

SUPPLEMENTARY MATERIAL

Antitumor and *Aedes aegypti* larvicidal activities of essential oils from *Piper klotzschianum*, *Piper hispidum*, and *Piper arboreum*

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Table S1. Yields (% w/w) of essential oils extracted from *Piper* species.

		(%) ^a
<i>P. klotzschianum</i>	Fresh leaves	0.15±0.01 ^b
	Dried leaves	0.46±0.01
	Stems	0.30±0.02
<i>P. hispidum</i>	Fresh leaves	0.22±0.02 ^b
	Dried leaves	0.59±0.09
	Stems	0.12±0.01
<i>P. arboreum</i>	Fresh leaves	0.16±0.03 ^b
	Dried leaves	1.12±0.11
	Stems	0.08±0.01

^a weight of dried or fresh plant/weight of essential oil, humidity of dried samples (5.33±0.09%); ^bhumidity of fresh leaves was not measured.

The chemical constituents of the oils, determined by Gas Chromatography-Mass Spectrometry and Gas Chromatography-Flame Ionization Detector GC-MS-FID, are shown in Table S2.

Table S2. Chemical constituents identified using GC-MS-FID of the essential oil of *Piper* species

RRI _{exp.}	RRI _{lit.}	Compound	<i>P. klotzschianum</i>			<i>P. hispidum</i>			<i>P. arboreum</i>		
			Fresh leaves (%)	Dried leaves (%)	Stems (%)	Fresh leaves (%)	Dried leaves (%)	Stems (%)	Fresh leaves (%)	Dried leaves (%)	Stems (%)
935	932	α -pinene	1.4 \pm 0.3	0.7 \pm 0.0	7.2 \pm 0.5	0.5 \pm 0.1	0.9 \pm 0.1	-	0.6 \pm 0.1	0.8 \pm 0.1	-
980	974	β -pinene	5.1 \pm 0.3	2.3 \pm 0.2	27.2 \pm 0.3	-	-	-	0.5 \pm 0.0	0.5 \pm 0.1	-
1013	1008	δ -3-carene	-	-	-	17.4 \pm 0.2	19.1 \pm 0.5	4.1 \pm 0.7	0.3 \pm 0.1	-	-
1033	1024	Limonene	-	-	3.4 \pm 0.2	-	-	-	-	-	-
1344	1335	δ -elemene	5.4 \pm 0.3	2.6 \pm 0.1	2.3 \pm 0.1	5.2 \pm 0.9	2.4 \pm 0.1	2.2 \pm 0.3	6.1 \pm 0.6	5.0 \pm 0.1	1.6 \pm 0.2
1355	1345	α -cubebene	-	-	-	-	0.4 \pm 0.0	1.9 \pm 0.2	-	0.6 \pm 0.1	0.3 \pm 0.0
1381	1373	α -ylangene	-	-	-	1.1 \pm 0.1	1.4 \pm 0.0	6.5 \pm 0.6	-	-	-
1392	1387	β -cubebene	-	-	-	-	-	-	4.2 \pm 0.2	3.6 \pm 0.2	2.7 \pm 0.2
1395	1387	β -bournonene	-	0.2 \pm 0.1	-	-	-	-	-	-	-
1395	1389	β -elemene	1.0 \pm 0.1	1.05 \pm 0.06	-	2.4 \pm 0.1	2.7 \pm 0.1	3.3 \pm 0.2	-	-	-
1414	1409	α -gurjunene	-	-	-	-	-	-	1.3 \pm 0.1	1.7 \pm 0.1	1.0 \pm 0.1
1422	1417	(<i>E</i>)-caryophyllene	14.1 \pm 0.7	16.8 \pm 0.7	11.9 \pm 0.1	13.8 \pm 0.6	14.9 \pm 0.2	14.2 \pm 0.8	15.6 \pm 0.6	18.0 \pm 0.1	19.6 \pm 1.1
1441	1434	γ -elemene	2.9 \pm 0.2	-	1.8 \pm 0.0	-	-	-	-	-	-
1440	1430	β -copaene	-	3.2 \pm 0.1	-	2.2 \pm 0.1	2.5 \pm 0.1	1.3 \pm 0.0	-	-	-
1440	1431	β -gurjunene	-	-	-	-	-	-	0.7 \pm 0.0	0.8 \pm 0.1	1.3 \pm 0.1
1443	1437	α -guaiene	-	-	-	-	-	-	-	0.6 \pm 0.2	-
1445	1439	aromadendrene	0.4 \pm 0.1	0.9 \pm 0.0	1.0 \pm 0.1	-	-	-	-	0.65 \pm 0.15	-
1459	1451	<i>trans</i> -3.5-diene-muurola	-	-	-	1.5 \pm 0.1	0.5 \pm 0.4	-	-	0.3 \pm 0.1	-
1460	1452	α -humulene	1.3 \pm 0.1	1.9 \pm 0.1	1.1 \pm 0.2	1.4 \pm 0.0	1.3 \pm 0.1	1.4 \pm 0.1	4.1 \pm 0.0	3.9 \pm 0.2	3.7 \pm 0.2
1463	1457	Rotundene	-	-	-	-	-	-	1.8 \pm 0.1	1.9 \pm 0.1	1.6 \pm 0.0
1483	1475	γ -gurjunene	1.2 \pm 0.1	2.1 \pm 0.1	1.4 \pm 0.1	-	-	-	0.9 \pm 0.4	0.9 \pm 0.0	1.9 \pm 0.1
1501	1493	α -zingiberene	-	-	-	-	-	-	0.8 \pm 0.3	-	-
1483	1478	γ -muurolo	-	-	-	-	0.8 \pm 0.1	1.0 \pm 0.5	-	-	-
1492	1484	germacrene D	22.8 \pm 0.8	13.4 \pm 0.5	7.3 \pm 0.3	33.9 \pm 0.4	31.0 \pm 0.2	18.8 \pm 1.0	-	-	-
1500	1493	<i>trans</i> -4(14), 5-diene muurola	-	-	-	-	0.5 \pm 0.4	2.6 \pm 0.5	6.2 \pm 0.8	3.2 \pm 0.1	1.9 \pm 0.1
1508	1500	bicyclogermacrene	21.6 \pm 0.8	14.6 \pm 0.9	13.4 \pm 0.6	7.1 \pm 0.8	6.2 \pm 0.1	9.3 \pm 0.1	28.8 \pm 1.0	23.7 \pm 0.5	11.2 \pm 0.4
1514	1509	α -bulnesene	-	-	-	-	-	-	1.8 \pm 0.2	1.6 \pm 0.1	1.6 \pm 0.1
1520	1513	γ -cadinene	0.9 \pm 0.1	1.6 \pm 0.3	0.8 \pm 0.1	1.4 \pm 0.2	0.9 \pm 0.0	-	2.1 \pm 0.1	0.7 \pm 0.0	0.9 \pm 0.1
1522	1514	β -curcumene	-	-	-	1.0 \pm 0.0	1.1 \pm 0.0	4.2 \pm 1.1	-	-	-
1565	1559	germacrene B	0.6 \pm 0.1	0.6 \pm 0.0	-	-	-	-	-	-	-
1569	1561	(<i>E</i>)-nerolidol	-	-	-	-	1.4 \pm 0.1	-	3.7 \pm 0.1	3.5 \pm 1.0	1.6 \pm 0.0
1584	1577	Spathulenol	-	11.1 \pm 0.5	3.2 \pm 0.2	0.8 \pm 0.6	1.9 \pm 0.1	1.9 \pm 0.3	2.1 \pm 0.3	4.5 \pm 0.1	9.7 \pm 0.3
1590	1582	caryophyllene oxide	5.3 \pm 0.2	7.5 \pm 0.9	6.7 \pm 0.5	1.1 \pm 0.8	1.6 \pm 0.1	1.9 \pm 0.3	-	-	9.7 \pm 0.4
1615	1607	β -oplopenone	-	1.6 \pm 0.2	-	-	-	-	-	-	-
1615	1608	β -atlantol	-	0.7 \pm 0.1	-	-	-	-	-	-	-
1644	1635	<i>cis</i> -cadin-4-en-7-ol	-	0.6 \pm 0.1	-	-	-	-	-	-	-

