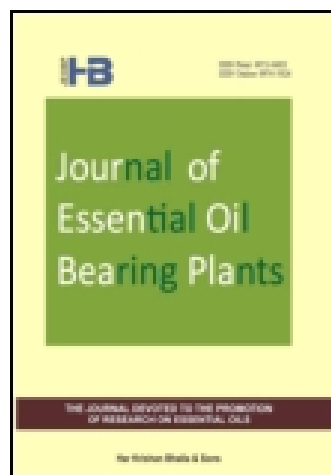




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The Chemical Constituents of the fruit essential oil of *Xylopi aethiopica* (Dunal) A. Rich from Nigeria

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The Chemical Constituents of the fruit essential oil of *Xylopi aethiopica* (Dunal) A. Rich from Nigeria

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Abstract: Systematic and comprehensive analyses of the essential oil of fruits of *Xylopi aethiopica* (Annonaceae) were conducted. The fruit essential oil was obtained in 0.42% yield. The gas chromatographic-mass spectrometric (GC-MS) analyses showed that the essential oil comprised mainly of monoterpenoids with 1,8-cineole (15.15%) being the most prominent compound.

Sabinene (6.6%) and terpinen-4-ol (4.1%) were present in moderately significant amounts. The sesquiterpenoid contents identified were β -elemene (1.26%) and caryophyllene oxide (3.83%).

Key words: *Xylopi aethiopica*, Annonaceae, Monoterpenes, 1,8-cineole.

Introduction: *Xylopi aethiopica* is a straight-stemmed tree found on the upper edge of mixed deciduous and infringing forests in West Africa¹. The plant is commonly known as “spice tree”, “Africa pepper”, “Ethiopian pepper” or “Guinea pepper”. The fruit is the most important part of the tree because of its nutritive and medicinal value². In Nigeria, the fruits are used ethnomedically as a cough medicine, a carminative and a stimulating additive to other medicines³. The powdered root is employed as a dressing for sores and to rub gums for pyorrhea and in the local treatment of cancer⁴.

The first attempt at characterizing the component of the essential oil of the plant was carried out in Ghana⁵ and about twelve compounds were identified with 1,8-cineole being the principal component. The essential oil composition of samples from different parts of West Africa most especially from Cairo⁶, Benin⁷ and Guinea⁸ has been reported. However, the fruit essential oil of the Nigerian grown *X. aethiopica* has not been investigated.

The present study is aimed at satisfying this need as part of an extensive research into the essential oils of the Nigerian medicinal and economic plants. *Xylopi* the plant itself possesses great potential for the production of agrochemicals and pharmaceuticals.

Experimental

Plant collection: The fruits of *X. aethiopica* were picked randomly from five

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plants in the Agodi Gardens, Ibadan, Nigeria. Mr. T. K. Odewo of the Forestry Research Institute of Nigeria (FRIN), Ibadan authenticated the plant and voucher specimens were deposited in the FRIN herbaria.

Essential oil collection: The fruits were air dried for five days and finely powdered. The powdered samples were subjected to hydrostillation for 4 hours in a modified Clevenger-type distiller according to the British Pharmacopoeia⁹ specifications to yield a pale yellow essential oil (0.42%).

Gas chromatographic-mass spectrometric (GC-MS) analyses: The GC-MS data of the fruit essential oil were obtained on a Shimadzu 17A gas chromatograph interfaced with a Shimadzu QP500 quadrupole mass spectrometer operating at an ion voltage of 70eV. Ion source temperature was 230°C and injection temperature, 200°C. The carrier gas was hydrogen at a flow rate of 50ml/min. interface temperature was 203°C.

The gas chromatograph was fitted with a fused silica capillary column (30 x 0.25 i.d) coated with BP 1. Oven temperature was programmed from 50°C to 230°C at 3°C/min. the mass spectra were processed and recorded by an on line computer system equipped with a DISC memory (LID-D84) and 62 NIST library system.

