Effect of foliar feeding of nutrients and plant growth regulators on vegetative growth and yield of phalsa (Grewia subinaequalis D.C.)

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(Received: April 26, 2014; Revised received: August 20, 2014; Accepted: August 22, 2014)

Abstract: The present investigation entitled “Effect of foliar feeding of nutrients and plant growth regulators on vegetative growth and yield of Phalsa (Grewia subinaequalis D.C.)” was carried out at the Main Experiment Station, Department of Horticulture, Narendra Deva University of Agriculture & Technology, Narendra Nagar (Kumarganj), Faizabad (U.P.) during the year 2011-2012. The experiment was laid out in Randomized Block Design with nine treatments and replicated in four times, considering two plants as a unit. The shoot length, number of shoots, leaves, internodal length, number of fruits, fruiting node and yield were recorded maximum significantly with foliar application of GA$_3$ @ 20ppm + NAA @ 50ppm + ZnSO$_4$ @ 0.4% + Urea @ 2% followed by GA$_3$ @ 20 ppm + Urea @ 2 % whereas minimum with control.

Key words: Foliar application of nutrients, Plant growth regulators, Growth, Yield and Phalsa

Introduction

Phalsa (Grewia subinaequalis D.C.) belongs to family ‘Tiliaceae’. Fruit is known as berry. Phalsa is native to India. It has about 41 genera and 400 species; it is commercially grown in Uttar Pradesh, Rajasthan, Madhya Pradesh, Gujarat, Punjab and Haryana. It has high nutritional and medicinal value containing iron, vitamin ‘A’, ‘C’ and phosphorus. It contains about 50-60% juice and 10-11% sugar. It is mostly consumed as fresh fruit and has cooling effect on human system.

It bears small berry like fruits of deep reddish brown colour. The main problem in the phalsa cultivation is the uneven ripening and small fruit size which are to be picked individually. Considering the importance of phalsa there is greater need to initiate the nutrient management programme to increase fruit size and fruit yield. With the application of nutrients some improvement in growth and yield was reported by Singh and Gaur (1989). The present investigation was therefore, undertaken to evaluate the effect of foliar feeding of nutrients and plant growth regulators on vegetative growth and fruit yield.

The objective of study to find out the effect of foliar feeding of nutrients and plant growth regulators on the vegetative growth and yield of phalsa fruits.

Material and Method

Twenty years old plants of phalsa having uniform vigour were selected at Main Experiment Station (Horticulture), Narendra Deva University of Agriculture and Technology, Narendra Nagar (Kumarganj), Faizabad for present investigation. The experiments were conducted in Randomized Block Design with nine treatments which were replicated four times considering two plants as a unit T$_1$, Control (water spray), T$_2$ (GA$_3$ @ 20 ppm), T$_3$ (NAA @ 50 ppm), T$_4$ (ZnSO$_4$ @ 0.4%), T$_5$ (Urea @ 2%), T$_6$ (GA$_3$ @ 20 ppm + NAA @ 50 ppm), T$_7$ (GA$_3$ @ 20 ppm + ZnSO$_4$ @ 0.4%), T$_8$ (GA$_3$ @ 20 ppm + Urea @ 2%), T$_9$ (GA$_3$ @ 20 ppm + Urea @ 2% + NAA @ 50 ppm + ZnSO$_4$ @ 0.4%).

Pruning was done in the month of January, 2011. First spray of nutrients were done at time of vegetative growth period (pre bloom stage) and second eight days after fruit set. The observations regarding shoot length, number of shoots per plant, number of leaves per shoot and internodal length were recorded in last week of October at full growth stage and yield attributes such as number of fruits per node, fruiting nodes and fruit yield were recorded at the time of fruit picking. Statistical analyses of the data obtained in the different sets of experiments were calculated as suggested by Panse and Sukhatme (1985) and results were evaluated at 5 per cent significance.

