

Natural Product Studies of US Endangered Plants: Volatile Components of
Lindera melissifolia (Lauraceae) Repel Mosquitoes and Ticks

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Fig. S1. Photos of *Lindera melissifolia* in the field under canopy, its unripe drupes, inflorescence and ripened drupes used for the volatile oil extraction (Photo credit: Dr. Theodor D. Leininger)



Herbarium of the U.S. Forest Service
Southern Hardwoods Laboratory
Mississippi

Sharkey County

Lindera melissifolia (Walt.) Blume Lauraceae

GSRC colony 20 F, Delta National Forest. 36°
26'32.9''N, 71°45'52''E. Collected from
potted plants in greenhouse at U.S. Forest
Service, Southern Hardwoods Laboratory,
Washington Co., MS.

D. Skojac w/ T. Hawkins 27 September 2005

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Fig. S2. Herbarium voucher deposited at the Southern Hardwoods Laboratory Sharkey County, Mississippi (U.S.)

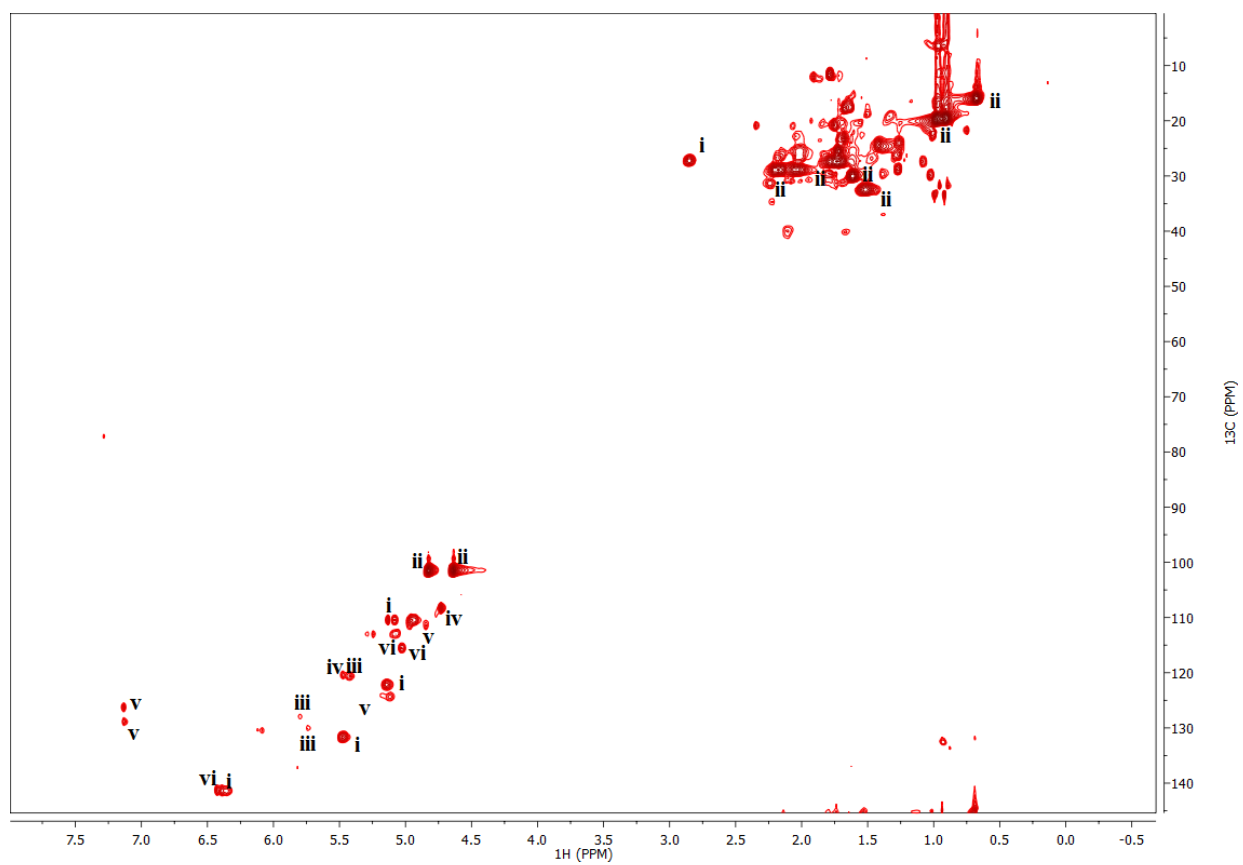


Fig. S3. gHSQC spectrum of the pondberry essential oil and identified major components of the oil (CDCl_3). (i) (*E*)- β -ocimene, (ii) sabinene, (iii) α -phellandrene, (iv) limonene, (v) *p*-cymene, (vi) myrcene

