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Effect of growth regulators and corm size on post-harvest parameters in gladiolus cv. Malaviya Kundan

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Abstract

The experiment was carried out the Horticulture Research Farm, Banaras Hindu University, Varanasi, U.P. during 2018-19. The treatments comprised of two growth regulators with three levels of each viz., GA₃ (50 ppm, 100 ppm and 150 ppm) and thiourea (0.5%, 1.5% and 2.0%) in addition to control and four levels of corm sizes (1.0 cm, 1.5 cm, 2.0 cm and 2.5 cm). The experiment was laid out in a Randomized Block Design with three replications. The results revealed that treatment of GA₃ at 50 ppm took minimum days for opening of florets (days) and withering of florets (days) and maximum diameter of florets (cm) and maximum length of floret (cm). Maximum number of florets opened in vase, number of florets opened at a time, spike length (cm), rachis length (cm), water uptake (ml) and vase life (days) was recorded with thiourea at 0.5%. Among various grades, early opening of florets (days), early withering of florets (days) and maximum diameter of floret (cm), length of floret (cm), number of florets opened in vase and spike length (cm) was obtained with grade 2.0 cm. Whereas, grade 2.5 cm recorded maximum number of florets opened at a time, rachis length (cm), water uptake (ml) and vase life (days). In interaction of doses of growth regulators and grade of corms, early opening of florets (days) and withering of florets (days) were obtained GA₃ 50 ppm with 1.5 cm. Whereas, maximum diameter of floret was recorded with thiourea 1.5% with 2.5 cm and length of floret (cm), number of florets opened in vase and water uptake (ml) were recorded maximum with thiourea 0.5% with 2.5 cm. Maximum number of florets opened at a time and rachis length (cm) was recorded maximum with combination of GA₃ 100 ppm with 2.5 cm. Maximum spike length was recorded with interaction of GA₃ 150 ppm with 2.0 cm while maximum vase life was with interaction of GA₃ 50 ppm with 2.5 cm.

Keywords: GA₃, thiourea, corm size, gladiolus

1. Introduction

Gladiolus, as a member of family Iridaceae, is one of the most important perennial bulbous plant grown for cut flowers. As a commercial flower, it is gaining importance in India due to its massive form, brilliant colours, attractive shapes, varying size. But in case of commercial floriculture industry, the growers face various constraints like decrease in longevity, yield and quality of spikes. Senescence of the flowers starts immediately after harvest which is directly influenced by the carbohydrate status of the flower. Various pre and post-harvest factors also plays major role in quality and yield of cut flowers. The quality and production of cut flowers can be improved by application of various plant growth regulators (Raju *et al.*, 2008) [6]. In case of bulbous ornamental plants, GA₃ plays a vital role in influencing flowering and post-harvest life of cut flowers. (Singh *et al.*, 2008, Kapri *et al.*, 2018 and Sharma and Singh, 2012) [10, 2, 9]. Similarly, thiourea also has significant effect on flowering and post-harvest characters (Padmalatha *et al.* 2014) [4]. According to various studies, the quality and vase life of the spikes also influenced by the size of the planting material (Sharma and Gupta, 2003) [8]. Therefore, an experiment was carried out to find out the influence of plant growth regulators i.e. GA₃ and thiourea and corm size on post-harvest parameters in gladiolus.

2. Materials and Methods

The experiment was carried out at Horticulture Research Farm, Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, India during the year of 2018-19. The location of experimental site is situated in the Agro climatic Zone-4 (Northern transitional tract) of Uttar Pradesh and is stretched between 82° 56'E-83° 03'E longitude and 25° 14'N- 25° 23.5'N latitude and at altitude of 76 m above mean sea level. Soil was tested on the basis of availability of essential nutrients and ions for the growth of plant. Three levels of thiourea (0.5%, 1.5%, 2.0%) and three levels of GA₃ (50 ppm, 100 ppm, 150 ppm) were tested on four levels of corm sizes (1.0 cm, 1.5 cm, 2.0 cm, 2.5 cm).

