FLAVOUR AND FRAGRANCE JOURNAL
Flavour Fragr. J. 2005; **20**: 429–430
Published online 12 May 2005 in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/ffj.1457

Volatile constituents of the flowers of *Clerodendron fragrans* (Vent.) R. Br.

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Received 13 August 2003; Revised 2 March 2004; Accepted 31 March 2004

ABSTRACT: The volatile constituents of *Clerodendron fragrans* (Vent.) R. Br. flowers were analysed by capillary GC and GC–MS following isolation by hydrodistillation–extraction; 41 compounds were identified. Oxygenated monoterpenes and aromatic compounds originating from phenylpropanoid metabolism predominated, accounting for 41.2% and 36.0% respectively, of the total volatiles. The major components were linalol, benzyl acetate and benzyl benzoate. Copyright © 2005 John Wiley & Sons, Ltd.

KEY WORDS: *Clerodendron fragrans* (Vent.) R. Br.; Verbenaceae; flower volatiles; linalol; benzyl acetate; benzyl benzoate

Introduction

Clerodendron fragrans (Vent.) R. Br. (Verbenaceae), a small shrub native to China, grows wild in Malaysia but is sometimes cultivated in home gardens for its ornamental appearance and its rather fragrant, double white flowers. Various parts of the plant are used in folk medicine for treating rheumatism and ague, and in combination with other materials for skin diseases.[1] Previous phytochemical investigations of the roots and aerial parts have revealed the presence of terpenoids and steroids.[2–5] Regarding the volatile composition of the flowers, there appears to be no published data, therefore this paper reports the first of such analyses.

Experimental

Material

The flowers were picked from a plant growing in a home garden in Tanjung Bungah, Penang. A voucher specimen (USM10130) has been deposited in the herbarium of the School of Biological Sciences, Universiti Sains Malaysia.

Isolation of Volatile Components

Freshly-picked flowers (120 g) were hydrodistilled for 5 h in an all-glass apparatus as described in the *British Pharmacopoeia*,[6] using pentane as collecting solvent. The extract was concentrated at room temperature to a volume of about 0.1 ml using a gentle stream of N_2. The resultant essence possessed an aroma characteristic of the fresh flowers.

Gas Chromatography

GC analysis was carried out using a Hitachi G-3000 gas chromatograph equipped with a FID. SPB-1 (50 m × 0.20 mm, film thickness 0.33 μm) and Supelcowax 10 (30 m × 0.25 mm, film thickness 0.25 um) fused-silica capillary columns were employed. The operating conditions of the two columns were as follows: initial oven temperature, 50 °C for 3 min, rising to 220 °C at 4 °C/min and held for 30 min; injector and detector temperatures, 230 °C; carrier gas, 1.0 ml/min He; injection volume, 0.4 μl; split ratio, 50:1. Peak areas were obtained using a Shimadzu C-R6A Chromatopac data processor.

Gas Chromatography–Mass Spectrometry

GC–MS analysis was performed using a HP 5989A and the same capillary GC conditions as described above. Significant MS operating parameters: ionization voltage, 70 eV; ion source temperature, 200 °C; scan mass range, 40–350 u. Constituents were identified by comparison of their mass spectra with those of authentic compounds or with reference spectra in the computer library, and confirmed by comparison of their retention indices with those of authentic compounds or with data in the literature.

Results and Discussion

The yield of total volatiles, estimated by the addition of a measured amount of dodecan-1-ol to the concentrated

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Contract/grant sponsor: Universiti Sains Malaysia; Contract/grant number: 305/PKIMIA/622194.