The components were identified by means of their relative retention times on BP1 (polar column) and by mass spectra comparison with those of authentic samples in the computer library and literature¹⁰. Quantitative analysis was based on peak area measurement calculated by the computer.

Result and Discussion: The GC-MS analyses resulted in the identification of eighteen (18) compounds (50.67%) from thirty-two (32) compounds eluted (Table1). The main constituents were 1, 8-cineole (15.15%) and sabinene (6.6%). The fruit essential oil consisted of 48.55% monoterpenoids, six of which were hydrocarbons and seven oxygenated derivatives. Only one sesquiterpenes hydrocarbon- β -elemene, (1.26%) and two sesquiterpenoids, caryophyllene oxide and elemol (0.47%) were identified.

These compositional features showed that the Nigeria fruit essential oil of *X. aethiopica* exhibited strong similarities to those from other parts of West Africa.

All the essential oil contained 1,8-cineole in high percentage except that from Cameroon¹¹ which has sabinene (23.9%) as its major component. The essential oil from Benin¹² and Guinea⁸ possessed β -pinene as their most prominent compound. However, plants from another part of Benin⁷ and Cameroon¹¹ contained sabinene as their major compound whereas, it was absent in the essential oil from Cairo⁶ which has predominantly terpinen-4-ol (23.4%). Although the Nigerian fruit essential oil comprised of 1,8-cineole as its main compound, sabinene was present in minor amounts. All the essential oils also contained β -pinene and terpinen-4-ol.

It could be expected that various chemical races with different patterns of metabolism caused by genetic adaptation under environmental stress might evolve little differences in the chemical composition of the essential oils from various parts of the globe.

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Table 1: Chemical Constituents of the Essential Oil of the Fruit of *Xylopi aethiopia*

Peak numbers ^a	Compound	% Composition	MS Data ^c
1	p-Xylene	2.0	191,106,51,105,77
2	Octane	1.01	43,57,41,56,77
3	α -Thujene	1.40	93,91,77,92,41
4	α -Pinene	2.08	93,92,91,77,79
5	Sabinene	6.60	93,91,77,41,79
6	β -Pinene	2.25	93,41,69,79,77
7	α -Phellandrene	0.64	93,77,136,79,41
8	Limonene	0.74	68,93,79,41,67
9	1,8-Cineole	15.54	43,71,81,55,41
10	α -Ionone	1.17	93,91,77,43,136
11	β -Ionone	2.44	93,43,91,77,91
12	Sabinol	1.51	91,43,92,41,81
13	Unidentified	1.87	91,119,41,43,67
14	Unidentified	1.57	53,108,81,41,107
15	Terpinen-4-ol	4.11	43,71,93,111,91
16	α -Terpineol	2.70	59,43,93,121,67
17	Myrtenol	2.29	79,91,108,41,119
18	β -Elemene	1.26	93,81,67,41,68
19	Caryophyllene oxide	3.83	43,41,79,55,91
20	C ₁₅ H ₂₄ O	1.65	43,41,79,55,91
21	C ₁₅ H ₂₄ O	2.13	43,67,41,109,55
22	C ₁₅ H ₂₄ O	1.18	43,55,41,93,79
23	C ₁₅ H ₂₄ O	7.47	43,159,91,131,119
24	Elemol	0.47	59,43,41,105,93
25	C ₁₅ H ₂₄ O	0.57	43,91,41,55,79
26	C ₁₅ H ₂₄ O	0.81	159,43,91,41,105
27	C ₁₅ H ₂₄ O	0.31	43,133,145,91,105
28	C ₁₅ H ₂₄ O	0.44	43,44,41,55,93
29	C ₁₅ H ₂₄ O	0.21	43,91,79,41,147
30	Unidentified	0.27	81,43,55,41,91
31	Unidentified	0.13	41,55,123,43,81
32	Unidentified	3.19	43,55,81,67,41

^aGC-MS peak numbers in eluting order^bRetention time on BPI capillary column (3.0m' 0.25mm i d)^cImportant peaks in decreasing order