

UNIVERSITY OF NIŠ
Faculty of Technology, Leskovac

BOOK OF ABSTRACTS
13th SYMPOSIUM
" Novel Technologies and Economic Development "

Leskovac, October, 18 - 19, 2019

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INFLUENCE OF ORGANIC MATTER ON THE ANTIBACTERIAL ACTIVITY OF CLOVE ESSENTIAL OIL AGAINST *STAPHYLOCOCCUS AUREUS*

Maja Vukašinović Sekulić¹, Marica Rakin¹, Maja Bulatović¹, Tanja Krunic²

¹Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia

²Innovation Centre of the Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia

Object and goals of the study: Clove essential oil is a clear, colourless to yellow liquid obtained from dried aromatic unopened floral buds of an evergreen tree *Syzygium aromaticum*. It possess strong characteristic sweet and spicy odour and a warm, almost burning and spicy flavour, wherefore it has been used as a flavouring agent in food industries. Besides the influence on sensory properties of foods, it has also antimicrobial and antioxidant activities and can be used as a natural food additive, instead of chemical preservatives, to extend products shelf-life. Many intrinsic properties of the food (fat/protein/water content, antioxidants, preservatives, pH, salt and other additives), and also extrinsic determinants (temperature, packaging in vacuum/gas/air, characteristics of microorganisms) can have impact on antimicrobial activity of essential oils. The objective of this study was to assess the influence of organic matter on the antibacterial activity of clove essential oil against *Staphylococcus aureus*, one of food-borne pathogenic bacteria species which is frequent cause of food infection and intoxication worldwide.

The experimental methods applied: Antibacterial activity of clove oil was determined by the agar well diffusion and broth macrodilution methods against two strains of *Staphylococcus aureus*, with a different sensitivity to the most frequently used antibiotics. Clove oil was purchased from the local market and before screening antibacterial activity it was dissolved in appropriate concentration in sterilized physiological saline solution (0.85% w/v) supplemented with Tween 80 at final concentration of 0.5% (v/v), nutrition broth and milk with different content of milk fat (0.5 and 3.2% w/v) and total solid (4.5 and 9% w/v). Influence of organic matter on the antibacterial activity of clove essential oil was estimated based on diameter of inhibition zones, minimal inhibitory concentration (MIC) and minimal bactericidal concentration (MBC).

Results obtained: The results of antibacterial activity obtained by agar well diffusion method have indicated that clove essential oil is better dissolved in milk samples with 0.5% and 3.2% (w/v) milk fat than in nutrition broth and physiological saline solution with Tween 80, since with these samples clear zones of inhibition were noticed till clove oil concentration 3.1% (v/v) and 6.2 (v/v), respectively. On the other hand, the results of broth macrodilution method have shown that the lowest values for MIC and MBC could be achieved when clove oil is added in physiological saline solution with Tween 80, afterwards both values have progressively increased, as content of organic matter in a media was higher.

Conclusions: Presence of high levels of fat and/or protein in foodstuffs could protect the microbial cells from the action of the essential oils, which is the reason that a greater concentration of essential oils is needed to achieve the same effect in foods, compared to laboratory media. Also, greater availability of nutrients in foods may enable microorganisms to repair damaged cells faster and to make effect of application of essential oils in food matrices more unpredictable.