## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure No.</th>
<th>Title</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Bioprospecting</td>
<td>1</td>
</tr>
<tr>
<td>1.2</td>
<td>Bioactive compounds with biological activities</td>
<td>2</td>
</tr>
<tr>
<td>1.3</td>
<td>Plant-microbe interactions and their benefits</td>
<td>3</td>
</tr>
<tr>
<td>1.4</td>
<td>Endophytes and their applications</td>
<td>4</td>
</tr>
<tr>
<td>1.5</td>
<td>Endophytic bacterium with plant cell</td>
<td>6</td>
</tr>
<tr>
<td>1.6</td>
<td>Overview of isolation and extraction of secondary metabolites from endophytes</td>
<td>12</td>
</tr>
<tr>
<td>1.7</td>
<td>Nanoparticles and its dimension</td>
<td>13</td>
</tr>
<tr>
<td>1.8(a)</td>
<td>Top down and Bottom up process for nanoparticles synthesis</td>
<td>16</td>
</tr>
<tr>
<td>1.8(b)</td>
<td>Conventional methods for nanoparticles synthesis</td>
<td>16</td>
</tr>
<tr>
<td>1.9</td>
<td>Different parameters for biosynthesis of nanoparticles</td>
<td>19</td>
</tr>
<tr>
<td>1.10</td>
<td>Probable mechanism for nanoparticles synthesis by microorganisms</td>
<td>20</td>
</tr>
<tr>
<td>1.11(a)</td>
<td>Nanoparticles based products</td>
<td>21</td>
</tr>
<tr>
<td>1.11(b)</td>
<td>Different categories of products based on nanoparticles</td>
<td>21</td>
</tr>
<tr>
<td>1.12</td>
<td>Nanoparticles and their applications</td>
<td>22</td>
</tr>
<tr>
<td>1.13</td>
<td>Nanoparticles based packaging and dressing materials</td>
<td>23</td>
</tr>
<tr>
<td>1.14</td>
<td>Development of resistance to antibiotics</td>
<td>27</td>
</tr>
<tr>
<td>1.15</td>
<td>Increase in resistant bacteria and decrease in antibiotics</td>
<td>29</td>
</tr>
<tr>
<td>1.16</td>
<td>Innovation gap against resistant mechanisms</td>
<td>29</td>
</tr>
<tr>
<td>2.1(a)</td>
<td><em>Annona squamosa</em> L.</td>
<td>37</td>
</tr>
<tr>
<td>2.1(b)</td>
<td><em>Coffea arabica</em> L.</td>
<td>38</td>
</tr>
<tr>
<td>2.1(c)</td>
<td><em>Euphorbia hirta</em> L.</td>
<td>39</td>
</tr>
<tr>
<td>2.1(d)</td>
<td><em>Mimosa pudica</em> L.</td>
<td>40</td>
</tr>
<tr>
<td>2.1(e)</td>
<td><em>Tridax procumbens</em> L.</td>
<td>40</td>
</tr>
<tr>
<td>2.2</td>
<td>Schematic representation of surface sterilization of plant material for isolation of endophytes</td>
<td>41</td>
</tr>
<tr>
<td>2.3</td>
<td>Endophytic colonies emerging from plant segments</td>
<td>46</td>
</tr>
<tr>
<td>2.4</td>
<td>Pure culture of endophytic bacteria</td>
<td>47</td>
</tr>
<tr>
<td>2.5</td>
<td>Screening of bacterial endophytes for synthesis of nanoparticles</td>
<td>48</td>
</tr>
<tr>
<td>2.6</td>
<td>UV-Visible spectrum of silver nanoparticles mediated by Strain AS 41</td>
<td>48</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>2.7</td>
<td>UV-Visible spectrum of silver nanoparticles mediated by Strain CA 417</td>
<td></td>
</tr>
<tr>
<td>2.8</td>
<td>UV-Visible spectrum of silver nanoparticles mediated by Strain EH 419</td>
<td></td>
</tr>
<tr>
<td>2.9</td>
<td>UV-Visible spectrum of silver nanoparticles mediated by Strain MB 13</td>
<td></td>
</tr>
<tr>
<td>2.10</td>
<td>UV-Visible spectrum of silver nanoparticles mediated by Strain MB 141</td>
<td></td>
</tr>
<tr>
<td>2.11</td>
<td>UV-Visible spectrum of silver nanoparticles mediated by Strain MB 149</td>
<td></td>
</tr>
<tr>
<td>2.12</td>
<td>UV-Visible spectrum of silver nanoparticles mediated by Strain TP 416</td>
<td></td>
</tr>
<tr>
<td>2.13</td>
<td>UV-Visible spectrum of gold nanoparticles mediated by Strain AS 41</td>
<td></td>
</tr>
<tr>
<td>2.14</td>
<td>UV-Visible spectrum of gold nanoparticles mediated by Strain CA 417</td>
<td></td>
</tr>
<tr>
<td>2.15</td>
