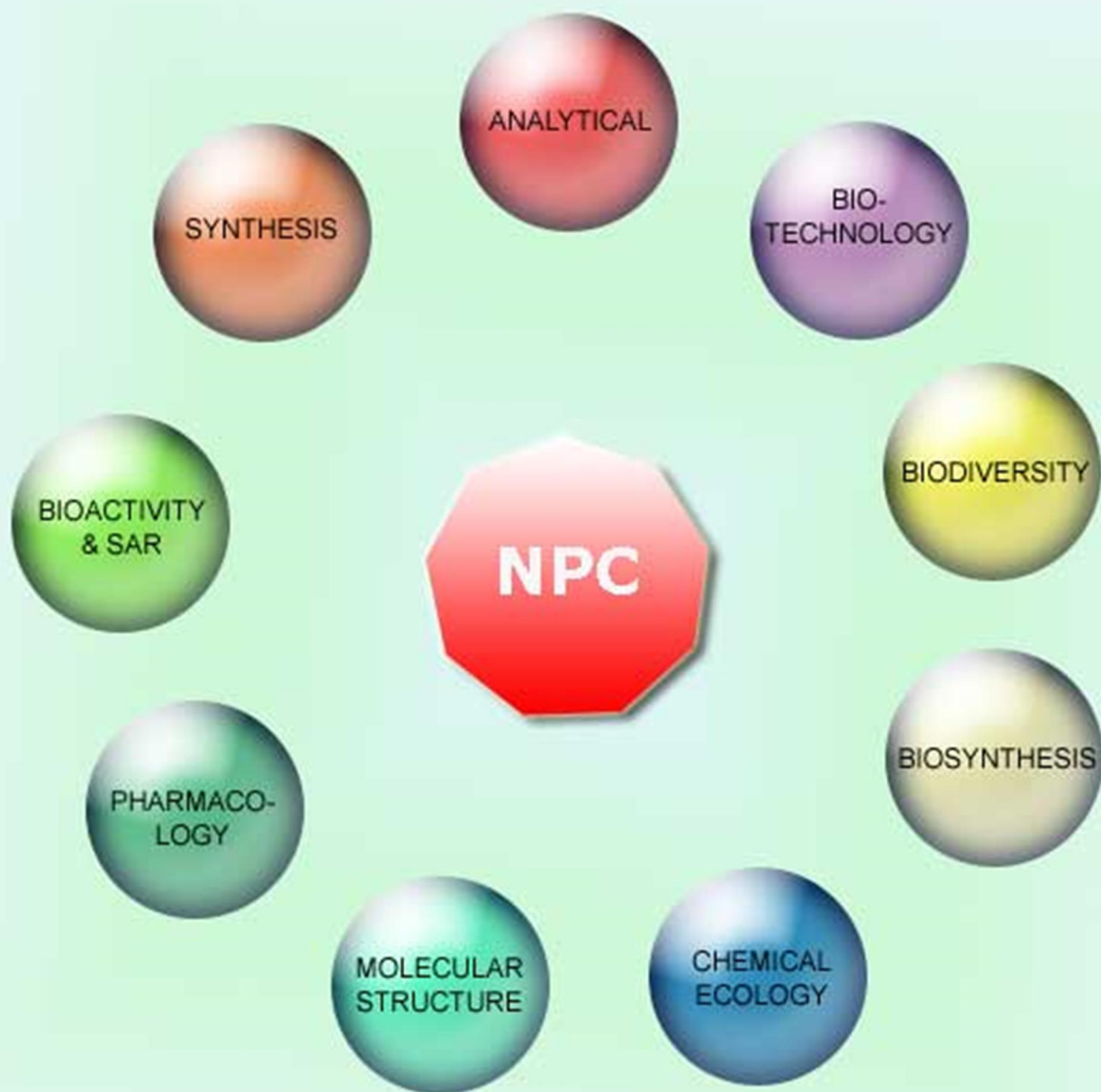


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Chemical Constituents of Essential Oils from the Leaves, Stems, Roots and Fruits of *Alpinia polyantha*

