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Short communication

Effect of plant growth regulators on corm production in gladiolus

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ABSTRACT

Experiments (spraying and dipping) were carried out to study the effect of different plant growth regulators with two methods of application on gladiolus cv. Pusa Jyotsna for various parameters of corm production. Spraying TIBA at 500 ppm produced maximum number of corms. Maximum number of cormels was produced by dipping corms in kinetin at 500 ppm concentration. Corm weight was maximum by dipping with 200 ppm of GA_3. Spraying GA_3 at 500 ppm resulted in maximum weight of cormels per plant and maximum diameter of corms. Dipping in 500 ppm of GA_3 produced maximum volume of corms. Propagation co-efficient was maximum in BA at 100 ppm as spray treatment, whereas it was minimum in the case of TIBA at 1500 ppm. This may be due to growth retardation.

Key words: Plant growth regulators, corm, gladiolus

Gladiolus is a very popular bulbous flowering plant with its magnificent inflorescence. It is grown in herbaceous border, bed, rockery, pot and also for cut flowers. The flowers, varying in colour with attractive shades are most suitable as cut flowers as the flowers have good shelf-life. However, major constraint for gladiolus cultivation is the corm dormancy. Plant growth regulators play an important role in breaking dormancy and promote more number of quality corm productions in gladiolus (Bhattacharjee, 1983). In spite of its importance, very little information is available on effect of growth regulators on gladiolus corm production. Hence, an experiment was laid out to study effects of growth regulators and their application methods in gladiolus.

The experiment was conducted during 2002-04 in the Division of Floriculture and Landscaping, IARI, New Delhi, on gladiolus cultivar Pusa Jyotsna. Healthy corms of uniform size (8-10 cm circumference) were planted at a spacing of 30 cm x 20 cm. In total, there were 49 treatments viz., control, BA 25, 50 and 100 ppm; kinetin 125, 250 and 500 ppm; NAA 100, 250 and 500 ppm; IAA 100, 250 and 500 ppm; GA_3 200, 500 and 1,000 ppm; MH 500, 1,000 and 1,500 ppm; TIBA 500, 1,000 and 1,500 ppm; and cycocel 1,000, 1,500 and 3000 ppm, with two methods of application (corm dipping and spraying). Data were recorded on various parameters of corm production. Statistical analysis was carried out according to Gomez and Gomez (1983). Randomized block design was followed for data interpretation.

Results indicated that all the growth hormones exhibited highly significant role in characters pertaining to corm production. Maximum number of corms was produced by use of TIBA 500 ppm as spraying followed by spraying of BA 100 ppm. In general, BA 100 ppm increased number of corms per plant followed by kinetin 250 ppm irrespective of modes of application. It shows that BA, like other cytokinins, characteristically causes more splitting than increasing the size of corms. Present results are in conformity with the work of Deutch (1974) and Vlahos (1989) in achimenes; Nightingale (1979) and Raju (2000) in lilies and Sehgal (1984) in gladiolus. The lowest number of corms was obtained by use of NAA 250 ppm as corm dipping. This was mainly due to inhibition of lateral root development by auxin. Maximum number of cormels was produced by kinetin 500 ppm as corm dipping followed by spraying of GA_3 at 500 ppm and IAA 100 ppm. These results are in conformity with the findings of Saniewski and Puchalski (1983) in *Muscari* spp. by use of cytokinin. El-Meligy (1982), Dua *et al* (1984) and Mahesh (1992) reported increased number of cormels in gladiolus by GA_3 treatment. The corm weight was maximum in corm dipping with 200 ppm of GA_3- followed by 500 ppm GA_3 and lowest weight was recorded in Kinetin 250 ppm. The superiority of GA_3 at low concentrations in improving corm weight when compared at higher concentrations might be due to exhaustion of assimilates towards stem elongation at higher concentrations. Similar results were reported by Bose *et al*

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Table 1. Effect of growth hormones on corm production in gladiolus (pooled data)