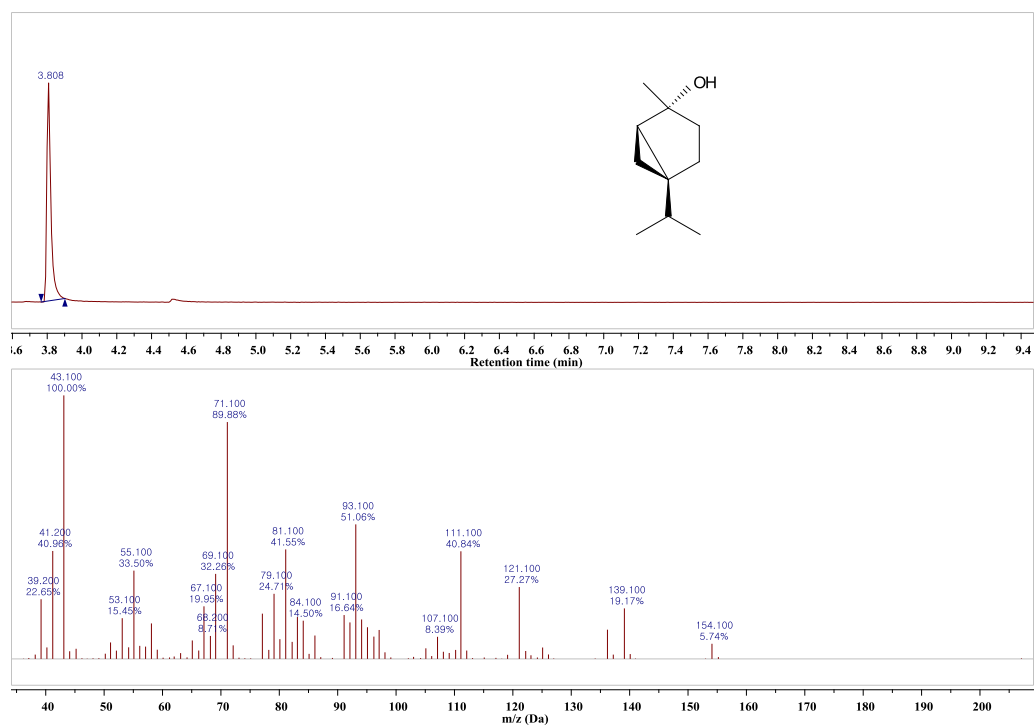
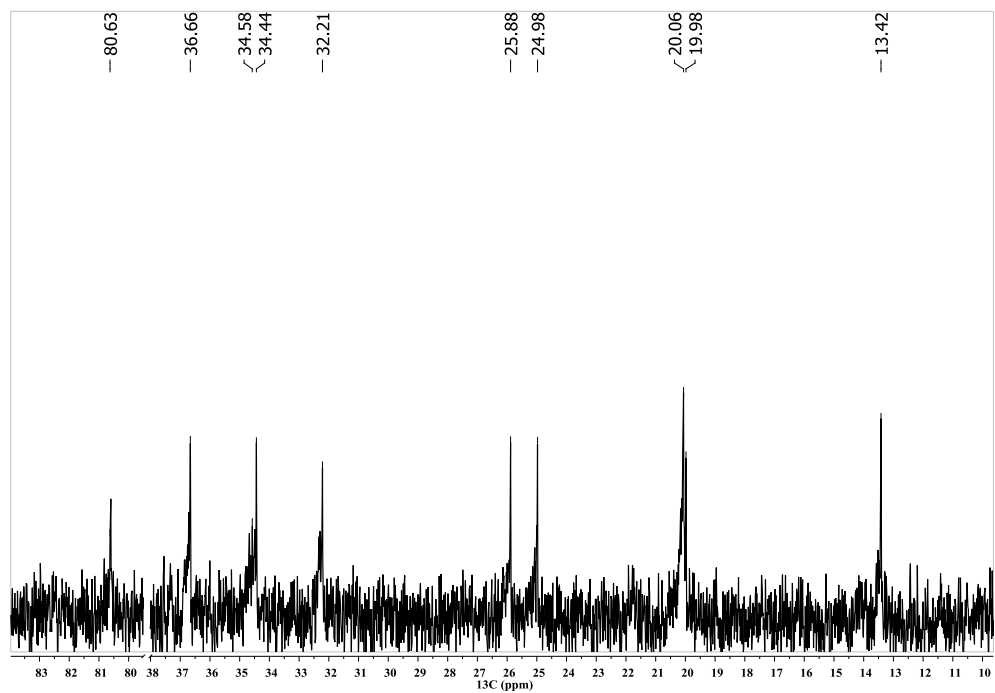


