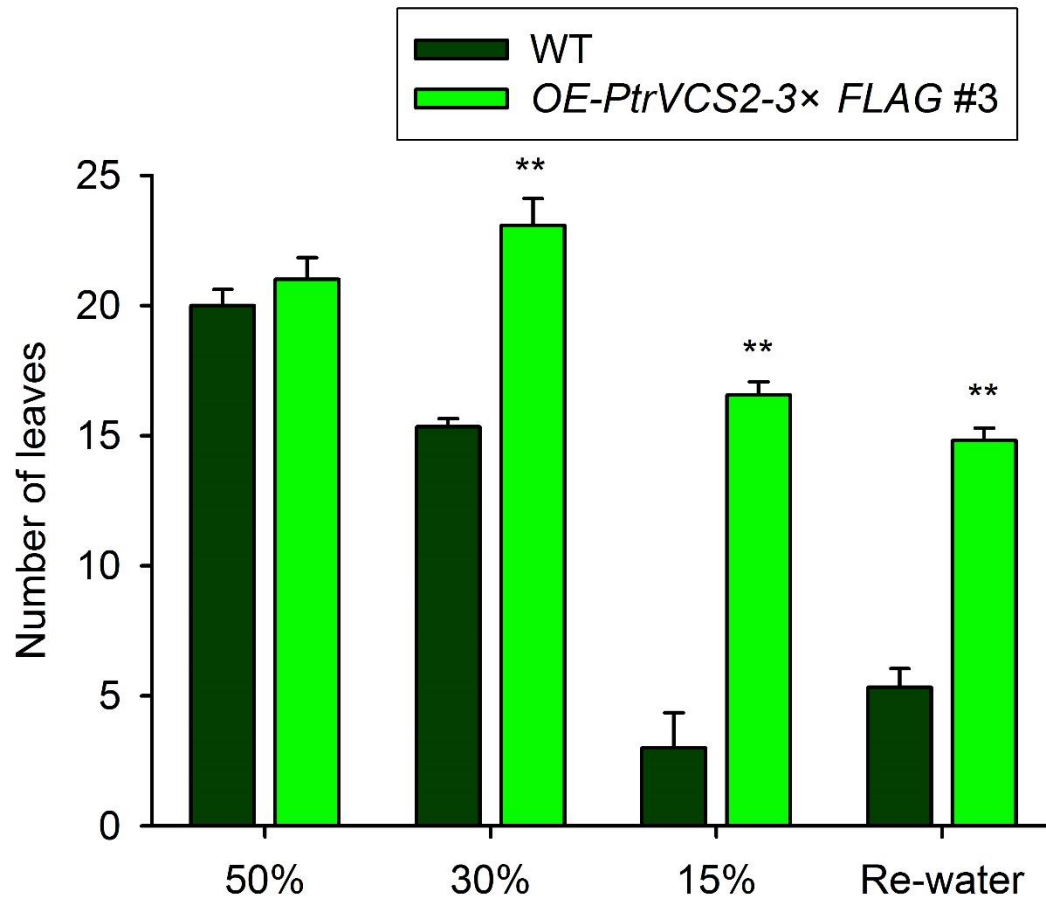
Gene ID	Common Name	WT FPKM	OE- <i>PtrVCS2</i> FPKM	Fold Change	References
Potri.002G049500	<i>PtrSULTR3;1-1</i>	1.9	71.77	3.44	(Chen et al., 2019)
Potri.007G021300	<i>PtrBSMT1-1</i>	0.32	18.45	3.35	(Zheng et al., 2012)
Potri.015G123900	<i>PtrNAPP-4</i>	0.03	1.06	2.76	(Huang et al., 2019)
Potri.006G179300	<i>PtrPNP-A-2</i>	16.06	213.79	2.62	(Wang et al., 2011)
Potri.015G069600	<i>PtrEDS1-1</i>	0.14	0.78	2.06	(Zheng et al., 2015)
Potri.007G082300	<i>PtrSERK2-2</i>	1.1	6.77	1.95	(Meng et al., 2015)
Potri.001G177400	<i>PtrIAA17-1</i>	176.87	87.84	-1.05	(Balcerowicz et al., 2014)
Potri.017G036700	<i>PtrSIP1-6</i>	24.78	7.08	-1.76	(Xu et al., 2018)

Supplemental Table S2. The differentially expressed genes related to cell wall biosynthesis under drought stress.

