

Electronic Supplementary Information

Developmental, chemical and transcriptional characteristics of artificially pollinated and hormone-induced parthenocarpic fruits of *Siraitia grosvenorii*

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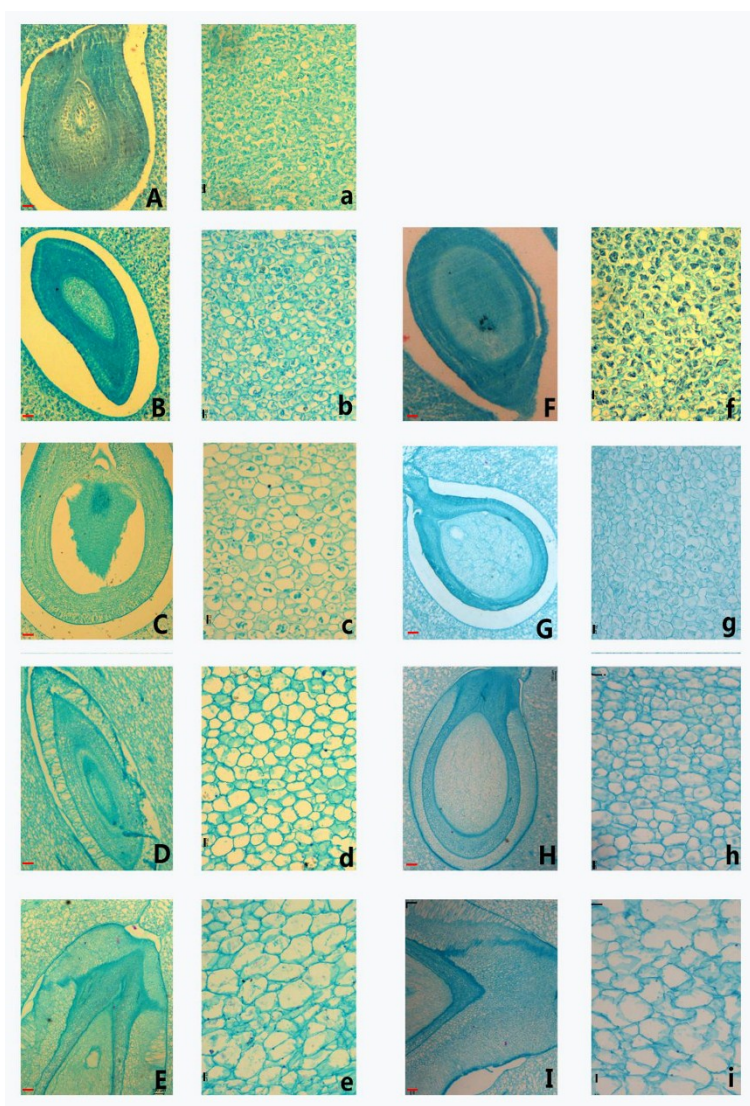
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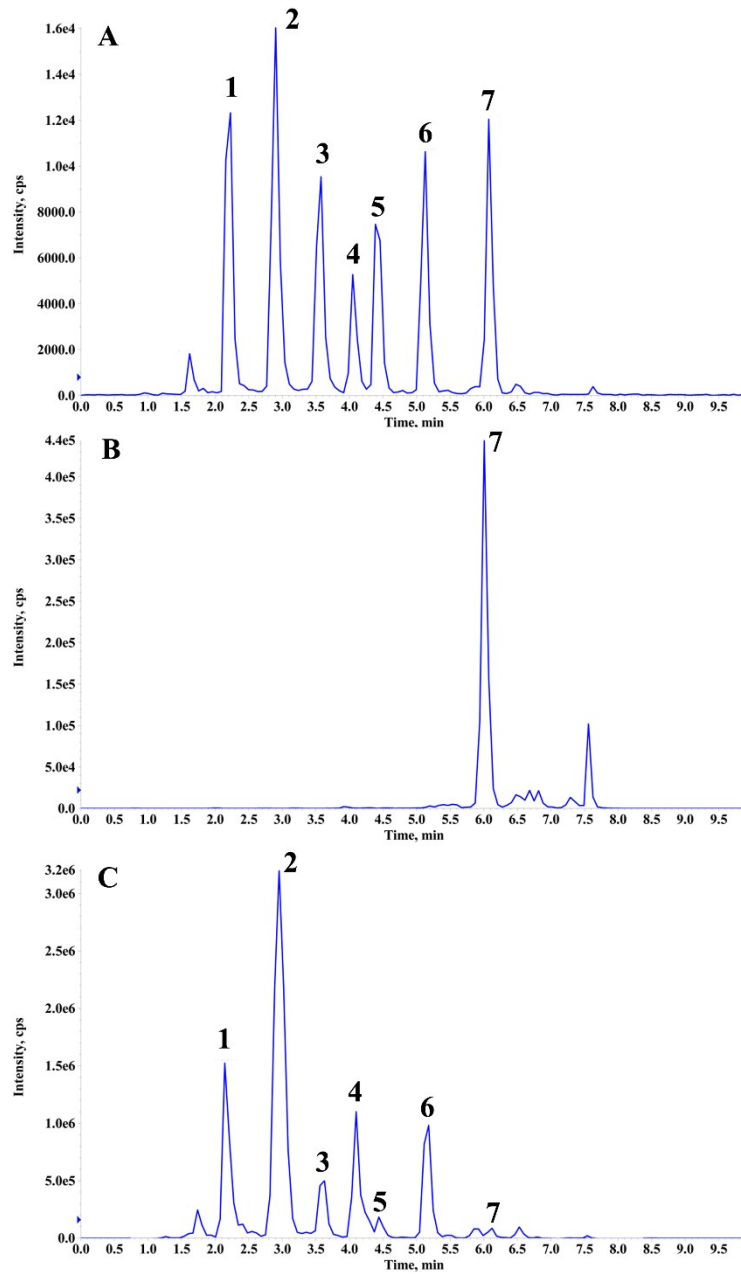
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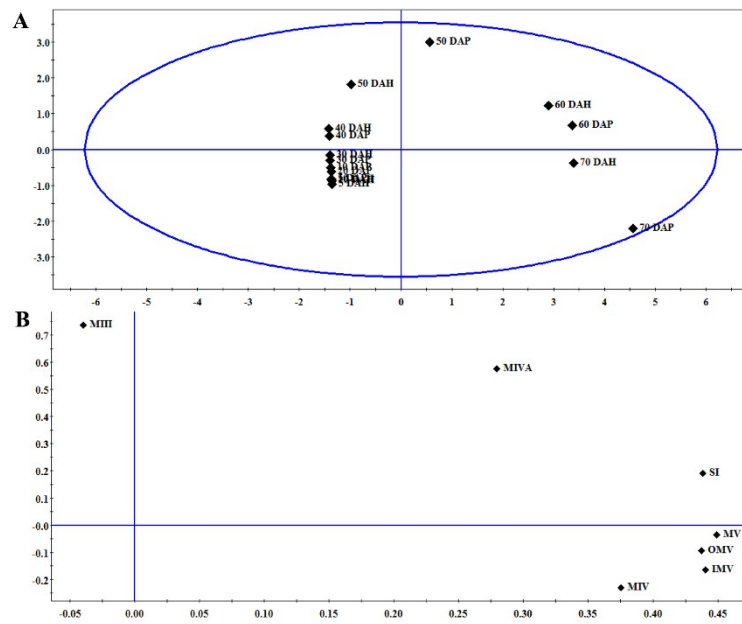
