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Influence of ga₃ and sa on growth and yield of *Limonium* var. misty blue

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Abstract

Present experiment was carried out to study the influence of GA₃ and SA on growth and yield of *Limonium* var. Misty Blue at Greenhouse Complex, Navsari Agricultural University, Navsari during September-2014 to May-2015. Results of the experiment revealed that application of salicylic acid @ 150 mg/l recorded significantly higher plant height (20.95 cm), minimum days to flowering (84.07) with maximum inflorescence length (172.90 cm) whereas application of gibberellic acid @ 200 mg/l recorded significantly maximum number of shoots per plant (1.80), flowering duration (16.60 days), weight of inflorescence per plant (79.24 g), number of inflorescences per plant (5.93) and vase life (6.13 days) in *limonium* flowers var. Misty Blue.

Keywords: Plant growth regulators, salicylic acid, gibberellic acid and *limonium*

Introduction

Limonium (Statice) belongs to family Plumbaginaceae and originated from Easter mediterranean region. Perennial statices have unique branches of very high utility value which are essential for bouquets, corsages and other flower arrangements and this crop now draws very close attention of florists all over the world. The best thing about perennial *limonium* is their special natural colour and long stems. Plant has olive green to light green coloured, oblong leaves with lobed margin, showy, thin, long and stable inflorescences with small flowers in colours ranging from white, purple, blue, violet and baby pink. The branches spread out wider at top. The stems are thin and do not take of much space where as the top of the plants have a large volume. Flowers are too small and each stem contains thousands of flowers. Even the annual *limonium* is also very colourful and suit for fresh and dry flower. Most of the varieties are cultivated under naturally ventilated green house. In recent years, the use of fertilizers and plant growth regulators in *limonium* has undergone to enhance the yield and improve quality by modifying and forcing the plant growth and development. Among the PGRs, GA₃ stimulates both cell division, cell elongation and ultimately helpful in increasing growth of plants. Different concentrations of salicylic acid delays senescence affecting rate of photosynthesis and physiology of stomata as well as it enhances vase life of *limonium* flowers when used in post harvest treatment. The use of growth regulators in horticultural crops has brought about a sort of revolution in the floriculture industry. Plant growth enhancers have a great potential in influencing the yield attribute and flower production. But there was scanty information available in *limonium*, therefore, different plant growth regulators were tried to study their effect on *limonium* under polyhouse in south Gujarat agroclimatic conditions.

Materials and Methods

The present investigation was carried out to study the influence of plant growth regulators on growth and yield of *limonium* var. Misty Blue during 2014-15 at Green House Complex, Department of Floriculture and Landscape Architecture, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari. The experiment was laid out in randomized block design with three replications under naturally ventilated poly house. Plants were planted on 60 cm wide raised bed in 2 lines with planting distance of 30 × 30 cm. Eleven treatments were consisted of various levels of plant growth regulators viz., GA₃ @ 50, 100, 200, 300, 400, 500 and 600 mg/l, SA @ 50, 100 and 150 mg/l and control (water spray). Different plant growth enhancers were sprayed at 40 days after planting. The crop was irrigated through drip system by employing two laterals of 2 lph dripper per bed at a spacing of 30 cm running along the length of the bed.

Misting was carried out by overhead 4 way foggers in summer months to bring the temperature and humidity at optimum level. Observations were recorded on vegetative and flowering parameters. Five plants were selected randomly from each treatment for recording observations and statistically analyzed as per method suggested by Panse and Sukhatme (1967) [7].

Results and Discussion

Application of salicylic acid (SA) and gibberellic acid (GA₃) significantly enhanced vegetative growth of limonium (Table 1). Spray of salicylic acid @ 150 mg/l recorded highest plant height without panicle (20.95 cm) and while application of GA₃ produced maximum number of shoot per plant (1.80). The effect of gibberellic acid (GA₃) and salicylic acid (SA) on plant spread and leaf area was found non-significant.

It is possible due to application of salicylic acid which is responsible for regulation of cell enlargement and division in synergy with other substances such as auxin, IAA and phenolic which cause stimulatory effect to increase plant height and plant spread. It has been also reported by Misra *et al.* (1993) [6] who observed that the pre harvest treatment of salicylic acid in tuberose at the concentration of 100 mg/l had significantly increased the plant height and vegetative growth. These results are in also agreement with observations of Swaroop *et al.* (2007) [12] in African marigold, Sable *et al.* (2015) [11], Aier *et al.* (2015) [1], Rahmania *et al.* (2015) [10] and Patel *et al.* (2013) [8] in gladiolus while Dalal *et al.* (2009) [3] in gerbera.

