

Supplementary Material

Genome-wide identification and expression profile analysis of the *OMT* gene family in response to cyst nematodes and multi-abiotic stresses in soybean

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Supplementary Table S1. Information of *OMT* family genes identified in the soybean genome.

Gene name	Gene accession No.	Length(bp)	Coding sequence length (bp)	Chromosome localization	Amino acids	Relative molecular mass (kDa)	PI	Aliphatic index	GRAVY	Instability index	Cell location
GmCCOMT1	Glyma.01G004200	2355	717	Gm01:428437..430792 forward	238	26.66	104.08	-0.18	45.20	104.08	Cytoplasmic
GmCCOMT2	Glyma.01G187700	2321	747	Gm01:53397419..53399740 forward	248	28.00	106.94	-0.17	38.97	106.94	Cytoplasmic
GmCCOMT3	Glyma.02G103500	2076	978	Gm02:9786060..9788136 forward	325	36.97	86.74	-0.46	43.07	86.74	Mitochondrial
GmCCOMT4	Glyma.05G147000	3242	711	Gm05:34125875..34129117 forward	236	26.75	104.96	-0.09	35.07	104.96	Cytoplasmic
GmCCOMT5	Glyma.05G223400	1906	753	Gm05:40322046..40323952 forward	250	28.10	95.60	-0.26	46.59	95.60	Cytoplasmic
GmCCOMT6	Glyma.07G055700	1978	717	Gm07:4886338..4888316 forward	238	27.11	81.05	-0.52	34.71	81.05	Nuclear
GmCCOMT7	Glyma.07G214700	1964	828	Gm07:39014524..39016488 forward	275	1.29	91.49	-0.44	43.53	91.49	Nuclear
GmCCOMT8	Glyma.08G030400	1903	702	Gm08:2426874..2428777 forward	233	25.93	107.64	0.03	39.14	107.64	Cytoplasmic
GmCCOMT9	Glyma.08G030500	1636	693	Gm08:2430930..2432566 forward	230	25.57	99.30	-0.11	47.69	99.30	Cytoplasmic
GmCCOMT10	Glyma.08G103900	3540	732	Gm08:7970704..7974244 forward	243	27.42	100.74	-0.22	33.67	100.74	Cytoplasmic
GmCCOMT11	Glyma.08G104000	4316	744	Gm08:7976047..7980363 forward	247	28.48	103.44	-0.25	51.29	103.44	PlasmaMembrane
GmCCOMT12	Glyma.08G175700	4030	936	Gm08:14117946..14121976 reverse	311	34.91	94.31	-0.10	45.28	94.31	Chloroplast
GmCCOMT13	Glyma.11G054500	2820	750	Gm11:4096759..4099579 reverse	249	28.14	106.91	-0.18	34.76	106.91	Cytoplasmic
GmCCOMT14	Glyma.15G250900	1876	504	Gm15:49901756..49903632 forward	167	18.46	108.50	0.11	30.66	108.50	Cytoplasmic
GmCCOMT15	Glyma.16G024400	2317	729	Gm16:2355702..2358019 forward	242	27.34	82.15	-0.48	35.80	82.15	Nuclear
GmCCOMT16	Glyma.17G171100	8369	741	Gm17:16123169..16131538 reverse	246	27.61	105.49	-0.17	40.55	105.49	Cytoplasmic
GmCOMT1	Glyma.02G233100	1973	456	Gm02:43892597..43894570 forward	151	16.41	89.14	0.19	25.67	89.14	Cytoplasmic
GmCOMT2	Glyma.04G227700	2291	1098	Gm04:48525212..48527503 forward	365	39.97	95.10	0.08	29.83	95.10	Cytoplasmic
GmCOMT3	Glyma.04G227800	2817	561	Gm04:48529082..48531899 forward	186	20.25	91.13	0.15	24.08	91.13	Cytoplasmic
GmCOMT4	Glyma.06G137100	3593	1098	Gm06:11180502..11184095 reverse	365	39.90	94.85	0.06	29.74	94.85	Cytoplasmic
GmCOMT5	Glyma.06G137200	2266	1101	Gm06:11187555..11189821 reverse	366	40.18	94.32	0.09	28.49	94.32	Cytoplasmic