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The essential oils obtained from the leaves, stems, roots and fruits of *Alpinia polyantha* D. Fang (Zingiberaceae) have been studied. The leaf oil was comprised mainly of camphor (16.1%), α -pinene (15.2%) and β -agarofuran (12.9%), while the major constituents of the stem oil were α -pinene (12.4%), β -cubebene (10.6%), β -agarofuran (10.3%) and globulol (8.8%). However, β -cubebene (12.6%), fenchyl acetate (10.8%), β -maaliene (9.0%), aristolone (8.8%) and α -pinene (8.2%) were the compounds occurring in higher amounts in the root oil. The quantitatively significant compounds of the fruit oil were δ -cadinene (10.9%), β -caryophyllene (9.1%), β -pinene (8.7%) and α -muurolene (7.7%).

Keywords: *Alpinia polyantha*, Essential oil composition, Monoterpenes, Sesquiterpenes.

Alpinia polyantha D. Fang is a creeping plant with thick pseudostems up to 6 m. Flowering occurs between May and June, while fruiting takes place from October to November. The plant is used in ethnomedicine for the treatment of ulcers, inflammation, fever and febrigue [1a,b]. Phytochemical analysis of the plant revealed the presence of antiplatelet compounds, such as alpinetin, cardamonin, 4',7-dihydroxy-5-methoxyflavanone, helichrysetin and 5,6-dehydrokawain [2a]. Bornyl acetate, α -terpineol and 1,8-cineole were previously detected from the essential oil of the seeds of *A. polyantha* [2b]. The objective of the present study was to examine, for the first time, the constituents of the leaf, stem, root, and fruit oils of *A. polyantha* grown in Vietnam. This is in reference to our continued interest in the analysis of the chemical constituents of essential oils from poorly studied species of the Vietnamese flora [2c,3].

The yields of essential oils were: 0.21%, 0.15%, 0.25% and 0.23% (v/w, calculated on a dry weight basis), respectively for the leaves, stems, roots and fruits. Oil samples were light yellow in color. The identities of the compounds and their percentage compositions are shown in Table 1. Monoterpene hydrocarbons (34.1%), oxygenated monoterpenes (30.5%) and sesquiterpene hydrocarbons (23.7%) represent the classes of compounds in the leaf oil. It was characterised by large contents of camphor (16.1%), α -pinene (15.2%) and β -agarofuran (12.9%), with smaller quantities of camphene (6.5%), β -eudesmol (4.4%) and *o*-cymene (4.1%).

The stem oil consisting of monoterpene hydrocarbons (29.0%), sesquiterpene hydrocarbons (44.4%) and oxygenated sesquiterpenes (14.5%). α -Pinene (12.4%), β -cubebene (10.6%), β -agarofuran (10.3%) and globulol (8.8%) were the main constituents of the oil. It also features sizeable amounts of aromadendrene (6.0%), β -maaliene (5.8%) and camphene (5.4%). Monoterpene hydrocarbons (24.5%), oxygenated monoterpenes (19.2%) and sesquiterpene hydrocarbons (48.2%) were the main classes of compounds in the root oil. However, β -cubebene (12.6%), fenchyl acetate (10.8%), β -maaliene (9.0%), aristolone (8.8%) and α -pinene (8.2%) were the

major compounds present in the oil. Other notable compounds include δ -selinene (5.7%), camphene (5.6%) and β -agarofuran (5.0%). In addition, monoterpene hydrocarbons (17.3%), sesquiterpene hydrocarbons (54.9%) and oxygenated sesquiterpenes (11.5%) were identified as the main chemical classes in the fruit oil. The major constituents of the oil were δ -cadinene (10.9%), β -caryophyllene (9.1%), β -pinene (8.7%), α -muurolene (7.7%) and caryophyllene oxide (5.4%).

To the best of our knowledge, there is only one previous report on an essential oil of *A. polyantha*. The main compounds in the seed oil [2b], bornyl acetate, α -terpineol and 1,8-cineole, were identified in much lower amount than in our investigated oil samples.

