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Studies of gamma irradiation on corms growth characters in gladiolus (*Gladiolus grandiflorus* L.)

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Abstract
The present investigation was undertaken entitled studies of gamma irradiation on corms growth characters in gladiolus. The experiment was carried out at Horticulture Research Farm, Department of Floriculture and Landscape Architecture, IGKV, Raipur, India during winter of 2016. To conduct field experiment three cultivars of gladiolus namely Candyman, American Beauty, Her Majesty were planted in the field at 30 × 20 cm distance. Experiment was laid out in Factorial randomized block design with three replications. Dormant corms of gladiolus were treated with 0, 15, 30, 45 and 60 Gy of gamma rays and evaluated for various corms growth characters. In this experiment different corms growth characters *i.e.* weight of corms, weight of cormels, numbers of corms, number of cormels and corms diameter were studied. Data revealed that the lower doses of gamma rays 15 Gy promote and enhance the weight, diameter, and numbers of corms and cormels, while higher doses of all mutagens were detrimental for growth, development and viability of corms.

Keywords: Gamma, grays, gladiolus grandiflorus, corms, cormels

Introduction
Gladiolus (*Gladiolus grandiflorus* L.) is very popular bulbous flowering plant, commonly known as Sword lily or Corn flag belonging to the family Iradiceae. The name gladiolus was derived from the Latin word “gladiolus” means sword and hence it is often called as “sword lily” owing to the shape of its leaves. Gladiolus is an important commercial cut flower of the trade having extensive demand throughout the world due to its numerous colours, shapes and prolonged vase life. Gladiolus is grown as flower bed in gardens and used in floral arrangements for interior decoration as well as making high quality bouquets (Lepcha *et al.*, 2007) [8]. It is native of South Africa and Asia Minor, occupying eight position international floriculture trade (Bhande *et al.*, 2015) [1]. Gladiolus is propagated mainly through vegetative reproduction of corms and cormels. Gladiolus is highly heterozygous in its genetic constitution which makes it promising test material for inducing physical mutagenesis. Gladiolus is grown vegetatively throughout India to perfection and so mutation breeding offers great potentialities as the mutated part can be conveniently perpetuated by vegetative means resulting in the development of new forms.

Material and method
The experiment was conducted at Horticultural Research Cum Instructional Farm, Department of Floriculture and Landscape Architecture, Indira Gandhi Krishi Vishvidyalaya, Raipur, India 2016. The experimental material comprised of the uniform sized corms of the three gladiolus varieties *viz;* Candyman, American Beauty and Her Majesty. These corms were exposed to 15, 30, 45, 60 Gy of gamma rays doses at gamma chamber facility of BARC, Mumbai.

The gamma irradiated corms along with the untreated corms were planted. The experiment was laid out in a Factorial Randomized Block Design. Forty five plots of 1.3 m x 1.0 m were laid out to accommodate the fifteen treatments replicated three times. The corms were planted at a spacing of 30 cm x 20 cm at a depth of 5-7 cm. All the recommended package of practices was followed throughout the crop duration. The data were recorded on croms growth parameters *viz.*, number of corms, number of cormels, weight of corms, weight of cormels, diameter of corms and statistically analyzed.

Result and Discussion

Number of corms plant^{-1}

The number of corms was significantly influenced by gladiolus varieties. Significantly maximum number of corms per plant (3.27) was noticed in variety American Beauty followed by Candyman and Her Majesty (1.96 and 1.72 corms respectively). The data on number of corms per plant did not have any significant difference by gamma radiation treatments and interaction. Similar results were reported by Srivastava *et al.* (2007) [14], Singh and Kumar (2013) [12] and Patil (2014) [11], who noted that number of corms per plant was adversely affected by gamma radiations at higher level but proved beneficial at lower levels in vM1 generations. The change in number of corms per plant may be attributed to the fact that due to irradiation treatment, physiology of plant at higher doses was disturbed which affected photosynthesis and root system resulting in the improper growth of the plants by hampering root system (Grabowska and Mynett, 1970) [5].

