EFFECT OF INDIVIDUAL AND COMBINED CONCENTRATIONS OF IBA AND NAA FOR ROOT DEVELOPMENT OF ROSE CULTIVAR, BAJAZZO

Malik Mohsin Abbas*, Malik Allah Baksh**, Saeed Ahmad***
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ABSTRACT

An experiment, was conducted to investigate the effects of hormone Indole Butyric Acid (IBA) and Naphthalene Acetic Acid (NAA) on rooting of hybrid roses cvs. Bajazzo, at Horticultural Research Station, Soon Valley, Nowshera, district Khushab, Punjab, Pakistan during 2011-12. Six treatments were applied i.e. T1 = control T2 = IBA@2000ppm, T3 = IBA@3000ppm T4 = NAA@2000ppm T5 = NAA@3000ppm and T6=T2+T4. The purpose of application of these hormones was multiplication of pedigree plants in short time. Plants were raised in the polythene sheet tunnels (1.80 x 0.90 x 0.75 meters). Results revealed that significantly higher sprouting percentage (33.25%) and higher survival percentage (63.25%) was noted in the cuttings treated with IBA @ 3000 ppm as compared to the control (4.75 and 25.5%). More number of leaves (7.5) and length of sprouting (19.16%) were found in the cuttings treated with IBA @ 2000 ppm as compared to rest of treatments. The cuttings treated with IBA @ 3000 ppm (T3) sprouted in 14.75 days against the control (T1) (28 days). Maximum number of roots (30.25) were noted in T2, whereas, the control produced the least number of roots (16.0).

KEYWORDS: Rosa hybrid; root promoting hormones; IBA; NAA; A-sexual propagation; pedigree plants; Pakistan.

INTRODUCTION

Rose belongs to family Rosaceae, genus Rosa, have more than 150 species and 1400 cultivars (6). Rose hybrids have been divided into gallica, alba, centifolia, tea roses, bourbon, hybrid perpetual, hybrid tea, polyantha, floribunda and grandiflora groups of cultivated roses (19).

Roses are grown for their multiple uses like production of petals, extraction of perfumes, and extraction of vitamin C for medicinal use from rose hips and for sale as cut flower (13). Due to extensive uses in human life rose has always been found favorite of mankind in all times.

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Roses are conventionally propagated by different vegetative means, specially budding. Budding keep all the desirable character intact, because plants raised through seed is not true to type. Budding is an expensive, laborious and time consuming method. Development of plants cutting is simplest way of propagation for desirable varieties. There are relatively few varieties that develop roots for other cultivars. So exogenous application of growth promoters is essential.

In rose nurseries, growth hormones such as auxins are being used for root development. In addition to root development these hormones also regulate the other physiological process like cell division, root initiation; apical dominance, leaf senescence, leaf and fruit abscission, fruit setting and ripening. The most biologically active and the most practical auxins are naphthalene acetic acid (NAA) and indole-3-butyric acid (IBA). Shoot cuttings of many plant species, when dipped or coated with small quantity of these growth regulators develop roots more quickly and in higher numbers (4). For application of the IBA on the basal ends the quick dip method is effective. There may be variable rooting by this method depending upon the time and concentration of IBA applied. For hardwood cuttings use 2000 ppm IBA (8).

The propagation of *Rosa hybrida* through stem cutting is an easy way to prepare the plants and will reduce the pressure of preparing the plants through grafting, which is much laborious and cost effective. It will also help reduce the time from propagation to marketing. With the introduction of rooting hormones like IBA, NAA and Seradix-A (5, 7 and 25) and rooting media, it is possible to induce rooting in cutting (11). Green rose cv. Sonia, revealed effectively to treatments in giving rapid rooting (3). Many growth substances are being used in the commercial propagation of different crops. The compounds commonly used for root induction, include Indole 3-butyric acid (IBA) and Seradix (20). Plant growth regulators could promote rooting in many ornamental plants including rose (17). It was also reported by Elizabeth et al. (4) that maximum survival percentage was recorded by using IBA 500 ppm for two rose cultivars (91% and 89%, respectively), the maximum number of roots (50 and 47 roots) and the longest roots at the end of vegetation (31 and 28 cm) were recorded by using IBA 1000 ppm, but the strongest roots and healthier seedlings were developed by using IBA 500 ppm. At the same time, the use of rooting hormones positively affected sprout length. The longest sprouts were developed by using IBA 500 ppm (66 and 62.3 cm, respectively). The increase of NAA and IBA concentration from 500 ppm up to 1000 ppm provided shorter shoots.

