Original Research Article

Effect of Nitrogen, Potash and Boron on Plant Growth, Flowering, Fruit Drop and Fruit Setting of Pomegranate (Punica granatum) cv. Bhagwa

Kuldeep* and V. M. Prasad

Department of Horticulture, Sam Higginbottom University of Agriculture, Technology & Sciences Allahabad (U.P), India

*Corresponding author

A B S T R A C T

The present investigation entitled “Effect of Nitrogen, Potash and Boron on plant growth, flowering, fruit drop and fruit setting of Pomegranate (Punica granatum) cv. Bhagwa” was carried out at the field of Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during the year 2019-20. The present experiment was conducted in Randomized Block Design having 10 treatments which were replicated 3 times. The biometrical observations were recorded on three randomly selected plants of each treatment to assess the effect of treatments on growth and flowering of Pomegranate. The observation revealed that with application of N 1% + K 1% + B 0.50 gave maximum plant height (3.01 m), plant spread (239 cm²), number of leaves (653.53), number of branches (15.17), length of Internodes (22.03 cm), stem diameter (4.04 cm), leaf area (7.07 cm²), plant canopy (1.99 cm²), number of flowers/plant (73.12), better fruit Set (68.71%) and chlorophyll content (21.40) among the treatments. It may be concluded that boron and Potash with nitrogen may be used for obtaining flower and fruit setting with higher chlorophyll content.

Keywords
Guava, Fruit quality, Boric Acid, Zinc sulphate

Article Info
Accepted: 20 October 2020
Available Online: 10 November 2020

Introduction

Pomegranate (Punica granatum L.) belongs to the family Punicaceae, subclass Rosidae and order Myrtales, is the only known genus of the family. India is one of the largest producers of Pomegranate in the world. In India, pomegranate is commercially cultivated in Maharashtra and Karnataka. During 2018-19 pomegranate was cultivated over 161.04 thousand ha land with an annual production of 1914.16 thousand tonnes in India. At present, Maharashtra with an area of 99.41 thousand ha is the leading state with the production of 1582.95 thousand tonnes Pomegranate annually. Other major Pomegranate growing states are Karnataka, Gujarat and Andhra Pradesh. In recent years, Pomegranate cultivation has also been started in Rajasthan, Orissa, Chhattisgarh, Uttarakhand and Madhya Pradesh at small scale. Pomegranate is currently ranked 10th in terms of fruit consumed annually in the world.

Pomegranate is a high value crop, mostly used as fresh fruit, and up to some extent for
processing purposes. It has a long shelf life and is an ideal fruit for long distance transport and prolonged storage. Entire tree of Pomegranate is of great economic importance. Apart from its demand for fresh fruits and juice, the processed products like wine and candy are also gaining importance in world trade. All parts of pomegranate tree have great therapeutic value and use in leather and dying industry.

Demand in the international market has widened the scope for earning higher dividends from this crop. Pomegranate seeds are used as a spice known as anardana, most notably in Indian and Pakistani cuisine. Dried whole seeds can often be obtained in ethnic Indian subcontinent markets.

These seeds are separated from the flesh, dried for 10–15 days, and used as an acidic agent for chutney and curry preparation. Ground anardana is also used, which results in a deeper flavoring in dishes and prevents the seeds from getting stuck in teeth. Seeds of the wild Pomegranate variety known as daru from the Himalayas are regarded as quality sources for this spice.

Materials and Methods

The present investigation entitled “Effect of Nitrogen, Potash and Boron on plant growth, flowering, fruit drop and fruit setting of Pomegranate (Punica granatum) cv. Bhagwa” was carried out at the field of Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during the year 2019-20. The present experiment was conducted in Randomized Block Design having 10 treatments which were replicated 3 times. Treatment combination namely T₁(K 1%),T₂ (B 0.25%),T₃ (B 0.50%),T₄ (K 1% + B 0.25%),T₅ (K 1% + B 0.50%),T₆ (N 1% + K 1%),T₇ (N 1% + B 0.25%),T₈ (N 1% + B 0.50%),T₉ (N 1% + K 1% + B 0.25%), T₁₀ (N 1% + K 1% + B 0.50%). The biometrical observations were recorded on three randomly selected plants of each treatment to assess the effect of treatments on growth and flowering of Pomegranate. Observations are recorded on plant height, plant spread, number of leaves, number of branches, length of Internodes, stem diameter, leaf area, plant canopy, number of flowers/plant, fruit Set and chlorophyll content.

