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Studies on the Effect of Cytokinin on Growth of African Marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gainda

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A B S T R A C T

The experiment was carried out in two consecutive years 2016 and 2017 at Uttar BangaKrishiViswavidyalaya, CoochBehar, West Bengal to Studies on the effect of cytokinin on growth of African Marigold (*Tagetes erecta*L.) cv. PusaNarangiGainda. I was taken twelve different dose such as 25ppm, 50ppm,75ppm, 100ppm, 125ppm, 150ppm, 175ppm, 200ppm, 225ppm, 250ppm, 275ppm, 300ppm and one control.The experiment was conducted following RBD with 12 different levels of cytokinin ranging from 25 ppm, 50 ppm, 75 ppm, 100 ppm, 125 ppm. 150 ppm, 175 ppm, 200 ppm, 225 ppm, 250 ppm, 275 ppm and 300 ppm and compared to control (distilled water spray). The 13 treatments were replicated thrice. Results revealed that application of 25 ppm BA increased the plant height at 21 days after transplanting (23.19 cm), plant height at 42 days after transplanting (48.13cm), leaflet length at 21 days after transplanting (4.32 cm), Leaflet length at 42 days after transplanting (6.80 cm), Increase in the girth of stem at 42 days after transplanting was noticed with 275 ppm BA application (9.36 mm). Initially, side-shoot production was increased with 200 ppm BA application (4.80 cm) but at 42 days after transplanting higher number of side-shoots was obtained with 150 ppm BA application (10.80 cm). Shoot length was found maximum with 175 BA application both at 21 days (2.88 cm) and 42 days after transplanting (14.0 cm). Leaf production was found maximum with 250 ppm BA application in both at 21 days (3.80) and 42 days (13.07) after transplanting. The same treatment also showed higher leaf length at 42 days after transplanting (21.86 cm).Though at 21 days leaflet production was higher with 225 ppm BA application (16.07) but at 42 days after transplanting 300 ppm BA application showed higher leaflet production (24.07). Initially 200 ppm BA application improved leaflet length (4.93 cm) but finally maximum leaflet length was found with 25 ppm BA application. Leaf expansion was observed higher with foliar application of 200 ppm BA in both at 21 days (0.96 cm) and 42 days after transplanting (1.33 cm). Plants treated with same concentration reached the flower bud initiation stage earliest (46.60 days after transplanting). Whereas, 200 ppm solution showed least time period (6.66 days) for flower bud development and from the developing bud to full bloom stage, 25 ppm BA concentration showed the earliness (6.60 days).

Introduction

Marigold is one of the most important commercial loose flowers of India (Kumar *et al*., 2015). Marigolds belong to the genus - "Tagetes", which was derived from the Greek word "Tages", the name of Estrucsch God, a demigod, known for the beauty. Marigolds were first discovered by the Portuguese in Central America in the 16th century (Gawle*et al.,* 2012). Genus *Tagetes* belongs to subfamily Asteroideae (or Tubuliflorae) of family Asteraceae (Panero and Funk, 2002) and is a native to Mexico. Genus Tagetes is a flowering plant represents 56 species, of w hich 27 are annual and 29 are perennial distributed throughout the world (Soule, 1993a, and Soule 1993b) and it is suitable under tropical and sub-tropical region.

Marigold has several important species, among which five species are cultivated for commercial purpose to some extent (Dixit *et al*., 2013) namely *Tagetes erect*a (African Marigold), *Tagetes patula* (French Marigold), *Tagetes tenuifolia* (Signet Marigold), *Tagetes lucida* (Sweet Scented Marigold) and *Tagetes minuta*(Southern Cone Marigold/ Mexican Marigold).

Nowadays, African Marigold flowers have huge demand in agricultural entrepreneurship due to its multifarious uses (Sudhagar, 2013) so, growth regulator is one and only way to increase of the yield and fulfillof the demand. Growth regulator has several types such as; Auxin, Gibberellin, Cytokinin, Ethylene etc. But among of them except Cytokinin, all other hormone already appliedor already has so many research paper. But the information regarding the effect of exogenous application of cytokinin in the cultivation of African marigold is very scanty. Keeping all these in view the present experiment is proposed to study the effect of exogenous application of cytokinin on growth and quality of African marigold with the following objectives.

