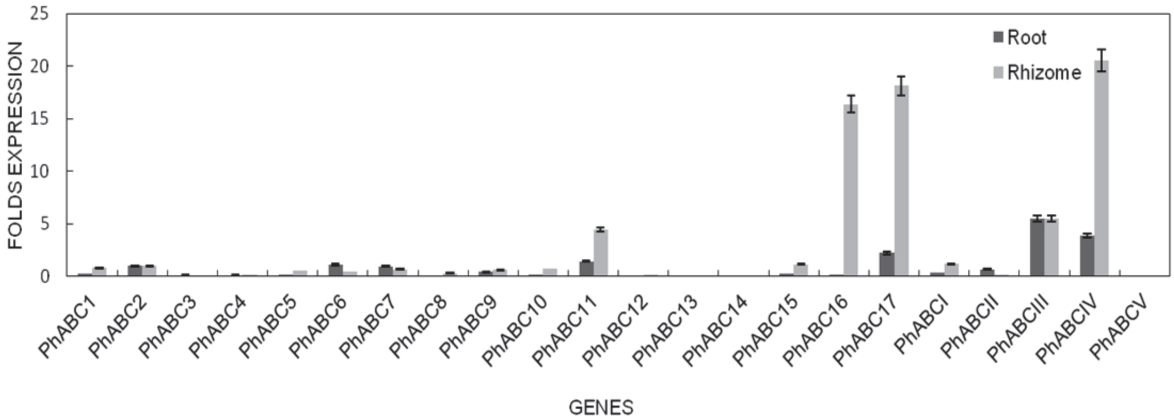

Fig. 1 Suppl. The expression status (real time qPCR) of ABC transporter orthologs from different plant species in roots and rhizomes with respect to shoots of *Podophyllum hexandrum*.

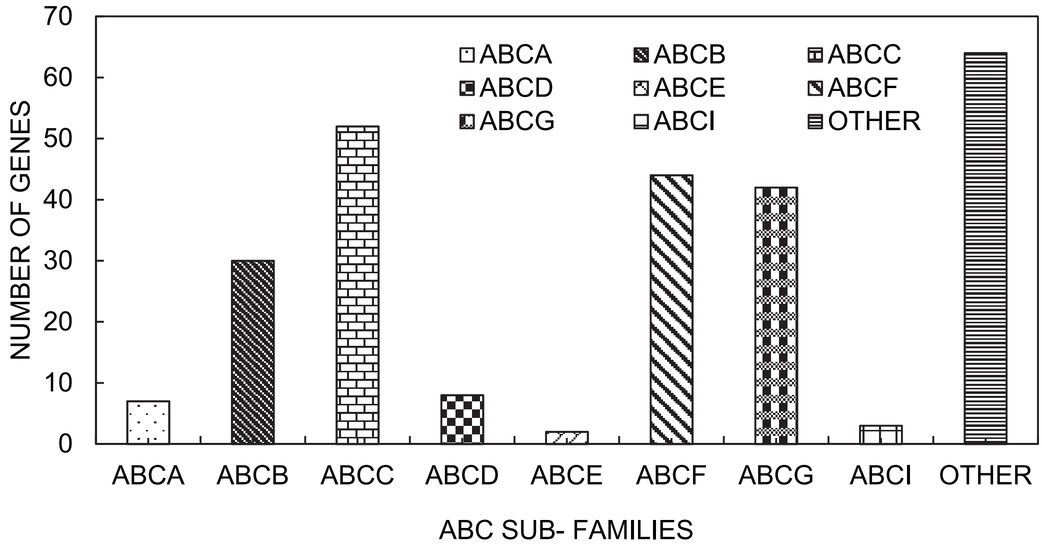

Fig. 2 Suppl. The distribution of the ABC transporter family into nine sub-families: ABCA, ABCB, ABCC, ABCD, ABCE, ABCF, ABCG, ABCI and others in transcriptomes of *P. hexandrum*.

Table 1 Suppl. Primers used for expression analysis through real time qPCR.