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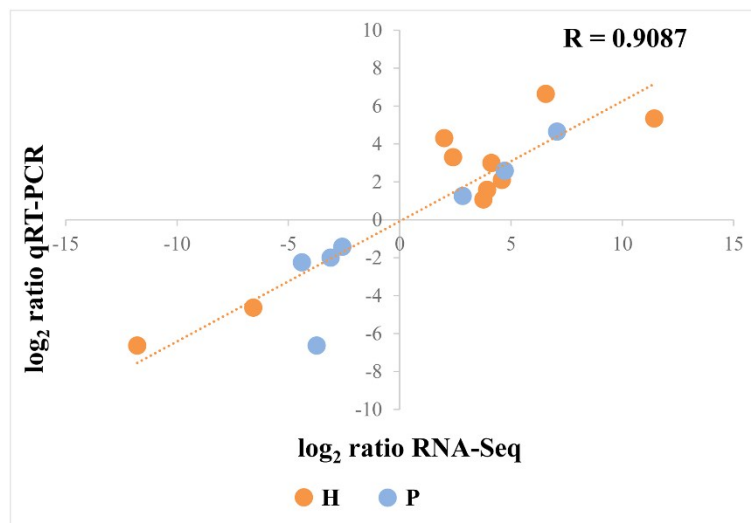
Supplementary Figure S1. Cytological observations of *S. grosvenorii* ovaries during early developmental stages. A, a: 0 DAA; B, b: H 1 DAA; C, c: H 3 DAA; D, d: H 5 DAA; E, e: H 10 DAA; F, f: P 1 DAA; G, g: P 3 DAA; H, h: P 5 DAA; I, i: P 10 DAA. H, hormone treated; P, pollinated. (A-I) The process of embryo development, red scale bar = 100 μ m. (a-i) Characteristics of pulp cells, black scale bar = 25 μ m.