Various grades of corms were soaked in stock solution and also in control (untreated) for 24 hrs and planted in the field on 17th November, 2018 at a spacing of 30×20 cm. The experiment was laid out in Randomized Complete Block Design with three replications. Weeding, earthing up, staking, irrigation and other cultural operations were practiced as and when required. Cut stems were harvested in early morning hours and placed immediately into bucket containing water and brought to the laboratory for post-harvest studies. Parameters such as opening and withering of 1st, 3rd and 5th florets, diameter and length of 1st, 3rd and 5th florets, spike length and rachis length were recorded. Post-harvest parameters including vase life, water uptake were also calculated. Results thus obtained were subjected to statistically analysis as suggested by Panse and Sukhatme (1978) [5].

3. Result and Discussion

A significant effect was observed due to the exercise of growth regulators i.e. thiourea and GA₃ at different concentrations on post-harvest parameters in case of days to opening of florets (days), days to withering of florets (days), spike length (cm), water uptake (ml). However, these growth regulators did not show any significant effect on diameter of florets (cm), length of floret (cm), number of florets opened in vase, number of florets opened at a time, spike length (cm) and vase life (days) (Table 1, Table 2, Table 3). Early opening of the 1st floret and 5th floret was recorded with control (1.61 days and 3.86 days) and early opening of 3rd floret was noticed in thiourea at 0.5% which was statistically at par with GA₃ at 150 ppm. Late withering of 1st floret was recorded with GA₃ at 100 ppm (3.75 days) whereas, late withering of 3rd floret and 5th floret was recorded with GA₃ at 50 ppm (4.72 days and 5.92 days) which was statistically at par with thiourea 2.0% (3.56 days, 4.36 days and 5.83 days). Regarding the parameter diameter of 1st floret and 3rd floret, maximum was obtained with GA₃ at 50 ppm (8.47 cm and 8.06 cm) whereas, diameter of 3rd floret was maximum with GA₃ at 100 ppm (7.92 cm). Minimum diameter of 1st, 3rd and 5th floret was in case of control (7.38 cm, 7.28 cm and 6.92 cm). Length of 1st floret and 5th floret was found to be maximum with thiourea at 0.5% (10.44 cm and 10.07 cm). While, maximum length of 3rd floret was recorded with GA₃ at 50 ppm (10.12 cm). Regarding the parameters, number of florets opened in vase, rachis length and water uptake, maximum was recorded with treatment of thiourea at 0.5% (10.67, 38.22 cm and 14.83 ml). Number of florets opened at a time was recorded to be maximum with GA₃ at 50 ppm (3.22) whereas, minimum was noticed with treatment of thiourea at 0.5% (3.04) and thiourea at 2.0% (3.04). Among various treatments, thiourea at 1.5% (60.94 cm) resulted in maximum spike length and minimum was with thiourea at 2.0% (54.42 cm). Vase life was recorded maximum with treatment of GA₃ at 150 ppm (11.23 days) while, minimum was observed with GA₃ at 100 ppm (9.90 days). This may be due to the increased photosynthetic and metabolic activity, which results in resulting in greater transport and utilization of photosynthesis products necessary for growth and development of a flower. These results are in line with the findings of Padmalatha *et al.*, 2014 [4], Kapri *et al.*, 2018 [2], Singh *et al.*, 2019 [11], Umrao *et al.*, 2007 [12].

There was a significant difference in length of florets (cm), number of florets opened in vase, spike length (cm), rachis

length (cm) and water uptake (ml) due to various corm sizes. However, these grades of corm failed to exert any significant effect on days to opening of florets (days), days to withering of florets (days), diameter of florets (cm), number of florets opened at a time and vase life (days). Early opening of 1st and 3rd floret was recorded with grade 1.0 cm (1.72, 2.68) while early opening of 5th floret was found in grade 1.5 cm (4.19). Early withering of 1st, 3rd and 5th floret was recorded with grade 1.0 cm (3.35, 4.03, 5.44) and late withering of 1st and 3rd floret was observed in grade 2.0 cm (3.56, 4.41). While, late withering of 5th floret was recorded with grade 2.5 cm (5.75). In case of parameter, diameter of 1st, 3rd and 5th floret, maximum diameter was recorded with grade 2.0 (8.18 cm, 8.00 cm and 7.87 cm). While, minimum diameter of 1st and 3rd floret was obtained with grade 1.0 cm (7.70 cm and 7.37 cm) and minimum diameter of 5th floret was with grade 1.5 cm (7.37 cm). Among various grades, maximum length of 1st and 5th floret was observed with grade 2.5 cm (10.32 cm and 9.91 cm) and minimum was with grade 1.0 cm (9.64 cm and 9.20 cm). While, maximum length of floret was recorded with grade 2.0 cm (10.20 cm) and minimum was with grade 1.0 cm (9.41 cm). Parameters such as number of florets opened in vase and spike length was found to be maximum with grade 2.0 cm (10.38 and 60.99 cm). While, minimum was obtained with grade 1.0 cm (9.60 and 54.85 cm). Number of florets opened at a time, rachis length (cm), water uptake (ml) and vase life (days) was found to be maximum with grade 2.5 cm (3.25, 40.56 cm, 14.70 ml and 10.68 days). It may be attributed to accumulation of higher amount of carbohydrates owing to larger size of corms (Joshi *et al.*, 2011) [1].

