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Antimicrobial activity of essential oils from selected culinary herbs of *Zingiberaceae* and detection of antimicrobial compounds using TLC- Bioautography

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Three *Zingiberaceae* plants were selected for this study and amongst them; rhizome of *Zingiber officinale* (Roscoe), *Curcuma longa* (L.) are usually used in many Indian and continental recipes and *Alpinia speciosa* (Wendl.) is used as a substitution of *A. galanga* and ginger as well. Antimicrobial activity of essential oils extracted from leaf material of three test plants was determined by Kirby-Bauer disc diffusion method and minimum inhibitory concentration (MIC) by micro dilution assay. Identification of compounds possessing antimicrobial activity was performed by TLC Bioautography and GC-MS analysis. In order to affirm and attribute the antimicrobial properties of test oils four selected standard compounds those of identified by TLC bioautography were again tested for their antimicrobial activities by Kirby-Bauer disc diffusion method. For determination of antimicrobial properties; five gram-positive, eleven gram-negative bacteria and one fungal strain *Candida albicans* were used; amongst many of them are pathogenic in nature. Relatively potent antibacterial activity was observed with *A. speciosa* followed *Z. officinale* and lowest activity was observed with *C. longa* essential oils when compared to 10 mcg of gentamicin antibiotic and the all three test oils showed potential antifungal activity compared to its positive control 10 mcg of ketoconazole. Gram-positive bacteria used in this study were comparatively sensitive than Gram-negative to three test oils. Among all the test bacteria *Acinetobacter baumannii* found to be most sensitive to *A. speciosa* and *C. longa* oils; zone of inhibition 53 ± 2.0 mm and 30.3 ± 2.52 mm respectively and *Bacillus subtilis* was most sensitive to *Z. officinale* oil and zone of inhibition was 61 ± 2.65 mm. Minimum inhibitory concentration (MIC) values obtained by broth dilution assay in the study confirmed the results obtained in the disc diffusion assay with certain deviations. With TLC-bioautography it was observed that Eucalyptol, Linalool, Myristic acid, Methyl cinnamate, α & L α - terpinenol and (R)-P-menth-1-en-ol were the compounds possessing antimicrobial activity in *A. speciosa* oil; Z & E- Citral, Eugenol, meta-eugenol, Linalool, Borneol and Carvol were antimicrobial compounds of *Z. officinale*; Eucalyptol, Hydroxy 1-8- Cineol, Linalool & α - terpinenol were antimicrobial compounds of *C. longa*. Substantial antimicrobial activity was also observed with Citral and Eugenol those out of four selected standard compounds along with Linalool and Eucalyptol against majority of test organism individually and combinatorially. Combinatorial activity of compounds was tested in accordance with oil active compound composition identified with bioautography. The activities of oils could be attributed to the identified compounds with the support of observed antimicrobial properties of standard compounds. Rhizomes of the test plants have commercial significance in general and rest was ignored by farmers in India. As leaf material is a source of potential antimicrobial compounds, agriculture practices should be slightly changed in such a way that the leaves can be collected after harvesting of rhizomes for extracting essential oil and this will help the farmers with additional financial benefits.

Biography

Anil Kumar Chintaluri Completed M.Sc., (Microbiology) from Acharya Nagarjuna University, Guntur and M.Phil., from Andhra University, Visakhapatnam. Presently working as Sr Asst. Professor, Dept. of Microbiology, Vizianagaram and Pursuing Ph.D. from GITAM University, Visakhapatnam. I have Published 4 research papers in reputed International Journals. My area of research is on Antimicrobial activities of essential oils and Plant extracts & TLC – Bio autography.

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