RESEARCH IN ESSENTIAL OILS: THE CASE OF OREGANO

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Of the 250,000 species of flowering plants in the world, more than 20,000 – nearly 10% of the total – are classified as herbs. Herbs picked by people from the wild have been an essential factor in healthcare all over the world throughout the ages and in all cultures. Nowadays, some 80% of the world's people rely on traditional, plant-based medicines for their primary healthcare *(1)*. Actually, there exists a tendency to use natural products for the treatment of several illnesses. With use of medicinal plants, investigations have been performed all over the world in order to find more productive and economical medicines *(2)*. Medications used to cure disorders require continuous changing to improve their effectiveness. However, few of the many claims of therapeutic efficacy have been validated adequately by clinical trials. Even though these claims have been substantiated scientifically, complementary medicines are unlikely to secure a place in conventional healthcare *(3)*.

Research in essential (volatile) oils has attracted increased attention from both academic and commercial circles due to a growing interest in green consumerism, worldwide reduction in the composition of salt in food (health reasons), and the need for alternative techniques to assure quality and safety of perishable foods *(4, 5)*. The essential oils of aromatic and medicinal plants present a great potential for application as antimicrobial agents and their use as remedies has been recognized for a long time *(6)*.

An essential oil is defined internationally as the product obtained by hydrodistillation, steam distillation or dry distillation, or by a suitable mechanical process without heating (for citrus fruits) of a plant or some parts of it *(7)*. They are aromatic oily liquids, volatile, characterized by a strong odour, rarely coloured and generally with a lower density than that of water. They can be synthesized by all plant organs (flowers, buds, seeds, leaves, twigs, bark, herbs, wood, fruits and root) and therefore extracted from these parts, where they are stored in secretory cells, cavities, canals, epidermic cells or glandular trichomes *(8, 9)*. Essential oils only represent a small fraction of a plant's composition; nevertheless they confer the characteristics by which aromatic plants are used in the food, cosmetic and pharmaceutical industries *(10)*.

Mediterranean countries are the biggest producers of native aromatic plants *(11)* due to the favorable climatic conditions, oil composition, and geographical morphology. Algeria is also one country which produces hundreds of species of aromatic plants which are native *(12)*. Among them oregano.

The genus Origanum (oregano) is one of over 200 genera in the *Lamiaceae* family and includes annual and perennial herbs growing on stony slopes at a wide range of altitudes *(13, 14)*. It comprises about 38 species, six subspecies and 17 hybrids, most of them indigenous to the Mediterranean region *(15, 16)*.

The origanum composition depends on the climate, altitude, time of recollection and the stage of growth *(14)*. *O. vulgare* growing in a Mediterranean climate contains a higher amount of phenols *(15)* or terpenic alcohols, respectively. In general, essential oil yields peak under hot summer conditions with species producing oil containing 60–75% phenols, mostly carvacrol *(16)*. This compound, together with thymol, p-cymene and c-terpinene are commonly reported as the main components of *origanum Eos* (*17, 18, 19*).

The structure of thymol is similar to that of carvacrol; however, they differ as to the location of the hydroxyl group in the phenolic ring. Both substances seem to make the membrane permeable *(20)*. Their structure disintegrates the external membrane of the Gram-negative bacteria, releasing lipopolysaccharides (LPS) and increasing the permeability of the cytoplasmic membrane to ATP (*21*).

Figure 1: **Carvacrol (1) and Thymol (2)**

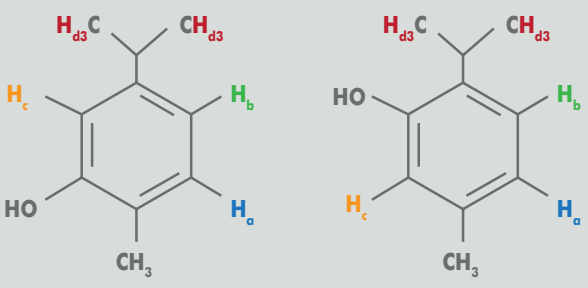

Figure 2: **Aromatograms : qualitative effects of the essential oil of oregano observed on the strains of *E.coli* , *Acinetobacter.spp* and *Citrobacter.spp* , by diffusion from impregnated discs on agar medium**

Our results of research on the antibacterial activity of oregano essential oil

Our results suggest the possible exploitation of oregano in the management of the infectious diseases. Further purification of the extract may yield a novel antibacterial drug. The plant can also be used as a natural source of antioxidants to prevent oxidative degradation of foods and to minimize oxidative damage to living cells.

The bacterial strains tested were found to be sensitive to essential oil studied and showed a very effective bactericidal activity with maximal inhibition zones in the range of 21.3–32.6 mm. ■

Assistant Professor Nora Mahfouf works in the Department of Pharmacy at Badji Mokhtar University (Algeria). She received her Diploma of Higher Studies in Microbiology, University of Badji Mokhtar, working with Professor Boutefnouchet Nafissa on topics in nosocomial infections and the resistance to antibiotics of the species Pseudomonas aeruginosa. She then moved to Chadli Ben Djedid University where she received a Biology Master's diploma in Ecotoxicology. She worked on the antibacterial activity of rosemary essential oil on strains of Gram-positive and Gram-negative antibiotic-resistant bacteria. At present, she is preparing a PhD thesis on the study of the Origanum vulgare *species. She works with Professor Hichem Nasri and Professor Bennadja Salima on the bactericidal activity of the essential oil of oregano.*

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