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## Essential oil composition of *Caperonia palustris* (L.) A. St-Hil. (Euphorbiaceae) growing in southwest Nigeria

Moses S. Owolabi, Akintayo L. Ogundajo, Isiaka A. Ogunwande, Rebecca M. Hauser and William N. Setzer

### Abstract

The essential oil from the aerial parts of *Caperonia palustris* was obtained by hydrodistillation and analyzed by gas chromatography – mass spectrometry. The essential oil was dominated by sesquiterpene hydrocarbons, (*E*)-caryophyllene (31.2%), germacrene-D (28.1%),  $\alpha$ -humulene (8.9%), and  $\beta$ -elemene (7.9%).

**Keywords:** Essential oil composition, (*E*)-caryophyllene, germacrene-D,  $\alpha$ -humulene,  $\beta$ -elemene.

### 1. Introduction

*Caperonia* (False croton) is a genus of unpleasant perennial weeds of the Euphorbiaceae comprised of 60 species found in tropical America and tropical Africa [1]. *Caperonia palustris* (L.) A. St-Hil., commonly known in English-speaking countries as Texasweed or Sacatrapo, is an annual dicotyledonous broadleaf plant with a glabrous stem [2, 3]. It is an erect herb ranging in height from 0.3 to 3.0 m, with coarsely pubescent stems and petioles. Leaves are alternate, range in length of 2 to 15 cm, are broadly lanceolate, and serrated on the margins [4]. *C. palustris* prevails in clay soils, which are commonly used for rice and soybean rotations [5, 6]. However, *C. palustris* has been reported to cause great yield losses in rice production [7-10]. To the best of our knowledge, nothing is known about the chemical composition of *C. palustris* essential oil. In this report we present the first detailed GC-MS analysis of the essential oil of *C. palustris* aerial parts.

### 2. Materials and Methods

#### 2.1 Plant Material

Aerial parts of *Caperonia palustris* were collected in May, 2013, from Olambe – Oke Aro, Ogun State, Nigeria, and the plant species was authenticated in the Botany Department, University of Lagos, Nigeria, with Voucher number LUH 5763. A 500 g sample of *C. palustris* was hydrodistilled for 4 h in a modified Clevenger-type apparatus to yield 1.64 g light yellow essential oil [11]. The essential oil so obtained was stored in a sealed glass bottle with screw lid cover under refrigeration at 4 °C.

#### 2.2 GC-MS Analysis

The volatile oil sample was subjected to GC-MS analysis on an Agilent system consisting of an Agilent model 6890 Gas Chromatograph, an Agilent 5973 mass selective detector (EIMS, electron energy = 70 eV, scan range = 40-400 amu, and scan rate = 3.99 scans/sec) and an Agilent Chemstation data system. The GC column was a HP-5ms fused silica capillary with a (5% phenyl)- methyl polysiloxane stationary phase, film thickness 0.25  $\mu$ m, length 30 m, and internal diameter of 0.25 mm. The carrier gas was helium with a column head pressure of 7.07 psi and a flow rate of 1.0 mL/min. Inlet temperature was 200 °C and MSD detector temperature was 280 °C. The GC oven temperature program was used as follows: 40 °C initial temperature, hold for 10 min, increased at 3 °C/min to 200 °C, increased 2 °C/min to 220 °C. A 1% w/v solution of the sample in dichloromethane was prepared and 1  $\mu$ L was injected using a 10:1 split ratio.

Identification of the constituents of the volatile oil was achieved based on their retention data (retention indices) determined with reference to C<sub>9</sub>-C<sub>21</sub> *n*-alkane homologous series, and by comparison of their mass spectral fragmentation patterns with those reported in the literature [12] and stored on the MS library [NIST database (G1036A, revision D.01.00) / ChemStation data system (G1701CA, version C.00.01.08)]. The chemical composition of *C. palustris* essential oil is summarized in Table 1.

### 3. Results and Discussion

The essential oil was obtained as a light yellow oil (0.328% of

the dried plant material). The GC-MS analysis of aerial parts of *C. palustris* facilitated the identification of oil components, which are listed in Table 1. The oil was mainly composed of sesquiterpene hydrocarbons dominated by (*E*)-caryophyllene (31.2%), germacrene-D (28.1%),  $\alpha$ -humulene (8.9%), and  $\beta$ -elemene (7.9%). To our knowledge this is the first report on the essential oil composition of any *Caperonia* species, so comparison within the genus is not possible. There have been some *Croton* species that have sesquiterpene-hydrocarbon-rich essential oils, however, e.g., *Croton draco* [13], *Croton isabelli* [14] and *Croton campestris* [15].

