EFFECT OF PRE-HARVEST SPRAYS OF CHEMICALS ON THE QUALITY OF POMEGRANATE FRUIT (*PUNICA GRANATUM L.*)

Cv. G-137

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ABSTRACT

The different chemicals namely CaCl₂, Ca(NO₃)₂ and KH₂PO₄ at one per cent and two per cent concentrations were sprayed at 90 days after full anthesis (DAFA) on the trees. It was found that aril and juice percentage were markedly enhanced by 2 per cent KH₂PO₄ spray while that of seed hardness was not responded to any treatment. The chemical parameters like total soluble solids and ascorbic acid content were greatly increased with 2 per cent Ca(NO₃)₂ spray while the highest total and reducing sugars were recorded with 2 per cent KH₂PO₄. The other chemical parameters like acidity and anthocyanin content remained unchanged.

Pomegranate (*Punica granatum* L.) belonging to the family Punicaceae is one of the favourite table and highly nutritious fruits in tropical and sub-tropical regions. In India, it is commercially cultivated in the states of Maharashtra, Karnataka, Gujarat, Rajasthan, Andhra Pradesh and Tamil Nadu (Anonymous, 1952). In Maharashtra its cultivation is mainly concentrated in Ahmednagar, Pune and Solapur districts. In addition new plantations are coming up in certain part of Nashik, Sangli and Satara districts. In recent years, the important cultural practices like manuring, training, spacing etc., have been standardised at the Mahatma Phule Krishi Vidyapeeth, Rahuri. Foliar application of nutrients can supply essential elements directly to the foliage at times when rapid response may be desired. The foliar applied chemicals mainly influence the chemical constituents and are highly effective and bring rapid plant response. The effect of foliar applied chemicals on quality of fruits have been studied by many workers but information of such effect on pomegranate fruit is very scanty. Hence, present investigation was undertaken to study the effect of pre-harvest sprays of chemicals on the quality of pomegranate fruits.

The present investigation was carried out at Instructional-Cum-Research Orchard of the Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri, during ambia bajar 1996 on about six years old uniform pomegranate trees Cv. G-137. A large number of flowers at a uniform stage of development i.e. full anthesis stage (FAS) were tagged on the trees. The different chemicals such as calcium chloride (CaCl₂), calcium nitrate (Ca(NO₃)₂) and potassium dihydrogen orthophosphate (KH₂PO₄) at one and two per cent concentration with teepol as a surfactant were sprayed on the trees at 90 days after full anthesis (thus total 6 treatments with control). The experiment was laid out in factorial randomised block design with three replications. Fruits were harvested at 135 DAFA and used for determination of physico-chemical parameters.

Aril percentage and juice percentage were calculated from the composite sample of 100 gm arils. Hardness of seed was estimated by using the "Tablet Hardness Tester" and expressed in Kg/cm². The total soluble solids were determined by hand refractometer and expressed in °Brix. The titratable acidity (%) was determined as per the procedure advocated by A.O.A.C. (1985). The percentage of acidity was expressed in terms of citric
acid. The reducing and total sugars were estimated as per the method of Lane and Eynon (1960) and expressed in per cent. The total anthocyanins of arils was estimated as per the method given by Fuleki and Francis (1968). Ascorbic acid content was also calculated as per the procedure suggested by Association of Vitamin chemist (1966) and expressed as mg/100 g of fresh weight of juice.

The data regarding the effect of preharvest sprays of chemicals on the quality of fresh pomegranate fruit is presented in Table 1.