Name	Forward primer 5'-3'	Reverse primer 5'-3'	Tm [°C]	Product size [bp]	PCR conditions
PhABC1	GTGCACTTGACGCTGAATCA	ATCAAATCCGCATGCCTTCC	55	172	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 55°C, 45s, 72°C, 20s.
PhABC2	CACGACAAACTTCAGCCTTCA	GGTCCCTCTCCATCCTCATC	52	160	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 52°C, 45s, 72°C, 20s.
PhABC3	CCCCGTATCGACAAGAAGGA	CACCTCTCTTCCTCCTTGCA	59	148	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 59°C, 45s, 72°C, 20s.
PhABC4	GGAAGCTTGTGTCTGGTTGG	CCAGGTCTGCACATACTGGT	55	169	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 55°C, 45s, 72°C, 20s.
PhABC5	CCAGGAGGTCTTACTGCACT	TAGGCAGCAGTTCCAAAGGA	58	155	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 58°C, 45s, 72°C, 20s.
PhABC6	GATGAATGACACTCCGCCAG	CCTGGTTAACGCGTTGGTTA	56	152	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 56°C, 45s, 72°C, 20s.
PhABC7	CCTTAAACAGATGCGTCCCC	TGGCTTTTGGGGATCAGACA	60	168	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 60°C, 45s, 72°C, 20s.
PhABC8	TATGGCTGTGTTGGGTGCTA	TTCAACGGTCAGCATAGGGT	61	190	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 61°C, 45s, 72°C, 20s.
PhABC9	TATGGGTCCTTTGTCAGCGT	CCCTCTCTCATCTGCTTGGT	57	173	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 57°C, 45s, 72°C, 20s.
PhABC10	TTCTCCAAAGCAGCCCAAAC	AGGACGGAGAGCAAGTCAAA	61	159	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 61°C, 45s, 72°C, 20s.
PhABC11	TTCGTATGCCAGTGACACCT	CTGTGTGTGCGCTCTATGTC	54	150	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 54°C, 45s, 72°C, 20s.
PhABC12	ATCCCACAAGACCCAACCAT	TTGACCCATGCTCCAGTTCT	54	186	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 54°C, 45s, 72°C, 20s.
PhABC13	TCATTGATCCTGGCATTGCG	ACTGCCTGGCCTATGTTCTT	58	185	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 58°C, 45s, 72°C, 20s.
PhABC14	CCGCGAGACATTGGACTTTT	GGTGATGAGTTGGCTTGCAA	54	182	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 54°C, 45s, 72°C, 20s.
PhABC15	CAGAGAGTCACGGTCCAAGA	CGTCATCTCCAAGCACTTCG	58	178	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 58°C, 45s, 72°C, 20s.
PhABC16	ATGGTTCTGTTGTCGCACAC	GTCCGAGGGTCAGAAGTCTC	51	150	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 51°C, 45s, 72°C, 20s.
PhABC17	CGAGTAGCAGGATCTTGGGG	TCCCTGCCTGATGGTTTCAA	54	100	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 54°C, 45s, 72°C, 20s.
PhABCI	TTGGCGCTTATGGGATTGTG	GTCCATCAAGATTCACCGCC	59	181	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 59°C, 45s, 72°C, 20s.
PhABCII	AGAGCAGGCCAGTTCATTCT	CCAATTTCTCGGCGCATGTA	58	183	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s,

					58°C, 45s, 72°C, 20s.
PhABCIII	TCTGGTCGAGATGGGTAAGC	CAGGGGAGGTGAAGCTGTTA	59	150	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 59°C, 45s, 72°C, 20s.
PhABCIV	GTCTCGGCTGCTACTTTTGG	TCTGGTGCCTCGAGAAACTT	58	188	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 58°C, 45s, 72°C, 20s.
PhABCV	ATTTGAGTGGACGGTAGCCA	CACTGGCATTCTCGGTCTTG	57	196	Initial denaturation at 94°C for 3 min, followed by 40 cycles of 94°C, 30 s, 57°C, 45s, 72°C, 20s.

Table 2 Suppl. Pearson's correlation coefficients between transporter gene expressions and podophyllotoxin content in *P. hexandrum*.

Gene	Gene expression			Podophyllotoxin content [%]			Pearson's correlation coefficient
	shoot	rhizome	root	shoot	rhizome	root	
PhABC1	1.29	1.00	0.30	0.05	1.28	3.02	-0.99
PhABC2	1.01	1.00	1.00	0.05	1.28	3.02	-0.81
PhABC3	1.67	0.15	0.18	0.05	1.28	3.02	-0.80
PhABC4	1.13	0.20	0.12	0.05	1.28	3.02	-0.85
PhABC5	1.13	0.59	0.16	0.05	1.28	3.02	-0.99
PhABC6	1.13	0.48	1.26	0.05	1.28	3.02	0.25
PhABC7	1.13	0.74	1.06	0.05	1.28	3.02	-0.07
PhABC8	1.13	0.33	0.00	0.05	1.28	3.02	-0.94
PhABC9	1.13	0.68	0.46	0.05	1.28	3.02	-0.95
PhABC10	1.13	0.81	0.14	0.05	1.28	3.02	-1.00
PhABC11	0.22	1.00	0.32	0.05	1.28	3.02	0.02
PhABC12	1.13	0.14	0.00	0.05	1.28	3.02	-0.87
PhABC13	1.13	0.01	0.04	0.05	1.28	3.02	-0.80
PhABC14	1.13	0.03	0.11	0.05	1.28	3.02	-0.77
PhABC15	0.87	1.00	0.23	0.05	1.28	3.02	-0.84
PhABC16	0.06	1.00	0.01	0.05	1.28	3.02	-0.15
PhABC17	0.06	1.00	0.12	0.05	1.28	3.02	-0.04
PhABCI	0.86	1.00	0.32	0.05	1.28	3.02	-0.82
PhABCII	1.13	0.18	0.75	0.05	1.28	3.02	-0.31
PhABCIII	0.18	1.00	1.01	0.05	1.28	3.02	0.82
PhABCIV	0.05	1.00	0.19	0.05	1.28	3.02	0.04
PhABCV	1.13	0.00	0.04	0.05	1.28	3.02	-0.79

Table 3 Suppl. ATP binding casette transporters known for transportation of primary and secondary metabolites in plant species.

