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Performance of Growth, flowering and yield response of gladiolus on rice bund condition in Chhattisgarh plains

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Abstract
The main objective of investigation was to utilize the rice bunds through selection of best crops and evaluate the suitable flower crops under bund condition. The main objective of this investigation was selection of superior variety of Gladiolus to utilize the rice bund. The present investigation was undertaken in the field of Krishi Vigyan Kendra Rajnandgaon, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G) during winter season of 2018-20. The experiment was carried out in Randomized Block Design with four replications. The treatment comprised of four varieties of Gladiolus. Under this investigation the growth attributes plant height and number of leaves were shown significantly maximum in variety red Majesty but length of leaves was shown in variety Summer Sunshine and in flowering characters Candyman variety shown maximum number of florets and weight of spikes gram per plant and maximum number of spikes per plant was noted in American Beauty statistically superior from others. Yield attributing parameters number of corms and number of spikes per hectare were found maximum in Candyman and America Beauty respectively.

Keywords: Flowering characters. Growth characters yield characters, Gladiolus, Rice bund

Introduction
Rice is staple food of the state and it is grown in 3.7 million ha. area, which is 68.8% of the total agricultural land of the state *i.e.,* state is known as a "Rice bowl" of central India but productivity is low in Chhattisgarh due to more than 55.40% farmers are marginal and 21.96% are small farmers (Anonymous, 2018) [1-2], they have very small and scattered land holdings. These small holdings are further surrounded by med (bund) and it occupies a significant portion of the arable rice production area it plays a critical role in retaining moisture/water on sloped ground, providing access to fields, and delineating ownership but bunds may, serve as sources of weed propagules if poorly managed, on the other hand, well-managed bunds may provide a source of income through the production of cash crops. The estimated area of bund is approximately 3, 79, 250 ha. This area is almost wasted which reduces the net cropped area which further reduce the average productivity of the State (Singh *et al.* 2016). To overcome aforesaid problems selection of suitable remunerative Gladiolus variety is for the state, the flower crops especially Gladiolus is most suitable crops because demand of the flower, during the winter and climatic parameters are ideal for its cultivation thus providing a good option to grow Gladiolus on bunds.
Therefore, Gladiolus should be evaluated under rice bund conditions on different parameters and recommended to farmers for adopting flower on bund plantation technology to increase the production level of area. Keeping in view, a study was conducted to assess the performance of four Gladiolus varieties under rice bund condition of Chhattisgarh plains.
The demand for flowers is increasing tremendously with the changing scenario of progressive economy, changing life style and changes in social values of people of the country. Gladiolus (*Gladiolus grandiflora L.*) the queen of bulbous flowers, belonging to the family Iridaceae and subfamily Ixoideae, is one of the most popular ornamental bulbous plants grown commercially for its fascinating flowers in many parts of the world. It has wide range in spike shape, colour and colour combinations and also due to its long vase-life and economic value makes it very popular for floral arrangement (Negi *et al.,* 1986) [14]. In our country (12,850 ha.) area and (319.12 thousand MT) production as a loose and cut flower are obtained. In Chhattisgarh state 2224 ha. area is covered by Gladiolus cultivation with (6693 MT) production (Anonymous 2018) [1-2].

The situation of Floriculture crops in Chhattisgarh state has been taken up on area in about 13200 ha with a production of 47500 MT (mainly loose flowers) with productivity of 3.60 MT/ha. With sixth rank, contribution of this state in the national floriculture (loose flowers) is about 8.15% (Anonymous 2018) [1-2] whereas, marigold production is 33288 MT and area is 4692 ha in the year of 2017-18 (Anonymous 2017-18) [1, 2].

Materials and Methods

The present investigation was conducted during winter season of 2018-19 and 2019-20 at Krishi Vigyan Kendra Rajnandgaon. Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.), Chhattisgarh is situated between 17°14N 24°45'N latitude and 79°30E 84°15'E longitude. Rajnandgaon situated on the bank of Shivnath River and falls between 21°06'N latitude and 81°02' E longitude at an altitude of 307 meter above the mean sea level. It having tropical and dry spell throughout the year. The materials utilized for the present study consisted of four varieties American Beauty, Candyman, Summer Sunshine and Red Majesty.

