

Antifungal activity of essential oil from *Artemisia campestris* L on fungal species development

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ABSTRACT

This work studies the antifungal capacity of the essential oil of spontaneous aromatic plant with vocation medication used in the traditional treatments in the South-West of Algeria: *Artemisia campestris* L. The local plant which was tested gave good essential oil yield (0.37%). The physico-chemical analysis of the essential oil of this plant species has enabled us to even characterize to identify our oil. Antifungal activity of the essential oil was studied with respect to seven fungal strains with various concentrations. The results of direct contact method show that the oil of *Artemisia campestris* L is proven very effective on the mycelial growth of the moulds. All strains were inhibited at concentration as weak as 1/70 (v/v), *Fusarium oxysporum* f.sp. *albedinis* and *Penicillium expansum* were most sensitive, being inhibited as from 1/800 (v/v) and 1/500 (v/v) respectively. This essential oil has a fungistatic effect. In addition to the growth of the mycelium, the essential oil of plant showed, in vitro, an antifungal activity at least important on the two other developmental stages, germination and the sporulation, of all fungi. All strains were inhibited at concentration as weak as 1/100 (v/v). *Fusarium oxysporum* f.sp. *albedinis* was most sensitive, being inhibited as from 1/1500 (v/v).

Introduction:

Many cereals and other crops are susceptible to fungal attack either in the field or during storage. This infection not only results in reducing crop yield and quality with significant economic losses, but also in contaminating grains with poisonous fungal secondary metabolites called mycotoxins. In order to protect food quality and the environment, low persistent synthetic fungicides are still relevant at present to prevent diseases of food crops. Though, synthetic fungicides improve plant protection, most of them result in environmental pollution, health hazards, and affect the natural ecological balance. Today, there are strict regulations on chemical pesticide use, and there is political pressure to remove the most hazardous chemicals from the market, which necessitates finding alternatives or complements to synthetic fungicide.

In recent years, the need to develop fungal disease control measures using phytochemicals as alternatives to synthetic chemicals has become a priority of scientists worldwide. Therefore, researchers have focused on the potentiality of plants and their metabolites to inhibit toxigenic fungus growth and/or toxin production as a useful tool for controlling mycotoxin contamination of crops and agricultural commodities. Plant products, especially essential oils, are recognized as one of the most promising groups of natural compounds for the development of safer antifungal agents. The antimicrobial compounds in plant materials are commonly contained in the essential oil fraction of leaves, flowers and flower buds, bulbs, rhizomes, fruit, or other parts of the plant. Essential

oils consist of a mixture of bioactive compounds such as esters, aldehydes, ketones, and terpenes. These compounds may be lethal to microbial cells or they may simply inhibit the production of a metabolite. Numerous reports clearly indicated that essential oils should find practical application in the inhibition of mycotoxin production by mycotoxigenic fungi.

Conclusion:

Several studies have been reported on the use of plant essential oils to control toxigenic fungi and their toxins. From the Algerian flora, 11 species of *Artemisia* are recorded. Among them, *Artemisia campestris* which belongs to the Asteraceae family, widespread in the south of Algeria, commonly known as dgouft. Many reports are available on the analysis of the essential oil compositions and their antimicrobial activities from many *Artemisia* sp. The present findings showed that *A. campestris* essential oil was a potent antifungal agent against some pathogenic fungal species which could be attributable to the presence of high concentrations of α -pinene, β -pinene, γ -myrcene, and germacrene D in this oil. In order to reduce the dependence on synthetic fungicides and ensure food safety and quality, our study suggested the application of *A. campestris* essential oil as a biofungicide in greenhouse crops or in storage silos taking into consideration the volatile nature of essential oils. The impact on toxicology and safety of these compounds require further investigations before considering their use in phytoprotection or in food preservation.