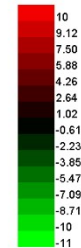
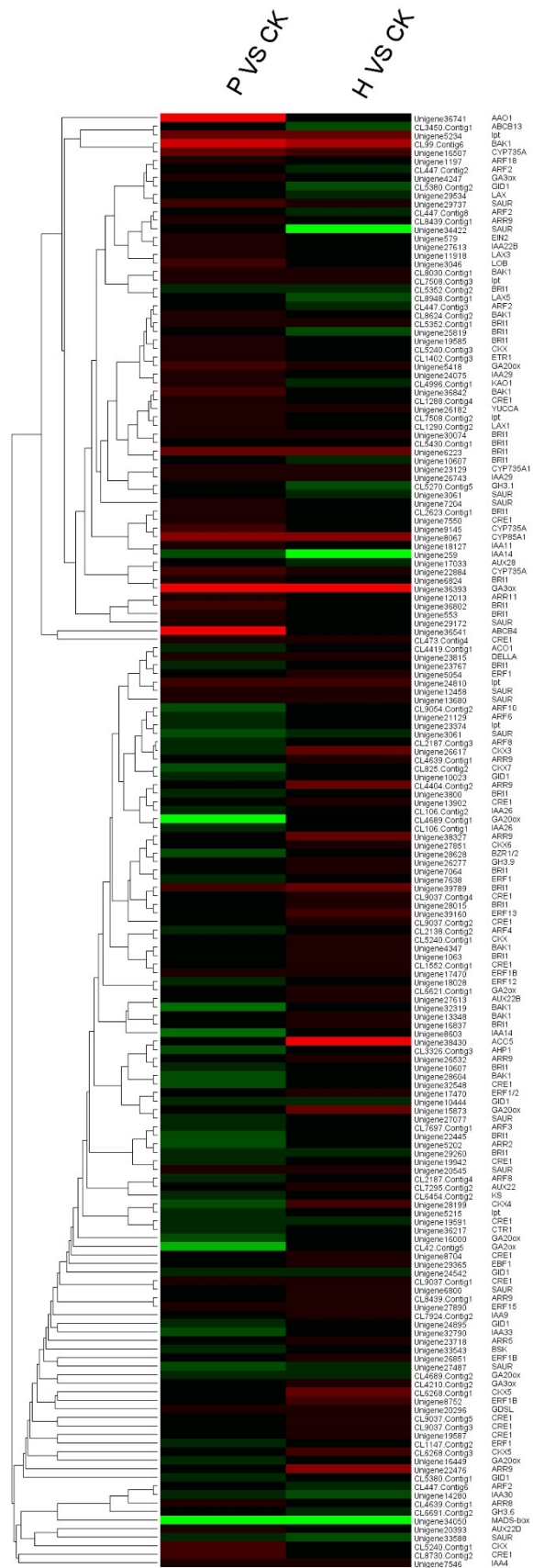
Supplementary Figure S2. Typical LC–MS/MS total ion chromatograms (TICs) of (A) standard solutions of seven mogrosides, (B) a pollinated sample at 5 DAA, and (C) a pollinated sample at 70 DAA. Peaks: 1. OMV, 2. MV, 3. IMV, 4. SI, 5. MIVA, 6. MIV, and 7. MIII.