GmCOMT6	Glyma.06G137300	2327	1098	Gm06:11192408..11194735 reverse	365	39.83	95.10	0.10	28.02	95.10	Cytoplasmic
GmCOMT7	Glyma.06G286200	2035	1080	Gm06:47062817..47064852 forward	359	40.63	90.70	-0.08	40.99	90.70	Cytoplasmic
GmCOMT8	Glyma.06G286600	1918	1059	Gm06:47083895..47085813 reverse	352	39.78	96.36	-0.06	33.46	96.36	Cytoplasmic
GmCOMT9	Glyma.06G286700	5159	1068	Gm06:47125444..47130603 forward	355	40.58	90.08	-0.08	44.11	90.08	Cytoplasmic
GmCOMT10	Glyma.06G295700	7301	1110	Gm06:48044757..48052058 forward	369	41.51	96.72	-0.08	39.55	96.72	Cytoplasmic
GmCOMT11	Glyma.07G048702	723	336	Gm07:4131632..4132355 forward	111	12.47	83.33	-0.16	38.04	83.33	Mitochondrial
GmCOMT12	Glyma.07G048800	2457	1065	Gm07:4135209..4137666 forward	354	38.93	89.52	0.08	31.55	89.52	Cytoplasmic
GmCOMT13	Glyma.07G048900	3961	1119	Gm07:4140717..4144678 forward	372	41.31	93.28	0.02	38.89	93.28	Cytoplasmic
GmCOMT14	Glyma.08G246700	1933	1077	Gm08:21431622..21433555 reverse	358	40.50	94.75	-0.07	40.02	94.75	Cytoplasmic
GmCOMT15	Glyma.08G247060	603	480	Gm08:21462916..21463519 reverse	159	17.71	105.41	0.05	21.63	105.41	Cytoplasmic
GmCOMT16	Glyma.09G094400	1884	1062	Gm09:13154714..13156598 forward	353	40.05	94.73	-0.05	33.28	94.73	Cytoplasmic
GmCOMT17	Glyma.09G094600	2723	942	Gm09:13205686..13208409 forward	313	35.51	98.72	0.05	35.04	98.72	Cytoplasmic
GmCOMT18	Glyma.09G281800	1911	1110	Gm09:50121423..50123334 reverse	369	41.02	91.19	-0.15	41.56	91.19	Cytoplasmic
GmCOMT19	Glyma.09G281900	2506	1074	Gm09:50128744..50131250 reverse	357	39.88	91.74	-0.13	45.55	91.74	Cytoplasmic
GmCOMT20	Glyma.10G176500	1460	1065	Gm10:41113941..41115401 reverse	354	39.91	94.18	-0.07	29.09	94.18	Cytoplasmic
GmCOMT21	Glyma.10G176600	1490	1068	Gm10:41118781..41120271 reverse	355	39.96	92.76	-0.04	30.31	92.76	Cytoplasmic
GmCOMT22	Glyma.10G176700	1641	1065	Gm10:41133365..41135006 reverse	354	39.83	96.95	-0.06	32.59	96.95	Cytoplasmic
GmCOMT23	Glyma.10G215700	2124	1110	Gm10:44835309..44837433 forward	369	40.82	92.74	0.01	39.89	92.74	Extracellular
GmCOMT24	Glyma.11G150800	3601	1101	Gm11:18047491..18051092 forward	366	40.59	89.78	0.01	40.97	89.78	Cytoplasmic
GmCOMT25	Glyma.11G256500	1402	1101	Gm11:39498821..39500223 forward	366	40.55	86.64	-0.09	46.36	86.64	Cytoplasmic
GmCOMT26	Glyma.12G109800	6438	1110	Gm12:10443968..10450406 reverse	369	41.57	94.07	-0.12	38.27	94.07	Cytoplasmic
GmCOMT27	Glyma.12G119600	1653	606	Gm12:12676035..12677688 forward	201	22.48	91.64	-0.09	31.69	91.64	Cytoplasmic
GmCOMT28	Glyma.13G173300	1688	1098	Gm13:28191416..28193104 forward	365	40.67	94.00	-0.08	25.82	94.00	Cytoplasmic
GmCOMT29	Glyma.13G173301	1673	831	Gm13:28151411..28153084 reverse	276	30.33	90.07	0.04	34.23	90.07	Cytoplasmic
GmCOMT30	Glyma.13G173800	2511	354	Gm13:28199098..28201609 forward	117	13.69	97.52	-0.39	33.32	97.52	Chloroplast
GmCOMT31	Glyma.13G263200	8984	1068	Gm13:36054169..36063153 reverse	355	39.91	84.08	-0.24	39.12	84.08	Cytoplasmic

