Effect of IBA on rooting in West Indian cherry (*Malpighia galbra* L.) cuttings

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Abstract

West Indian cherry (*Malpighia galbra* L.), a rich source of vitamin C, has a problem in propagation through seeds. Indole butyric acid (IBA) @ 500, 1000 and 1500 ppm was tried in hard and semi-hard wood cuttings for the vegetative propagation. After 90 days, maximum survival (90%), number of leaves (25.0), number of primary branches (6.60) and number of secondary branches (6.60) were recorded in hard wood cuttings treated with IBA @ 1500 ppm. Similarly, maximum number of primary roots (9.37), number of secondary roots (16.37), length of primary roots (22.04 cm) and length of secondary roots (15.10 cm) were observed in hard wood cuttings treated with IBA @ 1500 ppm. The hardwood cuttings treated with 1500 ppm IBA were found most successful for the vegetative propagation of West Indian cherry.

Key words: *Malpighia galbra*, propagation, indole butyric acid, hard and semi-hard wood cutting, survival, leaves

Introduction

West Indian cherry (*Malpighia galbra* L.), belonging to the family Malpighiaceae, is a native of West Indies and Northern South America to Southern Texas. It was further introduced into other parts of the tropics and sub-tropics. This diverse tropical fruit is called “Cherry” or “Apple” without being related to their name sake of temperate climate. Its chief claim to fame rests on the incredibly high vitamin C content, 6-8 times more than the recommended dose i.e., 4515 mg/100g ascorbic acid in the ripe fruit and 3100mg/100g in unripe fruit (Singh *et al.*, 1999, Attri and Singh, 1998).

A dense spreading glabrous, evergreen shrub is also valuable as an ornamental bush. In order to overcome inherent biological problems connected with seeds, vegetative propagation could be tried as potential means of production of quality planting stock. The goal of vegetative propagation is to get the best planting stock with highest genetic quality material (Hartmann and Kester, 1983; Nanda, 1970; Wright, 1975). For making plants through cuttings, it is essential to know the proper technique for vegetative propagation of this crop. Since, auxins like naphthalene acetic acid and indole butyric acid have been reported to show quick and better rooting in vegetative propagation of many fruit crops *viz.*, guava, grapes, ber, custard apple (Shanmugavelu, 1987; Singh and Singh, 1973; Bankar, 1989; Dhua *et al.*, 1982). For getting better, quick and more number of rooted cuttings, it is necessary to see the effect of different hormones on the success and establishment of cuttings. Present investigation was carried out to find out the type of cutting and effective concentration of IBA for proper rooting and establishment as a healthy plant.

Materials and methods

The present experiment was conducted during July–November, 1997 at Central Agricultural Research Institute, research farm, Port Blair which is located between 6° 45' and 13° 41' N latitudes and 92° 12' and 93° 57' E longitudes in the North-South direction in the Bay of Bengal. The experiment was taken in RBD and replicated thrice. Two types of cuttings *i.e.*, Hard Wood (HW) and Semi-Hard Wood (SHW) were treated with Indole Butyric Acid (IBA) in three concentrations *i.e.*, 500,1000, 1500 ppm. The cuttings taken for the experiment were 0.5 to 1.0 cm thick from one year old shoots of 4-5 years old trees of variety Sel-I growing in the orchard of the Institute. Atleast two nodes were secured in each cutting. After treating the cuttings with plant growth regulator, these were inserted in soil up to a depth of 7.5 to 12 cm. Twenty cuttings were treated in each treatment. Observations were recorded on survival percentage, number of leaves, number of primary and secondary branches, length of primary and secondary roots after 30, 60 and 90 days after planting (DAP) of the cuttings.

