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SHORT COMMUNICATION

Chemical characterisation of essential oils of leaves of two Solanaceae: *Solanum rugosum* and *Solanum erianthum* from Côte d'Ivoire

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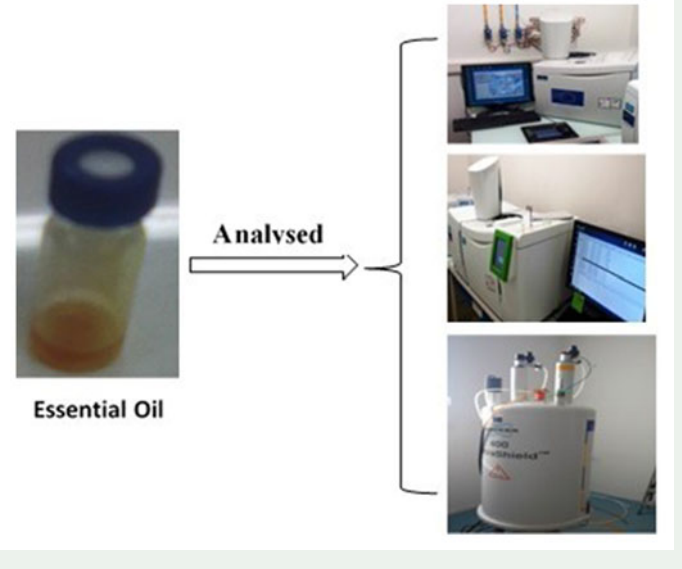
ABSTRACT

This study made it possible to characterise by GC (in combination with retention indices), GC-MS and ^{13}C NMR, the chemical composition of the essential oils from *Solanum rugosum* and *Solanum erianthum*, two Solanaceae of the Ivorian flora. The two essential oils were characterised by a very high proportion of sesquiterpenes. Specifically, the essential oil of *S. rugosum* was dominated by (E)-β-caryophyllene (33.7%), β-elemol (19.8%) and germacrene D (14.4%), while that of *S. erianthum* was mainly composed of α-humulene (38.6%), β-elemol (17.8%) and (E)-β-caryophyllene (16.7%). The chemical composition of *Solanum rugosum* is described here for the first time.



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1. Introduction

Solanum rugosum Dunal and *Solanum erianthum* D. Don are two species of Solanaceae growing wild in Côte d'Ivoire on the edge of forests. Both of these herbs are used in traditional medicine in the treatment of wounds, ulcers, haemorrhoids, etc. (Sam et al. 2013; Trébissou et al. 2014; Kamagate et al. 2015). The literature reports studies on the phytochemistry of *Solanum* genus (Aliero et al. 2006; Karlsson et al. 2009; Barbosa et al. 2012; Essien et al. 2012; Keawsa-Ard et al. 2012; Radhika et al. 2012; Ogunwande et al. 2013; Satyal et al. 2015; Peng et al. 2017).

In the course of our on-going work on the characterisation of aromatic plants of Côte d'Ivoire through the chemical composition of their essential oils, the aim of the present work was to determine the composition of essential oils of two Solanaceae: *Solanum rugosum* and *Solanum erianthum*, growing wild in Côte d'Ivoire.

2. Results and discussion

S. rugosum and *S. erianthum* gave oils with yield of 0.02% and 0.03% (w/w, *vs.* fresh material), respectively. The oil obtained from *S. rugosum* analysed by GC(RI), GC-MS and ^{13}C NMR, led to the identification of 22 compounds accounting for 93.5% to the global composition (Supplementary material Table S1). The essential oil phytocompounds were dominated by sesquiterpenes (86.9%) followed by a low rate of presence of oxygenated monoterpenes (2.9%) and diterpenes (2.5%). The major components were: (E)-β-caryophyllene (33.7%), β-elemol (19.8%) and germacrene D (14.4%). Some constituents were present in appreciable amount: guaiol (4.4%), (E)-phytol (2.5%), α-humulene (2.5%), γ-eudesmol (2.2%), α-eudesmol (2.4%) and linalool (2.0%).