Supplementary Figure S3. PCA score plot of *S. grosvenorii* fruit samples collected at different growing stages (A), and (B) loading plot obtained using Pareto scaling with mean centering. DAH, days after hormone treatment; DAP, days after pollination.



Supplementary Figure S4. The correlation between qRT-PCR and RNA-Seq. The X-axis indicates the \log_2 value of the fold change from RNA-Seq. The Y-axis represents \log_2 fold change of the qRT-PCR. The pollinated (P) and hormone-treated (H) ovaries were represented by points with different color.



Supplementary Figure S5. Cluster analysis of known genes associated with hormone biosynthesis and signaling in *S. grosvenorii* fruits. CK, untreated; H, hormone-treated; P, pollinated.

Supplementary Table S1. Optimized MS parameters for the seven mogrosides.

Analytes	Molecular formula	m/z precursor	m/z Productions	Ion ratio	DP (V)	CE (eV)
OMV	C ₆₀ H ₁₀₀ O ₂₉	1283.7	1121.6 ^a /959.5	1.42	-220	-85
MV	C ₆₀ H ₁₀₂ O ₂₉	1285.4	1123.5 ^a /961.4	2.00	-210	-85
IMV	C ₆₀ H ₁₀₂ O ₂₉	1285.4	1123.5 ^a /961.4	1.29	-210	-85
SI	C ₅₄ H ₉₂ O ₂₄	1123.4	961.6 ^a /799.2	2.13	-220	-75
MIVA	C ₅₄ H ₉₂ O ₂₄	1123.4	961.6 ^a /799.2	1.78	-220	-75
MIV	C ₅₄ H ₉₂ O ₂₄	1123.4	961.6 ^a /799.2	2.36	-220	-75
MIII	C ₄₈ H ₈₂ O ₁₉	961.4	799.5 ^a /637.2	4.00	-170	-70
Source temperature (°C)				500		
Ionization voltage (V)				-4500		
GS1 (psi)				50		
GS2 (psi)				40		
CUR (psi)				15		
CAD ^b				high		
Dwell time (ms)				400		
EP (V)				-10		
CXP (V)				-15		

^a Product ion used for quantification. ^b Collision activation dissociation

Supplementary Table S2. Validation of differential expression genes by qRT-PCR. A, Sequences of primers used for qRT-PCR; B, Validation of differential expression genes by qRT-PCR.

A. Sequences of primers used for qRT-PCR				
NO.	unigene	gene name	sequences of primers	
1	Unigene8603	<i>AUX/IAA14</i>	F: GCCACCAAGTGCATCCTACA	R: TCCGTCCATGCAAACCTTTA
2	Unigene24810	<i>ipt</i>	F: TAACGAAGAGGCAGTTGGGAAAG	R: TTATGCTTGGTTGCACCACTTGT
3	Unigene28199	<i>CKX-4</i>	F: GCTCCGAAACGACCACTCT	R: GCGTAGGGACCCAACGAAC
4	Unigene26617	<i>CKX-3</i>	F: TCAACATAGCCGCCAAAGGT	R: TGAGCACGTCAATCCACAGC
5	Unigene16507	<i>CYP735A</i>	F: AAAGCAGCTACGAAAAGGGAAAG	R: AAAACGGTGAGCAAATGGAAAA
6	Unigene26532	<i>ARR9</i>	F: TGCCTGGGATGACTGGCTATGAT	R: TCGTCAATGGCGGCTGAATGAGT
7	Unigene23718	<i>ARR5</i>	F: TGGAGAAGATAGAGGGAAGAGGA	R: GACGACGGAGGAGATAGTTGCAGAA
8	Unigene5202	<i>ARR2</i>	F: TGCAAGAGTGAACATGGTGGAA	R: CATTAAACGATGCTGGCGAAAC
9	Unigene38430	<i>ACO5</i>	F: AGCAAACCAGGAGGTGGAACA	R: GGGAGGAACTTCTGCTCAGCAT
10	Unigene8067	<i>CYP85A1</i>	F: GACGATAGATTGGCTAATGTGGG	R: GAGAATCAAAGTAAGAGTGGTGGAG
11	Unigene28604	<i>BAK1</i>	F: GCGGCTCTTTGTGATTTTCCT	R: ATGTGACCCCAGCCCAGGTAC
12	Unigene34050	<i>MADS-box</i>	F: AAGGTGGAGATGGTGAAGATGC	R: GGCGAGAAGACGATGATGGC