GmCOMT32	Glyma.14G005000	3357	714	Gm14:408726..412083 reverse	237	26.34	74.01	-0.22	20.27	74.01	Cytoplasmic
GmCOMT33	Glyma.14G200700	2214	954	Gm14:47427379..47429593 forward	317	36.20	86.72	-0.20	30.68	86.72	Cytoplasmic
GmCOMT34	Glyma.14G200800	2004	1077	Gm14:47447391..47449395 forward	358	40.37	94.22	-0.04	30.65	94.22	Cytoplasmic
GmCOMT35	Glyma.14G200900	2052	1077	Gm14:47454718..47456770 forward	358	40.40	91.51	-0.07	29.85	91.51	Cytoplasmic
GmCOMT36	Glyma.14G201000	2119	619	Gm14:47462262..47464381 forward	212	23.66	88.35	0.02	27.05	88.35	Cytoplasmic
GmCOMT37	Glyma.14G201100	3644	1077	Gm14:47476134..47479778 forward	358	40.40	92.85	-0.05	30.73	92.85	Cytoplasmic
GmCOMT38	Glyma.15G241100	4634	1071	Gm15:47748688..47753322 forward	356	39.82	84.41	-0.21	41.93	84.41	Cytoplasmic
GmCOMT39	Glyma.18G263700	1900	1137	Gm18:55172560..55174460 reverse	378	41.75	91.27	-0.05	44.84	91.27	Cytoplasmic
GmCOMT40	Glyma.18G267500	2321	1080	Gm18:55454064..55456385 reverse	359	40.51	101.81	-0.03	36.02	101.81	Cytoplasmic
GmCOMT41	Glyma.18G267800	1922	1065	Gm18:55466730..55468652 reverse	354	39.71	101.92	-0.03	35.87	101.92	Cytoplasmic
GmCOMT42	Glyma.18G267900	1470	1062	Gm18:55474017..55475487 reverse	353	40.07	102.18	-0.03	32.59	102.18	Cytoplasmic
GmCOMT43	Glyma.18G269600	4518	1149	Gm18:55603156..55607674 forward	382	42.85	97.02	-0.08	40.99	97.02	Cytoplasmic
GmCOMT44	Glyma.19G260700	2720	1119	Gm19:50912051..50914771 reverse	372	41.62	92.02	-0.06	33.45	92.02	Cytoplasmic
GmCOMT45	Glyma.20G003500	2569	1113	Gm20:345875..348444 forward	370	41.13	93.00	-0.12	43.48	93.00	Cytoplasmic
GmCOMT46	Glyma.20G003600	3407	552	Gm20:349713..353120 forward	183	21.00	97.38	-0.05	45.32	97.38	Cytoplasmic
GmCOMT47	Glyma.20G176100	1694	1083	Gm20:41301579..41303273 reverse	360	39.91	89.92	0.00	41.93	89.92	Cytoplasmic
GmCOMT48	Glyma.20G176950	1665	1083	Gm20:41378171..41379836 forward	360	39.87	92.61	0.03	41.22	92.61	Cytoplasmic
GmCOMT49	Glyma.20G213500	1487	1065	Gm20:44935153..44936640 forward	354	39.72	91.75	-0.04	28.78	91.75	Cytoplasmic
GmCOMT50	Glyma.20G213600	1585	846	Gm20:44939190..44940775 forward	281	31.66	86.01	-0.12	25.84	86.01	Cytoplasmic
GmCOMT51	Glyma.20G213700	1496	1065	Gm20:44949899..44951395 forward	354	39.80	95.85	-0.06	28.53	95.85	Cytoplasmic

Supplementary Table S2. Segmental duplications of OMT paralogous pairs in soybean and inference of duplication time.

