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SHORT COMMUNICATION

Essential oil composition of aerial parts from Algerian *Anacyclus monanthos* subsp. *cyrtolepidioides* (Pomel) Humphries

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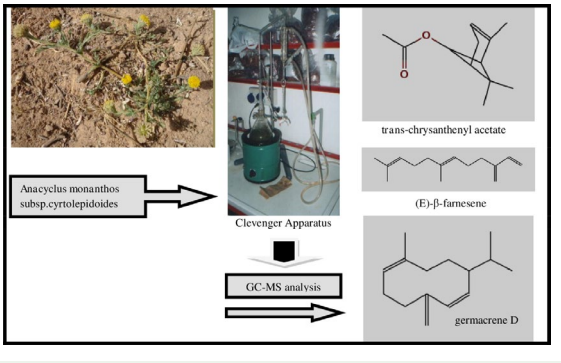
ABSTRACT

The chemical composition of the essential oil from the aerial parts of *Anacyclus monanthos* subsp. *cyrtolepidioides* (Pomel) Humphries (Asteraceae) growing in a semi-arid region of Algeria was investigated for the first time. The essential oil was obtained by hydrodistillation and fully characterized by gas chromatography-mass spectrometry (GC-MS). A total of 97 compounds were identified. The essential oil was found to be rich in *trans*-chrysanthenyl acetate (9.8 ± 2.0%), (*E*)-β-farnesene (7.4 ± 1.5%), germacrene D (6.9 ± 1.3%) and myristicin (4.8 ± 0.8%).



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Anacyclus monanthos subsp. *cyrtolepidioides* (Pomel) Humphries; Asteraceae; essential oil composition; GC-MS; Algeria

1. Introduction

Anacyclus monanthos subsp. *cyrtolepidioides* (Pomel) Humphries belongs to the Asteraceae family and represents one out of six indicated species of the *Anacyclus* genus widely

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distributed in Algeria. Six synonyms has been reported for *Anacyclus monanthos* subsp. *cyrtolepidioides*: *Anacyclus alexandrinus* var. *cyrtolepidioides* (Pomel) Durand & Baratte, *Anacyclus alexandrinus* var. *mauritanicus* (Pomel) Batt., *Anacyclus cyrtolepidioides* Pomel, *Anacyclus cyrtolepidioides* var. *cyrtolepidioides, Anacyclus cyrtolepidioides* var. *mauritanicus* (Pomel) Batt. ex. Jahand. & Maire and *Anacyclus mauritanicus* Pomel (The Plant List 2013). It is an annual, pubescent plant, ligules present or absent. Central florets usually with 2 erect teeth longer and 3 spread; devices with 5 equal teeth. Outer achenes with a ± marked crown, discoid homogamous flower heads; with grayish leaves and flexuous stems. Leaves are 1–2 pinnatipartite, with elongated, linear segments. Flowers are grouped in capitula arranged on short terminal peduncles; they are all tubular, 5-toothed. *A. monanthos* subsp. *cyrtolepidioides* is endemic to North Africa. In Algeria, it grows on sandy soils of regions characterized by semi-arid climate; it is quite common, especially in subsector of Algerian and Oranais high plateaus (H1), Constantine high plateaus (H2) and Eastern regions of the Northern Sahara (SS2). After identification of the specimen a new station of this species has been recently suggested in Hodna region (Hd). In Algeria, this species is known as vernacular: Djerf and Rebina and no particular traditional use of this plant is reported (Quezel and Santa 1963).

In Tunisia, some studies show that the essential oil from flowerheads of *A. cyrtolepidoides* has insecticidal and antimicrobial activities (Zardi-Bergaoui, Hammami et al. 2008, Zardi-Bergaoui, Harzallah-Skhiri et al. 2008). To the best of our knowledge, In Algeria, the secondary metabolites of this species have not been investigated yet. In particular, the volatile fraction is often useful to support the chemotaxonomy of the species. Therefore, in this work we reported the first investigation of the chemical composition of the essential oil obtained from the aerial parts of the *A. monanthos* subsp. *cyrtolepidioides* growing in Algeria.