Transporter	Species	Biological function(s)	References
MDR/PGP (Para Glycoprotein)-ABCB subfamily of ABC transporters			
ABCB1/PGP1	*Arabidopsis thaliana*	resistance to multiple xenobiotics including herbicides polar auxin transport	Thomas *et al.* 2000, Noh *et al.* 2001, 2003, Windsor *et al.* 2003, Lin and Wang, 2005, Lewis *et al.* 2007
ABCB4/PGP4	*Arabidopsis thaliana*	polar auxin transport	Santelia *et al.* 2005, Cho *et al.* 2007, Lewis *et al.* 2007, Yang and Murphy 2009
ABCB14/PGP14	*Arabidopsis thaliana*	polar auxin transport stomatal closure regulation	Lee *et al.* 2008, Kaneda *et al.* 2011
ABCB15/PGP15	*Arabidopsis thaliana*	polar auxin transport	Kaneda *et al.* 2011
ABCB19/PGP19	*Arabidopsis thaliana*	polar auxin transport	Noh *et al.* 2001, 2003, Lin and Wang, 2005, Lewis *et al.*2007
ABCB21/PGP21	*Arabidopsis thaliana*	polar auxin transport	Kamimoto *et al.*2012
CjMDR1	*Coptis japonica*	berberine transport into vacuole	Yazaki *et al.* 2001, Sakai *et al.* 2002, Shitan *et al.* 2003
ABCC (MRP) subfamily of ABC transporters			
ABCC1/MRP1	*Arabidopsis thaliana*	vacuolar sequestration of xenobiotic conjugates including herbicides, of excess folates, and of a conjugate of ABA	Lu *et al.* 1997a, Raichaudhuri *et al.* 2009, Song *et al.* 2010, Burla *et al.*2013
ABCC2/MRP2	*Arabidopsis thaliana*	vacuolar sequestration of xenobiotic conjugates including herbicides and of a conjugate of ABA vacuolar sequestration of chlorophyll catabolites tolerance to arsenic, cadmium, and mercury	Lu *et al.* 1998b, Song *et al.*2010, Park *et al.* 2012, Burla *et al.*2013
ABCC3/MRP3	*Arabidopsis thaliana*	vacuolar sequestration of xenobiotic conjugates including herbicides vacuolar sequestration of chlorophyll catabolites	Tommasini *et al.*1998
MRP4/ABCC4	*Arabidopsis thaliana*	vacuolar sequestration of excess folates regulation of stomatal movements	Klein *et al.*2004
ABCC5/MRP5	*Arabidopsis thaliana*	regulation of seed phytate content regulation of stomatal movements	Klein *et al.* 2003, Nagy *et al.* 2009, Kang *et al.* 2011
MRP3	*Zea mays*	vacuolar anthocyanin accumulation	Goodman *et al.* 2004
MRP4	*Zea mays*	regulation of seed phytate content	Shi *et al.* 2007
ABCC1/MRP1	*Vitis vinifera*	transport of anthocyanidin 3-O-glucosides into vacuoles	Francisco *et. al*. (2013)
ABCG (PDR) subfamily of ABC transporters			
ABCG30/PDR2	*Arabidopsis thaliana*	root exudation of phytochemicals	Badri *et al.*2009
ABCG36/PDR8	*Arabidopsis thaliana*	resistance to fungal and bacterial pathogens resistance to synthetic auxins IBA transport and root exudation of phytochemicals	Kobae *et al.* 2006, Stein *et al.* 2006, Kim *et al.* 2007, 2010, Strader and Bartel 2009, Badri *et al.* 2012,
ABCG37/PDR9	*Arabidopsis thaliana*	resistance to synthetic auxins and IBA transport	Ito and Gray 2006, Ruzicka *et al*. 2010, Badri *et al.* 2012
ABCG40/PDR12	*Arabidopsis thaliana*	sclareol resistance, ABA transport, and lead detoxification	Campbell *et al.* 2003, Kang *et al*. 2011
ABCG29	*Arabidopsis thaliana*	monolignol transporter involved in lignin biosynthesis	Alejandro *et al*. 2012
PDR1	*Nicotiana plumbaginifolia*	terpene transport basal defense	Jasinski *et al*. 2001, Stukkens *et al.* 2005
PDR5	*Nicotiana tabacum*	herbivore defense	Bienert *et al.* 2012