1625	1618	(Z)-bisaboladien-11-ol	3.8±0.2	-	1.9±0.0	-	-	-	-	-	-
1602	1596	Fokienol	-	-	-	-	-	-	-	3.1±0.1	-
1646	1638	α -epi-cadinol	-	1.5±0.3	-	-	-	-	0.9±0.1	1.2±0.1	2.0±0.6
1650	1644	α -muurulol	0.9±0.3	0.0±0.1	1.3±0.0	2.1±0.3	1.4±0.1	6.2±0.8			
1650	1645	Cubenol							-	1.3±0.1	4.9±0.6
1660	1652	α -cadinol	-	-	-	2.3±0.3	1.3±0.1	4.5±0.7	1.4±0.1	1.1±0.1	4.1±0.9
1704	1700	amorfa-4.9-dien-2-ol	-	0.3±0.1	-	-	-	-	-	-	-
Non-oxygenated monoterpenes			6.5	3.0	37.7	17.9	20.0	4.1	1.4	1.4	0
Oxygenated monoterpenes			0	0	0	0	0	0	0	0	0
Non-oxygenated sesquiterpenes			72.3	58.8	41.0	70.9	66.5	66.8	74.2	67.6	49.5
Oxygenated sesquiterpenes			9.9	24.1	13.1	6.3	7.5	14.5	8.1	14.8	32.2
Total compounds identified			88.7	85.9	91.8	95.1	94.1	85.4	83.6	83.8	81.7

Hydrocarbons (C₉H₂₀-C₁₉H₄₀) were injected under the same conditions used for the essential oil samples. The constituents were identified by comparing the spectra obtained with those given in the WILEY8, NIST105, NIST105s, NIST21, NIST107 databanks and by Adams [1] considering the relative retention index (RRI), calculated according to Van Den Dool and Kratz [2].

References

- [1] Adams RP. (2007) *Identification of Essential Oil Components by Gas chromatography/mass spectrometry*. Allured Publishing Carol Stream:IL, USA.
- [2] Van den Dool H, Kratz PD. (1963) A generalization of the retention index system including linear temperature programmed gas-liquid partition chromatography. *Journal of Chromatography*