The experimental field was laid out in Randomized Block Design with four replications. The experimental field was rice bund area; the experimental field was Rice bund area, ploughed well with the help of mattop and spade. Ploughing was done by labour and followed by removal of crop residues and grasses from the field. The experiment was laid out in the field as per layout plan with the help of measuring tape, rope and bamboo pegs and then ridges and furrows was prepared between (45 cm) distance of row to row and used (30-micron) poly mulching with drip line.

During the Gladiolus experiment, recommended doses of nitrogen phosphorus and potassium (gm m^2) (30, 20, 20) respectively, and FYM (kg m^2) (5.0) mixed with soil as a basal dose at the time of field preparation and also applied N @ of (30 gm m^2) at six leaves stage through drip irrigation. At the time of sowing nitrogen was administered in two doses, divided into three and six leaf phases as recommended. Farm yard manure was administered at the time of field preparation @ of (5 kg m^2).

Observations on important characters *viz*., plant height (cm), length of leaves (cm), number of leaves (No.) and flowering attributes; Number of days for first spikes emergence (Days), Number of days for 50% flowering (Days), Number of spikes per plant (No.) and per hectare, Number of florets per spikes and for yield weight of pr spike, number of spikes per plant, number of corms per plant and weight of corms per plant and per hectare.

Treatment details

Treatment	Name of variety
GV_1	American Beauty
GV_2	Candyman
GV_3	Summer Sunshine
GV_4	Red Majesty

Results and Discussion

The analysis of variance revealed that all the genotypes differed significantly from each other for the growth attributes. The mean performances of the genotypes for growth, flowering and yield attributes have been presented in (Table No.1-4).

Gladiolus Growth parameters

Plant height (cm): Plant height of different varieties of Gladiolus varied among each other significantly. It was observed maximum with Red Majesty and *at par* with Summer Sunshine. In contrast of, the minimum was observed with variety American Beauty (Table No.1). The significant differences in plant height among various varieties due to the hereditary trait and favorable climatic conditions particularly optimum temperature, humidity and photoperiod during growing period which provided ideal condition for photosynthesis resulted in the maximum growth for plant height. Similar findings were reported by Tirkey *et al.,* (2019) [24] in Gladiolus.

Total number of leaves

Total number of leaves was found maximum with variety Red Majesty it was *at par* with variety Candyman, whereas minimum it was calculated with variety Summer Sunshine on pooled basis (Table No.1.). The production of more number of leaves in Red Majesty and Summer Sunshine varieties was due to increased plant height. A similar finding was observed by Padma and Kumar (2004) [15], Poornima *et al.,* (2006) [16] in China aster, and Kumar *et al.,* (2007) [8] in Gladiolus.

Plate 1: Measurement of length of leaves of Gladiolus

Plate 2: Plant height of Gladiolus

Length of leaves (cm.)

Length of leaves of Gladiolus was recorded maximum with variety Summer Sunshine which was superior from others while, minimum was found with American Beauty on pooled basis (Table No.1). This type of variation definitely due to variation in genotypes and prevailed environmental condition in Gladiolus. Similar results were reported by Zubair *et al.*, (2013) [27].

Flowering parameters

Number of spikes plant^{-1} (No.), total number of florets spike^{-1} (No.), first emergence of spike (Days) and weight of spikes plant^{-1} (gm) all parameters were recorded at (60 DAT) with Gladiolus during two years (Table No.2).

Number of spikes plant^{-1} (No.)

It is evidence from the data present (Table No.2) that maximum significant difference of total number of spikes per plant was noted with variety American Beauty, it was superior with others. On the contrast, the minimum was noted with Red Majesty on pooled basis. More number of spikes per plant produced with American Beauty due to this variety produced more number of corms per plant. Genetic constitution of genotypes attributes also correlated with growing environment conditions promoted to produce more number of spikes per plant. A similar result was also reported in Gladiolus by Gupta *et al.* (2002) [5] and Kumari *et al.*, (2011) [11].