The volatile constituents of some other species have been reported. The essential oil from the rhizome of *A. malaccensis* contained methyl (*E*)-cinnamate (78.2%) as the major constituent, while β -sesquiphellandrene (36.5%) was the major component of *A. aquatica* [4a]. The main compounds in the rhizome oil of *A. calcarata* were 1,8-cineole (35.9%), β -fenchyl acetate (12.9%) and β -pinene (9.1%), while *A. galanga* was found to be rich in 1,8-cineole (52.9%) and α -terpineol (15.1%), whereas α -fenchyl acetate (12.5%) and β -caryophyllene (9.8%) were found in *A. smithiae* [4b]. The major components of *A. conchigera* rhizome oil [4c] were 1,8-cineole (25.85%), chavicol (25.08%) and β -pinene (6.71%). The rhizome oil of *A. officinarum* [5a] had as its major compounds α -bisabolene (10.6%), *trans*- α -bergamotene (7.9%) and β -sesquiphellandrene (6.9%). It may be postulated that the essential oils of the genus *Alpinia* exhibits high chemical variability.

Experimental

Plants collection: Leaves, stems, roots and fruits of *A. polyantha* were collected from Kỳ Sơn districts, Nghệ An Province, Vietnam, in November 2013. Botanical identification (voucher specimen, LTH 427) was performed at the Herbarium, Botany Museum, Vinh University. Plant samples were air-dried prior to extraction.

Table 1: Volatile compositions of *Alpinia polyantha*.

Compound ^a	RI ^b	RI ^c	Percent composition (% SD ^d)			
			Leaf	Stem	Root	Fruit
Tricyclene	926	921	0.4	0.2	0.3	0.1
<i>a</i> -Thujene	930	926	-	0.1	-	0.1
<i>a</i> -Pinene	939	932	15.2	12.4	8.2	3.5
Camphene	953	946	6.5	5.4	5.6	1.1
Verbenene	976	969	2.5	1.1	0.2	0.2
<i>β</i> -Pinene	980	974	1.7	3.1	4.1	8.7
<i>β</i> -Myrcene	990	988	-	-	0.8	0.3
<i>α</i> -Phellandrene	1006	1002	-	0.8	-	0.2
<i>δ</i> -3-Carene	1011	1008	-	0.2	-	0.1
<i>a</i> -Terpinene	1017	1014	-	0.1	-	-
<i>o</i> -Cymene	1024	1022	4.1	2.3	1.3	0.6
Limonene	1032	1024	1.3	2.4	2.6	1.6
1,8-Cineole	1034	1026	-	-	1.2	-
(<i>E</i>)- <i>β</i> -Ocimene	1052	1044	1.0	-	-	0.4
<i>γ</i> -Terpinene	1061	1054	-	-	0.2	0.1
<i>α</i> -Terpinolene	1090	1086	-	-	-	0.3
Linalool	1100	1095	0.8	0.6	-	1.7
<i>α</i> -Thujone	1102	1101	-	-	0.5	0.1
1,5,8- <i>p</i> -Menthatriene ^e	1105	1108	1.4	0.9	0.2	-
<i>α</i> -Campholenol aldehyde ^e	1120	1122	1.3	0.4	0.2	0.2
<i>cis</i> -Verbenol	1138	1137	0.3	-	-	-
Camphor	1145	1141	16.1	3.8	3.9	0.6
Isoborneol	1152	1155	-	0.5	0.6	0.1
Pinocampone	1160	1158	-	0.3	-	0.2
Pinocarvone	1165	1160	1.6	0.5	-	0.3
<i>p</i> -Mentha-1,5-dien-8-ol	1166	1166	2.5	0.6	0.6	0.1
Borneol	1167	1165	0.4	-	-	-
Terpinen-4-ol	1177	1174	0.5	0.2	0.5	0.2
<i>α</i> -Terpineol	1189	1186	-	0.2	0.2	0.1
Myrtanal	1200	1195	2.2	0.6	-	0.4
Verbenone	1205	1204	2.9	0.2	-	0.1
<i>trans</i> -Carveol	1217	1215	0.5	0.1	-	-
Fenchyl acetate	1228	1229	0.2	0.6	10.8	0.5
Cuminaldehyde	1236	1238	0.2	-	-	-
Carvone	1238	1239	0.4	0.1	-	0.1
Geranial	1264	1264	-	-	-	0.1
<i>p</i> -Mentha-1,8-dien-3-one ^e	1266	1272	0.2	-	-	-
Bornyl acetate	1287	1287	-	0.2	1.7	0.1
Thymol	1289	1289	0.6	0.1	-	-
Bicyclolemene	1327	1338	0.4	0.2	-	0.4
<i>α</i> -Cubebene	1351	1345	-	-	-	2.5
Neryl acetate	1362	1359	-	-	-	0.1
<i>α</i> -Copaene	1377	1374	-	0.1	-	-
<i>β</i> -Bourbonene	1385	1387	-	-	-	0.1
<i>β</i> -Cubebene	1388	1387	-	10.6	12.6	1.4
<i>β</i> -Elemene	1391	1389	-	0.3	0.1	-
<i>α</i> -Gurjunene	1410	1409	-	-	-	0.3
<i>α</i> -Cedrene	1412	1410	-	-	0.3	0.2
<i>β</i> -Caryophyllene	1419	1417	0.6	0.6	0.4	9.1
<i>trans</i> - <i>α</i> -Bergamotene	1435	1432	-	0.3	-	2.0
Aromadendrene	1441	1439	-	6.0	0.1	0.1
<i>α</i> -Humulene	1454	1452	0.3	0.4	0.2	2.7
Selina-4(15),7(11)-diene ^e	1470	1470	-	-	-	3.3
<i>γ</i> -Gurjunene	1477	1475	-	-	1.3	-
<i>γ</i> -Murolene	1480	1478	-	-	-	1.4
<i>α</i> -Amorphene	1481	1487	3.3	-	8.8	-
Aristolochene ^e	1485	1487	-	1.2	-	0.8
<i>β</i> -Selinene	1486	1489	-	0.9	0.6	-
<i>δ</i> -Selinene	1493	1492	-	-	5.7	3.8
Zingiberene	1494	1493	0.2	-	-	-
Valencene	1495	1496	0.8	2.0	1.4	0.1
Ledene	1496	1496	-	-	-	2.1
<i>α</i> -Selinene	1493	1498	0.6	-	-	-
<i>α</i> -Murolene	1500	1500	2.4	-	-	7.7
<i>γ</i> -Patchoulene ^e	1504	1502	-	-	0.4	-