Materials and Methods

The present experiment entitled "Application of Different dose of BA on growth of African marigold" was conducted under the Department of Floriculture, Medicinal and Aromatic Plants, Faculty of Horticulture, Uttar BangaKrishiViswavidyalaya, Pundibari, Cooch Behar, West Bengal, during the year 2016-17. Geographically the farm is situated at an elevation of 43 meter above the mean sea level at 26° 19'86" N latitude and 89°23'53" E longitude. According to this research point of view twelve different types dose was taken such as; $T_{1=}$ BA@ 50 ppm, $T_{2=}$ BA@50PPM, $T_{3=}$ BA@75ppm, $T_{4=}$ BA@100ppm, $T_{5=}$ BA@125ppm, $T_{6=}$ BA@150ppm, $T_{7=}$ BA@175ppm, $T_{8=}$ BA@200ppm, $T_{9=}$ BA@225ppm, $T_{10=}$ BA@250ppm, $T_{11=}$ BA@275ppm, $T_{12=}$ BA@300ppm, T_{13}= Control.

Results and Discussion

Plant height at 21 days after transplanting (cm)

The effect of N^6benzyladenine (BA) on plant height of African Marigold cv. PusaNagraniGainda at 21 days after transplanting was found statistically significant. Plants treated with 25 ppm BA showed an increase in the plant height (23.19 cm) which was Statistically at par with the effect of 225 ppm and 100 ppm BA applications (22.17 cm and 22.13 cm respectively), and the later was also on par with the effect of 275 ppm BA application (21.81cm), 250 ppm BA application (21.77 cm) and 150 ppm BA application (21.68 cm). Control plants showed the moderate effect of 20.47 cm which was equally effective with 50 ppm (20.30 cm) and 75 ppm (20.33 cm) BA applications (Table-4.1). The least plant height was recorded with 300 ppm BA treated plants (19.55 cm) which was found statistically at par with the effects of 200 ppm

(19.79 cm) and 125 ppm (20.11 cm) BA applications (Figure - 4.1).

Plant height at 42 days after transplanting (cm)

25 ppm BA treated plants again showed improved plant height (48.13 cm) of African Marigold cv. PusaNarangiGainda at 42 days after transplanting followed by 100 ppm and 225 ppm (both 47.01 cm) BA applications which was statistically at par with 175 ppm (46.39 cm) BA application. Result at that stage of crop growth was found statistically significant (Table -4.1). Next improved plant height was obtained from 150 ppm (46.17 cm), 250 ppm (46.18 cm) and 275 ppm (45.77 cm) BA treated plants (Figure - 4.1).Plants treated with 75 ppm BA showed the minimum plant height (41.71 cm) of African marigold which was found statistically at par with 300 ppm (41.95 cm) and 200 ppm (42.25 cm) BA applications as well as control plants (41.89 cm).

Girth of stem at 21 days after transplanting (mm)

The effect of Benzyladenineon the girth of the stem of African Marigold cv. PusaNarangiGainda at 21 days after transplanting was found statistically significant (Table-4.1). Plants treated with 150 ppm BA solution showed the maximum stem girth (5.87 mm) followed by 275 ppm BA application (5.25 mm) which was statistically at par with the effects of 225 ppm (5.23 mm), 175 ppm (5.22 mm), 100 ppm (5.12 mm), 25 ppm (5.12 mm) and 50 ppm (5.10 mm) BA applications. The next performers were 200 ppm (4.98 mm), 125 ppm (4.91 mm) and 75 ppm (4.81 mm) BA applications (Figure – 4.2). The minimum stem girth of African marigold was recorded with 300 ppm BA application (4.30 mm) that was statistically at par with the effects exerted by Control plants (4.68 mm) and 250 ppm BA application (4.75 mm).