Plate 3: Number of spikes plant^{-1} in Gladiolus

Total number of florets spike-1 (No.)

Total number of florets per spike was found maximum with Candyman variety of Gladiolus which was superior then others. Hence; these were regarded as suitable for bouquet making. On the contrary, minimum was found with variety American Beauty on pooled basis. The variation in number of florets per spike due to hereditary traits of the genotypes and it is directly correlated with favorable climatic conditions *viz*. temperature, humidity and photo period during the growth period. The results were in accordance with the findings of Rani and Singh (2005).

First emergence of spike (Days)

The varieties which producing earliest spikes are always in demand for commercial cultivation. In this experiment the days required for spike emergence was ranged between (49.60 to 67.80 days). In Gladiolus earliest emergence of spike was appeared with Summer Sunshine and maximum time was taken by Candyman, it was *at par* with Red Majesty on pooled basis. The variation in the response of varieties on spike emergence due to genetic constitution of the varieties and environmental conditions, during the growing period, *viz*. higher temperature and long day lengths during end of November to first week of December. These findings also collaborate with the results of Rani and Singh (2005) [19] in Gladiolus, Zubair *et al.*, (2006) [26], Saleem *et al.*, (2013) and Kadam *et al.* (2020).

Weight of spikes plant^{-1} (gm)

In this experiment significantly maximum weight of spikes was recorded with variety Candyman (48.40) which was superior from others. On contrast of, the minimum was noted with variety American Beauty (31.70). Minimum tillage on Rice bunds soil, which causes maximum Dehydrogenase activity of soil, due to this, increased the number of agricultural beneficial microorganisms in bund soil. Which boost the plant growth and development, resulted reserved higher amount of stored food. Similar work reported by Mukhopadhyay and Yadav (1984) [13], Bharadawaj *et al*., (2014) and Thakur *et al.* (2015) [23] in Gladiolus.

Yield parameters

The findings on number of corms (plant^{-1} and ha^{-1}) was recorded at 60 to 90 DAP with Gladiolus during two years (Table No. 3 and graphically shown in Fig. 1.1 to 1.4.).

Number of corms plant^{-1} and ha^{-1} (No.)

In Gladiolus significantly maximum number of corms per plant observed with variety American Beauty (2.70) and it was at par with Summer Sunshine (2.50) and Red Majesty (2.40). On contrast of, the minimum was obtained with variety Candyman (1.50) on pooled basis.

Maximum number of corms ha^{-1} was recorded significantly with variety American Beauty (16843.80) which was at par with Summer Sunshine (15562.50) and Red Majesty (14843.80) however; minimum number of corms ha^{-1} was recorded with Candyman variety (9289.10) on pooled basis. (Table No. 3 and Fig. No. 1.1 to 1.2). This was due to having more number of spikes per plant in American Beauty therefore more number of corms obtained. Similar finding was reported in Gladiolus by Kumar (2009) [9].

Weight of corms plant^{-1} (gm)

Maximum weight of corms was observed significantly with variety Candyman (34.90) due to large size of corms found, it was superior then others. On contrast of, the minimum was recorded with variety American Beauty (18.10). (Table no. 3 and Fig. no. 1.1). This was due to more DHA level of bund soil increased the mineralization of nutrients therefore higher amount of stored food reserves in large corms with wider plant spacing. A similar result was obtained by Mukhopadhyay & Yadav (1984) [13] and Methela *et al.* (2019) [12].

Yield of corms ha^{-1} (kg)

Yield of corms was maximum with Candyman variety of Gladiolus (218.50) it was superior with others. In contrary, the minimum was obtained with variety American Beauty (102.10) on pooled basis (Table no. 3 and Fig. no. 1.2). In Gladiolus corm production directly depends on highest corm weight and corm size and wider spacing at the time of planting. Similar work was reported by Saini *et al.* (1991) [21], Rahul *et al.* (2012) [17] in Gladiolus.

Number of spikes ha^{-1} (No.)

