

OBTAINING AND FRACTIONING OF *Cymbopogon nardus* (POACEAE) ESSENTIAL OIL BY STEAM DISTILLATION

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CONSTRUIMOS FUTURO

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Introduction

Cymbopogon nardus (Poaceae family) is an aromatic plant native to India and Sri Lanka, cultivated in tropical and subtropical areas. Its essential oil (EO) is of commercial interest due to its insect repellent activity and application in treatments for rheumatism, menstrual problems, fever, and intestinal parasites (Kaur *et al.*, 2021).

Experimental

Plant material

Family: Poaceae
Genus: *Cymbopogon*
Species: *nardus*
Common name: Citronella
Collection site: Barbosa, Santander, Colombia



The *C. nardus* EO was obtained by steam distillation from fresh plant material (PM). Distillation was carried out in a 0.1 m³ stainless steel still for ca. 1.5 h. During the distillation process twelve condensate fractions were collected, every five and ten minutes.

The EOs were analyzed by gas chromatography coupled to mass spectrometry (GC/MS) in full scan mode on two capillary columns, on an apolar DB-5MS column and a polar DB-WAX column. Tentative identification was carried out by comparison of experimental mass spectra and linear retention indices with those from data bases available and from scientific literature (Babushok *et al.*, 2011; NIST, Wiley).

Results

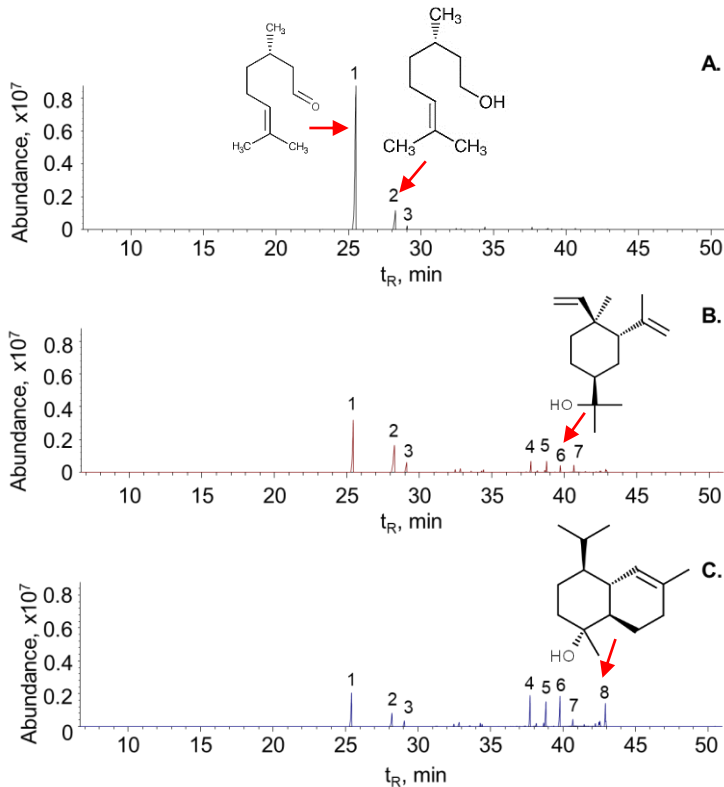


Figure 1. Chromatographic profiles obtained by GC/MS (full scan) of the *C. nardus* EO fractions. DB-5MS column (60 m). Distillation time: **A.** 15 min; **B.** 40 min; **C.** 70 min.

The yields (0,37-0,55%) and composition of the *C. nardus* EOs obtained in the present investigation were similar to those reported by Chong *et al.* (2015) and Rastuti *et al.* (2020). The PCA performed for the major compounds in the 12 EO fractions, allowed their grouping into four different fractions.

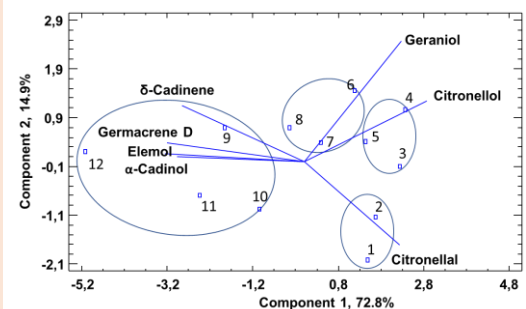


Figure 2. PCA for the *C. nardus* EO fractions.

Table 1. Chemical composition of the *C. nardus* EO, obtained by GC/MS.

N° Fig. 1	Compound	Linear retention indexes		Relative GC peak area, %		
		DB-5MS		Distillation time, min		
		Exp.	Lit.*	15	40	70
1	Citronellal	1159	1154	85,7	36,3	19,3
2	Citronellol	1233	1228	10,8	29,1	9,0
3	Geraniol	1256	1255	1,4	7,6	3,4
4	Germacrene D	1495	1495	0,7	5,2	13,8
5	δ-Cadinene	1530	1530	0,5	5,1	11,3
6	Elemol	1562	1562	0,3	3,2	15,1
7	Germacren-4-ol	1591	1593	0,3	3,3	2,7
8	α-Cadinol	1673	1672	-	1,5	8,9

*Babushok *et al.*, 2011 and NIST 2017.

Conclusions

The highest EO yield obtained was 0.55%, under the following steam distillation conditions: 240 kg/m³ (bed density) and 200 mL/min (steam flow). The major compounds of the *C. nardus* EO were citronellal (12-72%), citronellol (9-36%), geraniol (0.2-15%), and elemol (1-17%). Four fractions of the EO were obtained during the steam distillation process, as follows: 1). 0-10 min (citronellal); 2). 10-25 min (citronellol); 3). 25-50 min (geraniol), and 4). 50-90 min (germacrene D, elemol).

Acknowledgements

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