3.1 Interaction effect

The interaction between plant growth regulators and corm size was found to be significant in spike length (cm), rachis length (cm) and water uptake (ml) and non-significant in days to opening of florets (days), days to withering of florets (days), diameter of florets (cm), length of floret (cm), number of florets opened in vase, number of florets opened at a time and vase life (days). Early opening of 1st floret was recorded with control × 1.0 cm (1.44 days) while late opening was observed with GA₃ 50 ppm × 2.5 cm (2.55 days). Early opening of 3rd floret was recorded with thiourea 0.5% × 1.5 cm (2.22 days), thiourea 0.5% × 2.0 cm (2.22 days), thiourea 0.5% × 2.5 cm (2.22 days), thiourea 1.5% × 1.5 cm (2.22 days) while early opening of 5th floret was observed with GA₃ 150 ppm × 2.5 cm (3.44 days). Late withering of 1st and 3rd floret was recorded with GA₃ 50 ppm × 1.5 cm (4.00 days and 5.33 days). While, interaction of thiourea 0.5% × 2.5 cm (6.66 days) recorded late withering of 5th floret. Maximum diameter of 1st floret was found in thiourea 0.5% × 2.0 cm (9.23 cm) while minimum was in GA₃ 150 ppm × 1.0 cm (7.11 cm). In case of parameter diameter of 3rd and 5th floret, maximum was recorded with thiourea 1.5% × 2.5 cm (8.49 cm and 8.76 cm) whereas, minimum was in control × 1.5 cm (6.58 cm and 6.20 cm). Maximum length of 1st and 5th floret was recorded with thiourea 0.5% × 2.5 cm (10.67 cm and 10.77 cm) and length of the 3rd floret was maximum with thiourea 0.5% × 2.0 cm (10.56 cm). Number of florets opened in vase was found to be maximum in thiourea 0.5% × 2.5 cm (11.000) while minimum was in GA₃ 100 ppm × 1.0 cm (9.13) and GA₃ 150 ppm × 1.0 cm (9.13). Maximum number of florets opened at a time was recorded with GA₃ 100 ppm × 2.5 cm (3.45) and minimum was observed with thiourea 0.5% × 1.5 cm (2.78).

Significantly maximum spike length was observed with GA₃ 150 ppm × 2.0 cm (64.39 cm) which was statistically at par with thiourea 0.5% × 1.5 cm (63.87 cm) and minimum was in thiourea 2.0% × 1.5 cm (48.70 cm). In case of parameter rachis length, maximum was found in case of GA₃ 100 ppm × 2.5 cm (43.48 cm) and minimum was found in case of control × 1.0 cm (25.47 cm). Significantly maximum water uptake was found in case of thiourea 0.5% × 2.5 cm (18.89 ml) which

was statistically at par with GA₃ 100 ppm × 1.0 cm (15.89 ml) and thiourea 2.0% × 2.5 cm (15.78 ml) and minimum was found in thiourea 2.0% × 2.0 cm (9.11 ml). Maximum vase life was recorded with GA₃ 50 ppm × 2.5 cm (12.72 days) and minimum was observed with thiourea 0.5% × 2.5 cm (8.55 days). These results corroborated with the findings of Kumar and Gupta, 2014 [3], Padmalatha *et al.*, 2014 [4], Sarkar *et al.*, 2014 [7].