<td>UV-Visible spectrum of gold nanoparticles mediated by Strain EH 419</td>
<td></td>
</tr>
<tr>
<td>2.16</td>
<td>UV-Visible spectrum of gold nanoparticles mediated by Strain MB 13</td>
<td></td>
</tr>
<tr>
<td>2.17</td>
<td>UV-Visible spectrum of gold nanoparticles mediated by Strain MB 141</td>
<td></td>
</tr>
<tr>
<td>2.18</td>
<td>UV-Visible spectrum of gold nanoparticles mediated by Strain MB 149</td>
<td></td>
</tr>
<tr>
<td>2.19</td>
<td>UV-Visible spectrum of gold nanoparticles mediated by Strain TP 416</td>
<td></td>
</tr>
<tr>
<td>2.20</td>
<td>Different concentration of metal salts influencing synthesis of silver nanoparticles</td>
<td></td>
</tr>
<tr>
<td>2.21</td>
<td>Different pH influencing synthesis of nanoparticles</td>
<td></td>
</tr>
<tr>
<td>2.22</td>
<td>Different temperature influencing synthesis of nanoparticles</td>
<td></td>
</tr>
<tr>
<td>2.23</td>
<td>Antimicrobial activity of bacterial endophytes against test pathogens by agar overlay and dual culture techniques</td>
<td></td>
</tr>
<tr>
<td>2.24</td>
<td>Agarose gel showing genomic DNA of bioactive endophytic bacteria</td>
<td></td>
</tr>
<tr>
<td>2.25</td>
<td>Phylogram expressing the relationships of <em>Pseudomonas veronii</em> strain AS41G to taxonomically similar bacteria based on the 16S rRNA gene sequences</td>
<td></td>
</tr>
<tr>
<td>2.26</td>
<td>Phylogram expressing the relationships of <em>Pseudomonas fluorescens</em> strain CA 417 to taxonomically similar bacteria based on the 16S rRNA gene sequences</td>
<td></td>
</tr>
<tr>
<td>2.27</td>
<td>Phylogram expressing the relationships of <em>Aneurinibacillus migulanus</em> strain 141 to taxonomically similar bacteria based on the 16S rRNA gene sequences</td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>Important techniques used to characterize nanoparticles</td>
<td></td>
</tr>
<tr>
<td>3.2</td>
<td>XRD Mechanism</td>
<td></td>
</tr>
<tr>
<td>3.3(a)</td>
<td>UV-Visible spectrum of silver nanoparticles synthesized by <em>Pseudomonas veronii</em> strain AS 41G</td>
<td></td>
</tr>
<tr>
<td>3.3(b)</td>
<td>UV-Visible spectrum of gold nanoparticles synthesized by <em>Pseudomonas veronii</em> strain AS 41G</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>3.4(a)</td>
<td>FTIR analysis of silver nanoparticles synthesized by <em>Pseudomonas veronii</em> strain AS 41G</td>
<td></td>
</tr>
<tr>
<td>3.4(b)</td>
<td>FTIR analysis of gold nanoparticles synthesized by <em>Pseudomonas veronii</em> strain AS 41G</td>
<td></td>
</tr>
<tr>
<td>3.5(a)</td>
<td>XRD analysis of silver nanoparticles synthesized by <em>Pseudomonas veronii</em> strain AS 41G</td>
<td></td>
</tr>
<tr>
<td>3.5(b)</td>
<td>XRD analysis of gold nanoparticles synthesized by <em>Pseudomonas veronii</em> strain AS 41G</td>
<td></td>
</tr>
<tr>
<td>3.6</td>
<td>TEM microgram of nanoparticles synthesis by <em>Pseudomonas veronii</em> strain AS 41G</td>
<td></td>
</tr>
<tr>
<td>3.7(a)</td>
<td>UV-Visible spectrum of silver nanoparticles synthesized by <em>Pseudomonas fluorescens</em> strain CA 417</td>
<td></td>
</tr>
<tr>
<td>3.7(b)</td>
<td>UV-Visible spectrum of gold nanoparticles synthesized by <em>Pseudomonas fluorescens</em> strain CA 417</td>
<td></td>
</tr>
<tr>
<td>3.8(a)</td>
<td>FTIR analysis of silver nanoparticles synthesized by <em>Pseudomonas fluorescens</em> strain CA 417</td>
<td></td>
</tr>
<tr>
<td>3.8(b)</td>
<td>FTIR analysis of gold nanoparticles synthesized by <em>Pseudomonas fluorescens</em> strain CA 417</td>
<td></td>
</tr>
<tr>
<td>3.9(a)</td>
<td>XRD analysis of silver nanoparticles synthesized by <em>Pseudomonas fluorescens</em> strain CA 417</td>
