Essential Oils from *Zanthoxylum chiloperone* and *Z. riedelianum* Growing in Paraguay

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Abstract

Essential oils from aerial parts of *Zanthoxylum chiloperone* var. *angustifolium* Engl. and *Z. riedelianum* Engl. have been analyzed by GC/MS. Twenty-four compounds were identified, representing 80% of essential oils. The main components of these essential oils are, respectively, cis-nerolidol (71.0%) and spathulenol (65.2%).

Keywords: Rutaceae, Zanthoxylum chiloperone var. angustifolium Engl., Z. riedelianum Engl., essential oil, GC/MS method, Paraguay.

Introduction

*Zanthoxylum chiloperone* var. *angustifolium* Engl. (syn. *Fagara chiloperone* var. *angustifolia*) and *Zanthoxylum riedelianum* Engl. (syn. *Fagara riedelianus*) are dioic trees (up to 15 m) growing in South America. These species are respectively called in Guarani “tembetary hu” and “tembetary sa’jö” (“tembé = lip, ità = stone, y = abbreviation of “śvyra = tree, hu = black sa’jö which means yellow (bark color)”) (Spichiger & Stutz de Ortega, 1987). The decoction of the root bark of *Z. chiloperone* var. *angustifolium* is used in Paraguay as an antimalarial (Milliken, 1987), emmenagogue and an antirheumatic.

Both species present a similar physical appearance but their leaves possess different aroma. This characteristic is often used to facilitate their identification. GC/MS analysis of essential oils of *Z. chiloperone* var. *angustifolium* and *Z. riedelianum* resulted in identification of 24 compounds.

Materials and Methods

Aerial parts of *Zanthoxylum chiloperone* var. *angustifolium* and *Z. riedelianum* Engl. were collected by A. Fournet in March 1995, in Paraguay near Piribeuy, Department of Cordillera, and identified by N. Soria (Department of Botany, National University of Asuncion, Paraguay). Voucher specimens (AF 917 and AF 919, respectively) have been deposited at the Herbarium of Chemical Sciences Faculty, Asuncion, Paraguay (FCQ).

Essential oils

Essential oils were obtained by hydrodistillation of aerial parts in a French-pharmacopeia-type apparatus and dried over anhydrous sodium sulfate.

GC/MS analyses

GC/MS studies were carried out on a ATI UNICAM 610 gas chromatograph combined with ATI UNICAM 120 mass spectrometer connected to a computerized system. The BPX5 (SGE Ltd) capillary column (25 m x 0.22 mm – 1μm) was programmed from 60°C (5 min) to 250°C (10 min) at 3 °C/min with helium as the carrier gas (15 psi); ionizing voltage: 70 eV; injector: 240°C; detector: 250°C. 0.3 μl of essential oil 1/10 diluted with chloroform have been injected for analysis.

Components were identified by comparison of calculated Kovats indices with those given by Adams (Adams, 1995) and their mass spectra with those of the GC/MS system library.

Accepted June 20, 2000

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Figure 1. Chromatogram of essential oil obtained from *Z. chiloperone* var. *angustifolium*.

Table 1. Kovats indices and percentage composition of leaves oils of *Zanthoxylum chiloperone* var. *angustifolium* and *Z. riedelianum*.

<table>
<thead>
<tr>
<th>No.</th>
<th>Compound name</th>
<th><em>Z. chiloperone</em> var. <em>angustifolium</em></th>
<th><em>Z. riedelianum</em></th>
<th>Kovats Indices BPX5</th>
<th>Kovats Indices DB-5</th>
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Identified components

- Monoterpene hydrocarbons: 1.3
- Sesquiterpene hydrocarbons: 3.2
- Oxygenated-sesquiterpenes: 76.5

`t` = traces (≥0.01%).

Compounds are listed in order their elution on BPX-5 column.
Results and Discussion

Previously, only the essential oils of *Zanthoxylum* species from Africa or Asia have been studied (Oguntimein et al., 1985; Lamaty et al., 1989; Shah, 1991; Ramidi et al., 1998; Chisowa et al., 1999). These essential oils seemed to be rich in monoterpenes, particularly in linalool (Kusumoto et al., 1968; Sakai et al., 1970; Ramidi et al., 1998). GC/MS analyses of essential oils of *Z. chiloperone* var. *angustifolium* and *Z. riedelianum* showed that they contained few monoterpenes and were rich in sesquiterpenes. The identified components are listed in Table 1. Chromatograms of the essential oils are presented in Figures 1 and 2.

Twenty-four components were identified in essential oils of *Z. chiloperone* var. *angustifolium* and represented about 80% of these oils. The major compounds were sesquiterpenes: cis-nerolidol (71.0%), spathulenol (3.5%), caryophyllene oxide (2.0%) and β-elemene (1.9%).

Only nine compounds were identified in the essential oils of *Z. riedelianum* and represented about 80%. In this one, spathulenol (65.2%), was the main compound while cis-nerolidol yielded only 1.9% oil content. Other sesquiterpenes, such as aromadendren (4.7%), caryophyllene oxide (3.7%), β-elemene (0.6%), and δ-cadinene (0.6%) were also present.

As it is not easy to carry out sensory evaluation, it seems difficult to explain the difference in the aroma only by the chemical composition of the essential oils.

References