Table 1: Effect of growth regulators and corm size on post-harvest parameters of gladiolus

Treatments	Days to opening of floret (days)			Days to withering of floret (days)		
	1st	3rd	5th	1st	3rd	5th
Control	1.61	2.53	3.86	3.25	3.81	5.00
Thiourea 0.5%	1.70	2.25	4.56	3.22	4.03	5.86
Thiourea 1.5%	1.95	3.17	4.47	3.20	4.53	5.81
Thiourea 2.0%	1.89	2.88	4.44	3.56	4.36	5.83
GA ₃ 50 ppm	2.19	3.42	4.56	3.56	4.72	5.92
GA ₃ 100 ppm	1.92	2.92	4.33	3.75	4.50	5.53
GA ₃ 150 ppm	1.67	2.58	3.86	3.61	4.03	5.08
CD at 5%	0.25	0.48	0.47	0.32	0.41	0.47
Grade 1.0 cm	1.72	2.68	4.21	3.35	4.03	5.44
Grade 1.5 cm	1.78	2.81	4.19	3.46	4.40	5.46
Grade 2.0 cm	1.94	2.92	4.41	3.56	4.41	5.65
Grade 2.5 cm	1.95	2.87	4.38	3.43	4.29	5.75
CD at 5%	NS	NS	NS	NS	NS	NS
Control × 1.0 cm	1.44	2.44	3.67	3.00	3.78	4.89
Control × 1.5 cm	1.55	2.45	3.78	3.11	3.56	4.89
Control × 2.0 cm	1.89	2.55	4.11	3.44	4.11	5.22
Control × 2.5 cm	1.55	2.67	3.89	3.45	3.78	5.00
Thiourea 0.5% × 1.0 cm	1.67	2.33	4.44	3.33	3.56	5.78
Thiourea 0.5% × 1.5 cm	1.78	2.22	4.22	3.11	4.44	5.33
Thiourea 0.5% × 2.0 cm	1.78	2.22	4.78	3.45	4.22	5.67
Thiourea 0.5% × 2.5 cm	1.56	2.22	4.78	3.00	3.89	6.66
Thiourea 1.5% × 1.0 cm	2.00	3.33	4.44	3.44	4.33	5.78
Thiourea 1.5% × 1.5 cm	1.78	2.22	3.67	2.89	3.67	4.89
Thiourea 1.5% × 2.0 cm	1.89	3.44	4.67	3.34	5.00	6.11
Thiourea 1.5% × 2.5 cm	2.11	3.66	5.11	3.11	5.11	6.45
Thiourea 2.0% × 1.0 cm	1.89	2.55	4.33	3.45	4.00	5.56
Thiourea 2.0% × 1.5 cm	1.67	3.00	4.22	3.78	4.56	5.78
Thiourea 2.0% × 2.0 cm	2.00	3.22	4.67	3.45	4.56	6.11
Thiourea 2.0% × 2.5 cm	2.00	2.74	4.55	3.56	4.33	5.89
GA ₃ 50 ppm × 1.0 cm	1.78	2.89	4.00	3.22	4.56	5.33
GA ₃ 50 ppm × 1.5 cm	2.33	4.11	5.00	4.00	5.33	6.33
GA ₃ 50 ppm × 2.0 cm	2.11	3.22	4.56	3.45	4.33	5.89
GA ₃ 50 ppm × 2.5 cm	2.55	3.44	4.67	3.56	4.67	6.11
GA ₃ 100 ppm × 1.0 cm	1.67	2.89	4.67	3.56	4.33	5.78
GA ₃ 100 ppm × 1.5 cm	1.78	2.89	4.22	3.78	4.56	5.67
GA ₃ 100 ppm × 2.0 cm	2.00	3.22	4.22	3.89	4.78	5.33
GA ₃ 100 ppm × 2.5 cm	2.22	2.66	4.22	3.78	4.34	5.33
GA ₃ 150 ppm × 1.0 cm	1.56	2.33	3.89	3.44	3.66	5.00
GA ₃ 150 ppm × 1.5 cm	1.56	2.78	4.22	3.56	4.67	5.33
GA ₃ 150 ppm × 2.0 cm	1.89	2.56	3.89	3.89	3.89	5.22
GA ₃ 150 ppm × 2.5 cm	1.67	2.66	3.44	3.56	3.89	4.78
CD at 5%	NS	NS	NS	NS	0.82	NS

Table 2: Effect of growth regulators and corm size on post-harvest parameters of gladiolus.