Treatment(ppm)	Number of corms per plant	Number of cormels per plant	Weight of one corm (g)	Weight of cormels per plant (g)	Corm diameter (cm)	Volume of the corm (cm^3)	Propagation co-efficient (%)
Control	2.27	11.17	31.73	3.05	4.70	32.84	99.59
Corm Dipping							
BA 25	2.22	16.83	30.67	2.72	3.89	50.11	221.80
BA 50	2.37	20.83	28.17	3.66	4.10	46.84	220.90
BA 100	2.52	34.17	21.37	4.33	3.59	36.35	185.44
NAA 100	1.47	13.83	36.37	2.57	4.21	59.19	176.56
NAA 250	1.32	11.83	44.80	2.22	4.43	61.98	166.81
NAA 500	1.97	18.83	34.87	4.05	4.11	56.38	181.92
IAA 100	2.27	14.83	35.28	3.37	4.05	53.21	217.50
IAA 250	1.77	19.73	31.83	4.00	4.28	49.07	126.41
IAA 500	1.97	17.73	41.37	3.63	4.36	60.32	210.95
GA_3 200	2.57	22.23	66.37	4.51	4.66	71.08	319.73
GA_3 500	1.68	17.23	52.40	3.57	5.63	75.45	216.47
GA_3 1000	1.88	19.73	35.00	3.97	4.36	65.88	211.97
MH 500	2.33	29.57	29.73	4.13	3.61	48.11	223.59
MH 1000	1.58	20.23	34.93	3.95	4.01	55.35	164.34
MH 1500	1.53	18.75	49.17	3.65	4.53	58.84	158.50
Kinetin 125	2.18	14.48	26.03	2.95	4.01	46.98	176.09
Kinetin 250	2.52	26.92	20.53	4.85	3.79	39.84	172.88
Kinetin 500	2.37	38.92	22.63	5.66	3.95	42.60	179.06
TIBA 500	1.82	16.58	33.73	3.42	3.90	55.30	172.25
TIBA 1000	1.72	11.18	34.93	2.60	4.43	57.66	157.92
TIBA 1500	1.67	17.88	31.23	3.81	4.07	52.05	123.75
Cycocel 1000	1.67	13.58	49.03	3.03	4.60	67.51	207.36
Cycocel 1500	1.72	12.28	52.13	2.71	5.30	71.06	194.19
Cycocel 3000	2.22	19.38	43.70	3.91	4.68	64.51	237.84
Spraying							
BA 25	3.05	22.85	30.13	4.82	4.32	42.93	213.88
BA 50	3.25	22.05	33.93	4.70	4.59	40.70	266.75
BA 100	3.58	27.52	36.73	5.02	4.58	30.32	337.86
NAA 100	2.00	19.85	35.43	4.31	4.69	52.42	126.74
NAA 250	1.90	20.85	36.93	4.44	4.78	56.78	119.69
NAA 500	2.15	30.85	34.73	5.14	4.39	45.64	148.19
IAA 100	2.56	37.35	35.43	5.62	4.50	46.68	193.69
IAA 250	2.88	20.85	32.73	4.42	4.83	38.31	204.88
IAA 500	2.47	17.85	36.73	4.04	4.88	49.66	186.28
GA_3 200	2.86	15.85	49.17	3.54	5.15	60.48	276.86
GA_3 500	2.30	38.85	37.93	6.14	5.63	62.96	180.53
GA_3 1000	3.05	23.17	37.53	4.82	4.70	58.24	271.42
MH 500	2.52	15.87	34.73	3.95	4.74	37.32	151.71
MH 1000	3.02	14.17	35.13	3.22	4.77	44.78	213.05
MH 1500	3.32	20.97	37.93	4.72	5.10	43.91	277.31
Kinetin 125	3.20	18.17	25.53	3.88	4.76	40.92	162.17
Kinetin 250	3.52	20.67	22.13	5.01	4.33	32.64	163.46
Kinetin 500	3.34	20.17	28.93	4.77	5.01	34.82	205.30
TIBA 500	3.77	31.23	33.23	5.54	4.53	39.70	303.36
TIBA 1000	3.17	20.67	29.33	4.52	5.01	42.08	185.80
TIBA 1500	2.32	14.87	28.23	3.62	4.72	36.95	101.21
Cycocel 1000	2.57	16.67	33.33	3.91	4.90	53.49	151.71
Cycocel 1500	3.57	19.57	36.53	4.58	5.44	55.91	311.45
Cycocel 3000	2.82	15.17	34.03	3.79	5.24	49.12	178.77
CD ($P=0.05$)	0.97**	6.20**	11.31**	1.05**	1.04**	11.39**	30.49**

** Significance at 1% probability level

(1980) in *Hippeastrum hybridum;* Bhattacharjee (1983), Sujatha and Bhattacharjee (1992) and Raju (2000) in lilies; Dua *et al* (1984), Ravidas *et al* (1992) and Mahesh (1992) in gladiolus. Maximum weight of cormels per plant was observed by application of GA_3 500 ppm as spraying followed by kinetin 500 ppm as corm dipping. Results are in agreement with the work of Winkler (1969), Dua *et al* (1984), Lopez Oliveras *et al* (1984), Mukhopadhayay and Bankar (1986) and Mahesh (1992) in gladiolus. The cormels weight per plant was minimum in plants treated with NAA 250 ppm as corm dipping. GA_3 500 ppm gave the maximum diameter of the corm followed by cycocel 1500 ppm as dipping or spraying treatments. The diameter of the corm was minimum in case of BA 100 ppm spraying. Many workers reported similar effects in gladiolus (Bhattacharjee, 1984, Dua *et al*, 1984 and Mahesh, 1992) and in *Hippeastrum hybridum* (Bose *et al*, 1980). Maximum volume of the corm was achieved by corm dipping with GA_3 500 ppm followed by GA_3 200 ppm and the minimum in case of plants sprayed with BA 100 ppm. From these findings it is inferred that all these chemicals have potential in increasing corm size in terms of volume, as these would have participated in cell enlargement in the corms except cytokinins like BA and kinetin as these would have participated in cell division. An increase in volume with corresponding increase in weight may prove best for flowering in the next season.

Propagation co-efficient reveals that multiplication rate by which, at a glance, one can visualize over all corm and cormel production per plant. The propagation co-efficient was maximum in BA 100 ppm as spraying treatment followed by GA_3 at 200 ppm as corm dipping treatment indicating that these treatments are the best for good development of gladiolus corms and cormels. Reason may be due to BA 100 ppm would have encouraged other lateral buds present in the corm, inactive form, to accelerate the growth. In fact, corm starts forming just after sprouting and cormel starts forming normally at the time of spike formation. In the case of GA_3 200 ppm, the weight of corm was high and hence had a high propagation co-efficient. The propagation co-efficient was least in case of control followed by TIBA 1500 ppm as spraying treatment. This may be due to growth retardation.

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