

# Antifungal therapy of onychomycosis: bioactive potential of two plant extracts.

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## Introduction

Onychomycosis is the term used to describe all fungal infection of the nail. Onychomycosis can be caused by dermatophytes, non-dermatophytic molds, and yeasts. The most common fungal pathogens of the nails are dermatophytes account for 90% of cases. The treatment of onychomycosis is problematic for several reasons. Essential oils have already found a considerable range of applications, many of these oils have been shown bactericidal and fungicidal properties.

In this study, the antifungal activity of *Cistus ladanifer* and *Cupressus lusitanica* has been evaluated by microbroth dilution method against *Candida albicans* (ATCC 10231), *Aspergillus flavus* (LF12), *Aspergillus fumigatus* (LF13), *Aspergillus brasiliensis* (ATCC 16404) and *Trichophyton mentagrophytes* (LF137).

## Methods

The essential oils were solubilized with tween 20 to form an emulsion. The microorganisms were incubated with the essential oils, in 96-well plates, with the objective of determining the minimum inhibitory concentration (MIC) and the minimum lethal concentration (MLC). The range of oil concentrations tested was  $2,4 \times 10^{-4}$  µl/mL to 128 µl/mL. The densities of the suspensions were read at 530 nm and adjusted from 0.09 to 0.11 for *Aspergillus flavus*, *Aspergillus fumigatus*, *Aspergillus brasiliensis* and 0.4 for *Trichophyton mentagrophytes*. For *Candida albicans* the suspension was adjusted to 0.5 McFarland. All fungi were incubated for 7 days, except *Candida albicans*, which was incubated for 3 days.

MIC was performed by changing the color of rezasurin (purple to pink) for *Candida albicans*, *Aspergillus flavus*, *Aspergillus fumigatus* and *Aspergillus brasiliensis*. *Trichophyton mentagrophytes* MIC determination was performed through visual inspection of the plates. MLC was performed by plating 10µl of the MIC suspension.

## Results

**Table 1.** The following table shows the MIC (µl/mL) and MLC (µl/mL) values for *Cistus ladanifer* for species tested.

Species	MIC	MLC
<i>Aspergillus brasiliensis</i>	$3,125 \times 10^{-2}$	32
<i>Aspergillus flavus</i>	32	> 128
<i>Aspergillus fumigatus</i>	4	> 128
<i>Candida albicans</i>	4	32
<i>Trichophyton mentagrophytes</i>	1	2

**Table 2.** The following table shows the MIC (µl/mL) and MLC (µl/mL) values for *Cupressus lusitanica* for species tested.

Species	MIC	MLC
<i>Aspergillus brasiliensis</i>	8	> 128
<i>Aspergillus flavus</i>	8	> 128
<i>Aspergillus fumigatus</i>	4	> 128
<i>Candida albicans</i>	8	> 128
<i>Trichophyton mentagrophytes</i>	2	32

## Conclusion

These oils showed to have an important antifungal potential and could be a new alternative in the treatment of onychomycosis.