PGR's consequence on yield attributing trait of China aster (*Callistephus chinensis* L. Nees) cv. Ostrich Feather

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Abstract

The present investigation was conducted on China aster (*Callistephus chinensis* L. Nees) cv. Ostrich Feather at the Main Experiment Station, Department of Horticulture, Narendra Deva University of Agriculture & Technology, Kumarganj, Faizabad (U.P.) during the year 2013-14. The experiment was laid out in Randomized Block Design with 10 treatments comprising of three levels each of GA3, NAA and ethrel and a control replicated three times. The observations were recorded for flowering and yield attributing character of China aster cv. Ostrich Feather. The foliar spraying of plant growth regulators GA3, NAA and ethrel was done 30 days after transplanting. The maximum flower stalk length (25.87 cm), diameter of flower (8.40 cm), flower yield per plant (146.27g) as well as flower yield per hectare (130.02g) were recorded with the foliar application of GA3 300ppm and minimum values were recorded in control (water spray).

Keywords: GA3, Naa, ethrel, stalk length

Introduction

Flowers, crowning glory of god creation are an inseparable part of human life. They are part of age old tradition and culture of Indian society symbolizing purity, peace, passion, love and beauty. Due to their aesthetic, economic and social value their demand in the global market is increase tremendously. Among the flowers used for domestic market, China aster (*Callistephus chinensis* Nees.) is to be considered as one of the important annual and commercial flower crops belongs to family Asteraceae. China aster is native to China and spread to European countries and other tropical countries during 1731 AD. The genus *Callistephus* is derived from two Greek words Kalistos meaning ‘most beautiful’ and *Stephus*, ‘a crown’ referring to the flower head. The present day asters have been developed from a single wild species, *Callistephus chinensis*. The stature is medium tall, 18 to 24 inches in height. The first change in the flower type had been the prolongation or development of central florets and the pro

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The growth and flowering of China aster are greatly influenced by judicious application of growth regulators; therefore, it is imperative to find out their optimum doses for quality flower production. Deficiency of plant growth regulators results in poor growth, flowering and yield potential. The present study is therefore, undertaken to investigate the possibilities of improvement in quality and production of China aster with foliar application of different groups of plant growth regulators viz. auxin gibberllin and ethrel. Auxin group of growth regulators such as NAA (Naphthalene acetic acid) increases the growth of plant both by cell division and cell elongation, apical dominance, regulation of flowering in a large number of plants. The apical dominance might be under control of auxin produced at the terminal bud and it can regulate the flowering in desired season. Gibberellins are deterpene that promote stem and leaf growth. In some species, GA3 also induced seed germination and modulate flowering time and development of flowers, fruits and seed (Sum and Gubler, 2004) [10]. Gibberellins increases number of leaves per plant, number of stalk per plant, length of flower stalk and height of plant (Narayan and Syamal, 2002) [6]. The application of ethrel retards plant height, number of nodes and internodal length in China aster. It increased branching, delayed flowering, more number of leaves formed below the terminal flower, increased number of flower per plant in China aster. Ethrel is growth retardant check cell division in apical meristem only resulting in vascular synthesis beneath the apical meristem but the cambial and vascular cell continues to divide over a larger period and this results increase in thickness of stem (Sachs, 1961) [9]. Present investigation has been framed with the objective that to find out the optimum doses of PGR on yield trait of China aster.

Materials and Methods
Experimental Field Description
The field experiment was conducted to study the PGR’s consequence on yield attributing trait of China aster (Callistephus chinensis Il. Nees) cv. Ostrich Feather Main Experiment Station, Horticulture, Narendra Deva University of Agriculture & Technology, Narendra Nagar, (Kumarganj), Faizabad (U.P) during winter season of 2013-14, Kumarganj situated at 26.43° N latitude and 81.9° E longitudes and an altitude of 98 meter above mean sea level.

Climate and meteorological condition
The region enjoys sub humid and subtropical climate receiving a mean annual rainfall of about 1100 mm out of which about 85 per cent is concentrated from mid-June to end of September. The winter months are cold and dry and occasional frost occurs during this period. Westerly hot wind starts from the month of March and continues up to onset of monsoon. Meteorological observation recorded at the meteorological observatory of Narendra Deva University of Agriculture & Technology, Narendra Nagar, Kumarganj, Faizabad, is presented in Fig-3.1.

Experimental Design
The experiment was laid out in Randomized Block Design (R.B.D.) replicated three times keeping 10 treatments. In the present study China aster cv. Ostrich Feather was taken as experimental material considering total number of plots 30 and 25 plants in each with spacing 30 cm x 30 cm. The treatments consists of three levels each of GA3 (100,200,300ppm), NAA (50,100,150ppm) and ethrel (100,200,300ppm) and control. The different concentration of plant growth regulators were applied in an aqueous solution as foliar spray one month after transplanting. Control plants were sprayed with distilled water. Statistical analyses of the data obtained in the different treatments of experiments were calculated, as suggested by Panse and Sukhatme (1967). For calculating error of mean and critical differences “t” value was taken at 5 per cent level of significance.

