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Influence of plant growth promoters on vegetative growth, yield and quality parameters of daisy (*Aster amellus* L.) cv. DWARF PINK

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ABSTRACT : An experiment was carried out in the experimental field of K.R.C. College of Horticulture, Arabhavi, to improve the plant stature yield and quality of daisy. Among the treatments plants sprayed with combination of GA_3 150 and BR 0.5 ppm helped for improving vegetative growth by that ultimately production of good plant stature, yield and quality of plants at both the crop periods. Whereas, poor vegetative growth and quality were recorded in control plant at both the crop periods.

KEY WORDS : Daisy (*Aster amellus* L.), BR-Brassinosteroids, GA- Gibberellic acid, NAA- Alpha-naphthalene acetic acid

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Flowers are grown all over the country on an area of approximately 1, 91, 000 ha. with a production of 10, 31, 000 metric tons of loose flowers and 69, 027 lakh of cut flowers (Anonymous, 2011). Demand for traditional flowers is well established in India and demand for modern flowers is also increasing both in domestic as well as foreign markets. The people are asking for newer, rare and different type of cut flowers for various day-to-day uses. Although daisy has been known since the past, its use as a filler flower in ornamental sector has gained importance only in recent years. Daisy (*Aster amellus* L.) commonly called as 'Italian aster' is an upcoming new potential cut flower crop native to Europe and parts of Asia, belongs to family Asteraceae (Compositae) cultivar Dwarf Pink exhibits very attractive coloured flowers. However, plants are dwarf (15-20 cm) in stature with less spike length lied with small sized flowers. To improve the plant stature it is necessary to use the growth promoters. In recent years, the use of growth regulators in floriculture crop production has undergone enormous advance to enhance the yield and these plays an important role by modifying the plant growth and development process.

RESEARCH METHODS

The study was carried out in the experimental field of Department of Floriculture and Landscape Architecture, Kittur Rani Channamma College of Horticulture, Arabhavi, during June to December, 2011. The experiment was laid out in Randomized Completely Block Design with three replications and ten treatments, the treatments in each replication were allotted randomly. The treatments were comprised of two concentrations of gibberellic acid (150 and 200 ppm), brassinosteroid (0.5 and 0.75 ppm) and naphthalene acetic acid (150 and 200 ppm)and combination of gibberellic acid (150 ppm) and brassinosteroid (0.5 ppm); gibberellic acid (150) and naphthalene acetic acid (150); naphthalene acetic acid (150) and brassinosteroid (0.5 ppm) and control (water spray). The plant growth promoters were sprayed 4 times *viz.*, 20 and 50 DAP at 1st crop while, 80 and 110 DAP at 2nd crop and control plants were sprayed with water. The observations were recorded in two cropping periods. The five plants were randomly selected and tagged for recording observations on growth and quality parameters.

RESEARCH FINDINGS AND DISCUSSION

The vegetative growth parameters differ significantly for application of growth promoters (Table 1). The maximum plant height, plant spread at East-West and North-South and number of suckerswere recorded in plants sprayed with GA_3 (150 ppm)

+ BR (0.5 ppm)at I and II crops, respectively, followed by GA_3 at 200 ppm recorded next best treatment for plant height and plant spread at East-West and North-South at I and II crops, respectively. Whereas minimum plant height, plant spread at East-West and at North-South and number of suckers were recorded in control plants (water spray) at I and II crops, respectively,. The stem girth was recorded maximum in plants treated with NAA at 200 ppm (7.54 mm and 7.60 mm , at I and II crops, respectively) and plants sprayed with combination of GA_3 150 ppm and BR 0.5 ppm were at par for stem girth (6.97 mm and 7.06 mm, at I and II crops, respectively). Spike yield was also found higher (2.40 and 10.19, at I and II crops, respectively) in the treatment combination of GA_3 150 ppm and BR 0.5 ppm. While, minimum stem girth was recorded in control plants. The variation in vegetative growth and yield parameters by application of BR and GA might be due to accelerating cell division and enlargement as affected by growth promoters (Mandava, 1988). The results are in confirmation with findings of Dias (1988) in rose, Kulkarni (2003) in chrysanthemum by using BR and Girish (2011) in daisy, by using GA_3.