Table 1. Effect of preharvest sprays of chemical on physico-chemical properties of pomegranate fruits Cv.G137.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Arils (%)</th>
<th>Juice (%)</th>
<th>Seed hardness (Kg/cm²)</th>
<th>TSS (%)</th>
<th>Acidity (%)</th>
<th>Reducing sugars (%)</th>
<th>Total sugars (%)</th>
<th>Ascorbic acid (mg/100g arils)</th>
<th>Anthocyanine (ΔA at 530 nm/100 g arils)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CaCl₂ 1%</td>
<td>64.35</td>
<td>51.00</td>
<td>5.23</td>
<td>16.16</td>
<td>0.36</td>
<td>11.38</td>
<td>14.50</td>
<td>5.80</td>
<td>0.04</td>
</tr>
<tr>
<td>CaCl₂ 2%</td>
<td>65.00</td>
<td>51.55</td>
<td>5.28</td>
<td>16.22</td>
<td>0.36</td>
<td>11.40</td>
<td>14.52</td>
<td>5.85</td>
<td>0.04</td>
</tr>
<tr>
<td>Ca(NO₃)₂ 1%</td>
<td>65.40</td>
<td>51.87</td>
<td>5.22</td>
<td>16.20</td>
<td>0.37</td>
<td>11.46</td>
<td>14.60</td>
<td>5.87</td>
<td>0.04</td>
</tr>
<tr>
<td>Ca(NO₃)₂ 2%</td>
<td>66.05</td>
<td>52.38</td>
<td>5.20</td>
<td>16.36</td>
<td>0.37</td>
<td>11.53</td>
<td>14.70</td>
<td>5.88</td>
<td>0.04</td>
</tr>
<tr>
<td>KH₂PO₄ 1%</td>
<td>67.07</td>
<td>53.14</td>
<td>5.27</td>
<td>16.10</td>
<td>0.38</td>
<td>11.80</td>
<td>15.03</td>
<td>5.64</td>
<td>0.05</td>
</tr>
<tr>
<td>KH₂PO₄ 2%</td>
<td>68.93</td>
<td>54.67</td>
<td>5.24</td>
<td>16.11</td>
<td>0.37</td>
<td>11.94</td>
<td>15.21</td>
<td>5.68</td>
<td>0.05</td>
</tr>
<tr>
<td>Control</td>
<td>64.41</td>
<td>50.40</td>
<td>5.26</td>
<td>16.00</td>
<td>0.37</td>
<td>11.30</td>
<td>14.40</td>
<td>5.68</td>
<td>0.04</td>
</tr>
<tr>
<td>S.E.±</td>
<td>0.016</td>
<td>0.011</td>
<td>0.04</td>
<td>0.019</td>
<td>0.015</td>
<td>0.010</td>
<td>0.015</td>
<td>0.011</td>
<td>0.04</td>
</tr>
<tr>
<td>CD at 5%</td>
<td>0.051</td>
<td>0.036</td>
<td>-</td>
<td>0.060</td>
<td>-</td>
<td>0.031</td>
<td>0.047</td>
<td>0.034</td>
<td>-</td>
</tr>
</tbody>
</table>

Maximum aril and juice percentage was recorded due to KH₂PO₄ sprayed at 2 per cent. The increase in aril percentage might be due to rapid tissue formation and efficient synthesis of more photosynthates in treated trees (Venkatarayappa et al., 1978). The natural maximum increase in aril and juice percentage occurs during 90 to 120 DAFA (Patil, 1994) and this natural phenomenon might be boosted by pre-harvest treatment at 90 DAFA. However, the seed hardness was not statistically influenced by any of these treatments. The total soluble solids increased significantly when the trees were sprayed with 2 per cent Ca(NO₃)₂. This result elucidates the finding of Gupta et al. (1980) and Subburamu et al. (1990) in grapes. The increase in total soluble solids of fruits treated with calcium compounds might be due to lesser utilization of sugars in metabolic processes as a result of reduced respiration and increase in rate of photosynthesis which might have resulted more accumulation of sugars (Singh et al., 1987). The reducing sugars (11.94%) and total sugars (15.21%) were significantly increased over control (11.30%) and (14.40%) respectively when the trees were sprayed with 2% KH₂PO₄. These results are in accordance with the results reported by Higa (1980) in satsuma orange, Singh et al. (1981) in guava and Chour et al. (1990) in strawberry. This increase in sugars might be due to increase in rate of photosynthesis which resulted in more accumulation of sugars (Singh et al., 1987). The titratable acidity and the anthocyanin contents were found to be non-significant due to various chemicals whereas the ascorbic acid content in the fruits was found to be significantly influenced due to 2% Ca(NO₃)₂ spray. The increase in ascorbic acid content in treated fruits was due to stimulated actions of enzymes responsible for synthesis of ascorbic acid and its precursor (Glucose-6-phosphate) and additive effect of slow rate of oxidation in respiration process. These results are found in conformity with the reports of Singh et al. (1981) in guava.
REFERENCES


Subburamu, K. et al. (1990) South Indian Hort. 38 : 268.