Results and Discussion
Effect of PGR’s on growth attributes
Flower stalk length
Gibberellic acid treatments improved stalk length significantly. The maximum flower stalk length (25.87 cm) was measured with application of GA3 300 ppm followed by GA3 200 ppm and NAA 50 ppm which was found at par with GA3 100 ppm while minimum (14.94 cm) length of flower stalk was recorded in control. The increment in stalk length with application of GA3 might be due to enhanced cell division and cell enlargement, promotion of protein synthesis coupled with higher dry matter and apical dominance in chrysanthemum (Dalal et al. 2009) [1]. Gautam et al. (2006) [3] also reported maximum length of flower stalk with GA3 200ppm in chrysanthemum.
Table 1: Effect of plant growth regulators on yield attributing characters of China aster

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Length of flower stalk (cm)</th>
<th>Diameter of flower (cm)</th>
<th>Yield of flower per plant (g)</th>
<th>Yield of flower per hectare (q)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T&lt;sub&gt;1&lt;/sub&gt;-Control</td>
<td>14.94</td>
<td>6.87</td>
<td>71.80</td>
<td>63.83</td>
</tr>
<tr>
<td>T&lt;sub&gt;2&lt;/sub&gt;-GA&lt;sub&gt;3&lt;/sub&gt; 100 ppm</td>
<td>20.94</td>
<td>7.60</td>
<td>105.07</td>
<td>93.27</td>
</tr>
<tr>
<td>T&lt;sub&gt;3&lt;/sub&gt;-GA&lt;sub&gt;3&lt;/sub&gt; 200 ppm</td>
<td>24.00</td>
<td>8.27</td>
<td>121.00</td>
<td>107.56</td>
</tr>
<tr>
<td>T&lt;sub&gt;4&lt;/sub&gt;-GA&lt;sub&gt;3&lt;/sub&gt; 300 ppm</td>
<td>25.87</td>
<td>8.40</td>
<td>146.27</td>
<td>130.02</td>
</tr>
<tr>
<td>T&lt;sub&gt;5&lt;/sub&gt;-NAA 50 ppm</td>
<td>23.34</td>
<td>7.34</td>
<td>103.47</td>
<td>91.56</td>
</tr>
<tr>
<td>T&lt;sub&gt;6&lt;/sub&gt;-NAA 100 ppm</td>
<td>19.40</td>
<td>7.66</td>
<td>92.27</td>
<td>82.02</td>
</tr>
<tr>
<td>T&lt;sub&gt;7&lt;/sub&gt;-NAA 150 ppm</td>
<td>19.34</td>
<td>7.27</td>
<td>85.60</td>
<td>76.09</td>
</tr>
<tr>
<td>T&lt;sub&gt;8&lt;/sub&gt;-Ethrel 100 ppm</td>
<td>18.46</td>
<td>6.74</td>
<td>88.40</td>
<td>78.58</td>
</tr>
<tr>
<td>T&lt;sub&gt;9&lt;/sub&gt;-Ethrel 200 ppm</td>
<td>17.34</td>
<td>7.27</td>
<td>103.47</td>
<td>91.98</td>
</tr>
<tr>
<td>T&lt;sub&gt;10&lt;/sub&gt;-Ethrel 300 ppm</td>
<td>17.27</td>
<td>7.14</td>
<td>120.20</td>
<td>100.04</td>
</tr>
<tr>
<td>SEm&lt;sub&gt;2&lt;/sub&gt;</td>
<td>2.13</td>
<td>0.28</td>
<td>6.25</td>
<td>6.01</td>
</tr>
<tr>
<td>CD at 5%</td>
<td>6.32</td>
<td>0.83</td>
<td>18.56</td>
<td>17.85</td>
</tr>
</tbody>
</table>

Effect on diameter of flower

Diameter of flower was found significantly maximum (8.40 cm) with application of GA<sub>3</sub> 300 ppm followed by GA<sub>3</sub> 200 ppm and NAA 100 ppm which was found at par with GA<sub>3</sub> 100 ppm while minimum diameter of flower was recorded under Ethrel 100 ppm (6.74 cm). GA<sub>3</sub> at higher concentration increases flower diameter. Patel et al. (2010) observed maximum diameter of flower with GA<sub>3</sub> 150ppm in chrysanthemum. Similar result was also reported by Dalal et al. (2009) studied the effect of gibberellic acid and maleic hydrazide spray at 30th and 60th days after transplanting on growth, flowering and yield of chrysanthemum grown under net house conditions.

Effect of growth regulators on yield attributes

Flower yield per plant

It is evident from the data presented in Table-1 that the maximum flower yield per plant (146.27 g) was recorded with GA<sub>3</sub> 300 ppm followed by GA<sub>3</sub> 200 ppm whereas, minimum flower yield per plant (71.80 g) was recorded in control. Maximum flower yield per plant was recorded with foliar application of GA<sub>3</sub> 300ppm followed by GA<sub>3</sub> 200ppm. Tyagi and Kumar (2006) evaluated the effect of GA<sub>3</sub> on African marigold (Tagetes erecta L.) were maximum flower weight per plant with GA<sub>3</sub> spray at 200ppm. Mohariya et al. (2003) studied the effect of GA<sub>3</sub> at 100, 150 ppm on different varieties of chrysanthemum and observed that 150ppm GA<sub>3</sub> hastened flowering and highest number of flower per plant.

Flower yield per hectare

The maximum yield of flower per hectare (130.02 g) was recorded with application of GA<sub>3</sub> 300 ppm which was found superior over rest of the treatment followed by GA<sub>3</sub> 200 ppm, while minimum flower yield per hectare (63.83 g/ha) was recorded under control. Similar results were also reported by Patel et al. (2010) in chrysanthemum recorded maximum flower yield/ha with GA<sub>3</sub> 150ppm. Devadanam et al. (2007) reported maximum flower yield per hectare with GA<sub>3</sub> 150ppm in tuberose.

Acknowledgement

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References