B. Validation of differential expression genes by qRT-PCR				
	unigene	gene name	log2 ratio RNA-Seq	log2 ratio qRT-PCR
H VS CK	Unigene26617_All	<i>CKX3</i>	4.59	2.10
	Unigene28199_All	<i>CKX4</i>	3.77	1.07
	Unigene8603_All	<i>AUX/IAA14</i>	-6.57	-4.64
	Unigene24810_All	<i>ipt</i>	3.93	1.58
	Unigene38430_All	<i>ACO1</i>	11.44	5.34
	Unigene8067_All	<i>CYP85A1</i>	6.56	6.64
	Unigene16507_All	<i>CYP735A</i>	4.13	3.00
	Unigene26532_All	<i>ARR9</i>	2.40	3.30
	Unigene23718_All	<i>ARR5</i>	2.00	4.30
	Unigene34050_All	<i>MADS-box</i>	-11.79	-6.64
P VS CK	Unigene8603_All	<i>AUX/IAA14</i>	-4.38	-2.25
	Unigene28199_All	<i>CKX4</i>	-3.72	-6.64
	Unigene24810_All	<i>ipt</i>	2.84	1.25
	Unigene8067_All	<i>CYP85A1</i>	7.08	4.64
	Unigene16507_All	<i>CYP735A</i>	4.73	2.58
	Unigene5202_All	<i>ARR2</i>	-3.10	-2.00
	Unigene28604_All	<i>BAK1</i>	-2.56	-1.43

Supplementary Table S3. Contents (mg/g) of the seven mogrosides in the tested samples (n = 3, mean ± SD).

compounds	pollination																	
	0 DAA		5 DAA		10 DAA		20 DAA		30 DAA		40 DAA		50 DAA		60 DAA		70 DAA	
	Content	SD	Content	SD	Content	SD	Content	SD	Content	SD	Content	SD	Content	SD	Content	SD	Content	SD
OMV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.01	1.50	0.01	2.24	0.05
MV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.03	0.09	10.13	0.40	13.49	0.08
IMV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.03	0.91	0.08	1.44	0.04
SI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	3.09	0.01	4.02	0.13	3.98	0.08
MIVA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	4.48	0.14	4.19	0.03	0.23	0.03
MIV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.01	0.89	0.01	1.73	0.02
MIII	0.00	0.00	0.60	0.00	1.41	0.01	1.14	0.03	1.92	0.05	3.57	0.07	6.08	0.29	2.29	0.01	0.10	0.01
parthenocarpy																		
	5 DAA		10 DAA		20 DAA		30 DAA		40 DAA		50 DAA		60 DAA		70 DAA			
	Content	SD	Content	SD	Content	SD	Content	SD	Content	SD	Content	SD	Content	SD	Content	SD	Content	SD
OMV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	1.89	0.01	2.51	0.07		
MV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.19	0.00	11.55	0.32	13.23	0.44		
IMV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.60	0.05	1.00	0.02		
SI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.76	0.03	4.25	0.06	4.07	0.19		
MIVA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	1.69	0.00	4.28	0.04	2.00	0.20		
MIV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.23	0.01	0.31	0.00		
MIII	0.22	0.00	0.58	0.02	0.47	0.55	2.26	0.00	4.05	0.15	5.66	0.16	2.58	0.09	1.10	0.06		