Results and Discussion

Effect of Nitrogen, Potash and Boron on plant growth, flowering, fruit drop and fruit setting of Pomegranate Table 1 represented the growth and development of pomegranate as influence by micronutrient treatments. It was found that maximum plant height was recorded in T₁₀: N 1% + K 1% + B 0.50 (T₁₀) gave maximum plant height (3.01 m).The maximum tree height might be due to the increased nutrient availability due to the application of B and the minimum tree height might be due to without spray of nutrients needed for the growth of the plant. Similar findings were reported by Saboet al., (2013), Gill et al., (2015) and Shaaban (2019).

The treatment T₁₀: N 1% + K 1% + B 0.50 (T₁₀) gave maximum plant spread (239 cm²). The maximum plant spread may be due to the increase in shoot length and number of leaves which might have occurred due to higher nutrient availability supporting higher accumulation of photosynthesis in the plant body.

While, the minimum values of plant spread in control treatment may be due to poor availability of nutrients. These results are in conformity with the results reported by Ghosh et al., (2012), Prasad et al., (2003), Rao and Subramanyam (2009), Dhillon et al., (2011) in Pomegranate.
Table 1: Effect of different levels of nitrogen and phosphorus on growth and development of pomegranate plants

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Plant height (m)</th>
<th>Plant Spread (cm²)</th>
<th>Number of leaves per plant</th>
<th>Number of branches per plant</th>
<th>Length of Internodes (cm)</th>
<th>Stem diameter (cm)</th>
<th>Leaf area (cm²)</th>
<th>Plant Canopy (cm²)</th>
<th>Number of flowers/plant</th>
<th>Flowers drop %</th>
<th>Fruit Set %</th>
<th>Chlorophyll content</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁</td>
<td>2.96</td>
<td>199</td>
<td>565.12</td>
<td>11.81</td>
<td>20.41</td>
<td>3.85</td>
<td>5.64</td>
<td>1.83</td>
<td>61.80</td>
<td>45.72</td>
<td>54.28</td>
<td>19.50</td>
</tr>
<tr>
<td>T₂</td>
<td>2.90</td>
<td>202</td>
<td>552.51</td>
<td>11.38</td>
<td>19.90</td>
<td>3.80</td>
<td>5.32</td>
<td>1.78</td>
<td>65.67</td>
<td>44.51</td>
<td>55.49</td>
<td>19.34</td>
</tr>
<tr>
<td>T₃</td>
<td>2.97</td>
<td>191</td>
<td>556.80</td>
<td>11.56</td>
<td>19.93</td>
<td>3.84</td>
<td>5.59</td>
<td>1.81</td>
<td>68.55</td>
<td>41.49</td>
<td>58.51</td>
<td>19.46</td>
</tr>
<tr>
<td>T₄</td>
<td>2.94</td>
<td>244</td>
<td>572.95</td>
<td>11.87</td>
<td>20.65</td>
<td>3.87</td>
<td>5.77</td>
<td>1.84</td>
<td>68.66</td>
<td>39.35</td>
<td>59.33</td>
<td>19.57</td>
</tr>
<tr>
<td>T₅</td>
<td>2.96</td>
<td>194</td>
<td>589.56</td>
<td>12.34</td>
<td>20.67</td>
<td>3.87</td>
<td>6.37</td>
<td>1.84</td>
<td>69.62</td>
<td>38.66</td>
<td>60.65</td>
<td>19.65</td>
</tr>
<tr>
<td>T₆</td>
<td>3.00</td>
<td>171</td>
<td>608.14</td>
<td>14.59</td>
<td>21.49</td>
<td>3.97</td>
<td>6.65</td>
<td>1.95</td>
<td>68.02</td>
<td>40.67</td>
<td>62.49</td>
<td>19.71</td>
</tr>
<tr>
<td>T₇</td>
<td>2.94</td>
<td>201</td>
<td>606.03</td>
<td>12.39</td>
<td>20.86</td>
<td>3.90</td>
<td>6.43</td>
<td>1.87</td>
<td>70.34</td>
<td>38.47</td>
<td>61.53</td>
<td>20.39</td>
</tr>
<tr>
<td>T₈</td>
<td>3.01</td>
<td>237</td>
<td>640.21</td>
<td>13.52</td>
<td>20.95</td>
<td>3.96</td>
<td>6.44</td>
<td>1.93</td>
<td>70.91</td>
<td>37.51</td>
<td>61.34</td>
<td>20.62</td>
</tr>
<tr>
<td>T₉</td>
<td>2.93</td>
<td>242</td>
<td>644.10</td>
<td>15.07</td>
<td>21.78</td>
<td>4.01</td>
<td>7.02</td>
<td>1.98</td>
<td>71.38</td>
<td>34.06</td>
<td>65.94</td>
<td>20.68</td>
</tr>
<tr>
<td>T₁₀</td>
<td>2.94</td>
<td>237</td>
<td>653.53</td>
<td>15.17</td>
<td>22.03</td>
<td>4.04</td>
<td>7.07</td>
<td>1.99</td>
<td>73.12</td>
<td>31.29</td>
<td>68.71</td>
<td>21.40</td>
</tr>
<tr>
<td>F-test</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>NS</td>
<td>S</td>
<td>NS</td>
<td>NS</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>S. Ed. (±)</td>
<td>0.41</td>
<td>1.26</td>
<td>1.00</td>
<td>0.29</td>
<td>0.47</td>
<td>0.14</td>
<td>0.30</td>
<td>0.09</td>
<td>1.17</td>
<td>0.88</td>
<td>1.36</td>
<td>0.45</td>
</tr>
<tr>
<td>C. D. at 5%</td>
<td>0.83</td>
<td>2.65</td>
<td>2.10</td>
<td>0.61</td>
<td>0.98</td>
<td>0.29</td>
<td>0.63</td>
<td>0.19</td>
<td>2.45</td>
<td>1.85</td>
<td>2.85</td>
<td>0.94</td>
</tr>
</tbody>
</table>
The maximum number of leaves (653.53) attributed due to the easy availability of required quantity of nutrients and improved soil conditions due to the addition of N and B, while the lower values of these traits in control treatment attributed due to non-availability of required quantum of nutrients. Among the treatments applied T10: N 1% + K 1% + B 0.50% produced better number of branches (15.17).