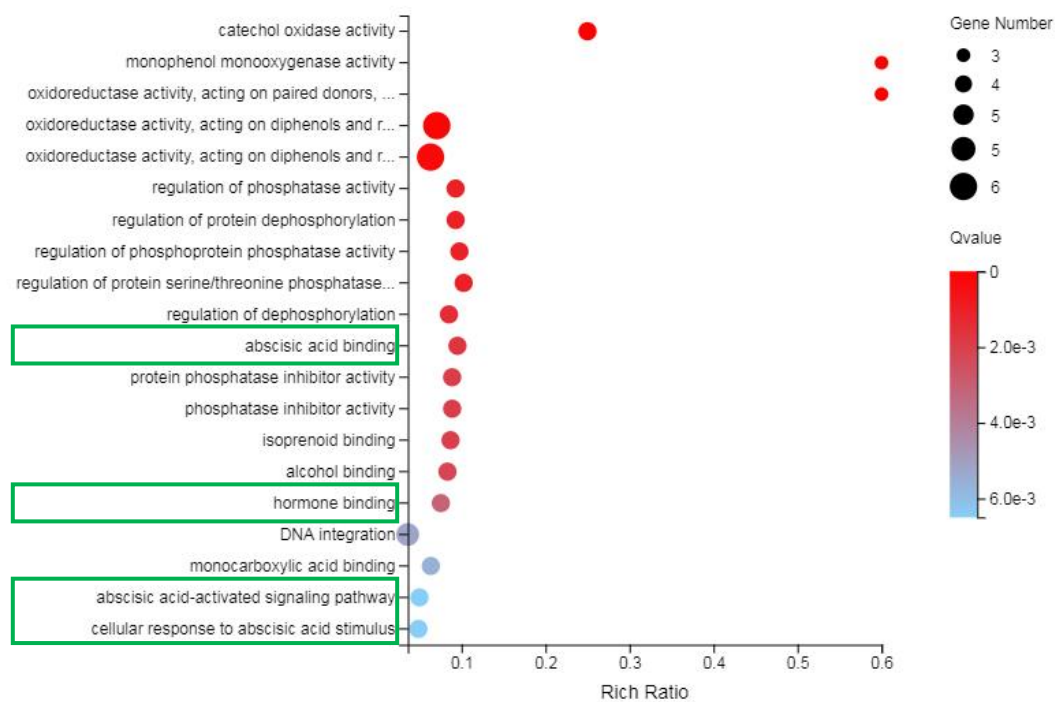
Gene ID	Common Name	WT FPKM	OE- <i>PtrVCS2</i> FPKM	Fold Change	GO Terms
Potri.019G088600	<i>PtrLAC44</i>	0.25	7.98	3.05	Lignin
Potri.019G088800	<i>PtrLAC45</i>	0.64	17.67	2.73	Lignin
Potri.009G141700	<i>PtrPR3-3 (B-CHI)</i>	0.64	7.74	2.49	Cell wall
Potri.001G141801	Novel gene	8.93	2.35	-1.77	Cell wall
Potri.019G121100	<i>PtrFLA11-12</i>	360.1	88.34	-1.82	Cell wall
Potri.008G132700	<i>PtrGH9B1-1</i> (<i>CEL1</i>)	8.56	1.82	-2.18	Cellulose

Supplemental Table S3. Primer list.

