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The floral essential oil composition of *Albizia julibrissin* growing in Northern Alabama

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Abstract
The floral essential oil of *Albizia julibrissin*, "silktree", growing in Huntsville, Alabama, was obtained by hydrodistillation and analyzed by gas chromatography – mass spectrometry. The oil was dominated by palmitic acid (23.3%), *trans*-linalool oxide (both furanoid and pyranoid forms, 6.6% and 7.0%, respectively), pentacosane (7.2%), methyl salicylate (6.2%), eugenol (6.1%), and 1-octanol (5.2%).

Keywords: palmitic acid, *trans*-linalool oxide, methyl salicylate, eugenol.

1. Introduction
Albizia julibrissin Durazz. (Fabaceae, Mimosoideae), known as "silktree" or "mimosa", is native to Asia, ranging naturally from Iran to Japan[1]. The plant was introduced to North America as an ornamental and has become naturalized along roadsides and woodland borders throughout the southeastern United States[2]. The tree produces fragrant showy flowerheads May through August. Because of our interest in fragrant floral essential oils[3-6], we investigated *A. julibrissin*. The floral fragrance volatiles of *A. julibrissin* growing in China has been previously reported[7].

2. Materials and Methods
2.1 Plant Material
Flowers of *A. julibrissin* were collected in July, 2012, from several treelets growing wild in Huntsville, Alabama (34°43′N, 86°39′W, 196 m elevation), and stored at 20 °C. The flowers (29.5 g) were hydrodistilled using a Likens-Nickerson apparatus to give a clear colorless essential oil (18.2 mg).

2.2 Gas Chromatography – Mass Spectrometry
The floral essential oil of *A. julibrissin* was analyzed by GC-MS using an Agilent 6890 GC with Agilent 5973 mass selective detector, an HP-5ms fused silica capillary column, and an Agilent ChemStation data system as described previously[8]. Identification of the oil components was based on their retention indices (RI) and by comparison of their mass spectral fragmentation patterns with those reported in the literature[9]. The *A. julibrissin* floral essential oil composition is summarized in Table 1.

3. Results and Discussion
The major components from the hydrodistilled floral essential oil of *A. julibrissin* in this study were palmitic acid (23.3%), *trans*-linalool oxide (furanoid form, 6.6%), *trans*-linalool oxide (pyranoid form, 7.0%), pentacosane (7.2%), methyl salicylate (6.2%), eugenol (6.1%), and 1-octanol (5.2%). Other compounds likely contributing to the fragrance were linalool (3.1%), and *cis*-linalool oxides (furanoid and pyranoid forms, 0.9% and 0.5%, respectively). The volatile floral components previously reported from China were obtained by headspace techniques and contained mostly *trans*-linalool oxide (furanoid form, 44.0%), *cis*-linalool oxide (furanoid form, 5.2%),

Table 1: Floral essential oil composition of *Albizia julibrissin*.

RI[a]	Compound	%[b]		RI	Compound	%
801	Hexanal	1.3		1252	Geraniol	0.2
835	2-Furaldehyde	0.1		1273	Nonanoic acid	0.8
855	(2*E*)-Hexenal	1.7		1292	Indole	0.5
857	(3*Z*)-Hexenol	3.1		1300	Tridecane	tr
868	(2*Z*)-Hexenol	1.7		1315	(2*E*,4*E*)-Decadienal	0.7
870	1-Hexanol	3.7		1357	Eugenol	6.1
904	Heptanal	0.6		1454	Geranyl acetone	0.8
988	3-Octanone	0.2		1487	(*E*)-β-Ionone	tr
989	6-Methyl-5-hepten-2-one	0.1		1500	Pentadecane	0.2
1072	1-Octanol	5.2		1510	α-Bulnesene	tr
1072	*cis*-Linalool oxide (furanoid)	0.9		1700	Heptadecane	0.1
1089	*trans*-Linalool oxide (furanoid)	6.6		1716	Pentadecanal	1.3
1101	Linalool	3.1		1765	Myristic acid	0.2
1105	Nonanal	2.5		1815	Hexadecanal	1.2
1113	2-Phenylethyl alcohol	0.2		1844	(2*E*,6*E*)-Farnesyl acetate	0.2
1139	Benzeneacetonitrile	0.2		1846	Unidentified[d]	1.3
1154	(2*E*,6*Z*)-Nonadienal	0.1		1912	Farnesyl acetone	0.6
1160	(2*E*)-Nonenal	0.2		1963	Palmitic acid	23.3
1169	*cis*-Linalool oxide (pyranoid)	0.5		2130	Linoleic acid	1.3
1174	*trans*-Linalool oxide (pyranoid)	7.0		2135	Oleic acid	0.5
1190	α-Terpineol	0.5		2300	Tricosane	4.0
1193	Methyl salicylate	6.2		2500	Pentacosane	7.2
1205	Decanal	tr[c]		2700	Heptacosane	1.7
					Total Identified	96.7

[a] RI = "Retention Index" determined in reference to a homologous series of *n*-alkanes on an HP-5ms column.