The maximum stem diameter (4.04 cm) may be due to the increase in shoot length and number of leaves which might have resulted in the production of more quantum of carbohydrates and subsequently their translocations towards the stem. The treatments applied T10: N 1% + K 1% + B 0.50% produced maximum leaf area (7.07 cm²) and plant canopy (1.99 cm²). It has been well documented that the beneficial effect of inorganic fertilizers help in improving the soil health in terms of nutrient availability as well as by improving the soil physical and biological conditions thereby, increasing the nutrient availability for the growth processes of the plant. The present findings are in accordance with the report of Anusree et al., (2018), Zhi and Yao-xiang (2010), Reddy et al., (2012), Sheikh and Manjula (2009) and Vishwakarma et al., (2017) in the orchards cultivating Bhagwa variety of 3-7 years old and fruiting season during hasta bahar. Among the treatments applied T10: N 1% + K 1% + B 0.50% was found maximum number of flowers/plant (73.12), better fruit Set (68.71%) and chlorophyll content (21.40). The higher chlorophyll content due to combined application of N, K and boron may be attributed to their stimulatory effect of plant metabolism. On the present investigation conducted in pomegranate, was found that with application of T10: N 1% + K 1% + B 0.50 (T10) gave maximum plant height (3.01 m), plant spread (239 cm²), number of leaves (653.53), number of branches (15.17), length of Internodes (22.03 cm), stem diameter (4.04 cm), leaf area (7.07 cm²), plant canopy (1.99 cm²), number of flowers/plant (73.12), better fruit Set (68.71%) and chlorophyll content (21.40) among the treatments. It may be concluded that boron and Potash with nitrogen may be used for obtaining flower and fruit setting with higher chlorophyll content.

References


**How to cite this article:**