EVALUATION OF ISOLATES AND IDENTIFIED PHENOLICS FROM PELARGONIUM SIDOIDES AGAINST MYCOBACTERIUM TUBERCULOSIS, OTHER BACTERIA AND FUNGI

BY

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DECLARATION

I, Sannah Patience Nkami Mativandlela, hereby declare that the work on which this thesis is based, is on my work and does not contain any significant amount of unacknowledged work of others.

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Date: 2005.06.22
DEDICATION

This thesis is dedicated to Kulani Charity (Khonamanje), for her positive support when I was away for my studies.
ABSTRACT

Anecdotal evidence of two South African Geranium species (*Pelargonium reniforme* and *Pelargonium sidoides*) from the United Kingdom with regard to plants being used against tuberculosis, which lacked scientific evidence’ prompted us to investigate these two plants for their antimicrobial properties. The German herbal remedy (‘Umckaloabo’) is prepared from these two plant species and is currently being sold for bronchitis.

Acetone, chloroform and ethanol extracts were investigated against three bacteria (pathogens causing bronchitis), three fungi (fungal species associated with the upper and lower respiratory tract) and *Mycobacterium tuberculosis*. This is the first report on the extracts’ activity against *Moraxella catarrhalis*, and three fungi (*Asperigilus niger, Rhizopus stolonifer* and *Fusarium oxysporum*). Acetone and ethanol root extracts of *P. sidoides* and its combination with *P. reniforme* exhibited activity against bacteria at 5.0 mg/ml concentration. The fungi were significantly inhibited by the acetone and ethanol extracts of *P. reniforme* and the ethanol extract of *P. sidoides* at a concentration of 5.0 mg/ml. Antituberculosis activity was observed on acetone, chloroform and ethanol root extract of *P. reniforme* and chloroform extract of *P. sidoides* at 5.0 mg/ml concentration.

The isolation and purification of compounds were attempted using two different approaches, of which the second approach resulted in isolation of **four compounds and two flavonoids**. One flavonoid (**epigallocatechin**) is isolated for the first time from *P. sidoides*. Laboratory investigations showed no activity of compounds isolated against *M. tuberculosis*.

As Mycobacteria are intracellular pathogens, antimycobacterial activities may be due to either direct or indirect effects. Though the compounds in this study did not show antituberculosis activity, it can be speculated that the anecdotal evidence of TB-patients could be due to their immunostimulant activity.
## List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AIDS</td>
<td>Acquired immune deficiency syndrome</td>
</tr>
<tr>
<td>ATCC</td>
<td>American type culture collection</td>
</tr>
<tr>
<td>CFU</td>
<td>Colony forming units</td>
</tr>
<tr>
<td>DMSO</td>
<td>Dimethyl sulphoxide</td>
</tr>
<tr>
<td>EB</td>
<td>Ethambutol</td>
</tr>
<tr>
<td>GI</td>
<td>Growth index</td>
</tr>
<tr>
<td>HIV</td>
<td>Human immunodeficiency virus</td>
</tr>
<tr>
<td>INH</td>
<td>Isoniazid</td>
</tr>
<tr>
<td>INT</td>
<td>2-(4-iodophenyl)-3-(4-nitrophenyl)-5-phenyl</td>
</tr>
<tr>
<td>MDR</td>
<td>Multidrug-resistant</td>
</tr>
<tr>
<td>MIC</td>
<td>Minimal inhibitory concentration</td>
</tr>
<tr>
<td>MRC</td>
<td>Medical Research Council</td>
</tr>
<tr>
<td>NMR</td>
<td>Nuclear magnetic resonance</td>
</tr>
<tr>
<td>PDA</td>
<td>Potato dextrose agar</td>
</tr>
<tr>
<td>RIF</td>
<td>Rifampin</td>
</tr>
<tr>
<td>SD</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>SM</td>
<td>Streptomycin</td>
</tr>
<tr>
<td>TB</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>TLC</td>
<td>Thin layer chromatography</td>
</tr>
<tr>
<td>TMP</td>
<td>Traditional medicinal practitioners</td>
</tr>
<tr>
<td>USA</td>
<td>United State of America</td>
</tr>
<tr>
<td>USSR</td>
<td>Union of Soviet Socialist Republics</td>
</tr>
<tr>
<td>UV</td>
<td>Ultra violet light</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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