

**IN VITRO ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY
OF THREE KENYAN MEDICINAL PLANTS AND ANALYSIS
OF ACTIVE CHEMICAL PRINCIPLES.**

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ABSTRACT

Medicinal plants have been used in centuries as a remedy for human diseases because they contain components of therapeutic value. The development of drug resistance to available antibiotics has also led to investigation of antimicrobial alternatives from medicinal plants. The Acquired Immunodeficiency Syndrome (AIDS) caused by the Human Immunodeficiency Virus (HIV) is an important public health problem in sub – Sahara Africa. Currently the treatment of the disease is mainly directed at secondary microbial infections mainly bacterial and fungal that account for up to 70% of HIV/AIDS defining illness.

From literature search by online sources, databases and search engines, a number of plants used in traditional health systems in Kenya were selected for study, of which basing on ethno botanical application and accessibility to their natural habitats three; *Aspilia mossambicensis* (Oliv.) Wild, *Ocimum gratissimum* (L.) Labiatae. and *Toddalia asiatica* (L.) Lam. (Rutaceae) were investigated with an overall aim of identifying and evaluating the bioactive antimicrobial agents.

Sequential extraction with organic solvents (n-Hexane, ethyl acetate and methanol) realized percentage yields in the range 0.5% (*Ocimum gratissimum* stem bark ethyl acetate extract) to 2.7% (*Toddalia asiatica* root bark methanol extract). Steam distillation enabled extraction of volatile oils with highest yields being 0.45% (*Ocimum gratissimum* leaves).

Antibacterial and antifungal assays were done on the crude extracts and volatile oils derived from these plants by disc diffusion susceptibility testing method. The highest activity was with *Toddalia asiatica* stem bark methanol extract (15mm diameter zone of inhibition) against Methicillin Resistant *Staphylococcus aureus* for antibacterial assays and the ethyl acetate extract (22mm diameter zone of inhibition) against *Microsporum gypseum* for antifungal assays.

Ocimum gratissimum leaves' volatile oils elicited activity across all the fungal strains tested against in the range of 12mm to 22mm inhibition zone diameter, this was a confirmation of explosive studies carried out previously hence no basis for further analysis. Statistical data analysis of the bioassays data using the Statistics Package for Social Scientists (SPSS) illustrated significance in the variation of bioactivity; from plant to plant, among different plant parts and for different extracts as expressed by F – statistics.

Bioactivity-guided fractionation of the *Toddalia asiatica* (stem bark methanol extract) yielded Methyl (6-methoxy-2-oxo-2H- chromen- 7 –yl) acetate (**F4-C**) (**6**), which was characterized using Ultra Violet, Infra Red, Nuclear Magnetic Resonance and Mass Spectroscopy and comparison with spectra of authentic samples. By bioautographic selection (**F4-C**) (**6**), showed antimicrobial activity against Methicillin Resistant *Staphylococcus aureus* (10mg/ml) and *Cryptococcus neoformans* (5mg/ml). **F'9-I'** (structure elucidation to be summed up) elicited antibacterial activity against *Pseudomonas aeruginosa* (10mg/ml).

These results validate the ethno botanical use of *Toddalia asiatica* a Kenyan medicinal plants for conditions that may be of bacterial and fungal etiology.