Supplementary Table S4. The differentially expressed genes in the fruits set were compared with those in untreated ovaries. In excel file

Supplementary Table S5. Known genes associated with hormone biosynthesis and signaling in *S. grosvenorii* fruits.

gene ID	gene name	log2 Ratio (P VS CK)	log2 Ratio (H VS CK)
Unigene36741	<i>AAO1</i>	12.36	0.00
CL3450.Contig1	<i>ABCB13</i>	0.00	-2.53
Unigene36541	<i>ABCB4</i>	11.59	0.00
CL4419.Contig1	<i>ACO1</i>	-1.09	0.00
Unigene38430	<i>ACO5</i>	0.00	11.44
CL3326.Contig3	<i>AHP1</i>	-2.77	0.00
CL9054.Contig2	<i>ARF10</i>	-3.49	0.00
Unigene1197	<i>ARF18</i>	1.62	0.00
CL447.Contig8	<i>ARF2</i>	0.00	-1.19
CL447.Contig2	<i>ARF2</i>	0.00	-1.05
CL447.Contig6	<i>ARF2</i>	0.00	-1.04
CL447.Contig3	<i>ARF2</i>	0.00	-1.01
CL7697.Contig1	<i>ARF3</i>	-1.15	0.00
CL2138.Contig2	<i>ARF4</i>	-1.57	0.00
Unigene21129	<i>ARF6</i>	-1.69	0.00
CL2187.Contig3	<i>ARF8</i>	-1.61	0.00
CL2187.Contig4	<i>ARF8</i>	-1.08	0.00
Unigene12013	<i>ARR11</i>	1.26	0.00
Unigene5202	<i>ARR2</i>	-3.10	0.00
Unigene23718	<i>ARR5</i>	0.00	2.00
CL4639.Contig1	<i>ARR8</i>	1.04	0.00
Unigene26532	<i>ARR9</i>	0.00	2.40
CL8439.Contig1	<i>ARR9</i>	1.81	0.00
Unigene22476	<i>ARR9</i>	0.00	6.32
Unigene38327	<i>ARR9</i>	0.00	5.62
CL4404.Contig2	<i>ARR9</i>	0.00	5.59
CL8439.Contig1	<i>ARR9</i>	0.00	2.61
CL4639.Contig1	<i>ARR9</i>	0.00	1.10
CL7295.Contig2	<i>AUX22</i>	0.00	1.64
Unigene27613	<i>AUX22B</i>	0.00	1.82
Unigene20393	<i>AUX22D</i>	1.36	0.00
Unigene17033	<i>AUX28</i>	0.00	-1.67
CL99.Contig6	<i>BAK1</i>	9.42	8.90
Unigene36842	<i>BAK1</i>	3.52	0.00
CL8030.Contig1	<i>BAK1</i>	1.46	1.26
CL8624.Contig2	<i>BAK1</i>	1.10	0.00
Unigene32319	<i>BAK1</i>	-3.92	0.00
Unigene28604	<i>BAK1</i>	-2.56	0.00