Girth of stem at 42 days after transplanting (mm)

Benzyladenine had a significant influence on stem girth of African Marigold at 42 days after transplanting (Table – 4.1). Application of 275 ppm BA solution produced maximum stem girth (9.36 mm) that was statistically at par with the effects of 25 ppm (9.04 mm), 150 ppm (8.92 mm), 225 ppm (8.85 mm) and 125 ppm (8.53 mm) BA applications (Figure – 4.2). The next performers were 100 ppm (8.48 mm), 175 ppm (8.28 mm), 50 ppm (8.22 mm) and 250 ppm (8.16 mm) BA treated plants. The minimum girth of stem was obtained from control (Distilled water) plants (7.37 mm) which was statistically at par with 75 ppm (7.81 mm) 200 ppm (7.88 mm) and 300 ppm (7.94 mm) BA applications

Number of shoots per plant at 21 days after transplanting

The effect of exogenous application of different concentrations of BA on the number of shoots per plant of African Marigold cv. PusaNarangiGainda at 21 days after transplanting was found statistically significant (Table – 4.1). The highest number of shoots per plant was recorded with 250 ppm BA application (4.80) which was statistically at par with 150 ppm (4.60) and 25 ppm (4.47) BA applications and the later was also statistically at par with 200 ppm (4.40), 225 ppm (4.40), 100 ppm (4.27), 275 ppm (4.27) and 300 ppm (4.27) BA treated plants as well as control plants (4.20). The least number of shoots per plant was found with 75 ppm BA treated plants (3.80) which were statistically at par with the 50 ppm (3.87), 175ppm (3.87) and 125 ppm (4.07) BA treatments.

Number of shoots per plant at 42 days after transplanting

150 ppm BA treated plants showed highest number of shoots per plant (10.80) of African Marigold cv. PusaNarangiGaindah at 42 days after transplanting (Table-4.1) that was statistically at par with 300 ppm (10.27), 225 ppm (10.13), 250 ppm (10.07), 100 ppm (10.00), 200 ppm (9.60), 25 ppm (9.53), 175 ppm (9.47) and 275 ppm (9.40) BA applications. The control plants produced the minimum number of shoots per plant (7.20) at 42 days after transplanting of African Marigold cv. PusaNarangiGainda.

Shoot length at 21 days after transplanting (cm)

Different concentrations of BA application on shoot length of African marigold cv. PusaNarangiGainda at 21 days after transplanting was found statistically non-significant (Table-4.2). The maximum shoot length (2.88 cm) was obtained from 175 ppm BA treated plants and the minimum shoot length (2.15 cm) was noticed with 300 ppm BA application.

Shoot length at 42 days after transplanting (cm)

Foliar application of different concentrations of BA on African marigold cv. PusaNarangiGainda was found statistically significant in respect of shoot length at 42 days after transplanting (Figure – 4.4).

Plants sprayed with 125 ppm BA solution produced maximum shoot length (13.6 cm) at that stage of crop growth which was found statistically at par with all the rest BA treatments (Table -4.2) except 150 ppm (12.0 cm) and 250 ppm (11.70 cm). Control plants produced the minimum shoot. length (10.9 cm).

Number of leaves per shoot at 21 days after transplanting

The exogenous application of different concentrations of BA on leaf production of African Marigold cv. PusaNarangiGainda at 21 days after transplanting was found statistically significant (Table – 4.2). Plants treated with 250 ppm BA produced highest number of leaves (3.80) followed by 225 ppm BA application (3.40) which was found statistically at par with the effects of 150 ppm (3.33), 25 ppm (3.27), 75 ppm (3.27), 300 ppm (3.27) and 50 ppm (3.20) BA applications and control plants (3.07). Plants treated with 125 ppm BA produced minimum number of leaves per shoot (2.80) of African Marigold which was statistically at par with 200 ppm (2.93), 100 ppm (3.00), 175 ppm (3.00) and 275 ppm (3.00) BA treatments.

