



Antimicrobial Activity of the Thio-Cyclized *Lippia citriodora* Leaf Essential Oil Cultivated in Algeria

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Abstract: The essential oil of *Lippia citriodora* extracted by hydrodistillation from dry leaves with a yield of 0.3 % which characterization by TLC, UV-Vis, and IRTF analyses make it possible to distinguish the presence of aldehydes functions within the chemical composition. The GC-MS has permitted to confirm and to identify the neral and the geranial in appreciable proportions in the chemical composition of *Lippia citriodora* essential oil. The thionation of the carbonyl compounds of the essential oil has led to the transformation of the carbonyl compounds into corresponding thiones. The UV-Vis spectroscopy and the FT-IR spectra have shown the disappearance of the aldehyde function and its replacement by thione and thiol functions in solution by tautomerism. The GC-MS has permitted to identify the formation of unsaturated cyclic compounds such as the 2-Isopropyl-5-methyl-cyclohexa-2,5-dienethione, the 6-Isopropyl-3-methyl-cyclohexa-2,4-dienethione and the 5-Isopropenyl-2-methyl-cyclohex-2-enethione, as well as an aromatic compound namely the thiothymol (2-Isopropyl-5-methyl-benzenethiol). The antibacterial and especially antifungal activity of the essential oil of *Lippia citriodora* has been greatly improved with the replacement of the oxygen by the sulphur and therefore the increase of the hydrophobic character and the volatility of the chemical composition of the oil.

Key words: *Lippia citriodora*, essential oil, aldehyde, thionation, antimicrobial activity.

Introduction

The essential oils are known for their biological activities ¹⁻³ and in particular, their microbiological activities ^{4,5}, but these activities are limited to certain microbial strains because of the qualitative and quantitative variability of the chemical composition of the essential oils ^{6,7}. Recently, thiocarbonyl derivatives isolated from marine algae have been identified for their antibacterial actions ⁸ and also the thionation of the essential oils of *Artemisia Herba alba* and *Ruta montana*

consisting mainly of ketones has revealed higher antimicrobial actions ⁹. However, the yields of the essential oils are very low ^{10,11} and especially for some plants such as *Lippia citriodora* ¹²⁻¹⁴ due to the resistance of several strains and their limited antimicrobial actions ¹⁵. Among the essential oils which chemical composition is comprised of aldehydes, they are those extracted from the genus *Lippia* as *Lippia citriodora* species. The works carried out on this species have shown that the essential oil composed mainly of the two iso-

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