

COMPOSITION AND ANTIMICROBIAL ACTIVITY OF THE ESSENTIAL OIL OF *Artemisia dracunculus* "PIEMONTESE" FROM ITALY

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Artemisia dracunculus L. (Fam. Asteraceae), also known worldwide with several common names such "Dragoncello", "Estragon", or "Tarragon", is a perennial herb widely cultivated in temperate and tropical Asia, Europe, and Northern America. Leaves of *A. dracunculus* are used for culinary purposes and as stomachic and to treat intestinal spasms [1]. Many subspecies and varieties of this plant have been described; in particular the variety cultivated in Italy is called "Piemontese". Only the genotoxic properties of the essential oil obtained from this cultivar, using the *Bacillus subtilis* rec-assay and *Salmonella*/microsome reversion assay, has been studied [2]. No other studies on biological activity of *A. dracunculus* "Piemontese" have been reported in the literature.

The aim of this work was to examine the chemical composition of the essential oil of *A. dracunculus* "Piemontese" collected in central Italy and to evaluate the activity of the oil on the growth of ten strains of Gram positive and Gram negative bacteria and four fungi belonging to the *Candida* genus.

Essential oil was obtained by steam distillation in a Clevenger apparatus of dried aerial parts of *A. dracunculus* (yield 4.6 mL/Kg). The GC and GC/MS analysis were carried out as already described [3], and the chemical composition of the essential oil is reported in Table 1.

The major components have been found in the monoterpene fraction and were *trans*-anethol (53.37%), *cis*-allo-ocimene (15.27%), *cis*-ocimene (10.61%), *trans*-ocimene (8.96%), and limonene (7.26%).

The *in vitro* antimicrobial activity of the essential oil of *A. dracunculus* "Piemontese" was assayed by the broth microdilution method [4] and is reported in Table 2, expressed as minimal inhibitory concentration (MIC) values (μg/mL).

Data reported in Table 2 show that all microorganisms were sensitive to the oil, except *Staphylococcus aureus* and *S. epidermidis*, for which no significant degrees of growth inhibition were observed. Fungi were by far more susceptible to growth inhibition than bacteria, and the most sensitive microorganisms with the lowest MIC value were *Candida albicans*, *C. lusitaniae*, *C. glabrata*, and *C. tropicalis*, and only *Xanthomonas maltophilia* and *Proteus mirabilis* among bacteria.

In conclusion, in this study we reported that the essential oil of *A. dracunculus* "Piemontese" showed good antifungal activity, while the activity against bacteria was less significant. Our study represents, to the best of our knowledge, the first one describing the application of the essential oil obtained from this cultivar as an antifungal agent against some human pathogenic fungi.

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TABLE 1. Chemical Composition of the Oil of Aerial Parts of *A. dracunculus* L. “Piemontese”

| Compound | % | RI |
|--------------------------|-------|------|
| α -Pinene | 2.90 | 942 |
| β -Pinene | 0.44 | 981 |
| β -Myrcene | 0.20 | 986 |
| Limonene | 7.26 | 1005 |
| <i>cis</i> -Ocimene | 10.61 | 1013 |
| <i>cis-allo</i> -Ocimene | 15.27 | 1025 |
| <i>trans</i> -Ocimene | 8.96 | 1025 |
| <i>trans</i> -Anethole | 53.37 | 1113 |
| Bornyl acetate | 0.34 | 1278 |
| γ -Elemene | 0.22 | 1319 |
| β -Caryophyllene | 0.25 | 1424 |
| Germacrene D | 0.18 | 1468 |

TABLE 2. Effect of *A. dracunculus* L. “Piemontese” Essential Oil on *in vitro* Growth of Selected Microorganisms

| Microorganism | MIC (μ g/mL) |
|------------------------------------|-------------------|
| <i>Staphylococcus haemoliticus</i> | 40 |
| <i>Staphylococcus aureus</i> | —* |
| <i>Staphylococcus epidermidis</i> | —* |
| <i>Streptococcus agalactiae</i> | 40 |
| <i>Streptococcus pyogenes</i> | 40 |
| <i>Enterococcus faecium</i> | 40 |
| <i>Enterococcus faecalis</i> | 40 |
| <i>Escherichia coli</i> | 40 |
| <i>Xanthomonas maltophilia</i> | 0.62 |
| <i>Proteus mirabilis</i> | 1.25 |
| <i>Candida albicans</i> | 0.62 |
| <i>Candida lusitanae</i> | 0.31 |
| <i>Candida glabrata</i> | 0.62 |
| <i>Candida tropicalis</i> | 0.62 |

*No growth inhibition was observed.

REFERENCES

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