Number of cormels plant^{-1}

The number of cormels per plant was significantly influenced by gladiolus varieties and variety Candyman was noticed maximum number of cormels per plant (47.93) which was having *at par* effect with variety Her Majesty (42.81) while, minimum number of cormels per plant was recorded in variety American Beauty (36.26). In case of gamma irradiation control was recorded significantly maximum number of cormels per plant (49.20) which was *at par* with 15 Gy (43.89) but significantly superior to 30 Gy (42.02), 45 Gy (39.51) and 60 Gy (37.05). An interaction of varieties and gamma radiation was found to be non significant for number of cormels per plant. The finding are in confirmatory with the results of Karki (2008) [6], Singh and Kumar (2013) [12] and Sisodia and Singh (2015) [13] who noted that more cormels were produced with lower doses in comparison to higher irradiation doses. Minimum number of cormels at higher doses may be due to the reduced vegetative growth as a result of gamma treatment. The reduction in photosynthethic organs *i.e.* leaves might be the reason for production of less photosynthets which further cased reduction in cormel numbers (Kumari and Kumar, 2015) [7].

Weight of corms plant^{-1}

The weight of corms per plant was influenced by gladiolus varieties. Candyman was found to be significantly superior with respect to weight of corms per plant (52.49 g) over variety Her Majesty (29.07 g) and variety American Beauty (25.30 g) which were *at par*. The weight of corms per plant was found to be not significantly influenced by gamma radiation treatments and interaction. Dhara and Bhattacharya (1972) [3] they found that the size, weight and number of corms were reduced at higher doses of gamma rays and concluded that higher doses were dangerous for corm production and had adverse effect on sprouting as well as survival percent and viability of corms. It may be due to ionization effect of gamma rays in gladiolus affected plant chromosome structure and cell division, which suppress growth or create lethal effect on the cells of the plant and consequently lead to delay growth of plant, photosynthates production and accumulation in sink (Dobanda, 2004) [4].

Weight of cormels plant^{-1}

Candyman was found to have significantly maximum weight of cormels per plant (29.47g) followed by variety Her Majesty (18.44 g) and variety American Beauty (16.64 g), this two having *at par* values. The weight of cormels per plant was found to be not significantly influenced by gamma radiation treatments and interaction. Similar results were reported by Srivastava *et al.* (2007) [14], Patil (2014) [11] and Yadav *et al.* (2016) [15] who reported that minimum weight of cormels per plant at higher doses may be due to reduced vegetative growth thus affect and decreased accumulation of photosynthates in sink as a result of lethal effect of gamma rays treatments in gladiolus. These results substantiate the finding of Mubarok *et al.* (2011) [10] who also reported reduction in bulb charters after gamma irradiation in tuberose.

Table 1: Mean effect of Gamma Irradiation on corms growth

Varieties	Number of comrs^{-1}	Number of cormels^{-1}	Weight of comrs^{-1}(g)	Weight of comels^{-1}(g)	Diameter of comrs^{-1}(cm)
V_1	1.96	47.93	52.49	29.47	5.94
V_2	3.27	36.26	25.30	16.64	4.33
V_3	1.72	42.81	29.07	18.44	3.93
S.E m±	0.12	1.95	1.42	1.01	0.11
CD at 5%	0.34	5.96	4.12	2.95	0.33
	Radiation doses				
I_0	2.36	49.20	38.67	21.93	5.17
I_1	2.38	43.89	35.11	23.93	4.87
I_2	2.49	42.02	37.19	19.13	4.68
I_3	2.22	39.51	33.96	21.27	4.58
I_4	2.13	37.05	33.18	21.68	4.36
S.E m±	0.15	2.52	1.83	1.31	0.14
CD at 5%	NS	7.34	NS	NS	0.42
	Interaction				
V_1I_0	2.00	52.13	55.13	29.07	6.77
V_1I_1	2.07	54.20	54.13	32.07	5.93
V_1I_2	2.00	48.80	53.63	25.00	5.69
V_1I_3	1.87	40.33	50.57	29.40	5.70
V_1I_4	1.87	44.20	49.00	31.80	5.60

V_2I_0	3.20	43.00	31.07	21.67	4.81
V_2I_1	3.53	33.13	24.67	17.07	4.38
V_2I_2	3.60	35.27	23.33	14.67	4.25
V_2I_3	3.13	37.13	24.23	16.13	4.17
V_2I_4	2.87	32.26	23.20	13.67	4.03
V_3I_0	1.87	52.47	29.80	15.07	3.93
V_3I_1	1.53	43.89	26.53	21.53	4.30
V_3I_2	1.87	42.02	43.60	17.73	4.09
V_3I_3	1.67	39.51	27.07	18.27	3.89
V_3I_4	1.67	37.05	27.37	19.60	3.45
S.E m±	0.26	4.36	3.14	2.26	0.25
CD at 5%	NS	NS	NS	NS	NS
C.V. (%)	19.50	17.86	15.38	18.22	9.14