[b] The percentages of each component are reported as raw percentages based on total ion current without standardization.

[c] tr = "trace" (< 0.05%).

[d] MS, m/z(%): 124(4), 113(3), 110(7), 109(13), 95(12), 85(14), 83(9), 81(8), 71(28), 69(15), 59(20), 58(50), 57(24), 55(29), 43(100), 41(32).

linalool (4.4%), isoamyl alcohol (17.2%), 4-penten-2-one (5.1%), 2,2,4-trimethyloxetane (3.9%) and isoamyl acetate (3.2%)[7]. Thus, while there are similarities in the content of linalool derivatives, there are also some notable differences, in particular, the absence of methyl salicylate and eugenol in the sample from China as well as the absence of isoamyl alcohol and isoamyl acetate in the sample from Alabama. The absence of higher boiling components from the sample from China can be attributed to headspace collection as opposed to hydrodistillation.

Interestingly, the floral oil compositions of *A. julibrissin* are very different from other floral essential oils of the Fabaceae, such as clover (*Trifolium* spp., dominated by maltol and linalool)[10], alfalfa (*Medicago sativa*, dominated by (2*E*)-hexenal)[11], or sweet pea (*Lathyrus odoratus*, dominated by (*E*)-β-ocimene and linalool)[12].

4. Conclusions

The presence of linalool, *trans*-linalool oxide, methyl salicylate, and eugenol are likely responsible for the fragrant odor of silktree blossoms.

5. References

1. Meyer R. *Albizia julibrissin*. In: Fire Effects Information System [online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, 2010. http://www.fs.fed.us/database/feis/. 3 October, 2013.
2. Radford AE, Ahles HE, Bell CR. Manual of the Vascular Flora of the Carolinas. University of North Carolina Press, Chapel Hill, NC, 1968, 574.
3. Setzer WN, Noletto JA, Haber WA. Chemical composition of the floral essential oil of *Psychotria eurycarpa* from Monteverde, Costa Rica. Journal of Essential Oil-Bearing Plants 2006; 9(1):28-31.
4. Setzer WN, Noletto JA, Lawton RO. Chemical composition of the floral essential oil of *Randia matudae* from Monteverde, Costa Rica. Flavour and Fragrance Journal 2006; 21:244-246.
5. Anthony SJ, Zuchowski W, Setzer WN. Composition of the floral essential oil of *Brugmansia suaveolens*. Records of Natural Products, 2009; 3(2):76-81.
6. Davé PC, Vogler B, Setzer WN. Composition of the floral essential oil of *Magnolia grandiflora* L. (Magnoliaceae): Intraspecific and floral maturity variations. Journal of Essential Oil-Bearing Plants 2012; 15(5):694-702.
7. Li C, Zheng Y, Sun Y, Wu Z, Liu M. Volatile constituents of the flower of *Albizia julibrissin* Durazz. Fenzi Huazue 1988; 16:585-589.
8. Wright C, Chhetri BK, Setzer WN. Chemical composition and phytotoxicity of the essential oil of *Encelia farinosa* growing in the Sonoran Desert. American Journal of Essential Oils and Natural Products 2013; 1(1):18-22.
9. Adams RP. Identification of Essential Oil Components by Gas Chromatography/Mass Spectrometry, Edn 4, Allured Publishing, Carol Stream, Illinois, USA, 2007.
10. Buchbauer G, Jirovetz L, Nikiforov A. Comparative investigation of essential clover flower oils from Austria using gas chromatography – flame ionization detection, gas chromatography – mass spectrometry, and gas chromatography – olfactometry. Journal of Agricultural and Food Chemistry 1996; 44:1827-1828.
11. Tava A, Pecetti L. Volatiles from *Medicago sativa* complex flowers. Phytochemistry 1997; 45(6):1145-1148.
12. Porter AEA, Griffiths DW, Robertson GW, Sexton R. Floral volatiles of the sweet pea *Lathyrus odoratus*. Phytochemistry 1999; 51:211-214.