



## Antimicrobial activity of essential oil *Cymbopogon nardus* (L.) Rendle and its effect in combination with synthetic preservative methylparaben

Anderson V. G. Ramos, Munice C. Eninger, Tatiana S. Tiuman, Sabryna I. G. Costa,  
Paula C. Frohlich

Universidade Tecnológica Federal do Paraná - Toledo, Brazil  
sabryna.igc@hotmail.com

Keywords: citronella, natural products, bacteria, synergism.

The demand for natural products is growing every day, due to the benefits they provide to health. Essential oils, volatile secondary metabolites from plants, are substances that have attracted great interest in research focused on natural products, because they have in their composition substances such as phenolic compounds and terpenoids, with potential in inhibiting microorganisms harmful health (1). Citronella (*Cymbopogon nardus* L. Rendle) is an aromatic plant belonging to Poaceae family, originally from Southern India. This plant is known to be taken out of their leaves an oil with repellent properties, with great application in the cosmetics industry (2). The objective of this research was to determine the antibacterial potential essential oil of citronella and evaluate a possible synergistic effect when combined with synthetic preservative methylparaben front of pathogenic bacteria. The essential oil of citronella (lot 1286) was obtained commercially from Laszlo Aromatherapy Company. The antimicrobial activity was determined by evaluating the Minimum Inhibitory Concentration (MIC) by microdilution assay in microplate with 96 wells front of Gram-positive bacteria, *Bacillus cereus* (ATCC 11778) and *Staphylococcus aureus* (ATCC 14458) and Gram-negative bacteria *Escherichia coli* (ATCC 10536) and *Salmonella typhi* (ATCC 06539). These microorganisms were lyophilized, and acquired from the National Institute of Quality Control in Health (INCQS). A standard solution McFarland 0.5 in saline 0.85 % was used to standardize the bacterial inoculum. The association tests of essential oil with synthetic preservative methylparaben (Biotec, lot 32343) were performed by the technique of checkerboard. The results of the test were rated according to the Fractional Inhibitory Concentration Index (FICI) in the total synergism ( $FICI \leq 0.5$ ), partial synergism ( $0.5 < FICI \leq 0.75$ ), indifferent ( $0.75 < FICI \leq 2.0$ ) or antagonistic ( $FICI \geq 2.0$ ) (3). In determining the antibacterial activity, the most sensitive strain to essential oil was *B. cereus* having a minimum inhibitory concentration of  $1.25 \text{ mg mL}^{-1}$ , followed by *E. coli* and *S. aureus* with MIC  $2.50 \text{ mg mL}^{-1}$ . The essential oil did not inhibit the bacteria *S. typhi* even at the highest concentration tested ( $5.0 \text{ mg.mL}^{-1}$ ). In association tests with synthetic preservative methylparaben, the essential oil of citronella is effective against Gram-positive bacteria, showing a partial synergistic effect for *B. cereus* (FICI 0.62) and *S. aureus* (FICI 0.75), reducing the concentration of preservative in the use of low concentrations of the essential oil. For the Gram-negative bacterium *E. coli* (FICI 0.99), it was observed an indifference effect by combining the substances.

1. Souza, S.P. et al. Plantas Mediciniais, 2011, **13**, 456-466.
2. Castro, L.O.; Ramos, R.L.D. Boletim Fepagro, 2003, **11**, 01-31.
3. Fadli, M. et al. Phytomedicine, 2012, **19**, 464-471.

Acknowledgements: UTFPR.