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MATERIALS AND METHODS

Bajazzo, a hybrid tea roses variety was tested for rooting after application of root promoting hormones i.e. IBA and NAA at Horticultural Research Station, Soon Valley, Nowshera, Khushab during 2011-12. The averages of both years were calculated and interpreted in the results. Experiment was laid out according to RCBD having six treatments with three replications each.

Cuttings were taken from disease free mother plants of rose. The fresh cuttings of 18-20 cm long were prepared. All the leaves were clipped and these cuttings were treated with different concentrations of IBA (indole-3-butyric acid) and NAA (naphthalene acetic acid) to enhance the rooting initiation. The medium for rooting of cuttings was prepared by mixing the 50 % sand and 50 % silt. The ¾ portion of each cutting was inserted into medium the media after treating with IBA and NAA according to the treatments. The irrigation was applied with sprinkler at alternate days because during August the temperature rises decreasing the humidity of the atmosphere. The cuttings were placed under the small tunnels (1.80 X 0.90 X 0.75 meters) which were covered with polythene sheet. The tunnels were placed under the semi shade (50% shade) of green sheet.

The temperature was measured by thermometer model, AZ-8801 and humidity was measured by hygrometer model C3-4154. The compound leaves (with five leaflets) were counted. The sprouting percentage was recorded by observing the initial sprouting of buds and the survival percentage was recorded after 60 days. Detail of treatments given as fallow.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>T₁ = Control</th>
<th>T₂ = IBA 2000 ppm</th>
<th>T₃ = IBA 3000 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₄ = NAA 2000 ppm</td>
<td>T₅ = NAA 3000 ppm</td>
<td>T₆ = T₂+ T₄</td>
<td></td>
</tr>
</tbody>
</table>

Data on following parameters were collected:

1. Sprouting percentage
2. Days taken to sprout
3. Length of sprouting (cm) after 90 days
4. Number of leaves after 90 days
5. Survival percentage after 120 days
6. Number of roots after 120 days
Data were analyzed statistically by using the Fisher's analysis of variance technique and treatments were compared by using the Least Significant Difference (LSD) test at 5% probability level (23). Detail of treatments is as follows:

RESULTS AND DISCUSSION

The data (Table 1) regarding the sprouting percentage revealed that the maximum sprouting percentage (33.25 %) was observed in the cuttings treated with IBA at the rate of 3000 ppm (T₃). In treatment T₂, 27.5 percent sprouting was recorded. The minimum sprouting percentage (4.75 %) was observed in control. The treatments T₄, T₅ and T₆ showed 22.5, 11 % and 17.5 sprouting percentage on descending order respectively. The results are in line with the findings of Manan et al. (16) who reported that cuttings treated with IBA at 1000 ppm gave 37 percent and control showed 17.5 percent success. The results are also in agreement with the earlier findings of scientists (1, 2, 7, 15, 25).

Table 1. Effect of different concentrations of NAA and IBA on stem cuttings.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Sprouting percentage</th>
<th>Days taken to sprout</th>
<th>Length of sprouting (cm) after 90 days</th>
<th>Number of leaves after 90 days</th>
<th>Survival percentage after 120 days</th>
<th>Number of roots after 120 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁ = Control</td>
<td>4.75 e</td>
<td>28.00 a</td>
<td>9.25 c</td>
<td>3 d</td>
<td>26.5 e</td>
<td>16 d</td>
</tr>
<tr>
<td>T₂ = IBA 2000 ppm</td>
<td>27.5 ab</td>
<td>17.25 c</td>
<td>19.163 a</td>
<td>7.5 a</td>
<td>40.25 d</td>
<td>30.25 a</td>
</tr>
<tr>
<td>T₃ = IBA 3000 ppm</td>
<td>33.25 a</td>
<td>14.75 c</td>
<td>17.663 a</td>
<td>6.5 ab</td>
<td>63.25 b</td>
<td>28 ab</td>
</tr>
<tr>
<td>T₄ = NAA 2000 ppm</td>
<td>22.5 bc</td>
<td>20.75 b</td>
<td>14.25 b</td>
<td>6 ab</td>
<td>71.5 a</td>
<td>24 abc</td>
</tr>
<tr>
<td>T₅ = NAA 3000 ppm</td>
<td>11d e</td>
<td>27 a</td>
<td>10.25 c</td>
<td>3.75 cd</td>
<td>52.5 c</td>
<td>18 cd</td>
</tr>
<tr>
<td>T₆ = NAA 2000 + IBA 2000</td>
<td>17.5 cd</td>
<td>21.75 b</td>
<td>12.83 b</td>
<td>5.5 bc</td>
<td>33.75 d</td>
<td>21 bcd</td>
</tr>
<tr>
<td>LSD VALUE 0.05 %</td>
<td>7.59</td>
<td>3.06</td>
<td>2.41</td>
<td>1.78</td>
<td>7.23</td>
<td>7.02</td>
</tr>
</tbody>
</table>