Germaerene A	1509	1508	-	-	-	0.3
<i>γ</i> -Cadinene ^e	1514	1513	-	-	-	4.3
<i>β</i> -Agarofuran	1516	1516	12.9	10.3	5.0	-
7- <i>epi</i> - <i>α</i> -Selinene	1515	1520	-	2.1	-	-
<i>δ</i> -Cadinene	1525	1522	-	-	-	10.9
<i>α</i> -Agarofuran	1543	1548	2.2	3.6	2.3	0.8
<i>α</i> -Calacorene	1546	1544	-	-	-	1.6
(<i>E</i>)-Nerolidol	1563	1561	-	-	-	0.8
Spathulenol	1578	1577	0.2	1.5	-	-
Caryophyllene oxide	1583	1581	0.6	1.0	0.6	5.4
Globulol	1585	1590	-	8.8	-	-
Guaiol	1601	1600	-	0.9	0.3	-
10- <i>epi</i> - <i>γ</i> -Eudesmol ^e	1613	1622	0.7	-	-	-
<i>γ</i> -Eudesmol	1628	1630	-	-	0.4	-
Aromadendrene epoxide	1630	1639	-	1.9	-	0.9
<i>β</i> -Eudesmol	1651	1649	4.4	-	-	-
<i>α</i> -Cadinol	1654	1652	-	-	-	3.2
Juniper camphor	1688	1690	-	0.4	-	0.6
<i>β</i> -Maaliene ^e	1732	1732	-	5.8	9.0	0.7
Benzyl benzoate	1760	1759	-	0.4	0.6	-
Nootkatone ^e	1810	1806	-	-	2.5	-
8,9-Dehydro-9-formyl-cycloisolongifolene ^e	2082	2082	-	-	0.2	0.9
Phytol	2125	2122	-	-	-	0.2
Total			94.2	97.3	96.5	90.0
Monoterpene hydrocarbons			34.1	29.0	24.5	17.3
Oxygenated monoterpenes			30.5	9.0	19.2	5.2
Sesquiterpene hydrocarbons			23.7	44.4	48.2	54.9
Oxygenated sesquiterpenes			5.9	14.5	1.5	11.5
Diterpenes			-	-	2.5	1.1
Others			-	0.4	0.6	-

^aElution order on HP-5MS column; ^bRetention indices on HP-5MS column; ^cLiterature retention indices [10-12]; ^dSD, Standard deviation, values were not significant enough for consideration and were omitted from the Table to avoid congestion; ^eFurther identification was performed by co-elution with known standards; - Not identified.

