

RESEARCH ARTICLE

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## Biological activities and volatile constituents of *Daucus muricatus* L. from Algeria

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### Abstract

**Background:** In order to find new bioactive natural products, the antimicrobial and antioxidant activities of essential oil components extracted from the separated organs of the Algerian medicinal and aromatic plant *Daucus muricatus* L. were studied.

**Results:** The chemical composition of essential oils obtained by hydrodistillation (HD) was investigated using Gas Chromatography–Retention Indices (GC-RI) and GC–Mass Spectrometry (GC-MS). Two types of essential oils were produced by *D. muricatus*: (i) The oil from roots is mainly composed by nonterpenic oxygenated compounds (59.8 g/100 g), and (ii) the aerial part oils (i.e., the leaves, stems, flowers, and umbels) was mainly composed by terpenic hydrocarbon compounds (62.3–72.2 g/100 g). The chemical composition of the volatile fraction isolated from different organs of *Daucus muricatus* were studied by HS–SPME/GC–RI and GC–MS after optimization of Solid Phase MicroExtraction parameters. For all organs studied, the main volatiles emitted by the plant were hydrocarbon compounds (60.7–82.2 g/100 g). Only quantitative differences between the volatiles of the separated organs studied were observed. In addition, the activity of the oil of *D. muricatus* against eight bacterial strains and one yeast was investigated. The oil from roots revealed active against *S. aureus*, while the essential oil obtained from the aerial parts was active against the yeast *C. albicans*.

**Conclusions:** *Daucus muricatus* essential oil seems be a promising source of natural products with potential antimicrobial activity.

**Keywords:** *Daucus muricatus*. L, Essential oils, HS-SPME, GC/MS, Antimicrobial and antioxidant activities

### Background

*Daucus* is a genus belonging to the Apiaceae family and consists of about 600 species that are widely distributed around the world. In Algeria, the *Daucus* genus is represented by more than 27 species living in dry and uncultivated areas [1], and they are mostly found from Tlemcen to Mascara [1,2]. The most prevalent of the species is *Daucus carota* L. (carrot) reported with eight subspecies throughout Algeria [1]. *Daucus muricatus* L., synonym of *Artemisia muricata* L., *Caucalis muricata* L., and *Platyspermum muricatum* Hoffm., is widely distributed in Algeria, Spain, Portugal, Corsica, Sardinia, Sicily, Italy, the Aegean Islands, and Turkey [2]. *Daucus muricatus* is an annual plant 30–50 cm high, dark green,

bristling at the base, with a stem thickened at the nodes and branches spreading erect. The leaves are soft and lanceolate in their periphery in segments cut into narrow strips with white flowers. The umbels opposite the leaves at the end are contracted, the fruit are large, elliptical and compressed, armed with spines expanded and confluent at the base [1,2]. Several investigations deal with the chemical composition of essential oils of the *Daucus* species [3–27]. While no study has investigated *D. muricatus* essential oils, most of them have reported the chemical composition of essential oils from *D. carota* and its subspecies [3,4,6–16,20,22,23,25–27]. However, only three studies have reported the chemical composition of essential oils from *Daucus* species from Algeria. The first reported the chemical composition of the essential oil of *D. reboudii* Coss. [17], and the other two reported the chemical composition of the oil from *D. crinitus* Desf. [18,19]. Previous reports showed that

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