ANTIMICROBIAL ACTIVITY OF THE ESSENTIAL OILS OF MEXICAN OREGANO (*Lippia graveolens* H.B.K.) AND EUROPEAN OREGANO (*Origanum vulgare* L.)

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Introduction. The essential oils are a mixture of compounds present in aromatic plants. The oils of Mexican oregano and European oregano contain mainly carvacrol and thymol which possess antimicrobial properties (1).
The objective of this work was study the effectiveness of the essential oils of European oregano (*Origanum vulgare* L.) and Mexican oregano (*Lippia graveolens* H. B. K.) from the state of Querétaro, on the inhibition of the growth of *Micrococcus luteus* and *Pseudomonas fragi*.

Methods. The essential oils were extracted from dry leaves by hydrodistillation. Bacteria grown in nutritive broth at 30°C for 48 h and was adjusted to 10^7 UFC mL^{-1}. Agar disk diffusion method was used to determine the antibacterial capacity of the essential oils (2). Sterile filter paper disks (13 mm dia) were soaked with 30 µL of the essential oil diluted (50%, 70% and 80%) and placed on the inoculated plates. They were incubated at 30°C for 48 h. The diameters of the inhibition zones were measured in millimeters.

Results. The essential oils exhibited antimicrobial activity against two test organisms (Figure 1). The activity observed can be attributed to the presence of the phenolic compounds, particularly thymol and carvacrol, their antibacterial activity is not attributable to one specific mechanism.

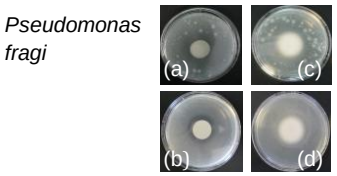

Fig.1. Effect against *Pseudomonas fragi* and *Micrococcus luteus* of 70% European oregano (a, b) and Mexican oregano (c, d) essential oils.

The essential oils pass through the cell wall and cytoplasm membrane, disrupt the structure of their different layers of polysaccharides, fatty acids, and phospholipids, and permeabilize them (2)(3).
The essential oils were found to be more effective for *Micrococcus luteus* (Gram-positive bacteria) than *Pseudomonas fragi* (Gram-negative bacteria) (Table 1).

Table 1. Antibacterial activity of essential oils against *Micrococcus luteus* and *Pseudomonas fragi*. Inhibition zone (mm)

Essential oil	Microorganism	Concentration		
		50%	70%	80%
Origanum	*Micrococcus*	13 ± 0	22.5 ± 2.12	19.4 ± 0.85
	Pseudomonas	13 ± 0	16.5 ± 0.71	17.7 ± 0.99
Lippia	*Micrococcus*	18 ± 0.39	19.9 ± 0.71	21.2 ± 0.35
	Pseudomonas	15.1 ± 0.42	16 ± 0.99	17 ± 0.57

Plant essential oil are more active against Gram-positive bacteria than Gram-negative bacteria, the outer membrane surrounding the cell wall of Gram-negative bacteria may restrict diffusion of hydrophobic compounds through its lipopolysaccharide covering (4). Direct contact between the disk and the agar was required for effective antimicrobial activity against two bacteria at 50% concentration of European oregano essential oil. Differences in the antimicrobial activity should be attributed to their chemical composition and relative proportions of the individual constituents (3).

Conclusions. The essential oils were effective for inhibition of *Pseudomonas fragi*. In general, *Pseudomonas* spp, are known to show high resistance to plant antimicrobials. Both essential oils can be used as natural preservatives to improve the safety of food products.

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