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SYNERGISTIC EFFECT OF *MYRTUS COMMUNIS* L. AND *LAURUS NOBILIS* L. ESSENTIAL OILS

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Background: The aim of the study was to determine antimicrobial effectiveness of *Myrtus communis* L. and *Laurus nobilis* L. essential oils, both alone and in combination.

Methods: The broth microdilution MIC method is used to measure the in vitro activity of an antimicrobial agent against a bacterial isolate. After overnight incubation, the minimum inhibitory concentration (MIC) is determined by observing the lowest concentration of an antimicrobial agent which will inhibit visible growth of the bacterium. MICs obtained are interpreted as based on the criteria listed in the CLSI standard (Clinical and Laboratory Standards Institute). Using checkerboard method, the combinations of subinhibitory concentrations of myrtle and laurel essential oils were examined. The FIC index values were calculated using the following formula: ∑ FICI = FIC (A) + FIC (B); where FIC (A) = MIC (A) in combination / MIC (A) alone and FIC (B) = MIC (B) in combination / MIC (B) alone. The ∑ FICI values are interpreted as follows: ≤ 0.5= synergistic; 0.5–0.75 = partial synergy; 0.76– 1.0 = additive; >1.0–4.0 = indifferent (non-interactive); > 4.0 = antagonistic .

Results: The results obtained highlighted the occurrence of good antibacterial effect of myrtle and laurel oils when administered alone. The results proved synergism among *M. communis* L. and *Laurus nobilis* L. essential oils, with a fractional inhibitory concentration (FICI) index under 0.50 (except in *Bacillus spizizenii* where the FICI is 0.507).

Table 1. Minimum Inhibitory concentration (MIC) of essential oil (EO) *Myrtus communis* L. and *Laurus nobilis* L. by broth microdilution assay

	EO *Myrtus communis* L.	EO *Laurus nobilis* L.	Amoxicillin
	MIC (mg/mL)	MIC (mg/mL)	MIC (µg/mL)
Gram-negative bacteria			
Salmonella typhimurium	0.39	0.39	16
Escherichia coli	0.39	0.39	64
Gram-positive bacteria			
Staphylococcus aureus	0.39	0.39	4
Bacillus spizizenii	0.39	0.39	16
Enterococcus faecalis	0.39	0.39	16
Listeria monocytogenes	0.39	0.39	16

Table 2. Fractional inhibitory concentration (FIC) index and outcome of interaction of *Myrtus communis* L. and *Laurus nobilis* L. essential oil combination against gram-negative bacteria and gram-positive bacteria.

Bacteria strains	Oils combination	MIC alone (µg/mL)	MIC combination (µg/mL)	FIC	Σ FICI	Outcome
Salmonella typhimurium	EO Myrtus communis L.	390	48,75	0,125	0,156	synergistic
	EO Laurus nobilis L.	390	12,18	0,031		
Staphylococcus aureus	EO Myrtus communis L.	390	97,5	0,25	0,265	synergistic
	EO Laurus nobilis L.	390	6	0,015		
Bacillus spizizenii	EO Myrtus communis L.	390	195	0,5	0,507	partially synergistic
	EO Laurus nobilis L.	390	3	0,007		
Enterococcus faecalis	EO Myrtus communis L.	390	97,5	0,25	0,265	synergistic
	EO Laurus nobilis L.	390	6	0,015		
Listeria monocytogenes	EO Myrtus communis L.	390	97,5	0,25	0,5	synergistic
	EO Laurus nobilis L.	390	97,5	0,25		
Escherichia coli	EO Myrtus communis L.	390	48,75	0,125	0,14	synergistic
	EO Laurus nobilis L.	390	6	0,015		

Conclusion: The essential oil from myrtle and laurel is a potential source of novel antimicrobial agents for the treatment of infections.

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