Antibacterial activity of natural extracts from oregano and clove as potential food preservatives

Neith Pacheco, Ingrid Rodríguez-Buenfil and Nohemí Reyes Vázquez.
Centro de Investigación y Asistencia en Tecnología y Diseño del Estado de Jalisco, Unidad Sureste. Mérida Yucatán, CP. 97070.
E-mail: npacheco@ciatej.net.mx;
Keywords: Natural extracts, antibacterial activity, Oregano

Introduction. Natural compounds with antimicrobial activity represent a great alternative to the chemical preservatives used in processed food. The extracts of spices like rosemary, oregano, cloves and fruits such as citrus (lemon, orange and grapefruit), have demonstrated antibacterial activity against different food pathogens, principally due to the presence of polyphenolic and flavonoids compounds (1). Moreover the use of different methods to obtain natural compounds, favor the extractionof specific compounds.
The main objective of this work was the determination of the antibacterial activity of commercial natural extracts from oregano and clove and extracted by two different methods.

Methods. Ethanolic and aqueous Commercial samples were purchase from the region. Ethanolic and Methanolic extracts were obtained as reported elsewhere (2,3). Antibacterial activity was determined by agar diffusion methods and as minimum inhibitory concentrations (MIC) (4), against *E. coli* ATCC 25922, *S. aureus* ATCC 25923, *and S. tiphimurium* ATCC 14028.

Results. The yield obtained for ethanolic extracts were higher than methanolic ones, 9.4 and 12.5% for clove and oregano respectively. In table 1 antibacterial activity determined by agar diffusion method is shown with the different evaluated extracts.

Table 1. Antibacterial activity of natural extracts determined by agar diffusion method.

Sample	Extract source	Extraction solvent	Density (g/mL)	Inhibition (mm)
		S.aureus		
Control	**Antibiotic *Amicasina***		-	18.9 ± 0.4
	Clove	Ethanolic	0.936	5.19 ± 0.16
Commerci	Oregano		0.923	8.83 ± 0.73
alextracts	Clove	Aqueous	1.005	8.24 ± 0.59
	Oregano		1.013	15.63 ± 0.46
	Clove	Methanolic	1.026	14.07 ± 1.01
Laborator		Ethanolic	1.038	17.99 ± 0.60
yextracts	Oregano	Methanolic	1.071	28.13 ± 0.91
		Ethanolic	1.057	22.03 ± 0.37
		S. typhiminium		
Control	**Antibiotic *Amicasina***		-	16.9 ± 0.32
	Clove	Methanolic	1.026	12.72 ± 0.63
Laborator		Ethanolic	1.038	12.78 ± 0.57
yextracts	Oregano	Methanolic	1.071	14.31± 0.90
		Ethanolic	1.057	9.30 ± 1.07
		E. coli		
Control	**Antibiotic *Amicasina***		-	16.8 ± 0.4
	Clove	Methanolic	1.026	10.38 ± .01
Laboratory		Ethanolic	1.038	11.09 ± 1.2
extracts	Oregano	Methanolic	1.071	16.08 ± 0.46
		Ethanolic	1.057	9.27 ± 0.2

Laboratory extracts showed higher antibacterial activity than commercial extracts. Oregano extracts presented higher activity than the control against *S. aureus*. For *E. coli* and *S. typhiminium*, methanolic oregano extract showed higher antimicrobial activity.
The MIC of natural extracts determined in % (v/v) against the different bacterial strains are shown in figure 1. Values of MIC50 were similar among the strains. MIC90 and MIC99 values were higher for *S. aureus* and statistically significant differences were obtained ($p<0.5$). Concentration of 14% v/v of natural methanolic or ethanolic extracts is necessary for microbial growth inhibition in 99% with all the evaluated strains.

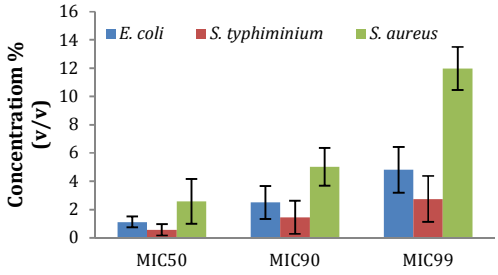

Fig.1 MIC against different food spoilage bacteria strains.

Conclusions. Natural extracts showed antimicrobial activity against *E. coli*, *S. aureus*, *and S. tiphimurium.* These results provide valuable information of natural extacts to be use as preservatives in food products.

Acknowledgements. Authors thank project founding FOMIX CONACyT-Yucatán 2011-09-172091

References.

1.Iturriaga L., Olabarrieta, I., Martínez I. (2012). *INT J FOOD* MICROBIOL. (127),261–267
2.Paul, D (2009). Personal communication (tesis)
3. Sanchez- Contreras A., González FT., Uc VA., Alvarez HAH., Padilla CE., Canales A. Godoy Z. M. Flores M. JL., Ireta M MC., Rodrigez-buenfil I.,(2012). Ed. Ingrid Rodríguez and Tania González
4.Brudzynski, K., and Kim, K. (2011). *Food Chem.* 126:1155-1163.