Seq_1	Seq_2	Ka	Ks	Ka_Ks	EffectiveLen	AverageS-sites	AverageN-sites	cN	cS	pN	pS
GmCOMT1	GmCOMT33	0.04	0.12	0.35	354.00	74.17	279.83	11.00	8.00	0.04	0.11
GmCOMT2	GmCOMT4	0.02	0.22	0.09	1089.00	252.25	836.75	16.50	47.50	0.02	0.19
GmCOMT2	GmCOMT11	0.32	NaN	NaN	327.00	72.67	254.33	65.67	55.33	0.26	0.76
GmCOMT2	GmCOMT44	0.36	NaN	NaN	1074.00	247.75	826.25	235.75	188.25	0.29	0.76
GmCOMT3	GmCOMT12	0.30	3.03	0.10	546.00	120.92	425.08	104.92	89.08	0.25	0.74
GmCOMT4	GmCOMT11	0.31	2.08	0.15	327.00	71.83	255.17	65.50	50.50	0.26	0.70
GmCOMT4	GmCOMT44	0.36	2.89	0.12	1071.00	246.00	825.00	235.42	180.58	0.29	0.73
GmCOMT7	GmCOMT27	0.07	0.24	0.29	597.00	124.08	472.92	31.50	25.50	0.07	0.21
GmCOMT8	GmCOMT29	0.49	3.70	0.13	795.00	177.50	617.50	222.83	132.17	0.36	0.74
GmCOMT10	GmCOMT26	0.02	0.23	0.07	1101.00	247.92	853.08	13.00	49.00	0.02	0.20
GmCOMT11	GmCOMT44	0.23	0.72	0.32	327.00	72.08	254.92	50.67	33.33	0.20	0.46
GmCOMT14	GmCOMT40	0.13	0.25	0.51	1056.00	222.75	833.25	98.50	47.50	0.12	0.21
GmCOMT18	GmCOMT45	0.17	0.58	0.30	1089.00	245.42	843.58	130.33	98.67	0.15	0.40
GmCOMT20	GmCOMT49	0.11	0.23	0.47	1056.00	231.08	824.92	82.58	45.42	0.10	0.20
GmCOMT23	GmCOMT47	0.04	0.16	0.27	1074.00	249.83	824.17	35.00	36.00	0.04	0.14
GmCOMT31	GmCOMT38	0.03	0.17	0.17	1059.00	242.08	816.92	22.00	36.00	0.03	0.15
GmCCoAOMT1	GmCCoAOMT5	0.21	0.76	0.28	708.00	167.17	540.83	98.33	79.67	0.18	0.48
GmCCoAOMT1	GmCCoAOMT8	0.21	0.92	0.23	693.00	162.75	530.25	96.50	86.50	0.18	0.53
GmCCoAOMT2	GmCCoAOMT7	0.13	1.76	0.07	738.00	170.33	567.67	67.50	115.50	0.12	0.68
GmCCoAOMT2	GmCCoAOMT13	0.01	0.12	0.11	738.00	172.67	565.33	7.50	19.50	0.01	0.11
GmCCoAOMT2	GmCCoAOMT16	0.13	0.63	0.20	732.00	170.83	561.17	65.00	73.00	0.12	0.43

Figure S1. Detailed amino acid composition of the 10 motifs in *GmOMT* proteins.