Number of leaves per shoot at 42 days after transplanting

250 ppm BA treated plants again showed maximum leaf production (13.07) of African marigold at 42 days after transplanting (Table – 4.2) followed by 175 ppm BA application (10.27) which was equally effective with 125 ppm BA application (10.00) and the later was also on par with the effects of 25 ppm (9.67) and 75 ppm (9.67) BA applications (Figure – 4.5). The minimum number of leaves per shoot was recorded with control plants (7.93) which were found statistically at par with 50 ppm BA application (8.20).

Leaf length at 21 days after transplanting (cm)

The effect of exogenous application different concentrations of BA on African Marigold cv. PusaNarangiGainda was found statistically significant in respect of leaf length at 21 days after transplanting (Table – 4.2). Plants treated with 25 ppm BA (13.42 cm) showed

maximum leaf length which was found statistically at par with the effects of 250 ppm (13.16 cm), 275 ppm (13.03 cm), 225 ppm (12.64 cm), 200 ppm (12.01 cm) and 150 ppm (11.88 cm) treated plants (Figure – 4.6). The minimum leaf length at that stage was noticed with 50 ppm BA treated plants (10.61 cm) which was found statistically at par with rest of the BA treatments and Control (10.85 cm).

Leaf length at 42 days after transplanting (cm)

Different concentrations of BA application on African Marigold cv. PusaNarangiGainda was found statistically significant in respect of leaf length at 42 days after transplanting (Table - 4.2). The longest leaves were produced by 250 ppm BA treated plants (21.86 cm) which was statistically at par with the effects of 25 ppm (20.69 cm), 275 ppm (20.37 cm), 200 ppm (19.87 cm), 225 ppm (19.55 cm), 150 ppm (19.55 cm), 125 ppm (19.48 cm) and 100 ppm (19.17cm) BA applications (Figure – 4.6). The control plants produced minimum leaf length (15.37cm) which was statistically at par with the effect of 300ppm BA application (17.90 cm).

Number of leaflets per leaf at 21 days after transplanting

The exogenous application of different concentrations of BA on number of leaflets per leaf of African Marigold cv. PusaNarangiGainda at 21 days after transplanting was found statistically significant (Table – 4.3). The data revealed that the application of 225 ppm BA produced the maximum number of leaflets per leaf (Figure - 4.7) of marigold (16.07) which was found statistically on par with the effects of 75 ppm (15.87), 25 ppm (15.67), 175 ppm (15.60) and 50 ppm (15.20) BA applications. Plants when treated with 100 ppm and 150 ppm BA solutions showed moderate effects (14.87 leaflets/leaf) which were at par with the applications of 300 ppm (14.80), 250 ppm (14.73) and 275ppm (14.13) BA and control (14.67) respectively. The lowest number of leaflets per leaf was found in 200 ppm BA treated plants (14.00).

Number of leaflets per leaf at 42 days after transplanting

Foliar application of BA at different concentrations on African marigold cv. PusaNarangiGainda was found statistically significant with respect to leaflet production (Table – 4.3). Plants treated with 300 ppm BA recorded maximum number of leaflets per leaf (24.07) which was statistically at par with the effects of 225 ppm (23.67) and 150 ppm (23.33) BA applications (Figure- 4.7). Plants treated with 50 ppm BA performed next (23.00) which was statistically at par with the effects of 175 ppm (22.80), 75 ppm (22.40), and 200 ppm (22.27) BA treated plants. All the plant growth regulator treatments showed higher leaflet production than control plants produced the least number of leaflets per leaf (18.87).

Leaflet length at 21 days after transplanting (cm)

The effect of N^6benzyladednine on leaflet length of African marigold cv. PusaNarangiGainda at 21 days after transplanting was found statistically non-significant (Table – 4.3). Marigold plants when treated with 200 ppm BA recorded the longest leaflet (4.93cm) while the shortest leaflets were reported under the application effects of 25 ppm BA (4.32 cm) and 50 ppm BA (4.32 cm) respectively.

Leaflet length at 42 days after transplanting (cm)

Effect of exogenous foliar application of different concentrations of BA on leaflet length of African Marigold cv.