Diameter of corms plant^{-1}

Candyman was found to have significantly maximum diameter of corms per plant (5.93 cm) followed by variety American Beauty (4.33 cm) and variety Her Majesty (3.99 cm). Among the gamma radiation doses control was recorded maximum diameter of corms (5.17 cm) which was *at par* with 15 Gy (4.87 cm) while minimum diameter of corms was recorded at 60 Gy (4.36 cm).An interaction of varieties and gamma radiation was found to be non significant for diameter of corms per plant. Similarly Patil (2014) [11] also reported that gamma radiations had both positive and negative effect on weight, viability, number and diameter of corms and cormels. Dhaduk *et al.* (1992) [2] and Misra *et al.* (1977) [9] they also reported that reduction in diameter of corms could be because of the ill-effects of gamma rays treatments, as it hampered root system and cessation of growth of the auxiliary buds present on the corm by the inactivation of enzymes and hormones.

References

1. Bhande MH, Chopde N, Wasnik P, Warkade VP. Responce of *Gladiolus* Var. American Beauty to Spacing and Corm size. Plant Archive. 2015; 15(2):837-840.
2. Dhaduk BK. Induction of mutation in garden gladiolus (*Gladiolus* L.) by gamma rays. Ph.D. Thesis. Submitted to IARI, New Delhi, 1992.
3. Dhara J, Bhattacharya NK. Effect of gamma irradiation on *Gladiolus* spp. Proc. 59th Indian Science Congress Assocation, Calcutta, 1972, pp. 1-4.
4. Dobanda E. Evaluation of variability induced by gamma radiation on quantitative and qualitative traits in gladiolus. Cercetari de Genetica Vegetala si Animala. 2004; 8:149-156.
5. Grabowska B, Mynett K. Induction of changes in garden gladiolus (*Gladiolus hybrid*. Hort.) Under the influences of gamma rays 60Co (Polish). Biul IHAR. 1970; 1(2):85-88.
6. Karki K. Gamma irradiation studies in gladiolus (*Gladiolus grandiflorus* L.) Ph. D Thesis, G.B. Pant University of Agriculture and Technology, Pantnagar, 2008.
7. Kumari K, Kumar S. Effect of gamma irradiation on vegetative and propagule character in gladiolus and induction of homeotic mutants. International Journals of Agriculture, Environment and Biotechnolog. 2015; 8(2):412-422.
8. Lepcha B, Nautial MC, Rao VK. Variability studies in gladiolus under midhills condition of Uttarakhand. Journal of Ornamental Horticulture. 2007; 10(3):169-172.
9. Misra RL. Induction of mutations in gladiolus. Plant Science. 1977; 9:99-100.
10. Mubarok S, Suminar E, Murgayanti D. Uji Effectivitas sinar gamma terhadap karakter pertumbuhan sedapmalam. Journal of Agrivigour. 2011; 11(1):25-33.
11. Patil DS. Induction of mutation in commercial varieties of gladiolus using physical mutagen CO-60 gamma rays. International Journals of Advanced Research in Biologycal Sciences. 2014; 1(6):15-20.
12. Singh AK, Kumar A. Studies of gamma irradiation on morphological characters in gladiolus. Asian Journal of Horticulture. 2013; 8:299-303.
13. Sisodia A, Singh AK. Studies on gamma ray induced mutants in gladiolus. Indian Journal of Agricultural Sciences. 2015; 85(1):79-86.
14. Srivastava P, Singh RP, Tripathi VR. Response of gamma radiation on vegetative and floral characters of gladiolus. Asian Journal of Horticulture. 2007; 10(2):135-136.
15. Yadav M, Rajput V, Sharma RS, Sehrawat SR, Ravika. Influence of gamma radiation and EMS on morphological charaterstics of gladiolus cv. Pink Beauty. The Asian Journal of Horticulture. 2016; 11(1):114-118.