Results and Discussion

The data presented in Table-1 clearly indicated that shoot length, number of shoots, number of leaves and internodal length per shoot were significantly improved by all the treatments over control. The maximum shoot length (222.93cm), number of shoot (34.33) per plant, number of leaves (101.47) per shoot and internodal length (9.19cm) per shoot and fruit yield (3.93 kg/fruit) were recorded with the combined spray of (GA$_3$ @ 20 ppm + Urea @ 2% + NAA @ 50 ppm + ZnSO$_4$ @ 0.4%), whereas minimum value was noted with control (water spray). It might be due to application of proper dose of micro-nutrients because they have important functioning role of chlorophyll synthesis and development of cells in meristematic tissue. Yadav et al. (2007) have observed maximum shoot length, number of shoots, leaves and internodal
The increased fruit yield due to more uptake of nutrients because efficient absorption and consequently more luxuriant vegetative growth to the initial stage which later on resultant more metabolites for developing fruits. Singh and Singh (1995) also found that spraying of calcium ammonium nitrate (CAN) +150 ppm GA₃ significantly improved the yield of guava cv. Allahabad Safeda. Yadav et al. (2004) observed that the spray of GA₃ (15, 30 and 45ppm) and zinc (0.2%, 0.4%, 0.6%) increase fruit yield significantly particularly by GA₃ at 30ppm on ber fruit. Barun and Kumar (2003) also found similar result by NAA, Zinc sulphate and urea on growth and yield of litchi cv. Purabi. The maximum fruit retention, yield and leaf nutrient content was found by Sharma et al. (2011) with the foliar application of nutrients and plant growth regulators in ber fruit.

Overall from experimental finding it can be concluded that combined spray of GA₃ @ 20 ppm + NAA @ 50 ppm + Urea @ 2% + ZnSO₄ @ 0.4% was found to be best for vegetative growth and higher yield.

**Table-1:** Effect of treatments on various plant growth and yield parameters

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Shoot length (cm)</th>
<th>No. of shoots/Plant</th>
<th>No. of leaves/shoot</th>
<th>Internodal length (cm)</th>
<th>No. of fruits/node</th>
<th>Number of fruiting nodes/shoot</th>
<th>Fruit yield per plant (kg)</th>
<th>Fruit yield per hec. (q)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁: Control</td>
<td>194.93</td>
<td>16.67</td>
<td>72.33</td>
<td>6.06</td>
<td>14.47</td>
<td>12.93</td>
<td>2.76</td>
<td>45.99</td>
</tr>
<tr>
<td>T₂: GA₃ @ 20 ppm</td>
<td>208.87</td>
<td>28.00</td>
<td>78.43</td>
<td>7.99</td>
<td>16.13</td>
<td>15.20</td>
<td>3.41</td>
<td>56.70</td>
</tr>
<tr>
<td>T₃: NAA @ 50 ppm</td>
<td>204.13</td>
<td>29.00</td>
<td>78.53</td>
<td>8.13</td>
<td>16.77</td>
<td>14.43</td>
<td>3.31</td>
<td>55.14</td>
</tr>
<tr>
<td>T₄: ZnSO₄ @ 0.4 %</td>
<td>215.87</td>
<td>30.33</td>
<td>82.67</td>
<td>8.19</td>
<td>17.17</td>
<td>15.17</td>
<td>3.50</td>
<td>59.03</td>
</tr>
<tr>
<td>T₅: Urea @ 2 %</td>
<td>210.27</td>
<td>31.00</td>
<td>85.00</td>
<td>8.61</td>
<td>17.20</td>
<td>15.33</td>
<td>3.45</td>
<td>57.42</td>
</tr>
<tr>
<td>T₆: GA₃ @ 20 ppm + NAA @ 50 ppm</td>
<td>206.60</td>
<td>30.67</td>
<td>81.00</td>
<td>9.00</td>
<td>17.13</td>
<td>14.70</td>
<td>3.51</td>
<td>58.47</td>
</tr>
<tr>
<td>T₇: GA₃ @ 20 ppm + ZnSO₄ @ 0.4 %</td>
<td>218.13</td>
<td>30.33</td>
<td>84.53</td>
<td>8.91</td>
<td>17.97</td>
<td>15.18</td>
<td>3.61</td>
<td>60.08</td>
</tr>
<tr>
<td>T₈: GA₃ @ 20 ppm + Urea @ 2 %</td>
<td>218.47</td>
<td>31.00</td>
<td>89.07</td>
<td>8.96</td>
<td>18.27</td>
<td>15.43</td>
<td>3.72</td>
<td>62.09</td>
</tr>
<tr>
<td>T₉: GA₃ @ 20 ppm + NAA @ 50 ppm + ZnSO₄ @ 0.4 % + Urea @ 2 %</td>
<td>222.93</td>
<td>34.33</td>
<td>101.47</td>
<td>9.19</td>
<td>19.57</td>
<td>16.13</td>
<td>3.93</td>
<td>65.41</td>
</tr>
</tbody>
</table>

**Acknowledgement**

The author is grateful to Major Advisor and the Head, Department of Horticulture for providing necessary facilities.

**Reference**