The enhancement in number of shoots per plant as a result of application of gibberellic acid might be due to the fact that GA₃ induced the active cell division and cell elongation (Misra *et al.*, 1993) [6]. Growth might also be increased due to osmotic

uptake of water and nutrients under the influence of GA₃, which maintain swelling force against the softening of cell wall and thereby increasing the plant height (Lockhart, 1960) [5]. These results are also in similarity to the findings of Umrao *et al.* (2008) [14] in gladiolus, Dhaduk *et al.* (2007) [4] in anthurium and Tyagi and Singh (2006) [13] in African marigold.

There was a significant enhancement recorded in flowering parameters with the application of both the plant growth regulators (GA₃ and SA) as compared to control which influenced all the floral and yield characters of limonium var. Misty Blue (Table 2).

Floral and yield parameters taken under study showed that minimum days to flowering (84.07) with maximum inflorescence length (172.90 cm) were noted in plants treated with salicylic acid @ 150 mg/l while significantly maximum flowering duration (16.60 days), weight of inflorescence per plant (79.24 g), number of inflorescence per plant (5.93) and vase life (6.13 days) were obtained with the application of gibberellic acid @ 200 mg/l in limonium var. Misty Blue.

The increase in floral and yield parameters by the application of GA₃ can be explained in light of the fact that GA₃ was quite effective in reducing the juvenile period of plants because of its higher capacity of cell division and cell elongation which cause early maturity in plants (Lockhart, 1960) [5]. These results have also been inconsonance with results reported by Patil (2001) [9] in gerbera cv. Sangria and Dahiya and Rana (2001) [2] in chrysanthemum cv. Vasantika. Moreover, length of inflorescences was increased because of the growth-promoting effects of SA which could be related to changes in the hormonal status or by improvement of photosynthesis, transpiration and stomatal conductance. Similar results were obtained by Rahmania *et al.* (2015) [10] in gladiolus.

Table 1: Influence of GA₃ and SA on vegetative characters of limonium var. Misty Blue

Treatments	Plant height (cm)	Plant spread (cm)	Number of shoot per plant	Leaf area (cm ²)
T ₁ : Salicylic acid 50 mg/l	17.65	27.43	1.07	68.87
T ₂ : Salicylic acid 100 mg/l	19.15	27.58	1.13	68.87
T ₃ : Salicylic acid 150 mg/l	20.95	28.19	1.67	68.63
T ₄ : Gibberellic acid 50 mg/l	18.64	27.98	1.47	69.67
T ₅ : Gibberellic acid 100 mg/l	19.48	27.86	1.73	69.40
T ₆ : Gibberellic acid 200 mg/l	20.89	27.90	1.80	70.17
T ₇ : Gibberellic acid 300 mg/l	18.54	27.67	1.73	69.40
T ₈ : Gibberellic acid 400 mg/l	18.46	27.79	1.60	68.53
T ₉ : Gibberellic acid 500 mg/l	18.11	27.61	1.53	67.83
T ₁₀ : Gibberellic acid 600 mg/l	17.53	26.64	1.47	66.63
T ₁₁ : Control	17.11	26.57	1.27	67.53
C. D. at 5%	2.42	NS	0.17	NS

Table 2: Influence of GA₃ and SA on flowering characters of limonium var. Misty Blue

Treatments	Days to flowering	Flowering duration (days)	Inflorescence length (cm)	Weight of inflorescence (g)	Inflorescence per plant	Vase life (days)
T ₁ : Salicylic acid 50 mg/l	89.07	15.47	167.27	49.21	4.53	5.33
T ₂ : Salicylic acid 100 mg/l	87.63	15.50	170.20	52.55	4.73	5.73
T ₃ : Salicylic acid 150 mg/l	84.07	16.27	172.90	76.07	5.73	5.93
T ₄ : Gibberellic acid 50 mg/l	88.27	15.53	161.20	64.91	4.60	5.73
T ₅ : Gibberellic acid 100 mg/l	86.67	15.77	163.53	71.39	5.87	5.93
T ₆ : Gibberellic acid 200 mg/l	84.00	16.60	170.30	79.24	5.93	6.13
T ₇ : Gibberellic acid 300 mg/l	85.67	16.10	166.67	74.44	5.53	6.07
T ₈ : Gibberellic acid 400 mg/l	86.87	15.87	162.70	70.50	5.27	5.80
T ₉ : Gibberellic acid 500 mg/l	88.27	15.80	162.00	64.90	5.20	5.80
T ₁₀ : Gibberellic acid 600 mg/l	89.20	15.37	161.70	63.17	4.80	5.80
T ₁₁ : Control	89.73	14.13	162.53	48.82	4.60	5.53
C. D. at 5%	3.81	0.88	6.21	7.92	0.67	0.28

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