**Table 1:** Essential oil composition of *Caperonia palustris*.

RI	Compound	%	RI	Compound	%
1375	$\alpha$ -Copaene	1.6	1499	Bicyclogermacrene	2.7
1385	$\beta$ -Bourbonene	1.5	1504	$\alpha$ -Muurolene	0.2
1390	$\beta$ -Cubebene	0.2	1508	Germacrene A	3.3
1393	$\beta$ -Elemene	7.9	1511	( <i>E,E</i> )- $\alpha$ -Farnesene	0.5
1421	( <i>E</i> )-Caryophyllene	31.2	1518	Cubebol	1.1
1430	$\beta$ -Copaene	0.3	1526	$\delta$ -Cadinene	1.3
1435	$\gamma$ -Elemene	0.4	1558	Germacrene B	1.8
1455	$\alpha$ -Humulene	8.9	1566	( <i>E</i> )-Nerolidol	0.5
1462	Alloaromadendrene	0.8	1577	Germacrene D-4-ol	0.9
1479	$\gamma$ -Muurolene	tr	1584	Caryophyllene oxide	0.9
1484	Germacrene-D	28.1	1641	$\tau$ -Cadinol	0.9
1490	$\beta$ -Selinene	0.6	1654	$\alpha$ -Cadinol	3.0
1496	Valencene	1.4		Total Identified	100.0

### 4. References

- Godara RK, Williams BJ, Webster EP. Texasweed (*Caperonia palustris*) can survive and reproduce in 30-cm flood. *Weed Technology* 2011; 25(4):667-673.
- Godfrey RK, Wooten JW. Aquatic and Wetland Plants of Southeastern United States: Dicotyledons. University of Georgia Press, Athens, Georgia, 1982, 281-282.
- United States Department of Agriculture, Natural Resources Conservation Service. *Caperonia palustris* (L.) A St Hil Sacatrapo, 2014. <http://plants.usda.gov/core/profile?symbol=CAPA11>.
- Southern Weed Science Society. Weed Identification Guide. Southern Weed Science Society, Champaign, Illinois, 1998.
- Koger CH, Reddy KN, Poston DH. Factors affecting seed germination, seedling emergence, and survival of Texasweed (*Caperonia palustris*). *Weed Science* 2004; 52(6):989-995.
- Poston DH, Nandula VK, Griffin RM, Koger CH. Texasweed (*Caperonia palustris*) control in soybean with postemergence herbicides. *Weed Technology* 2007; 21:670-673.
- Smith RJ. Weed competition in rice. *Weed Science* 1968; 16(2):252-255.
- Smith RH. Competition of spreading dayflower (*Commelina diffusa*) with rice (*Oryza sativa*). *Weed Science* 1984; 32(1):116-119.
- Caton BP, Foin TC, Hill JE. Phenotypic plasticity of *Ammannia* spp. in competition with rice. *Weed Research* 1997; 37(1):33-38.
- Zhang JX, Li CH, Lou YL, Deng YY, Qiu CY. Studies on the transplanting rice yield loss caused by weed *Alternanthera philoxeroides* and its economic threshold. *Acta Agriculturae Shanghai* 2004; 20(1):95-98.
- British Pharmacopoeia, Vol 2, H.M. Stationary Office, London, 1980, 109.
- Adams RP. Identification of Essential Oil Components by Gas Chromatography/Mass Spectrometry, Edn 4, Allured Publishing Corp, Carol Stream, Illinois, 2007.
- Setzer WN, Stokes SL, Bansal A, Haber WA, Caffrey CR, Hansell E *et al*. Chemical composition and cruzain inhibitory activity of *Croton draco* bark essential oil from Monteverde, Costa Rica. *Natural Product Communications* 2007; 2(6):685-689.
- Vunda SLL, Sauter IP, Cibulski SP, Roehle PM, Bordignon SAL, Rott MB *et al*. Chemical composition and amoebicidal activity of *Croton pallidulus*, *Croton ericoides*, and *Croton isabelli* (Euphorbiaceae) essential oils. *Parasitology Research* 2012; 111(3):961-966.
- De-Almeida TS, Rocha JBT, Rodrigues FFG, Campos AR, da Costa JGM. Chemical composition, antibacterial and antibiotic modulatory effect of *Croton campestris* essential oils. *Industrial Crops and Products* 2013; 44:630-633.