Treatments	Diameter of floret (cm)			Length of floret (cm)		
	1st	3rd	5th	1st	3rd	5th
Control	7.38	7.28	6.92	9.83	10.05	9.48
Thiourea 0.5%	8.24	7.67	7.85	10.44	10.08	10.07
Thiourea 1.5%	7.50	7.81	8.04	10.02	9.91	9.60
Thiourea 2.0%	7.98	7.80	7.46	9.98	9.71	9.47
GA ₃ 50 ppm	8.47	7.84	8.06	9.82	10.12	9.67
GA ₃ 100 ppm	8.19	7.92	7.49	10.08	10.00	9.49
GA ₃ 150 ppm	7.84	7.64	7.56	9.96	9.75	9.51
CD at 5%	NS	NS	0.63	NS	NS	NS
Grade 1.0 cm	7.70	7.37	7.55	9.64	9.41	9.20
Grade 1.5 cm	7.78	7.70	7.36	9.94	10.04	9.52
Grade 2.0 cm	8.18	8.00	7.87	10.18	10.20	9.83
Grade 2.5 cm	8.11	7.75	7.73	10.32	10.13	9.91
CD at 5%	7.13	7.67	6.88	9.85	9.56	8.15
Control × 1.0 cm	7.32	6.58	6.20	9.94	10.04	9.68
Control × 1.5 cm	7.59	7.58	7.53	9.73	10.38	9.78
Control × 2.0 cm	7.47	7.27	7.05	9.80	10.21	10.32
Control × 2.5 cm	NS	NS	NS	0.42	0.33	0.36
Thiourea 0.5% × 1.0 cm	8.72	7.80	7.97	10.28	9.22	9.23
Thiourea 0.5% × 1.5 cm	7.14	7.65	7.53	10.25	10.34	9.94
Thiourea 0.5% × 2.0 cm	9.23	7.76	7.90	10.57	10.56	10.33
Thiourea 0.5% × 2.5 cm	7.87	7.48	7.99	10.67	10.21	10.77
Thiourea 1.5% × 1.0 cm	6.98	6.81	7.95	9.62	9.54	9.38
Thiourea 1.5% × 1.5 cm	7.20	7.87	7.53	9.78	9.78	9.84
Thiourea 1.5% × 2.0 cm	7.64	8.07	7.92	10.06	10.00	9.45
Thiourea 1.5% × 2.5 cm	8.19	8.49	8.76	10.63	10.31	9.71
Thiourea 2.0% × 1.0 cm	8.20	8.00	7.98	9.43	9.58	9.93
Thiourea 2.0% × 1.5 cm	7.78	7.56	7.76	10.13	9.70	9.28
Thiourea 2.0% × 2.0 cm	7.52	8.04	7.27	10.14	9.91	9.35
Thiourea 2.0% × 2.5 cm	8.41	7.59	6.84	10.20	9.63	9.34
GA ₃ 50 ppm × 1.0 cm	8.04	7.14	7.67	8.45	9.75	9.42
GA ₃ 50 ppm × 1.5 cm	8.38	8.27	7.79	10.17	10.44	9.34
GA ₃ 50 ppm × 2.0 cm	8.61	8.20	8.65	10.38	10.14	9.97
GA ₃ 50 ppm × 2.5 cm	8.84	7.76	8.11	10.29	10.12	9.96
GA ₃ 100 ppm × 1.0 cm	7.70	6.88	6.70	9.67	9.34	9.10
GA ₃ 100 ppm × 1.5 cm	8.39	8.38	7.63	9.94	10.08	8.87
GA ₃ 100 ppm × 2.0 cm	8.71	8.47	8.09	10.34	10.25	9.98
GA ₃ 100 ppm × 2.5 cm	7.94	7.92	7.55	10.36	10.32	10.01
GA ₃ 150 ppm × 1.0 cm	7.11	7.32	7.67	10.15	8.87	9.17
GA ₃ 150 ppm × 1.5 cm	8.22	7.57	7.07	9.34	9.91	9.65
GA ₃ 150 ppm × 2.0 cm	7.97	7.91	7.73	10.05	10.13	9.95
GA ₃ 150 ppm × 2.5 cm	8.07	7.75	7.78	10.28	10.10	9.27
CD at 5%	NS	NS	NS	NS	NS	0.96

Table 3: Effect of growth regulators and corm size on post-harvest parameters of gladiolus

