Exploring three Sicilian Species of *Daucus* L. from Sicily: Chemical Composition of Essential Oils and Antimicrobial, Antibiofilm and Antioxidant Properties

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Abstract:

Daucus is a large genus of Apiaceae, comprising around forty-five accepted species with a large distribution in Europa, Africa, America, and Australia. Species of this genus have been reported to have several ethnopharmacological activities, and some of them are also largely used as food and spices. In Sicily, several subspecies of *Daucus* are present, among them *D. aureus* Desf., *D. nebrodenis* Strobl., and *D. muricatus* (L.) L., objects of this communication. We investigated the essential oils (EOs) of these three species, obtained from the aerial parts collected wild near Messina and Agrigento, and never previously phytochemically studied. The chemical composition of the essential oils was evaluated by GC-MS analysis. *D. aureus* EO showed, as main class, monoterpene hydrocarbons followed by alkanes,

which instead represent the principal classes in *D. muricatus* EO; *D. nebrodensis* EO was shown to be particularly rich in monoterpene hydrocarbons, with sabinene (33.6%), α-pinene (17.2%), γ-terpinene (9.8%), and α-terpinene (7.6%) as main metabolites.

The EO and and its main constituents, were tested to evaluate their antimicrobial properties. The results showed activity against both Gram-positive and Gram-negative bacterial strains.

Among tested components, the most active appear to be sabinene and α-pinene. Additionally, antibiofilm properties, antioxidant activities, and mechanisms of action were evaluated. The EO demonstrates potential inhibitory and disruptive activities against the biofilm of *M. smegmatis*, as well as antioxidant properties.

α-Pinene seems to damage bacterial membranes, while the other components don't show same effect, suggesting possible synergism among the individual components for EO antimicrobial activity.

Keywords:

Legacy System, Reengineering, SOA, Clustering, K-Means.