Data regarding the days taken to sprout showed that minimum number of days (14.75) were taken to sprout the cuttings treated with 3000 ppm IBA (T₃) and the maximum number of days to sprout (28) were taken by the cuttings kept as control. The cuttings in the treatments T₂, T₄, T₆ and T₅ sprouted in 17.25, 20.75, 21.75 and 27 days on ascending order. The results are supported by the findings of the Khan et al. (14).

The sprout length was measured every ten days, starting from 30 days after planting to 120 days after planting using 10 chosen randomly seedlings per replication. Maximum length of sprouting after 90 days (19.16 cm) was

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measured in the treatment T₂ (IBA 2000 ppm), whereas minimum length of sprouting after 90 days (9.25 cm) was measured in the control. The treatments T₃, T₄ and T₆ showed 17.66, 14.25 and 12.83 cm length of sprouting after 60 days. The results are in line with the findings of Akhtar et al. (1) who reported the significance superiority of IBA over NAA. Indole butyric acid (IBA) produced 3.9 cm mean length of sprouted shoot and NAA produced 3.3 cm length of sprouted shoot. The results were similar with the findings of Iqbal et al (10) and Shah (21).

For counting the number of leaves, the whole compound leaf with five leaflets was counted. Maximum number of leaves (7.5) were recorded in the treatment T₂ (IBA 2000 ppm) whereas minimum number of leaves (3) were recorded in control. The cuttings as treated in T₃, T₄ and T₆ produced the 6.5, 6 and 5.5 number of leaves respectively. It was also found that maximum length of sprout and more number of leaves were found in T₂ over the other treatments (22). The results of the study are in line with the findings of Khattak (12) and Sing and Attri (22) who noted the same results with IBA at 3000 to 9000 ppm.

Survival percentage after 120 days was also counted on the basis of cutting which remained alive. The maximum survival percentage after 120 days (71.5 %) was recorded in the treatment T₄ while minimum (26.5 %) in case of control. The treatment T₅, T₂ and T₆ showed the survival percentage of 63.25, 52, 40 and 33.75 % respectively. The results were similar with the findings of Iqbal et al (10) who stated that best plant survival (76.67 %) was given with 3000 ppm concentration of IBA, while it was minimum (16.67 %) when the cuttings were not treated with IBA.

Encouraging results were measured regarding average number of roots after 120 days. The maximum number of roots (30.25) were recorded in the T₂ while minimum (16) in control. The treatment T₃, T₄, T₆ and T₅ showed 28, 24, 21 and 18 number of roots respectively. It was also noted that in the treatment where there were more length of sprouting, produced more number of leaves and this leads to production of more roots. The results are in line with the findings of Hussain and Khan (9) and Pivelta (18). The results are also in line with the findings of Elisabeta et al. (4) who stated that treated cuttings showed high values of the root number per seedling (cuttings) compared to control for both cultivars. Indole butyric acid (IBA) concentration 1000 ppm showed the highest root number, but roots are weaker than under effect of IBA 500 ppm. For rooting the mode of action was thought to involve auxin-stimulated ethylene production which generated the roots initials (24).
CONCLUSION

It is concluded from the study that roses can be easily propagated through cutting by applying growth promoter IBA in solution form under polythene tunnel. The application of IBA is useful for roots development and survival percentage of seedlings. This growth regulator helps in development of true to type plants.

REFERENCES


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