IDECEFYN
Molecular Medicinal Chemistry 10
vol 11 September-December 2006, 10-11 http//:www.idecefyn.com.ar ISSN 1666-888X

Bactericide activity of extracts from different plant structures of *Melia azedarach* L.

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INTRODUCTION

Since antibiotics arose during the decade of 1950 the use of plant antimicrobials has been practically nonexistent. However, there is a new interest in the study of these products with antibacterial properties. Among these reasons we can mention the growing troubles associated to the use of antibiotics, such as secondary effects, high costs, but especially the appearance of multi-resistant bacterial strains.

At present it seems that microorganisms are able to develop resistance to the new medicines so quick as they are introduced in the market. In this work it is intended to study the antibacterial effectiveness of extracts from different plant structures of *Melia azedarach*, which is a tree naturalized in Argentina, commonly known as 'Paradise' ('Paraíso'). This tree is used as medicinal plant, and has not been found toxicity in mammals (Carpinella *et al*., 1999). Its effectiveness against other microorganisms, *e.g.*, fungi, has been previously reported (Carpinella *et al.*, 2003a; 2003b; 2005).

METHODOLOGY

Plant extracts. Extracts of senescent leaves, ripe fruits and endocarp were subjected to extraction with different organic solvents.

Microorganisms. The effectiveness of the extracts was assayed on ATCC strains, and bacteria strains pathogen to man from different clinical sources, such as *Bacillus subtilis*, *Enterococcus faecalis*, *Escherichia coli*, *Klebsiella oxytoca*, *Klebsiella pneumoniae, Pseudomonas aeruginosa, Salmonella enteritidis* and *Staphylococcus aureus.*

Determination of the minimum inhibitory concentration (MIC). Due to the necessity of finding quick techniques of easy realization and interpretation, low costs and reliable results, two methodologies were compared. These are: serial dilution in individual agar, and serial dilution in multiple agar with modifications in order to adapt them to the activity measurement of natural extracts. Culture medium was Plate Counting Agar (PCA). Both positive and negative controls were carried out. MIC was considered the minimum concentration that didn't develop growth of the microorganism.

Determination of the minimum bactericide concentration (MBC). From those extract concentrations that denoted inhibition of bacteria growth, it was further studied the minimum concentration that resulted in an irreversible inhibition of the microorganism. For this study, brain-heart infusion was used, to which extract portions with negative visible growth were transferred.

RESULTS AND DISCUSSION

In both tests similar results were obtained with Minimum Inhibitory Concentrations (MIC) of 2 to

IDECEFYN
vol 11 September-December 2006, 10-11 http//:www.idecefyn.com.ar ISSN 1666-888X

10 mg/ml, depending on the extract and the tested bacterium (Table 1). First, hexanic and ethanolic

extracts of senescent leaves, and second, ethanolic extract of ripe endocarp, were
the most effective. The hexanic extracts of fruits and endocarp were the less effective.

The extracts also showed bactericide action,

thus being also effective the ethanolic extract of ripe fruit. The bactericide concentrations accounted for 10 mg/ml (not shown data). Results didn't reveal differences in the inhibition of Gram-positive and Gram-negative bacteria.

Table 1. Minimum Inhibitory Concentration (MIC) of *Melia azedarach* extracts.

Bacteria	Extract (mg/mL)			
	HEYL	**EEYL**	**ERF**	**ERE**
B. subtilis	(8)	(l0)	(>10)	(l0)
E. faecalis ATCC 29212	8 (8)	10 (l0)	>10 (>10)	8 (>10)
E. coli ATCC 25922	10 (l0)	10 (l0)	>10 (>10)	10 (>10)
K. oxytoca	(l0)	(>10)	(>10)	(>10)
K. pneumoniae	(l0)	(>10)	(>10)	(>10)
P. aeruginosa ATCC 27853	8 (l0)	2 (4)	10 (>10)	8 (>10)
S. *enteritidis*[a]	(>10)	(>10)	(>10)	(>10)
S. *enteritidis*[a]	(>10)	(>10)	(>10)	(>10)
S. *aureus* ATCC 6538	4 (2)	8 (8)	>10 (>10)	10 (l0)

HEYL: Hexanic extract of yellow leaves. **EEYL**: Ethanolic extract of yellow leaves. **ERF**: Extract of ripe fruit. **ORF**: Oil of ripe fruit. **ERE**: Extract of ripe endocarp. **ORE**: Oil of ripe endocarp. Results of the Steers-Foltz replicator technique are between brackets. [a]: clinical strains from different isolations.

CONCLUSIONS

These results open the possibility to isolate the principles responsible for the activity, which can be used as new alternatives in antibacterial therapies.

Note: This study was presented at the 'I Reunión de Biotecnología aplicada a plantas medicinales y aromáticas' (First Biotechnology Meeting on Medicinal and Aromatic Plants), Córdoba, Argentina, 2006.

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