

STUDENT RESEARCH WEEK

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Examining the Antimicrobial Activity of Plant Extracts

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Abstract

With the increasing prevalence of antibiotic resistance, the need for novel antimicrobials is high (Laxminarayan et al. 2013). In Africa, native plant extracts are commonly used therapeutically by local populations to treat illness and infection. Despite this, little investigation into the antimicrobial activity of these plant extracts has been performed (S. Mugo, personal communication, February 2, 2015). If these plant extracts demonstrate antimicrobial activity they may prove useful in the fight against antibiotic resistance. The purpose of this project was to develop a standard method to evaluate the antimicrobial activity of extracts from eleven plant species used in traditional medicine, and to examine if they inhibit growth of four different bacterial species representing various pathogen groups: *Escherichia coli*, *Bacillus subtilus*, *Staphylococcus epidermidis* and *Pseudomonas aeruginosa*.

Using a modified Kirby Bauer disk diffusion assay, increasing volumes of plant extracts, antibiotic solutions (streptomycin and chloramphenicol), or vehicles (water and ethanol) were added to filter paper disks (Hudzicki, 2009). These disks were then placed onto media plates inoculated with bacterial culture. The radius of the zone of clearing was measured and additional visual growth effects were recorded.

Of the eleven extracts tested, seven produced zones of inhibition against at least one bacterial species. This antimicrobial effect was dose-dependent. Of the four bacterial species tested, the strains *E. coli*, *B. subtilus* and *S. epidermidis* had their growth inhibited by at least one extract. Interestingly, ten of the extracts had additional bio-activity that

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resulted in visible morphological changes in the bacteria, indicating these extracts affect growth and gene expression. This effect was produced in all four bacterial species by at least one extract. This investigation was essential in characterizing the extracts' biological properties so they may be studied further and potentially be used in industrial and medical application.

References

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