<td></td>
</tr>
<tr>
<td>3.9(b)</td>
<td>XRD analysis of gold nanoparticles synthesized by <em>Pseudomonas fluorescens</em> strain CA 417</td>
<td></td>
</tr>
<tr>
<td>3.10</td>
<td>TEM microgram of nanoparticles synthesis by <em>Pseudomonas fluorescens</em> strain CA 417</td>
<td></td>
</tr>
<tr>
<td>3.11(a)</td>
<td>UV-Visible spectrum of silver nanoparticles synthesized by <em>Aneurinibacillus migulanus</em> strain 141</td>
<td></td>
</tr>
<tr>
<td>3.11(b)</td>
<td>UV-Visible spectrum of gold nanoparticles synthesized by <em>Aneurinibacillus migulanus</em> strain 141</td>
<td></td>
</tr>
<tr>
<td>3.12(a)</td>
<td>FTIR analysis of silver nanoparticles synthesized by <em>Aneurinibacillus migulanus</em> strain 141</td>
<td></td>
</tr>
<tr>
<td>3.12(b)</td>
<td>FTIR analysis of gold nanoparticles synthesized by <em>Aneurinibacillus migulanus</em> strain 141</td>
<td></td>
</tr>
<tr>
<td>3.13(a)</td>
<td>XRD analysis of silver nanoparticles synthesized by <em>Aneurinibacillus migulanus</em> strain 141</td>
<td></td>
</tr>
<tr>
<td>3.13(b)</td>
<td>XRD analysis of gold nanoparticles synthesized by <em>Aneurinibacillus migulanus</em> strain 141</td>
<td></td>
</tr>
<tr>
<td>3.14</td>
<td>TEM analysis nanoparticles synthesized by <em>Aneurinibacillus migulanus</em> strain 141</td>
<td></td>
</tr>
</tbody>
</table>
3.15 Antibacterial activity of nanoparticles via disc and well diffusion
3.16(a) Antibacterial activity of silver nanoparticles synthesized by *Pseudomonas veronii* strain AS 41G using broth dilution
3.16(b) Antibacterial activity of silver nanoparticles synthesized by *Pseudomonas fluorescens* strain CA 417 using broth dilution
3.16(c) Antibacterial activity of silver nanoparticles synthesized by *Aneurinibacillus migulanus* strain 141 using broth dilution
3.17(a) Antibacterial activity of silver nanoparticles synthesized by *Pseudomonas veronii* strain AS 41G using CFU
3.17(b) Antibacterial activity of silver nanoparticles synthesized by *Pseudomonas fluorescens* strain CA 417 using CFU
3.17(c) Antibacterial activity of silver nanoparticles synthesized by *Aneurinibacillus migulanus* strain 141 using CFU
3.18(a) Antibacterial activity of gold nanoparticles synthesized by *Pseudomonas veronii* strain AS 41G using broth dilution
3.18(b) Antibacterial activity of gold nanoparticles synthesized by *Pseudomonas fluorescens* strain CA 417 using broth dilution
3.18(c) Antibacterial activity of gold nanoparticles synthesized by *Aneurinibacillus migulanus* strain 141 using broth dilution
3.19(a) Antibacterial activity of gold nanoparticles synthesized by *Pseudomonas veronii* strain AS 41G using CFU
3.19(b) Antibacterial activity of gold nanoparticles synthesized by *Pseudomonas fluorescens* strain CA 417 using CFU
3.19(c) Antibacterial activity of gold nanoparticles synthesized by *Aneurinibacillus migulanus* strain 141 using CFU
3.20 DNA Damage of nanoparticles
4.1 Overview of methods and techniques for purification and characterization of antimicrobial metabolites
4.2(a) The phlD gene cluster and proposed biosynthesis pathway of 2,4-diacyl phloroglucinol (2,4-DAPG)
4.2(b) Biosynthetic pathway of 2,4-DAPG
4.3 *Pseudomonas veronii* strain AS 41G and *Pseudomonas fluorescens* strain CA 417
4.4 HPLC profile of crude antimicrobial metabolites and purified bioactive fraction of *Pseudomonas veronii* strain AS 41G
4.5 TLC profile of crude metabolites, purified bioactive fraction of *Pseudomonas veronii* strain AS 41G and bioautography against *Staphylococcus aureus* (MTCC 7443)
4.6 LC-MS profile of purified bioactive fraction extracted from *Pseudomonas veronii* strain AS 41G

