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Identification of volatile components isolated from indigenous fruits of Mozambique: Maphilwa (*Vangueria infausta*)

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Abstract

The aim of this work is to find the optimal combination of solvents which can extract the aroma components and identify the aroma profile of maphilwa (*Vangueria infausta*). Different extraction solvents like pentane, diethyl ether, ethanol and water were studied. Geraniol was used as internal standard added to the ethanol. Gas Chromatography was used to investigate the aroma components profile in maphilwa (*V. infausta*). The aroma compounds appears at relatively high values of retention time 15.1, 20.2 and 35.3 minutes for peak a, b and c respectively, reflecting the different boiling points.

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Keywords: GC; aroma components; volatile; indigenous fruits of Mozambique; maphilwa (*Vangueria infausta*).

1. Introduction

Substantial quantities of perishable fruits and vegetables with high nutritional value [1] grow in Mozambique as well as everywhere in southern part of Africa. Most of these fruits and vegetables (commonly known by local names) are available during the seasons of harvest, usually from January to May. Some examples of fruits are rubber vine or mavungwa (*Landolphia kirki*), maçanica (*Ziziphus mauritiana*), mapsinsha (*Salacia kraussi*), false medlar or maphilwa (*Vangueria infausta*), kaffir orange or Kwazulu Natal orange or massala (*Strychnos spinosa*) [2]. These fruits can be considered as a possible additional source of food especially during periods when there are restrictions of other products. Most fruits have high content of micronutrients and fibres. But overall the fruits have to have a good taste when fresh and after processing. Volatile compounds are also present in these fruits. However, there are very few reports about the identification and quantification of volatile components from the indigenous fruits. The volatile chemicals present in natural leaves, flowers and fruits have been widely used in

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aromatherapy since ancient times [3]. In this study we investigate the fruit *Vangueria infausta*. The fresh *V.infausta* common called maphilwa in Ronga, (local language), it is sweet and has a taste like wild apple. It is brown-orange when ripe and have an orange flesh. The size is about 3-5 cm in diameter and it contains 2-3 seeds. The aim of this study is to find the optimal combination of solvents which can extract the aroma components of *V. infausta* in a reproducible manner. We have studied different extraction solvents such as pentane, diethyl ether, ethanol and investigated the effect of water. Geraniol was used as internal standard added to the ethanol.

2. Material and Methods

Ripe fruits of maphilwa, (*Vangueria infausta*) were collected in Marracuene, 30 km north from Maputo (Mozambique). Matured fruits free from defects were selected, washed, sealed in vacuum bag and frozen at minus 18°C. At the moment of analyses the fruits were thawed, boiled for 5 minutes, manually peeled and the pulp separated from seeds. The aromas are made more mobile by adding ethanol in the ratio 1:1 to the sample. The internal standard, geraniol, was added to the ethanol (0.04% V/V). The sample preextraction continued during 24 h and followed by filtration. The aromas were extracted using a hydrophobic solvent. Different extraction solvents have been evaluated: diethyl ether (D), pentane (P) and mixtures thereof. The ratio of the preextract to solvent was kept 1:1. GC analysis of extract was performed on a Agilent Technologies 6890N gas chromatography equipped with DB-225 column (30mx0,25mm) film 0,25 µm with stationary phase containing 50% cyanopropylphenyl-diethylpolysiloxane. The oven temperature was programmed to increase from 50°C to 200°C during 5 min and than from 200°C to 240°C during 40 minutes. The injector and detector temperatures were 300°C. The carrier gas was helium, pressure 55,5 kPa, and a split ratio of 40:1 flowing at 24,1ml/min. The hydrogen flow was 30 ml/min [4, 5]. The tentative concentration of the aroma compounds was calculated using the following equation:

$$C = \frac{mIS \times A_{pi}}{mS \times A_{pIS}} \quad (1)$$

Where C is a concentration of aroma component (given in mg/g), mIS is a mass of internal standard, mS is a mass of the sample, A_{pi} is a area of the peak of the sample, and A_{pIS} is a area of the peak of internal standard.

3. Sample preparation

3.1. Isolation of volatile components by solvent extraction

Two fruits (15 g) of maphilwa (*Vangueria infausta*) sample were manually peeled and crashed in small pieces (about 10 µm) and added 15 ml of Ethanol containing 0,04% V/V of geraniol as internal standard. The mixture was continuously steered for 12 hours on any magnetic rotator. Then was filtered and added 25 ml of mixture of pentane and diethyl ether (1:1) and kept for extraction during 2 hours under steering. The organic phase (supernatant) was removed and introduced in a 1,5 ml GC vial, and crimped for GC analysis.

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