PusaNarangiGainda at 42 days after transplanting was found statistically significant (Table - 4.3). Plants treated with 25 ppm BA produced maximum leaflet length (6.80 cm) which was statistically at par with the application effects of 275 ppm (6.72 cm), 75 ppm (6.64 cm), 50 ppm (6.60 cm), 100 ppm (6.39 cm), 150 ppm (6.62 cm), 175 ppm (6.47 cm), 300 ppm (6.44 cm), 200 ppm (6.27 cm), 125 ppm (6.25 cm) and 250 ppm (6.11 cm) BA respectively (Figure- 4.8). Application of 175 ppm BA (5.62 cm) followed next and was found as statistically at par with the control (5.14 cm) reported the shortest length of leaflet at 42 days after transplanting.

Leaflet width at 21 days after transplanting (cm)

Different concentrations of BA application on leaflet width of African marigold cv. PusaNarangiGainda at 21 days after transplanting was found statistically non-significant (Table – 4.3). Plants treated with 200 ppm BA recorded the maximum width of leaflet (0.96 cm) while the minimum leaflet width (0.71 cm) was noticed with 50 ppm BA application.

Leaflet width at 42 days after transplanting (cm)

Exogenous foliar application of different concentrations of BA on leaflet width at 42 days after transplanting of African marigold cv. PusaNarangiGainda was observed as statistically significant (Table – 4.3). Leaf expansion was observed better with cytokinin application. Application of 200 ppm BA on marigold plant showed the maximum width of leaflet (1.33 cm) which was on par with the effects of 25 ppm (1.32 cm), 75 ppm (1.32 cm), 50 ppm (1.27 cm), 100 ppm (1.23 cm), 175 ppm (1.23 cm), 225 ppm (1.21 cm) and 275 ppm (1.21 cm) BA application respectively (Figure- 4.9). Control plants recorded the minimum leaf expansion of African Marigold (1.04 cm).

Foliar application of different concentrations of BA on time period requirement for flower bud initiation of African Marigold cv. PusaNarangiGainda was found statistically significant (Table – 4.7). Plants treated with 125ppm BA solution reached the flower bud initiation stage earliest (46.60days after transplanting) which was statistically at par with 275 ppm BA application (47.40days after transplanting) and the later was also on par with 200 ppm BA application (47.73days after transplanting). The plant growth regulator applications showed earliness in flowering over control (49.93 days after transplanting) except at 300 ppm 100 ppm and 25 ppm levels (Figure-4.15) of which 25 ppm BA treated pants reached the flower bud initiation stage last of all (53 days after transplanting).

Days required for flower bud development (days)

The exogenous application of different concentrations of BA on time period requirement for flower bud development of African Marigold cv. PusaNarangiGainda was found statistically significant (Table – 4.7). Early flower bud development (Figure -4.15) was noticed with 200 ppm BA treated plants (6.66 days after FBI) which was found statistically at par with all the other levels of BA application except 300 ppm and 225 ppm levels of which 225 ppm BA application required the maximum time period for flower bud development (7.73 days after FBI).

Table.1 Effect of different concentrations of BA on plant height, girth of stem, number of shoots per plant at 21 days and 42 days after transplanting of African Marigold cv. Pusa Narangi Gainda

Treatments	Plant Height at 21 days (cm)	Plant Height at 42 days (cm)	Girth of stem at 21 days (mm)	Girth of stem at 42 days (mm)	Number of shoots per plant at 21 days	Number of shoots per plant at 42 days
T_1	23.19	48.13	5.12	9.04	4.47	9.53
T_2	20.30	44.77	5.10	8.22	3.87	9.13
T_3	20.33	41.71	4.81	7.81	3.80	8.73
T_4	22.13	47.01	5.12	8.48	4.27	10.00
T_5	20.11	44.76	4.91	8.53	4.07	9.00
T_6	21.68	46.17	5.87	8.92	4.60	10.80
T_7	22.45	46.39	5.22	8.28	3.87	9.47
T_8	19.79	42.25	4.98	7.88	4.40	9.60
T_9	22.17	47.01	5.23	8.85	4.40	10.13
T_{10}	21.77	46.18	4.75	8.16	4.80	10.07
T_{11}	21.81	45.77	5.25	9.36	4.27	9.40
T_{12}	19.55	41.95	4.30	7.94	4.27	10.27
T_{13}	20.47	41.89	4.68	7.37	4.20	7.20
S.Em (±)	***0.20***	***0.26***	***0.16***	***0.28***	***0.12***	***0.48***
C.D. at 5%	**0.57**	**0.77**	**0.46**	**0.83**	**0.36**	**1.41**