Significant differences were observed in parameters regarding leaf and internodes with different plant growth promoters (Table 2). Plants sprayed with GA_3 at 200 ppm produced maximum number of leaves in first crop, followed by plants treated with combination of $GA_3$150 ppmand BR 0.5 ppm. Whereas, in second crop the maximum number of leaves were produced in plants treated with combination of GA_3 150 ppm and BR 0.5 ppm, followed by GA_3 at 200 ppm sprayed plants. Whereas, minimum number of leaves were recorded in control plants at I and II crops, respectively. BR responsible for cell division and cell enlargement and is known to influence the production of primary, secondary branches and plant spread which in turn facilitated more points for production of leaves (Kulkarni, 2003). The plants sprayed with GA_3 (150 ppm) + BR (0.5 ppm) recorded maximum leaf area, number of internodes and internode length at I and II crops, respectively. While plants treated with GA_3 at 200 ppm recorded next best treatment to increase in number of internodes at first crop and internode length at second crop. The control plants recorded minimum leaf area,number of internodes and internode length at I and II crops, respectively. Increase in leaf area might be due to production of more number of leaves of maximum leaf length and leaf width as reported by Zahoor *et al*. (2011) in grape. The internodal parameters varied due to synergistic effect of BR and GA which helps in cell elongation, enlargement and faster cell multiplication as reported by Kulkarni (2003) in chrysanthemum and Nomura *et al*. (1997) in the dwarf pea.

The maximum fresh weight, dry weight and per cent dry weight of the plant were recorded in plants sprayed with $GA_3$150 ppm + BR 0.5 ppm at I and II crops, respectively. While, control plants recorded minimum fresh weight dry

Table 1 : Effect of plant growth promoters on vegetative growth parameters of daisy (*Aster amellus*L.) cv. DWARF PINK

Treatments	Plant height (cm)		Plant spread (cm)				Stem girth (mm)		Number of suckers/ plant	
			EW		NS					
	I crop	II crop	I crop	II crop	I crop	II crop	I crop	II crop	I crop	II crop
GA_3 (150 ppm)	27.73	19.99	28.23	17.37	27.09	18.47	6.33	6.27	1.47	7.78
GA_3 (200 ppm)	32.40	20.61	29.80	17.47	30.81	21.51	6.57	6.65	1.87	7.22
BR (0.5 ppm)	28.13	19.03	26.57	16.27	27.07	17.76	6.28	6.38	1.60	5.44
BR (0.75 ppm)	26.10	19.61	25.70	15.94	26.54	18.59	6.58	5.78	2.00	6.69
NAA (150 ppm)	27.60	18.44	25.95	14.28	26.69	14.54	6.59	5.55	1.73	6.67
NAA (200 ppm)	28.14	19.52	25.95	15.38	26.71	15.91	7.54	7.60	1.73	5.89
GA_3 (150 ppm)+ BR (0.5 ppm)	36.11	22.91	32.03	18.94	30.82	21.57	6.97	7.06	2.40	10.19
GA_3 (150 ppm)+ NAA (150 ppm)	27.35	18.41	25.80	14.26	28.36	14.08	6.39	6.24	1.59	6.89
NAA (150 ppm) + BR (0.5 ppm)	28.55	19.11	27.55	14.25	28.02	14.94	6.44	6.33	1.77	8.11
Control (water spray)	26.61	18.33	25.58	13.22	26.29	13.08	6.18	5.07	1.65	6.89
Mean	28.87	19.60	27.32	15.74	27.84	17.05	6.59	6.29	1.78	7.17
S.E.±	1.13	0.78	0.81	0.77	0.76	0.82	0.23	0.29	0.20	0.61
C.D. (P=0.05)	3.35	2.32	2.42	2.30	2.27	2.45	0.68	0.86	0.56	1.81

Table 2 : Effect of plant growth promoters on leaf and internode parameters of daisy (*Aster amellus* L.) cv. DWARF PINK

Treatments	Number of leaves/ plant		Leaf area (cm^2)		Number of internodes/ plant		Internode length	
	I crop	II crop	I crop	II crop	I crop	II crop	I crop	II crop
GA_3 (150 ppm)	62.00	64.89	443.89	506.19	12.27	8.44	2.03	1.86
GA_3 (200 ppm)	74.05	69.12	580.22	649.10	13.75	9.93	2.19	2.04
BR (0.5 ppm)	65.04	65.20	498.38	529.30	9.55	8.92	1.83	1.53
BR (0.75 ppm)	66.05	64.89	463.57	472.38	9.80	9.29	2.09	1.66
NAA (150 ppm)	62.67	61.24	426.56	341.90	9.72	7.78	2.09	1.47
NAA (200 ppm)	60.61	60.27	458.09	399.81	9.59	7.78	2.21	1.58
GA_3 (150 ppm)+ BR (0.5 ppm)	73.81	72.45	834.29	851.04	14.15	11.84	2.73	2.23
GA_3 (150 ppm)+ NAA (150 ppm)	62.02	62.80	388.07	378.16	9.34	8.18	1.91	1.39
NAA (150 ppm) + BR (0.5 ppm)	60.96	63.02	468.62	437.92	10.20	8.11	1.95	1.59
Control (water spray)	52.93	61.23	313.42	276.04	8.87	6.78	1.75	0.91
Mean	64.01	64.51	487.51	484.18	10.72	8.70	2.08	1.63
S.E.±	1.71	1.27	32.93	30.15	0.56	0.33	0.17	0.13
C.D. (P=0.05)	5.07	3.77	97.84	89.58	1.66	0.97	0.50	0.38