Unigene13348	<i>BAK1</i>	0.00	1.45
Unigene4347	<i>BAK1</i>	0.00	1.19
Unigene6223	<i>BRI1</i>	5.12	4.74
Unigene36802	<i>BRI1</i>	4.20	0.00
Unigene39789	<i>BRI1</i>	4.20	4.31
Unigene30074	<i>BRI1</i>	1.77	1.71
Unigene6824	<i>BRI1</i>	1.67	0.00
CL5352.Contig1	<i>BRI1</i>	1.59	1.37
Unigene553	<i>BRI1</i>	1.26	0.00
Unigene19585	<i>BRI1</i>	1.18	0.00
CL2623.Contig1	<i>BRI1</i>	1.14	0.00
CL5430.Contig1	<i>BRI1</i>	1.01	0.00
Unigene22445	<i>BRI1</i>	-2.41	0.00
Unigene29260	<i>BRI1</i>	-2.22	-1.40
Unigene10607	<i>BRI1</i>	-1.72	0.00
Unigene3800	<i>BRI1</i>	-1.70	0.00
Unigene23767	<i>BRI1</i>	-1.66	0.00
CL5352.Contig2	<i>BRI1</i>	-1.11	-1.51
Unigene7064	<i>BRI1</i>	0.00	1.03
Unigene28015	<i>BRI1</i>	0.00	2.06
Unigene1063	<i>BRI1</i>	0.00	1.23
Unigene16837	<i>BRI1</i>	0.00	1.13
Unigene25819	<i>BRI1</i>	0.00	-2.76
Unigene10607	<i>BRI1</i>	0.00	-1.53
Unigene33543	<i>BSK</i>	-2.00	0.00
Unigene28628	<i>BZR1/2</i>	-2.66	0.00
CL5240.Contig1	<i>CKX</i>	2.72	0.00
CL5240.Contig3	<i>CKX</i>	1.31	0.00
CL5240.Contig1	<i>CKX</i>	0.00	1.69
Unigene26617	<i>CKX3</i>	-1.97	4.59
Unigene28199	<i>CKX4</i>	-3.72	3.77
CL6268.Contig1	<i>CKX5</i>	0.00	5.27
CL6268.Contig3	<i>CKX5</i>	0.00	3.03
Unigene27851	<i>CKX6</i>	0.00	2.02
CL825.Contig2	<i>CKX7</i>	-2.45	0.00
CL8730.Contig2	<i>CRE1</i>	3.20	0.00
CL9037.Contig1	<i>CRE1</i>	1.55	2.03
Unigene7550	<i>CRE1</i>	1.43	0.00
CL473.Contig4	<i>CRE1</i>	1.42	1.42
CL1288.Contig4	<i>CRE1</i>	1.13	0.00
Unigene32548	<i>CRE1</i>	-2.77	0.00
Unigene19591	<i>CRE1</i>	-1.84	-1.78
Unigene19942	<i>CRE1</i>	-1.55	0.00
CL9037.Contig5	<i>CRE1</i>	0.00	2.18
CL9037.Contig3	<i>CRE1</i>	0.00	2.05

Unigene19587	<i>CRE1</i>	0.00	2.05
CL9037.Contig4	<i>CRE1</i>	0.00	2.03
CL1552.Contig1	<i>CRE1</i>	0.00	1.39
Unigene8704	<i>CRE1</i>	0.00	1.34
CL9037.Contig2	<i>CRE1</i>	0.00	1.33
Unigene13902	<i>CRE1</i>	0.00	1.24
Unigene36217	<i>CTR1</i>	-1.84	0.00
Unigene16507	<i>CYP735A</i>	4.73	4.13
Unigene9145	<i>CYP735A</i>	3.69	0.00
Unigene22884	<i>CYP735A</i>	3.05	2.07
Unigene23129	<i>CYP735A1</i>	1.29	1.10
Unigene8067	<i>CYP85A1</i>	7.08	6.56
Unigene23815	<i>DELLA</i>	1.17	2.00
Unigene29365	<i>EBF1</i>	0.00	1.34
Unigene579	<i>EIN2</i>	1.19	0.00
Unigene7638	<i>ERF1</i>	-1.17	0.00
CL1147.Contig2	<i>ERF1</i>	-1.09	0.00
Unigene5054	<i>ERF1</i>	0.00	1.79
Unigene17470	<i>ERF1/2</i>	0.00	2.37
Unigene18028	<i>ERF12</i>	-1.02	0.00
Unigene39160	<i>ERF13</i>	0.00	3.01
Unigene27890	<i>ERF15</i>	1.82	2.52
Unigene17470	<i>ERF1B</i>	1.48	2.37
Unigene8752	<i>ERF1B</i>	0.00	2.92
Unigene26851	<i>ERF1B</i>	0.00	1.04
CL1402.Contig3	<i>ETR1</i>	1.18	0.00
Unigene5418	<i>GA20ox</i>	2.78	2.61
CL4689.Contig1	<i>GA20ox</i>	-10.12	0.00
Unigene16000	<i>GA20ox</i>	-2.59	0.00
Unigene16449	<i>GA20ox</i>	-1.46	0.00
CL4689.Contig2	<i>GA20ox</i>	-1.10	-1.05
Unigene15873	<i>GA20ox</i>	0.00	4.74
CL42.Contig5	<i>GA2ox</i>	-8.63	0.00
CL6621.Contig1	<i>GA2ox</i>	0.00	1.27
Unigene36393	<i>GA3ox</i>	11.83	11.59
Unigene4247	<i>GA3ox</i>	1.02	0.00
CL4210.Contig2	<i>GA3ox</i>	0.00	1.46
Unigene20296	<i>GDSL</i>	1.86	2.30
CL5270.Contig5	<i>GH3.1</i>	0.00	-2.92
CL6691.Contig2	<i>GH3.6</i>	0.00	-1.25
Unigene26277	<i>GH3.9</i>	0.00	1.17
Unigene24895	<i>GID1</i>	-1.77	0.00
Unigene10444	<i>GID1</i>	-1.70	-1.47
CL5380.Contig1	<i>GID1</i>	-1.58	0.00
Unigene24542	<i>GID1</i>	-1.51	-1.11