2. Results and discussion

Table S1 lists the chemical composition of the *A. monanthos* subsp. *cyrtolepidioides* essential oil. In total, 97 volatile components, accounting for 70.4% of the total composition, were fully characterized and grouped into eight classes, namely: aldehydes, alkanes, monoterpene hydrocarbons, oxygenated monoterpenes, sesquiterpene hydrocarbons, oxygenated sesquiterpenes, diterpenes, phenylpropanoids and others. The essential oil was characterized by sesquiterpene hydrocarbons (17 compounds accounting for 24.6% of the total composition), oxygenated monoterpenes (28 compounds, 15.6% of the total composition), oxygenated sesquiterpenes (13 compounds, 13.1% of the total composition), phenylpropanoids (2 compounds, 4.8% of the total composition), monoterpene hydrocarbons (11 compounds, 4.0% of the total composition), diterpenes (2 compounds, 2.6% of the total composition), alkanes (8 compounds, 2.2% of the total composition) and aldehydes (9 compounds, 1.0% of the total composition). The major constituents (in order of decreasing amount) were *trans*-chrysanthenyl acetate (9.8%), (*E*)-β-farnesene (7.4%), germacrene D (6.9%), myristicin (4.8%), vulgarone B (3.6%), spathulenol (2.8%), β-sesquiphellandrene (2.7%) and neryl isovalerate (2.0%).

A review of the existing literature on essential oils of the genus *Anacyclus* revealed the presence of a few studies. The group of oxygenated sesquiterpenes of the Moroccan species *A. pyrethrum* constitutes the most abundant fraction of the oil (89.2–90.6%) during the maturation stage (Elazzouzi et al. 2014) likewise; this group is the most abundant in the Algerian

species as shown by Selles et al. (2013). In this study, the percentage of oxygenated sesquiterpenes increased from 37.1 to 58.6% before and after flowering, respectively. In contrast, the essential oil of the Tunisian species *A. clavatus* is characterized by the predominance of the group of oxygenated monoterpenes with 54.03% of the total composition, the major constituents of this fraction are *trans*-chrysanthenyl acetate (12.3%), *cis*-thuyone (9.8%), chrysanthenone (8.2%) and *trans*-thuyone (7.3%) (Hammami et al. 2013). Whereas in that of an Algerian population, Aliboudhar et al. (2013, 2015) showed that the oxygenated fraction represented 36.1% and the main components are germacrene D (16.84%) and β-thujone (11.16%). By comparison, *A. cyrtolepidoides* shows a low content of both groups (oxygenated sesquiterpenes: 13.1%; oxygenated monoterpenes: 15.6%), and high levels of sesquiterpene hydrocarbons (24.6%).

Other chemical investigation of butanol and acetone extracts from Tunisian *Anacyclus cyrtolepidioïdes* identified new compounds: rutin 1, nicotoflorin 2, methyl linoleate 3, linoleic, palmitic and linolenic acids (Hammami et al. 2011).

We have to mention here that another extraction technique of essential oil (extracted and separated by fractions) done on the *Anacyclus cyrtolepidioïdes* shows a quite different results from ours. This technique is used by Zardi-Bergaoui, Harzallah-Skhiri et al. (2008), who identified seventy-five compounds (four fractions F_1-F_4), were identified by GC and GC-MS. α-pinene (71.4, 46.5, 80.3 and 63.7%) as the major constituent in the four fractions. Decanal (8.0%), β-cubebene (5.6%) and Compholenal (5.3%) were found at the highest value in F_2, but the compound 9-hexacosene (15.7%) was found at the highest value in F_4.

3. Experimental

See Supplementary Material.

4. Conclusion

This work is the first report on the essential oil composition of *A. monanthos* subsp. *cyrtolepidioides* growing in Algeria. The GC–MS analysis of the oil allowed us to identify *trans*-chrysanthenyl acetate (9.8%), (*E*)-β-farnesene (7.4%), germacrene D (6.9%) and myristicin (4.8%) as the major compounds. These results shed light into the phytochemistry of this unexplored species of the Flora of Algeria. The second step will be to evaluate the biological activities of the essential oil in order to valorize this endemic species with a special ecological character.

Disclosure statement

No potential conflict of interest was reported by the authors.

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