Fig. S4. ^{13}C NMR and GC-MS spectrum of *trans*-sabinene hydrate

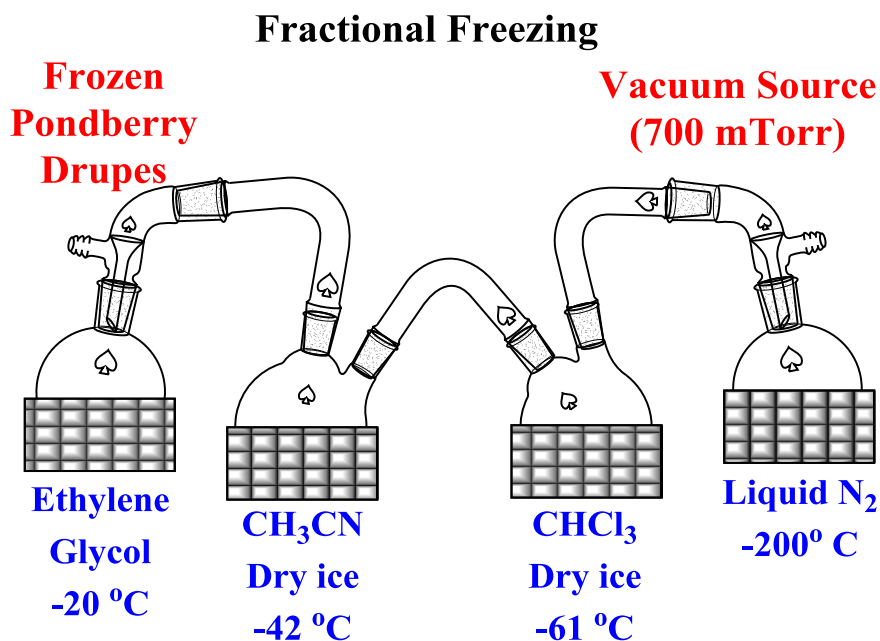


Fig. S5. Schematic diagrams of the fractional freezing apparatus to fractionate pongberry essential oil

Table S1

Mosquito (*Ae. aegypti*) repellency of *Lindera melissifolia* essential oil (Sample A) and hexanes extract (Sample B). The essential oil showed moderate mosquito repellency but the hexanes extract was proven to be ineffective.

Sample	MED ^a	SD ^b	SE ^c	HDA ^d
A	0.5	0.217	0.125	1.5
B	-	-	-	0.75
DEET ^e	0.023	0.000	0.000	1.5

^a Minimum effective dose (mg/cm²). ^b Standard deviation. ^c Standard error. ^d Highest dose available (mg/cm²). ^e *N,N*-diethyl-3-methylbenzamide.

Table S2

Mosquito (*Ae. aegypti*) repellency minimum effective dose (MED, mg/cm²) of the fractions generated by fractional freezing. The fractional freezing can enrich some mosquito repellent components of *Lindera melissifolia* essential based on the observation that the minimum effective doses of -20 and -40 °C were lowered than the one of the pongberry crude oil.

Fraction	MED	SD ^a	SE ^b	HAD ^c
-20 °C	0.187	0.000	0.000	0.375
-42 °C	0.25	0.109	0.063	0.75
-61 °C	0.469	0.398	0.23	0.75
-200 °C	-	-	-	0.75
DEET ^d	0.013	0.009	0.005	0.75

^a Standard deviation. ^b Standard error. ^c Highest dose available (mg/cm²). ^d *N,N*-diethyl-3-methylbenzamide.

Table S3
Components identified in the collected essential oil fractions generated by fractional freezing

Components	Code	-20 °C %	-42 °C %	-61 °C %	-200 °C %
α -pinene	A		3.20	7.27	7.13
α -thujene	B		1.52	5.46	3.47
camphene	C		0.45		
β -pinene	D	0.28	0.32	2.67	2.87
sabinene	E	9.23	61.42	62.89	70.93
myrcene	F	0.43	1.30		
α -phellandrene	G	0.53	6.66	4.91	2.70
α -terpinene	H	0.47	0.50	4.56	2.16
limonene	I		3.87	1.10	Tr
1,8-cineole	J	8.78	1.39	0.85	2.50
(<i>E</i>)- β -ocimene	K	3.53		1.21	1.76
γ -terpinene	L	1.64	11.04	7.14	4.71
<i>p</i> -cymene	M	3.30	2.47	0.76	1.77
2-methyl butyl 2-methyl butyrate	N		0.48		
alloocimene	O		0.42		
terpinolene	P	0.52	0.87	1.18	
citronellal	Q	0.54	0.50		
linalool	R	2.39			
geraniol	S	0.55			
bornyl acetate	T	1.90	0.22		
terpinen-4-ol	U	28.90	0.65		
α -terpinyl acetate	V	1.87			
β -caryophyllene	W	13.80	1.69		
α -humulene	X	0.90	0.08		
germacrene D	Y	2.30	0.33		
pregeijerene B	Z		0.12		
sabina ketone	AA	0.30			
citronellyl acetate	AB	3.10	0.29		
α -copanene	AC	0.37			
geranyl acetate	AD	1.22			
β -elemene	AE	0.61	0.05		
citronellol	AF	8.34	0.17		
caryophyllene oxide	AG	4.21			

% Calculated from areas of each peaks corresponding to each components on GC chromatogram.