ESSENTIAL OILS OF SOME AMAZONIAN ZINGIBERACEAE, 3. GENERA *ALPINIA* AND *RENGALMIA*

A.I.R. LUZ, M.G.B. ZOGHBI, L.S. RAMOS, J.G.S. MAIA, and M.L. SILVA

Departamento de Produtos Naturais, Instituto Nacional de Pesquisas da Amazônia (INPA), Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), 6900, Manaus, Amazonas, Brazil

Alpinia speciosa (Wendl.) Schum. is cultivated around the cities of Manaus and Belém in the Amazon, but it is a foreign plant brought from the Eastern Hemisphere. It is used in the Amazon as a cardiovascular agent and hypotonic (1). *Rengalmia floribunda* K. Sch. grows wild in the state of Amazonas, Brazil. Both species belong to the Zingiberaceae family. Sesquiterpenes (2), diterpenes (3), flavonoids (4,5), pungent agents (6,7), and constituents from essential oils (7,8) of the genus *Alpinia,* have been reported earlier. As part of an ongoing study of the essential oils of Amazonian plants, we also characterized the volatiles of *A. speciosa* and *R. floribunda* using capillary column gc/ms and we now report the presence of additional constituents.

Identification of most of these components was accomplished by comparison of mass spectra of authentic compounds and of gc retention data. Other identifications were made by comparison of mass spectra with those in the data system library and in the literature. Peaks whose identities were confirmed by comparison of their mass spectra and their gc retention data with those of authentic compounds are so indicated. The gc/ms data from the oil of *A. speciosa* were the same as those found in the oil of *Alpinia mutans* Rosc. planted in the Emilio Goeldi Museum, in Belém. It was attributed to a probable lapse in the specimens' identification. Relative concentrations and relative retention data of the compounds identified are shown in Table 1. The main constituents of the oil of *A. speciosa* were *p*-cymene, 1,8-cineole, γ-terpinene,

TABLE 1. Constituents of the Essential Oils of *Alpinia speciosa* (OE-71) and *Rengalmia floribunda* (OE-62) and Their Relative Retention Data

Peak number	Compound	RRT[a]	OE-71 % of oil[b]	OE-62 % of oil[b]
1	α-Thujene[c]	0.402	4.59	—
2	α-Pinene[c]	0.414	1.54	2.60
3	Camphene[c]	0.438	0.13	—
4	Sabinene	0.487	5.97	—
5	β-Pinene[c]	0.489	2.35	27.89
6	Myrcene[c]	0.523	0.72	—
7	α-Phellandrene[c]	0.545	0.23	—
8	α-Terpinene[c]	0.572	1.67	—
9	*p*-Cymene[c]	0.591	9.38	0.37
10	Limonene[c]	0.597	2.97	1.52
11	1,8-Cineole[c]	0.605	14.87	0.19
12	γ-Terpinene	0.661	9.48	—
13	α-Terpinolene	0.717	0.98	—
14	Linalol[c]	0.744	0.62	0.10
15	α-Thujone[c]	0.776	—	0.10
16	*trans*-Pinocarveol	0.824	—	5,11
17	4-Terpineol	0.909	20.40	—
18	α-Terpineol[c]	0.930	1.07	—
19	Myrtenal	0.944	—	5.74
20	Verbenone	0.968	—	0.12
21	*trans*-Carveol	0.987	—	0.11
22	Carvone	1.037	—	0.16
23	Peryllaldehyde	1.097	—	0.22
24	Isobornyl acetate[c]	1.121	—	0.15
25	Terpenyl acetate[c]	1.243	—	0.68
26	β-Bourbonene	1.308	—	0.15
27	β-Caryophyllene[c]	1.375	2.48	—
28	*trans*-β-Bergamotene	1.401	—	0.14

[a] Retention time relative to pelargonic acid ester.

[b] Values were performed on INCOS data system.

[c] Identity confirmed by ms and gc comparisons with authentic compounds.

and 4-terpineol as was reported previously (9), while β-pinene was found as the major volatile component of the oil of *R. floribunda*. The qualitative and quantitative differences between the two oils of unlike genera may be of chemotaxonomic value.

EXPERIMENTAL

Plant materials of *A. speciosa* (OE-71) and *R. floribunda* (OE-62) were collected 60 km from Manaus, along the road to Porto Velho (BR-319) and in the place called Tarumã, 20 km from Manaus, respectively. Voucher specimens (nos. 92486 and 92458) were deposited in the INPA Herbarium. The leaves were air-dried, then subjected to steam distillation, according to usual techniques (10). The oils obtained were dried in the presence of anhydrous Na_2SO_4 and produced a yield of 0.25 and 0.30%, respectively.

The volatile oils were each analyzed on a Carlo Erba 4160 FID-GC, using a 30m×0,25mm fused silica capillary column containing a 0.25 μm film of SE-54. Hydrogen was used as carrier gas, adjusted to a linear velocity of 33 cm-sec (measured at 150°); split flow was adjusted to give a 20:1 ratio, and septum sweep was a constant 10 ml/min. Splitless injection of 2 μl, of a 1:1000 *n*-hexane solution was followed by a delay of 30 sec before beginning inlet purge. Injections were done with the oven at 50°. After 3 min initial delay, temperature was programmed at 6° min to 230°.

Gc-ms was performed on a Finnigan 4021 system, which includes INCOS data system. An identical 30m SE-54 fused silica capillary column was installed in the gc, fitted with a Grob-Type injector and directly coupled to the ion source of the MS. Helium was used as carrier gas. Injection and oven programming temperatures were the same as above except that a 4° min gradient was used. The ms was operated in ei mode at 70 eV. The quadrupole filter was scanned from 34 to 434 a.m.u. once every second, and resulting spectra were stored on disc for later recall.

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