Table.2 Effect of different concentrations of BA on shoot length, number of leaves per shoot and leaf length at 21 days and 42 days after transplanting of African Marigold cv. PusaNarangiGainda

Treatments	Shoot length at 21 days after transplanting (cm)	Shoot length at 42 days after transplanting (cm)	Number of leaves per shoot at 21 days after transplanting	Number of leaves per shoot at 42 days after transplanting	Leaf length at 21 days after transplanting (cm)	Leaf length at 42 days after transplanting (cm)
T_1	2.71	13.1	3.27	9.67	13.42	20.69
T_2	2.41	13.4	3.20	8.20	10.61	18.51
T_3	2.54	13.0	3.27	9.67	10.83	18.74
T_4	2.66	12.8	3.00	8.80	11.05	19.17
T_5	2.52	13.6	2.80	10.00	11.40	19.48
T_6	2.69	12.0	3.33	9.40	11.88	19.55
T_7	2.88	14.1	3.00	10.27	10.96	18.73
T_8	2.67	12.7	2.93	8.47	12.01	19.87
T_9	2.51	13.0	3.40	8.53	12.64	19.55
T_{10}	2.49	11.7	3.80	13.07	13.16	21.86
T_{11}	2.53	12.7	3.00	9.53	13.03	20.37
T_{12}	2.15	12.1	3.27	9.47	11.35	17.90
T_{13}	2.65	10.9	3.07	7.93	10.85	15.37
S. Em (±)	***0.06***	***0.54***	***0.12***	***0.65***	***0.65***	***0.94***
C. D. at 5%	**N.S.**	**1.58**	**0.34**	**0.51**	**1.89**	**2.74**

Table.3 Effect of different concentrations of BA on number of leaflets per leaf, leaflet length and leaflet width at 21 days and 42 days after transplanting of African Marigold cv. PusaNarangiGainda

Treatments	Number of leaflets per leaf at 21 days after Transplanting	Number of leaflets per leaf at 42 days after Transplanting	Leaflet length at 21 days after Transplanting (cm)	Leaflet length at 42 days after Transplanting (cm)	Leaflet width at 21 days after Transplanting (cm)	Leaflet width at 42 days after Transplanting (cm)
T_1	15.67	21.87	4.32	6.80	0.81	1.32
T_2	15.20	23.00	4.32	6.60	0.71	1.27
T_3	15.87	22.40	4.80	6.64	0.90	1.32
T_4	14.87	21.47	4.64	6.39	0.87	1.23
T_5	14.07	21.80	4.36	6.25	0.78	1.11
T_6	14.87	23.33	4.74	6.62	0.79	1.19
T_7	15.60	22.80	4.43	5.62	0.83	1.23
T_8	14.00	22.27	4.93	6.27	0.96	1.33
T_9	16.07	23.67	4.74	6.47	0.79	1.21
T_{10}	14.73	20.60	4.67	6.11	0.76	1.14
T_{11}	14.13	20.60	4.87	6.72	0.89	1.21
T_{12}	14.80	24.07	4.54	6.44	0.75	1.20
T_{13}	14.67	18.87	4.35	5.14	0.81	1.04
S. Em (±)	***0.34***	***0.29***	***0.24***	***0.30***	***0.06***	***0.42***
C. D. at 5%	**1.00**	**0.83**	**N.S.**	**0.86**	**N.S**	**0.123**

Table.4 Effect of different concentrations of BA in days required for flower bud initiation (FBI), flower bud development (FBD) and full blooming (FB) of African marigold cv. PusaNarangiGainda