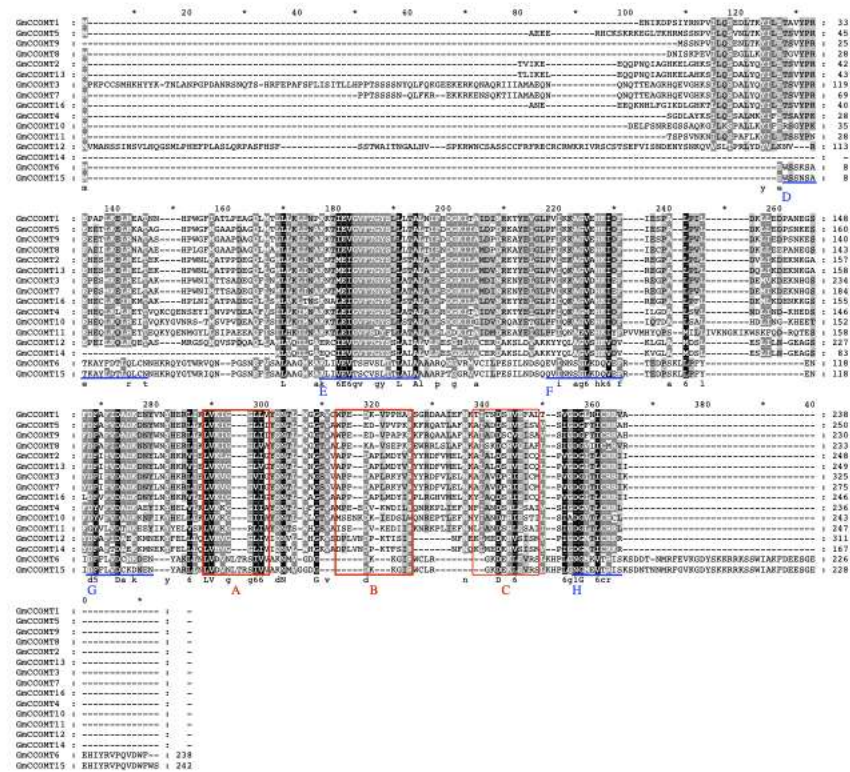
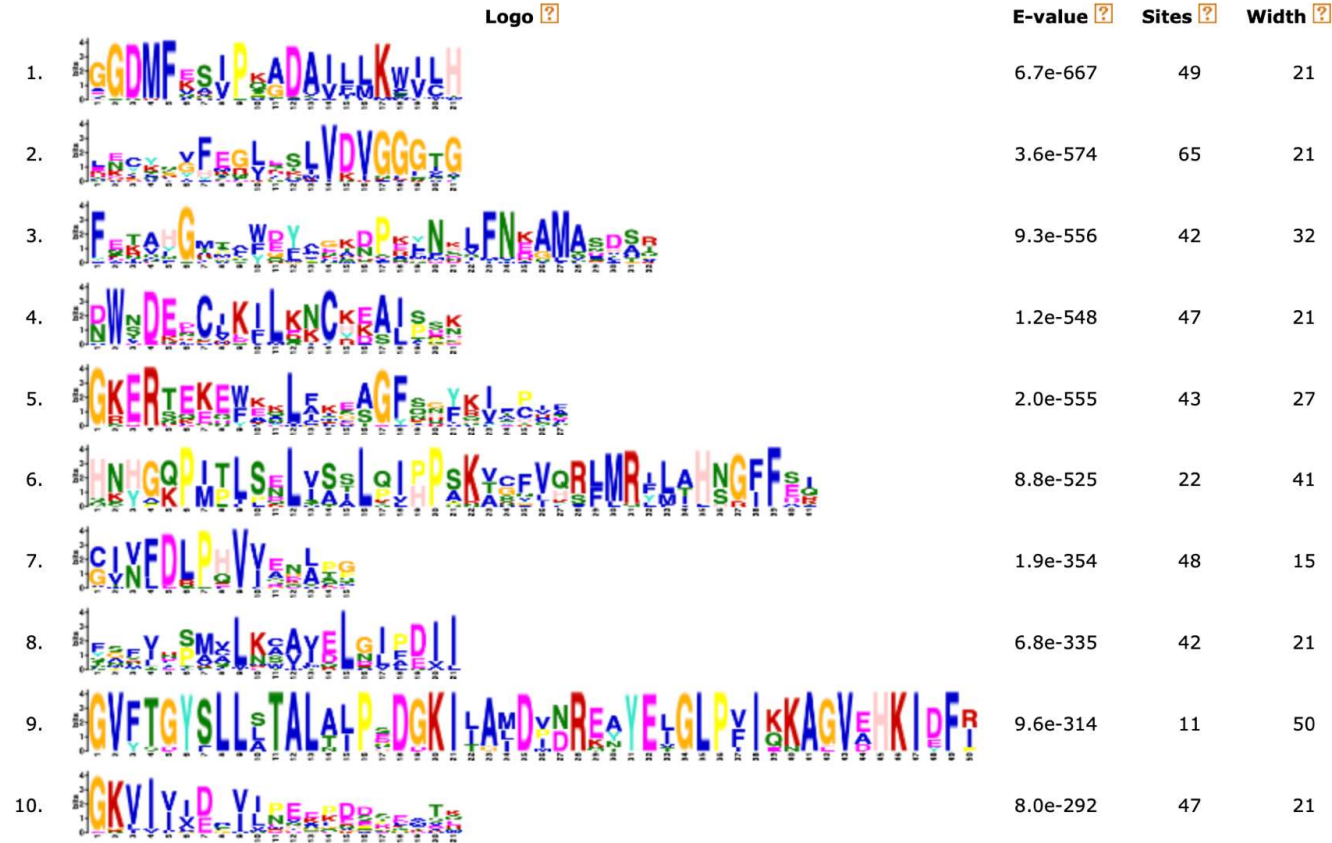


