

**Phytochemical and anti-microbial studies of isolates from  
*Senecio lyratipatitus* (Asteraceae)**

**Eunice Nkatha Marete**

**A Thesis submitted in partial fulfillment for the degree of Master of  
Science in Chemistry in the Jomo Kenyatta University of Agriculture  
and Technology**

**2010**

## ABSTRACT

Infections caused by bacteria and fungi account for approximately one-half of all deaths in the developing countries. Prevention of the microbial infections includes vaccination and development of anti-microbial agents. Although anti-microbial drugs have saved many lives, the high production cost of these drugs and development of resistance in the responsible pathogens are challenges facing the healthcare system. Developing countries have the potential of plant resources that exhibit a wide range of biological activities which may help in the development of cheaper and more potent anti-microbial agents. *Senecio lyratipatitus* has been used traditionally for the treatment of wounds and sexually transmitted diseases. The anti-microbial activities of the crude extracts and compounds of *S. lyratipatitus* were investigated. Dried and powdered roots of *S. lyratipatitus* were sequentially extracted using *n*-hexane, dichloromethane and methanol. The extracts were separated using Column Chromatography (normal and reverse phase) and Preparative Thin Layer Chromatography (Prep-TLC). Toxicity tests were carried out against brine shrimp. Anti-microbial activities against gram positive bacteria (*Bacillus subtilis* and *Staphylococcus aureus*) and gram negative bacteria (*Escherichia coli* and *Pseudomonas aeruginosa*) were carried out. Anti-fungal activity against *Candida albicans* was also done. The brine shrimp lethality test results indicated that the crude extracts and dichloromethane fractions possessed high toxicity against the brine shrimp larvae. The dichloromethane extract showed a significant level of toxicity with  $LD_{50} = 450.33$  ppm. Further toxicity tests on the dichloromethane fractions, showed the highest toxicity was exhibited by the dichloromethane/ethyl acetate (1:1) fraction with  $LD_{50} = 175.89$  ppm and ethyl acetate/ methanol (1:1) fraction was least toxic with  $LD_{50} = 1158$  ppm. The crude extracts and dichloromethane fractions exhibited significant activity against bacteria compared to the standard anti-biotics. Two (2) compounds were isolated from the *n*-hexane extract, three (3) from the dichloromethane extract and one (1) from the methanol extract. Compounds SLRD1 and SLRH1 isolated from dichloromethane and *n*-hexane respectively, exhibited anti-microbial activity at a concentration of 20  $\mu\text{g}/\text{disc}$ . Compound SLRD1 exhibited inhibition diameter ranging from 7.7 to 11.0 mm while that of SLRH1 ranged from 8.6 to 10.6 mm. On the basis of spectroscopic and physical data obtained, compound SLRD1 was identified as  $\beta$ -sitosterol. The anti-bacterial and anti-fungal activity exhibited by extracts and compounds of *S. lyratipatitus* is an indication of its potential in the development of anti-microbial agents.