Table 3 : Effect of plant growth promoters on chlorophyll contents, fresh and dry matter of daisy (*Aster amellus* L.) cv. DWARF PINK

Treatments	Fresh and dry matter production						Chlorophyll contents (mg/ 100 mg of tissue)					
	Fresh weight (g/plant)		Dry weight (g/plant)		Dry weight (%)		Chlorophyll a		Chlorophyll b		Total chlorophyll	
	I crop	II crop	I crop	II crop	I crop	II crop	I crop	II crop	I crop	II crop	I crop	II crop
GA_3 (150 ppm)	68.94	67.43	21.22	19.87	30.85	29.43	0.47	0.40	0.21	0.16	0.65	0.56
GA_3 (200 ppm)	88.22	88.86	26.72	25.57	30.30	28.76	0.35	0.31	0.22	0.25	0.76	0.75
BR (0.5 ppm)	68.42	75.11	21.89	19.90	32.23	27.96	0.30	0.29	0.18	0.19	0.64	0.64
BR (0.75 ppm)	75.29	70.93	23.22	19.82	30.96	28.02	0.35	0.36	0.22	0.22	0.66	0.78
NAA (150 ppm)	72.22	69.54	23.43	21.27	32.41	30.52	0.34	0.31	0.20	0.20	0.71	0.69
NAA (200 ppm)	63.44	74.53	21.08	23.56	32.90	31.61	0.27	0.26	0.20	0.17	0.62	0.58
GA_3 (150 ppm)+ BR (0.5 ppm)	104.78	94.43	38.72	32.63	36.91	34.75	0.42	0.37	0.29	0.29	0.84	0.90
GA_3 (150 ppm)+ NAA (150 ppm)	70.12	59.19	26.78	18.83	30.11	31.96	0.32	0.31	0.22	0.23	0.71	0.74
NAA (150 ppm) + BR (0.5 ppm)	68.11	65.80	20.79	20.40	30.76	30.99	0.34	0.31	0.21	0.25	0.70	0.76
Control (water spray)	58.00	56.22	15.33	17.18	26.35	26.58	0.34	0.26	0.14	0.15	0.64	0.54
Mean	73.76	72.20	23.92	21.90	31.38	56.63	0.35	0.32	0.21	0.21	0.69	0.69
S.E.±	6.51	2.79	2.65	1.33	1.65	1.38	0.02	0.02	0.02	0.02	0.04	0.03
C.D. (P=0.05)	19.35	8.27	7.88	3.94	4.90	4.11	0.05	0.05	0.06	0.06	0.11	0.10

weight and per cent dry weight of the plant (Table 3).It was due to the fact that the plants treated with GA and BR had increased leaf area which might have facilitated the accumulation of more carbohydrates in terms of increased dry matter production. Similarly with use of BR, maximum dry matter production was recorded in grape by Zahoor *et al*. (2011).

Chlorophyll is the important factor for photosynthesis varied significantly due to the different growth promoters (Table 3). The maximum chlorophyll a content was recorded in plants sprayed with $GA_3$200 ppm, followed by plants treated with $GA_3$150 ppm + BR 0.5 ppm . Whereas minimum chlorophyll a content was recorded in plants sprayed with BR 0.5 ppm. The plants sprayed with $GA_3$150 ppm + BR 0.5 ppm recorded maximum chlorophyll b and total chlorophyll contents. Whereas, minimum chlorophyll b recorded in control plants. Whereas, minimum total chlorophyll content were recorded in T_6 at first crop and at second crop it was recorded significantly minimum in control plants .Enhanced chlorophyll contents in been seedling has been well documented by Kriezek and Mandava (1983). Dias (1988) also reported BR increased chlorophyll content in rose. Girish *et al.* (2012) recorded influenced effect on chlorophyll contents in leaf by using GA in daisy.

Finally, it can be concluded that spraying of $GA_3$150 ppm + BR 0.5 ppm helped for improving the plant stature, yield and quality of daisy.

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