Extraction of the oils: Aliquots of 0.5 kg each of air-dried plant samples were subjected to separate hydrodistillation for 4 h at normal pressure, according to the Vietnamese Pharmacopoeia [5b].

Analysis of the oils and identification of the constituents: GC-FID and GC-MS analyses were carried out under the experimental conditions reported earlier [2c]. The identification of constituents was performed on the basis of retention indices (RI) determined with reference to a homologous series of *n*-alkanes, under identical experimental conditions, co-injection with standards (Sigma-Aldrich, St. Louis, MO, USA) or known essential oil constituents, MS library search (NIST Database 69) and by comparing with MS literature data [6a,6b,7].

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References

- [1] (a) Umberto Q. (2012) *World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology*. CRC Press, New York, 1-2390; (b) Yu F. (2012) *Botanical Paintings of Chinese Zingiberales*. China Scientific Book Services, Beijing, 1-216.
- [2] (a) Qiao CF, Han QB, Song JZ, Wang ZT, Xu LS, Xu HX. (2008) Analysis of eight bioactive compounds in *Alpinia* species by HPLC-DAD. *Natural Product Research and Development*, **20**, 422-426; (b) Lai M, Chen S, Fang D, Qin D. (1989) Histology and essential oil of *Alpinia* species used to adulterate Sharen. *Zhongguo Zhongyao Zazhi*, **14**, 394-397; (c) Dai DN, Hoi TM, Thang TD, Thin DB, Ogunwande IA. (2014) Chemical composition of the leaf oil of *Actephila excelsa* from Vietnam. *Natural Product Communications*, **9**, 1359-1360.
- [3] Thang TD, Dai DN, Thanh BV, Dung DM, Ogunwande IA. (2014) Study on the chemical constituents of essential oils of two Annonaceae plants from Vietnam: *Miliusa sinensis* and *Artabotrys taynguyenensis*. *American Journal of Essential Oils and Natural Products*, **1**, 24-28.
- [4] (a) Sirat MH, Basar N, Jani NA. (2011) Chemical compositions of the rhizome oils of two *Alpinia* species of Malaysia. *Natural Product Research*, **25**, 1478-6419; (b) Gopan R, Pradeep DP, Yusufali C, Mathew D, Sabulal B. (2013) Chemical profiles of volatiles in four *Alpinia* species from Kerala, South India. *Journal of Essential Oil Research*, **25**, 97-102; (c) Bhuiyan MNI, Chowdhury JU, Jaripa B, Nemai CN. (2010) Essential oils analysis of the rhizomes of *Alpinia conchigera* Griff. and leaves of *Alpinia malaccensis*. *African Journal of Plant Science*, **4**, 197-201.
- [5] (a) Pripdeevech P, Nuntawong N, Wongpornchai S. (2009) Composition of essential oils from the rhizomes of three *Alpinia* species grown in Thailand. *Chemistry of Natural Compounds*, **45**, 562-564; (b) Vietnamese Pharmacopoeia. (1997) Medical Publishing House, Hanoi, Vietnam.
- [6] Adams RP. (2007). *Identification of Essential Oil Components by Gas Chromatography/Quadrupole Mass Spectrometry*. Allured Publishing Corp. Carol Stream, IL; (b) Joulain D, Koenig WA. (1998) *The Atlas of Spectral Data of Sesquiterpene Hydrocarbons*. E. B. Verlag, Hamburg.
- [7] *National Institute of Standards and Technology* (2011) Chemistry web book. Data from NIST Standard Reference Database 69 (<http://www.nist.gov/>)

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