Figure S2. Multiple sequence alignment of CCOMT proteins from soybean.



Stopped because requested number of motifs (10) found.

Figure S3. Multiple sequence alignment of COMT proteins from soyben.

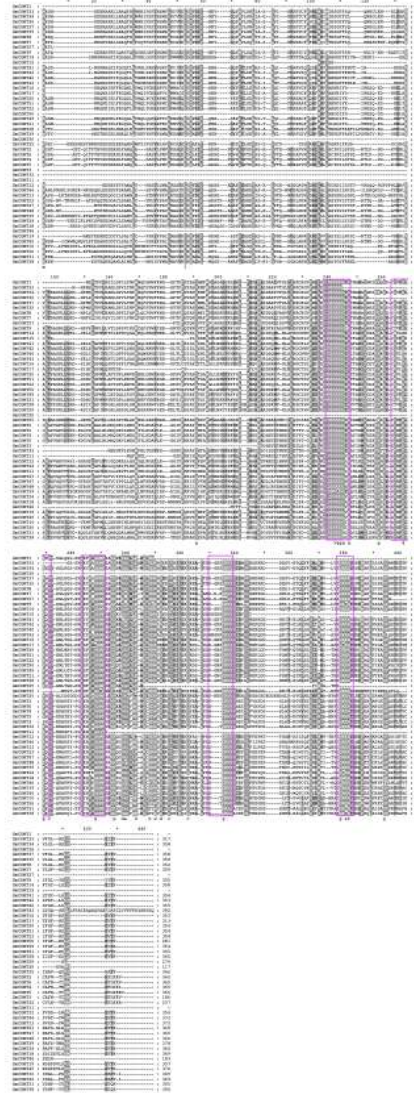


Figure S4. Prediction of cis-regulatory elements in the promoters of *GmOMTs*.