4.7(a) $^1$H-NMR profile of purified bioactive fraction extracted from *Pseudomonas veronii* strain AS 41G

4.7(b) $^{13}$C-NMR profile of purified bioactive fraction extracted from *Pseudomonas veronii* strain AS 41G

4.8 FTIR of purified bioactive fraction from *Pseudomonas veronii* strain AS 41G

4.9 Structure of 2, 3-Dichloro-5,6-dicyano-1,4-benzoquinone

4.10 HPLC profile of crude antimicrobial metabolite and purified bioactive fraction of *Pseudomonas fluorescens* strain CA 417

4.11 HPLC profile of crude antimicrobial metabolites, purified bioactive fraction of *Pseudomonas fluorescens* strain CA 417 and bioautography against *Staphylococcus aureus* (MTCC 7443)

4.12 LC-MS profile of purified bioactive fraction extracted from *Pseudomonas fluorescens* strain CA 417

4.13(a) $^1$H-NMR profile of purified bioactive fraction extracted from *Pseudomonas fluorescens* strain CA 417

4.13(b) $^{13}$C-NMR profile of purified bioactive fraction extracted from *Pseudomonas fluorescens* strain CA 417

4.14 FTIR of purified bioactive fraction from *Pseudomonas fluorescens* strain CA 417

4.15 Structure of 2,4-diacylphloroglucinol

4.16 Agarose gel showing amplicons size of ~700 and ~600 base pairs for phlD gene specific primers

4.17 Antibacterial activity of DDQ and DAPG against test bacteria

4.18 Antifungal activity of DDQ and DAPG against test fungi