Results and discussion

Amongst the type, hard wood cuttings performed better in comparison to the semi-hard wood cuttings *i.e.*, number of branches, number and length of primary and secondary roots, survival percentage at different intervals. There was a clear cut and significant impact of IBA on the survival percentage and number of leaves recorded 90 days after planting. Maximum survival percentage (90%) and number of leaves (24.66%) were recorded in hardwood cuttings treated with IBA @ 1500 ppm. Other treatments also showed significant differences amongst themselves and were found better than control (Fig. 1). Regarding the number of primary branches, both type of cuttings and plant
growth regulators have significant effect. Maximum number of primary branches (6.60) was obtained in case of hard wood cuttings treated with 1500 ppm IBA (Table 1). As far as the secondary branches are concerned, type of cuttings had no significant effect. However, amongst the concentrations of plant growth regulator used, 1500 ppm IBA showed the best performance and it was maximum (6.60) in hard wood cuttings. It was observed from the table 1 that maximum primary and secondary roots were found in hard wood cuttings. IBA @ 1500 ppm was more effective in producing maximum primary (9.37) and secondary roots (16.57) in case of hard wood cuttings. This trend was confirmed with the work reported by Cameron and Rook (1974), Nanda (1970) and Bankar (1989). The length of primary and secondary roots was also found to be more in hard wood cuttings. IBA @1500 ppm in hard wood cuttings was more effective in increasing the length of primary (22.04 cm) and secondary (15.10 cm) roots.

From the above discussion, it is evident that in all the parameters of rooting behaviour and survival of cuttings, IBA @ 1500 ppm in hard wood cuttings, had shown the best results. Overall, application of plant growth regulator indicated a considerable influence on rooting which might be due to the increased auxin content. Exogenous application of IBA might have caused formation of callus and elongation of cells in the cuttings. Cameron and Rook (1974) found that IBA had positive effect on both callus formation and root initiation in stem cuttings of *Pinus radiata*. Root formation may also be due to the hydrolysis and translocation of carbohydrates and nitrogenous substances present at the base of the cuttings. The action of auxin activity might have accelerated cell elongation and cell division along with suitable environment, which might have helped in increasing the root growth process.

### Table 1. Effect of IBA and type of cuttings on the vegetative propagation of West Indian cherry

<table>
<thead>
<tr>
<th>Treatment</th>
<th>No. of primary branches</th>
<th>No. of secondary branches</th>
<th>No. of primary roots</th>
<th>No. of secondary roots</th>
<th>Length of primary roots (cm)</th>
<th>Length of secondary roots (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HWC (T1)</td>
<td>4.30</td>
<td>2.60</td>
<td>3.00</td>
<td>9.37</td>
<td>5.44</td>
<td>5.54</td>
</tr>
<tr>
<td>HWC + IBA 500 ppm (T2)</td>
<td>5.30</td>
<td>4.34</td>
<td>4.10</td>
<td>13.37</td>
<td>13.00</td>
<td>5.67</td>
</tr>
<tr>
<td>HWC + IBA 1000 ppm (T3)</td>
<td>5.30</td>
<td>4.64</td>
<td>7.54</td>
<td>14.50</td>
<td>19.94</td>
<td>8.67</td>
</tr>
<tr>
<td>HWC + IBA 1500 ppm (T4)</td>
<td>6.60</td>
<td>6.60</td>
<td>9.37</td>
<td>16.57</td>
<td>22.04</td>
<td>15.10</td>
</tr>
<tr>
<td>SHWC (T5)</td>
<td>3.30</td>
<td>2.60</td>
<td>1.44</td>
<td>6.10</td>
<td>4.27</td>
<td>4.54</td>
</tr>
<tr>
<td>SHWC + IBA 500 ppm (T6)</td>
<td>4.33</td>
<td>3.03</td>
<td>3.70</td>
<td>6.10</td>
<td>11.47</td>
<td>10.17</td>
</tr>
<tr>
<td>SHWC + IBA 1000 ppm (T7)</td>
<td>4.26</td>
<td>3.70</td>
<td>5.10</td>
<td>7.10</td>
<td>13.60</td>
<td>6.27</td>
</tr>
<tr>
<td>SHWC + IBA 1500 ppm (T8)</td>
<td>6.00</td>
<td>5.16</td>
<td>8.27</td>
<td>13.27</td>
<td>15.50</td>
<td>7.70</td>
</tr>
<tr>
<td>C.D. at 5%</td>
<td>0.11</td>
<td>0.17</td>
<td>0.25</td>
<td>0.07</td>
<td>0.46</td>
<td>0.30</td>
</tr>
</tbody>
</table>

HWC = Hard wood cuttings, SHWC = Semi hard wood cuttings

Fig. 1. Effect of IBA on survival and number of leaves of West Indian cherry

![Graph showing the effect of IBA on survival and number of leaves of West Indian cherry.](image)

References


