### Table 1. Commonly used architectural parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root volume</td>
<td>Volume of tree root system in the soil</td>
</tr>
<tr>
<td>Root length</td>
<td>Total sum of root length</td>
</tr>
<tr>
<td>Horizontal spread</td>
<td>Maximum horizontal distance</td>
</tr>
<tr>
<td>Rooting depth</td>
<td>Depth of the deepest root in a root system</td>
</tr>
<tr>
<td>Cross-sectional area</td>
<td>Area of cross-section (calculated from root diameter)</td>
</tr>
<tr>
<td>Allocation ratio (q)</td>
<td>Average ratio of the cross-sectional area of larger branch to the total</td>
</tr>
<tr>
<td></td>
<td>cross-sectional area of all branch (if q is 1, herringbone and if q is 0.5,</td>
</tr>
<tr>
<td></td>
<td>dichotomous)</td>
</tr>
<tr>
<td>Proportionality index (p)</td>
<td>Area ratio of before and after branching ((\frac{\text{Area}<em>{\text{parent}}}{\text{Area}</em>{\text{children}}}))</td>
</tr>
<tr>
<td>Branching angle</td>
<td>Angle between parent root and children root</td>
</tr>
<tr>
<td>Root order or Generation number</td>
<td>Branching order of each root segment</td>
</tr>
<tr>
<td>Root fork number or Total bifurcation number</td>
<td>Total number of root bifurcations</td>
</tr>
</tbody>
</table>
Table 2. Bulk properties for model tree roots

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Lovell1</th>
<th>Lovell 2</th>
<th>Lovell 3</th>
<th>Lovell 4</th>
<th>Marianna 1</th>
<th>Marianna 2</th>
<th>Marianna 3</th>
<th>Myrobalan 1</th>
<th>Myrobalan 2</th>
<th>Myrobalan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Species</strong></td>
<td>Lovell</td>
<td>Lovell</td>
<td>Lovell</td>
<td>Lovell</td>
<td>Marianna</td>
<td>Marianna</td>
<td>Marianna</td>
<td>Myrobalan</td>
<td>Myrobalan</td>
<td>Myrobalan</td>
</tr>
<tr>
<td><strong>Peak Pullout Capacity (kN)</strong></td>
<td>5.7</td>
<td>7.5</td>
<td>4.3</td>
<td>4.8</td>
<td>8.0</td>
<td>9.9</td>
<td>6.5</td>
<td>10.7</td>
<td>16.4</td>
<td>12.9</td>
</tr>
<tr>
<td><strong>Total Volume (cm$^3$)</strong></td>
<td>3268</td>
<td>3446</td>
<td>2378</td>
<td>3411</td>
<td>4673</td>
<td>4082</td>
<td>1983</td>
<td>4018</td>
<td>3756</td>
<td>2219</td>
</tr>
<tr>
<td><strong>Total Surface Area (cm$^2$)</strong></td>
<td>6861</td>
<td>9058</td>
<td>5043</td>
<td>5770</td>
<td>9807</td>
<td>6804</td>
<td>4994</td>
<td>9021</td>
<td>6512</td>
<td>6730</td>
</tr>
<tr>
<td><strong>Total length (cm)</strong></td>
<td>1871</td>
<td>3100</td>
<td>1274</td>
<td>1279</td>
<td>2462</td>
<td>1415</td>
<td>1112</td>
<td>1969</td>
<td>1463</td>
<td>1378</td>
</tr>
<tr>
<td><strong>Trunk diameter (cm)</strong></td>
<td>8.2</td>
<td>8.6</td>
<td>7.4</td>
<td>8.3</td>
<td>8.2</td>
<td>7.2</td>
<td>6.3</td>
<td>7.6</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td><strong>Buried depth (cm)</strong></td>
<td>58</td>
<td>39</td>
<td>35</td>
<td>61</td>
<td>36</td>
<td>52</td>
<td>58</td>
<td>38</td>
<td>65</td>
<td>63</td>
</tr>
<tr>
<td><strong>Maximum hemisphere radius (cm)</strong></td>
<td>110</td>
<td>110</td>
<td>120</td>
<td>110</td>
<td>120</td>
<td>90</td>
<td>100</td>
<td>110</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td><strong>Number of generation</strong></td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>10</td>
<td>12</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td><strong>Fractal dimension for volume</strong></td>
<td>1.27</td>
<td>1.09</td>
<td>1.11</td>
<td>1.33</td>
<td>1.53</td>
<td>1.19</td>
<td>1.17</td>
<td>1.35</td>
<td>1.37</td>
<td>1.06</td>
</tr>
<tr>
<td><strong>Fractal dimension for area</strong></td>
<td>2.03</td>
<td>1.92</td>
<td>1.73</td>
<td>1.69</td>
<td>1.76</td>
<td>1.42</td>
<td>2.16</td>
<td>1.61</td>
<td>1.61</td>
<td>1.66</td>
</tr>
</tbody>
</table>

Note. $^a$ Volume and surface area are calculated from STL format. $^b$ Total length is calculated from the skeletons. $^c$ The trunk diameter is estimated from the diameter of the maximum inscribed sphere. $^d$ Maximum hemisphere radius is equivalent to the distance from the trunk center at the ground surface.
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Lovel1</th>
<th>Lovel2</th>
<th>Lovel3</th>
<th>Lovel4</th>
<th>Marianna1</th>
<th>Marianna2</th>
<th>Marianna3</th>
<th>Myrobalan1</th>
<th>Myrobalan2</th>
<th>Myrobalan3</th>
</tr>
</thead>
<tbody>
<tr>
<td>LT10</td>
<td>5.5</td>
<td>5.5</td>
<td>6.5</td>
<td>7.5</td>
<td>6.5</td>
<td>8.5</td>
<td>5.5</td>
<td>7.5</td>
<td>7.5</td>
<td>3.5</td>
</tr>
<tr>
<td>LT30</td>
<td>12.5</td>
<td>9.5</td>
<td>11.5</td>
<td>17.5</td>
<td>11.5</td>
<td>17.5</td>
<td>9.5</td>
<td>11.5</td>
<td>11.5</td>
<td>8.5</td>
</tr>
<tr>
<td>LT50</td>
<td>21.5</td>
<td>14.5</td>
<td>19.5</td>
<td>33.5</td>
<td>19.5</td>
<td>25.5</td>
<td>14.5</td>
<td>16.5</td>
<td>16.5</td>
<td>14.5</td>
</tr>
<tr>
<td>LT60</td>
<td>30.5</td>
<td>20.5</td>
<td>27.5</td>
<td>39.5</td>
<td>27.5</td>
<td>33.5</td>
<td>22.5</td>
<td>20.5</td>
<td>20.5</td>
<td>17.5</td>
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<tr>
<td>LT90</td>
<td>79.5</td>
<td>85.5</td>
<td>68.5</td>
<td>78.5</td>
<td>69.5</td>
<td>57.5</td>
<td>70.5</td>
<td>38.5</td>
<td>38.5</td>
<td>32.5</td>
</tr>
<tr>
<td>Cu a</td>
<td>5.55</td>
<td>3.73</td>
<td>4.23</td>
<td>5.27</td>
<td>4.23</td>
<td>3.94</td>
<td>4.09</td>
<td>2.73</td>
<td>2.73</td>
<td>5</td>
</tr>
</tbody>
</table>

Note: a The coefficient of uniformity in root thickness Cu is defined as LT60/LT10, which represents the variability in thickness. The Cu value of 1 indicates that the root thickness is uniform. Greater Cu indicates greater variation of root thickness.