	AC1	AC11	MBS	MBS1	ARE	DRE	GATA-motif	GC-motif	LTR	TC-rich repeats	W box	Box 4	circadian	GA-motif	G-box	COTCA-motif	P-box	TATC-box	TCA	TGA-box	MTB	MTC	W box
GmCCOMT1			2		3	2			1	2	3	3	1		3	1			1		2	2	3
GmCCOMT2					1	1	2				1	3	1		3	1			3		3	3	1
GmCCOMT3		1				4			1			4			2	1			3	1	3	3	1
GmCCOMT4					1	2	1		1	1		7			2				1		1	3	2
GmCCOMT5					1	2	1		1	1		7			2				1		1	5	4
GmCCOMT6			1		2	1			1	1	1	9			1	2			2		1	3	1
GmCCOMT7	2	3			2																	2	4
GmCCOMT8				1	2	3			1	1		2	1		2		1		2		5	6	
GmCCOMT9					5				1	1	1	8			4				2		5	2	1
GmCCOMT10				2	6				1	1	1				1	1	2				8	5	1
GmCCOMT11		1		3	6	1			1	1	8			3	1			1		8	2	1	
GmCCOMT12		1		1	2	1			1		2		1	2	2			2	1	6	3		
GmCCOMT13			1		2						2			2	2		1			6	3		
GmCCOMT14				3	2	1	1				3		1	1	1		3			3	3		
GmCCOMT15			2		3	4			1		3	5		2				1	2	1	2	1	3
GmCCOMT16				3	10	3			2	1	1		2	9	5	1	1		1	6	8	1	
GmCOMT1				1	2		1		1			3			1					4	4		
GmCOMT2					1	4					1	4			3				2	1	5	5	1
GmCOMT3					6	1	1				1	1			5	4				7	2	1	
GmCOMT4		1	1		4						4				1			1	1	3	2		
GmCOMT5				1	2				1	2	2			1	1			1		11	2	2	
GmCOMT6	1		2		2	5	1				2		2	3	1			1	1	8	5		
GmCOMT7			1		4				1	1	7			5	2			1	1	9	7	1	
GmCOMT8				1	4	12			1	1	9			7	1		1	31		7	5	1	
GmCOMT9		1		1	4	2			1		4	1		3	1			3		3	5		
GmCOMT10		2		2	4	1					4			4	2			2		9	5		
GmCOMT11		4	1	2	5	1			1		4		1	4	1	1		2		10	4		
GmCOMT12		1		4	2				2	1	4	1		2	1			2		10		1	
GmCOMT13		1		2	5				1	1	7			3	2		1			12	5	1	
GmCOMT14					7				1	1	7			1	1			3		6	2		
GmCOMT15		1	1	1	2	1			1	1	3			2			1		3		10	7	1
GmCOMT16				5	2	1			1		5			1	1				1	3	5		
GmCOMT17				6	7				1		10			1	6	3				1	4	2	
GmCOMT18				3	7	3			1		7			2	1			1	3		14	5	
GmCOMT19				3	3						12			1	2		2			4	1		
GmCOMT20				2	6					2	2	1		6		2	1	2		12	2	2	
GmCOMT21				2	5						8			7	2	2		2	2	10	1		
GmCOMT22			1		1	2				1	5	1	1	1	2					9	5	1	
GmCOMT23				1	2				1		7			1				3		7			
GmCOMT24			1		4		1				3	1			4		2	1	2	6	6		
GmCOMT25				1		2					4			1	1		1	1		3	5		
GmCOMT26				2	2				1		1	1		1	1		1	1	1	14	8		
GmCOMT27				2					2	1	2	1			1			1	1	4	1	1	
GmCOMT28	1			2	1					2	4		1	2	1					6	6	2	
GmCOMT29				2	2					2	4		1	2	1					6	6	2	
GmCOMT30			1		1	1		1			5			1			1			11	2		
GmCOMT31				1	8						1	6			4			2	1	10	1	1	
GmCOMT32			1		3	2	1				1	1		3	1				1	7	3	1	
GmCOMT33			1		4		1			1	2	1		1	1	4		1	1	5	8	2	
GmCOMT34			1		3	4		1	1	2	3	2		4	1			2		9	3	3	
GmCOMT35					3			1		2	7			2	4	1	1			3	4	2	
GmCOMT36	1				7			1		1	5	1	2	6				2	1	4	3	1	
GmCOMT37					6						8			2	5	1	1			1	5	5	
GmCOMT38			1		2		2				7							1		4	1		
GmCOMT39				1	3				1		5			5	2			2	1	6	3	1	
GmCOMT40				2	4				1		6			1	1		1			2	4		
GmCOMT41			1		7				1	1	8			1	2	1				3	1	1	
GmCOMT42				1	2						1	6			1			1	1	1	5	1	1
GmCOMT43					2		1				7			3	2					1	2	5	1
GmCOMT44				3	7	2				1	1	1		4				3		1	3	1	
GmCOMT45				1					1		13			1	1		1			2	4	1	
GmCOMT46				1					1	1	10		1		1			2		2	10	1	
GmCOMT47		1			1	2			1	1	4	1			1					8	1		
GmCOMT48		1	1		1						2						1			9	3		
GmCOMT49			1		1	6					3		1	6	1					5	4		
GmCOMT50			2		2		1		1	1	6			2				1	2	5	3	1	
GmCOMT51			1		3	6				2	6			4	4	2				5	2	2	

Figure S5. Expression pattern analysis of *GmOMTs* genes.