Treatments	Number of florets opened in vase	Number of florets opened at a time	Spike length (cm)	Rachis length (cm)	Water uptake (ml)	Vase life (days)
Control	9.97	3.14	57.03	34.37	14.03	10.15
Thiourea 0.5%	10.67	3.04	59.78	38.22	14.83	10.02
Thiourea 1.5%	9.97	3.15	60.94	35.62	11.94	10.52
Thiourea 2.0%	10.27	3.04	54.42	34.93	12.00	10.34
GA ₃ 50 ppm	10.07	3.22	55.60	37.90	12.50	10.86
GA ₃ 100 ppm	9.60	3.06	57.31	36.92	13.53	9.90
GA ₃ 150 ppm	10.18	3.15	56.55	37.27	13.50	11.23
CD at 5%	NS	NS	0.61	NS	1.68	NS
Grade 1.0 cm	9.60	3.07	54.85	30.99	12.49	10.20
Grade 1.5 cm	10.19	3.03	56.05	34.21	12.98	10.52
Grade 2.0 cm	10.38	3.11	60.99	40.09	12.59	10.33
Grade 2.5 cm	10.24	3.25	57.61	40.56	14.70	10.68
CD at 5%	0.45	NS	0.46	2.29	1.27	NS
Control × 1.0 cm	9.67	3.17	56.10	25.47	13.55	9.00
Control × 1.5 cm	10.40	2.89	53.13	31.55	14.22	11.40
Control × 2.0 cm	10.33	3.33	61.77	41.52	13.67	10.33
Control × 2.5 cm	9.47	3.17	57.10	38.97	14.67	10.87

Thiourea 0.5% × 1.0 cm	10.33	2.95	56.20	35.13	11.33	9.87
Thiourea 0.5% × 1.5 cm	10.53	2.78	63.87	36.63	15.33	11.27
Thiourea 0.5% × 2.0 cm	10.80	3.11	63.07	40.89	13.78	10.40
Thiourea 0.5% × 2.5 cm	11.00	3.33	55.97	40.21	18.89	8.55
Thiourea 1.5% × 1.0 cm	9.27	3.17	56.62	33.73	9.33	9.98
Thiourea 1.5% × 1.5 cm	10.53	3.11	61.80	34.08	9.33	10.73
Thiourea 1.5% × 2.0 cm	9.87	3.11	62.30	36.64	14.00	10.40
Thiourea 1.5% × 2.5 cm	10.20	3.22	63.02	38.02	15.11	11.00
Thiourea 2.0% × 1.0 cm	9.67	3.11	53.23	32.92	12.67	11.18
Thiourea 2.0% × 1.5 cm	10.00	3.00	48.70	26.93	10.44	10.68
Thiourea 2.0% × 2.0 cm	10.73	3.06	55.30	38.95	9.11	9.87
Thiourea 2.0% × 2.5 cm	10.67	3.00	60.47	40.92	15.78	9.64
GA ₃ 50 ppm × 1.0 cm	10.00	3.00	59.00	33.62	12.22	10.00
GA ₃ 50 ppm × 1.5 cm	10.07	3.28	57.17	36.08	13.78	10.60
GA ₃ 50 ppm × 2.0 cm	10.20	3.33	57.37	40.60	11.78	10.13
GA ₃ 50 ppm × 2.5 cm	10.00	3.28	48.88	41.30	12.22	12.72
GA ₃ 100 ppm × 1.0 cm	9.13	2.89	51.13	28.30	15.89	9.60
GA ₃ 100 ppm × 1.5 cm	9.27	3.11	58.97	36.40	13.78	9.61
GA ₃ 100 ppm × 2.0 cm	10.00	2.78	62.77	39.51	10.67	9.78
GA ₃ 100 ppm × 2.5 cm	10.00	3.45	56.37	43.48	13.78	10.60
GA ₃ 150 ppm × 1.0 cm	9.13	3.22	51.63	27.77	12.44	11.73
GA ₃ 150 ppm × 1.5 cm	10.53	3.06	48.70	37.80	14.00	10.40
GA ₃ 150 ppm × 2.0 cm	10.73	3.06	64.39	42.49	15.11	11.40
GA ₃ 150 ppm × 2.5 cm	10.33	3.28	61.48	41.00	12.44	11.39
CD at 5%	NS	NS	1.21	6.06	3.37	NS

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