The combination of GC(RI), GC-MS and ^{13}C NMR applied to *S. erianthum* oil allowed to identification of nineteen compounds accounting for 93.8% of the total composition (Supplementary material Table S1). *S. erianthum* produced a sesquiterpene-rich oil (91.7%). Diterpenes were poorly represented (1%) as well as non-terpenic linear compounds (0.6%). The main components were α-humulene (38.6%), β-elemol (17.8%); (E)-β-caryophyllene (16.7%). Besides these compounds, other were present in relatively appreciable content: guaiol (4.4%), germacrene D (3.1%), γ-eudesmol (2.3%) and α-eudesmol (2.2%).

Despite the fact that these two oils were dominated by sesquiterpenes, 86.9% in *S. rugosum* oil and 91.7% in *S. erianthum* oil, several differences concerning the major compounds were present; (i) α-humulene (38.6%, predominant compound in *S. erianthum* and only 2.5% in *S. rugosum*), (ii) (E)-β-caryophyllene (33.7% in *S. rugosum vs.* 16.7% in *S. erianthum*) and (iii) germacrene D (14.4% in *S. rugosum vs* 3.1% in *S. erianthum*). β-elemol (around 19%) and guaiol (4.4%) were reported in both oils in the same proportion. Monoterpenes were poorly represented in *S. rugosum oil* (2.9%), and absent in *S. erianthum*. (E)-phytol, a usual diterpene, was detected in *S. rugosum* (2.5%) and in *S. erianthum* (1%).

The chemical composition of essential oils of Ivorian species of *S. rugosum* and *S. erianthum*, investigated in this study differed drastically from those of oils extracted from several species of the *Solanum* genus. Indeed, the leaf oil from

Nigerian *S. erianthum* exhibited a high amount of monoterpenes (86.3%) such as α-terpinolene (17.8%), α-phellandrene (17.5%) and *p*-cymene (15.7%) (Essien et al. 2012). The chemical composition of *S. torvum* leaf oil which was rich in phenylpropanoids [(Z)-asarone, 30.1%, (E)-asarone, 36.4%)]. The oil of *S. torvum* were composed of various compounds including β-vetivenene (55.4%) and 1,10-di-*epi*-cubenol (25.6%), for stems; dillapiole (55.3%), methyl salicylate (19.5%) and santalone (16.1%), in fruits; dillapiole (48%), cyclocolorenone (12.6%) and nerol (12%), in roots (Barbosa et al. 2012). The oils obtained from the unripe berries of *S. pseudocapsicum* and leaves of *S. xanthocarpum* were represented by alkanes (decane, 41.06% and undecane 29.26%) (Aliero et al. 2006) and (heptacosane 20.0%) (Satyal et al. 2015), respectively. *S. xanthocarpum* oils, exbibited terpenic and non terpenic compounds in fruit oil (benzyl benzoate, 21.7% and (E,E)-geranyllinalool, 12.6%); root oil (solavetivone, 22.9%; palmitic acid, 21.0% and linoleic acid, 8.2%) and stem oil (palmitic acid, 28.9%; heptacosane, 12.8% and linoleic acid, 10.1%) (Satyal et al. 2015), absent from our oils. Finally, the essential oils of the leaves from *S. spirale* (Keawsa-Ard et al. 2012) and *S. macranthum* (Essien et al. 2012) were dominated by diterpenes [(E)-phytol, 48.10% and 29.0%, respectively)]. However, α-humulene and (E)-β-caryophyllene, main components in the oil of Ivorian species of *S. erianthum* (38.6 and 16.7%, respectively) were the major compounds of Nigerian *S. erianthum* oil, 46.6% and 20.6%, respectively (Ogunwande et al. 2013).

3. Conclusion

This study allowed to describe for the first time the chemical composition of (i) *S. rugosum* and (ii) *S. erianthum* from Côte d'Ivoire. Both essential oils were sesquiterpene-rich oils: (E)-β-caryophyllene, β-elemol and germacrene D in *S. rugosum*; and α-humulene, β-elemol and (E)-β-caryophyllene in *S. erianthum*.

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Disclosure statement

No potential conflict of interest was reported by the author.

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