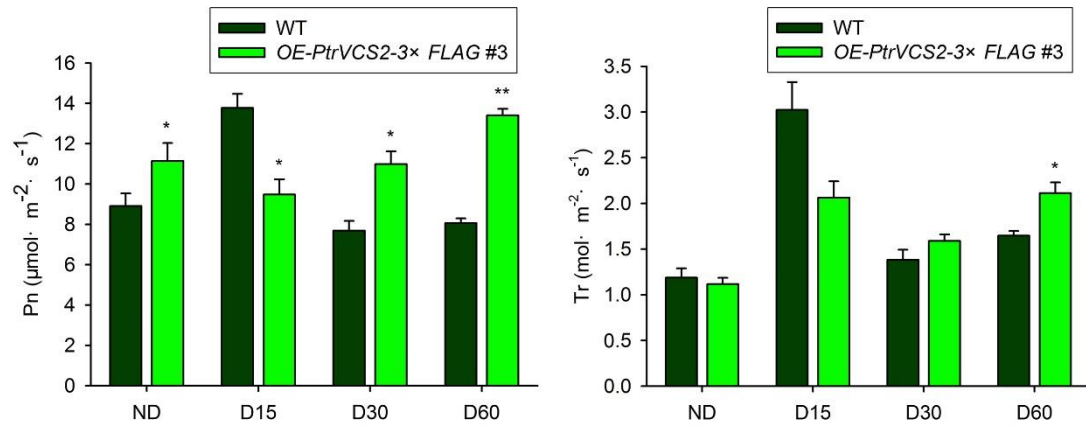
Gene ID (Common name)	Primer Name	Primer sequence (5' - 3')
Potri.019G010400 (<i>PtrActin</i>)	RT- <i>PtrActin</i> -F RT- <i>PtrActin</i> -R	TGTTGCCCTTGACTATGAGCAGGA ACGGAATCTCTCAGCTCCAATGGT
Potri.002G049500 (<i>PtrSULTR3;1-1</i>)	RT- <i>PtrSULTR3;1-1</i> -F RT- <i>PtrSULTR3;1-1</i> -R	GTCCACTAATGTAGAGCGTACACC TGAAGTGGTCTGGTTCTTGAATTGT
Potri.007G021300 (<i>PtrBSMT1-1</i>)	RT- <i>PtrBSMT1-1</i> -F RT- <i>PtrBSMT1-1</i> -R	GAGACAAGTTATGCACAGAACTCAC GAACATCCCAAGTCTGCTATGGC
Potri.015G123900 (<i>PtrNAPP-4</i>)	RT- <i>PtrNAPP-4</i> -F RT- <i>PtrNAPP-4</i> -R	TCTTACTCATGGTATTCAAGAAGTT GTGGCCGACCCAGTAAGCTGC
Potri.006G179300 (<i>PtrPNP-A-2</i>)	RT- <i>PtrPNP-A-2</i> -F RT- <i>PtrPNP-A-2</i> -R	ATCTCCGTTGCGCATGCTGCAC ATAACTCCATCGTTCCTGTTTCCG
Potri.015G069600 (<i>PtrEDS1-1</i>)	RT- <i>PtrEDS1-1</i> -F RT- <i>PtrEDS1-1</i> -R	CTGAAGGGATTTCATAGTTCATCATC GAAAGAACTGAAGATCCACCTTCA
Potri.007G082300 (<i>PtrSERK2-2</i>)	RT- <i>PtrSERK2-2</i> -F RT- <i>PtrSERK2-2</i> -R	GAGAGAGTTTAGGACTTGTCTTGC CCATGATATTGTTAGGATCTTGCAG
Potri.001G177400 (<i>PtrIAA17-1</i>)	RT- <i>PtrIAA17-1</i> -F RT- <i>PtrIAA17-1</i> -R	GGTTCAAACCTTGCTGGAATCCGAT CTCTATTAATGCTAGCCCACGAG
Potri.017G036700 (<i>PtrSIP1-6</i>)	RT- <i>PtrSIP1-6</i> -F RT- <i>PtrSIP1-6</i> -R	TGATAATATAACCCTCAGTCCCTCG CTTCAATTTCCCAATATGGACAACG



Supplemental Figure S1. Number of functional leaves of the *OE-PtrVCS2* transgenic and wild-type plants under drought stress conditions. ** $p < 0.01$ (Student's *t*-test).



Supplemental Figure S2. The differentially expressed genes related to ABA response under drought stress. Green box: the differentially expressed genes related to ABA signal and other hormones.



Supplemental Figure S3. Key photosynthesis indicators of *Populus trichocarpa* under chronic drought stress. Net photosynthetic rate (Pn) and transpiration rate (Tr) of the wild-type (WT) and OE-PtrVCS2 plants. Error bars indicate one SE of three biological replicates from independent pools of *P. trichocarpa* leaves. Asterisks indicate significant differences between the transgenics and WT plants under drought condition. * $p < 0.05$, ** $p < 0.01$ (Student's *t*-test).

Reference

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