Treatments	Days required for FBI (days)	Days required for FBD (days)	Days require for FB (days)
T_1	53	7.00	6.60
T_2	49.07	7.47	6.93
T_3	49.60	6.80	7.20
T_4	51.60	7.47	6.87
T_5	46.40	7.60	6.80
T_6	49.60	7.53	6.73
T_7	48.40	6.73	7.67
T_8	47.73	6.66	7.47
T_9	48.93	7.73	6.87
T_{10}	49.40	7.20	7.27
T_{11}	47.40	7.40	7.40
T_{12}	51.33	7.67	7.47
T_{13}	49.93	7.40	8.20
S. Em (±)	***1.20***	***0.34***	***0.24***
C. D. at 5%	**3.48**	**1.00**	**0.70**

Days required for full blooming of flowers (days)

Effect ofdifferent concentrations of BA applied on African Marigold cv. PusaNarangiGainda regarding time period required for full blooming of flowers was observed statistically significant. Plants treated with 25 ppm BA recorded the minimum time period (6.60 days after FBD). All the levels of BA application showed lesser time period requirement than Control (Table – 4.7), that reached the full blooming stage (Figure-4.15) last of all (8.20 days after FB

In conclusion, African marigold is the ace loose flower of the country having multifarious uses. Considering the importance of African marigold as a commercial flower, the present experiment was undertaken to evaluate the effect of exogenous application of cytokinin in the form of foliar spray on the growth, development, flowering and quality of flowers in a promising cultivar - PusaNarangiGainda. The experiment was conducted at the instructional farm of Department of Floriculture, Medicinal and Aromatic Plants, Faculty of Horticulture, Uttar BangaKrishiViswavidyalaya, Pundibari, Coochbehar, West Bengal, India, in the crop growing season from November 2016 to march 2017. The experiment was conducted following RBD with 12 different levels of cytokinin ranging from 25 ppm, 50 ppm, 75 ppm, 100 ppm, 125 ppm. 150 ppm, 175 ppm, 200 ppm, 225 ppm, 250 ppm, 275 ppm and 300 ppm and compared to control (distilled water spray). The 13 treatments were replicated thrice. Results revealed that application of 25 ppm BA increased the plant height at 21 days after transplanting (23.19 cm), plant height at 42 days after transplanting (48.13cm), leaflet length at 21 days after transplanting (4.32 cm), Leaflet length at 42 days after transplanting (6.80 cm), Increase in the girth of stem at 42 days after transplanting was noticed with 275 ppm BA application (9.36 mm). Initially, side-shoot production was increased with 200 ppm BA application (4.80 cm) but at 42 days after transplanting higher number of side-shoots was obtained with 150 ppm BA application (10.80 cm). Shoot length was found maximum with 175 BA application both at 21 days (2.88 cm) and 42 days after transplanting (14.0 cm). Leaf production was found maximum with 250 ppm BA application in both at 21 days (3.80) and 42 days (13.07) after transplanting. The same treatment also showed higher leaf length at 42 days after transplanting (21.86 cm).Though at 21 days leaflet production was higher with 225 ppm BA application (16.07) but at 42 days after transplanting 300 ppm BA application showed higher leaflet production (24.07). Initially 200 ppm BA application improved leaflet length (4.93 cm) but finally maximum leaflet length was found with 25 ppm BA application. Leaf expansion was observed higher with foliar application of 200 ppm BA in both at 21 days (0.96 cm) and 42 days after transplanting (1.33 cm). Plants treated with same concentration reached the flower bud initiation stage earliest (46.60 days after transplanting). Whereas, 200 ppm solution showed least time period (6.66 days) for flower bud development and from the developing bud to full bloom stage, 25 ppm BA concentration showed the earliness (6.60 days). In the present experiment exogenous application of 25 ppm BA as foliar spray at 15 and 30 days after transplanting and the earliness flower obtain from 25ppm dose BA application.So, hence may be recommended (25ppm BA) forgrowth parameter of African marigold cv. PusaNarangiGainda in the Terai region of West Bengal.

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