Unigene10023	<i>GID1</i>	-1.01	0.00
CL5380.Contig2	<i>GID1</i>	0.00	-2.33
Unigene18127	<i>IAA11</i>	1.15	0.00
Unigene259	<i>IAA14</i>	-2.37	-11.95
Unigene27613	<i>IAA22B</i>	1.93	0.00
CL106.Contig2	<i>IAA26</i>	-2.23	0.00
CL106.Contig1	<i>IAA26</i>	-2.15	0.00
Unigene26743	<i>IAA29</i>	2.26	2.03
Unigene24075	<i>IAA29</i>	1.10	0.00
Unigene14280	<i>IAA30</i>	-1.40	-3.18
Unigene32790	<i>IAA33</i>	-3.72	0.00
Unigene7546	<i>IAA4</i>	1.60	1.35
Unigene8603	<i>IAA14</i>	-4.38	0.00
CL7924.Contig2	<i>IAA9</i>	0.00	1.76
Unigene5234	<i>lpt</i>	5.36	5.23
Unigene24810	<i>lpt</i>	2.84	3.93
CL7508.Contig3	<i>lpt</i>	2.43	2.12
CL7508.Contig2	<i>lpt</i>	2.26	0.00
Unigene5215	<i>lpt</i>	-1.63	0.00
Unigene23374	<i>lpt</i>	-1.62	0.00
CL4996.Contig1	<i>KAO1</i>	1.26	-2.09
CL6454.Contig2	<i>KS</i>	-1.03	0.00
Unigene29534	<i>LAX</i>	0.00	-1.97
CL1290.Contig2	<i>LAX1</i>	1.70	0.00
Unigene11918	<i>LAX3</i>	1.81	0.00
CL8948.Contig1	<i>LAX5</i>	0.00	-2.49
Unigene3046	<i>LOB</i>	3.10	0.00
Unigene34050	<i>MADS-box</i>	-11.79	-11.79
Unigene29172	<i>SAUR</i>	2.59	0.00
Unigene12458	<i>SAUR</i>	1.74	1.76
Unigene13680	<i>SAUR</i>	1.50	1.54
Unigene20545	<i>SAUR</i>	1.34	2.05
Unigene7204	<i>SAUR</i>	1.12	0.00
Unigene27487	<i>SAUR</i>	-3.04	-1.90
Unigene3061	<i>SAUR</i>	-2.62	-1.51
Unigene33588	<i>SAUR</i>	-2.16	-2.69
Unigene27077	<i>SAUR</i>	-1.06	0.00
Unigene29737	<i>SAUR</i>	2.66	1.73
Unigene6800	<i>SAUR</i>	0.00	2.25
Unigene34422	<i>SAUR</i>	0.00	-11.38
Unigene3061	<i>SAUR</i>	0.00	-1.51
Unigene26182	<i>YUCCA</i>	1.67	1.21