Total number of spikes was recorded significantly maximum with variety American Beauty (11882.80) which was superior with others. On contrast the minimum was recorded with variety Red Majesty (7242.20) (Table no. 4 and Fig. 1.5). In Gladiolus number of shoots produced directly depends on number of corm means more number of corms produced more number of spikes therefore American Beauty produced more number of spikes. Similar work was reported by Ramachandrudu & Thangam (2008) [18], Kishan (2010) [7].

Yield of spikes ha^{-1} (kg)

Maximum yield of spikes was obtained with variety Candyman (431.90) which was superior with others, whereas Red Majesty variety was found minimum (312.90) on pooled basis (Table no. 4 and Fig. 1.6). This was due to higher amount of stored food reserves in large corms with wider plant spacing and sufficient amount of soil moisture content available in soil during the flowering. Similar work done by Mukhopadhyay and Yadav (1984) [13].

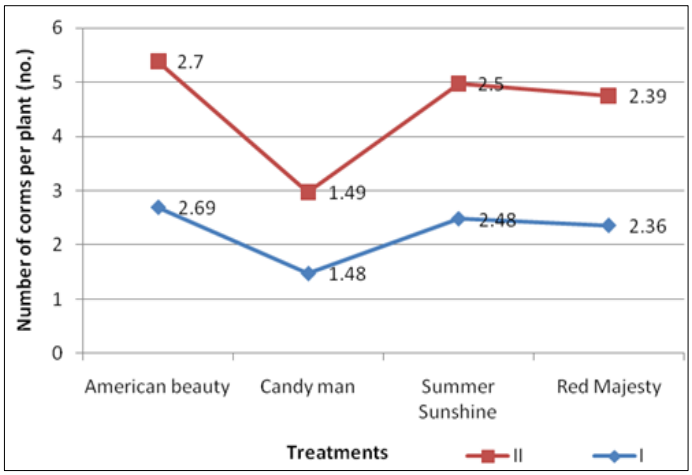

Fig 1: Number of corms plant^{-1} (No.)

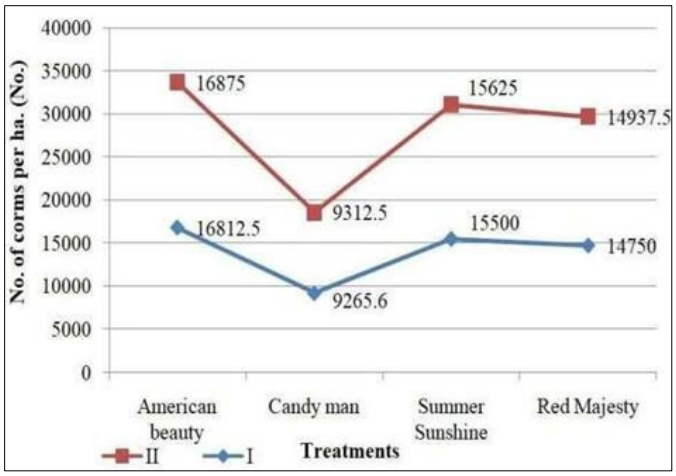

Fig 2: Number of corms ha^{-1} (No.)

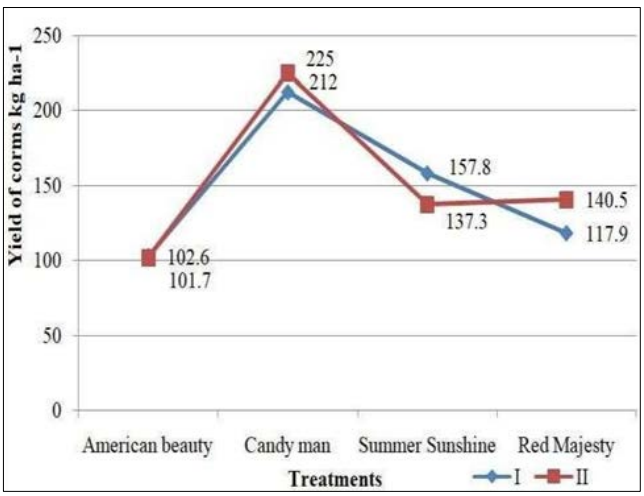

Fig 3: Yield of corms Kg ha^{-1}

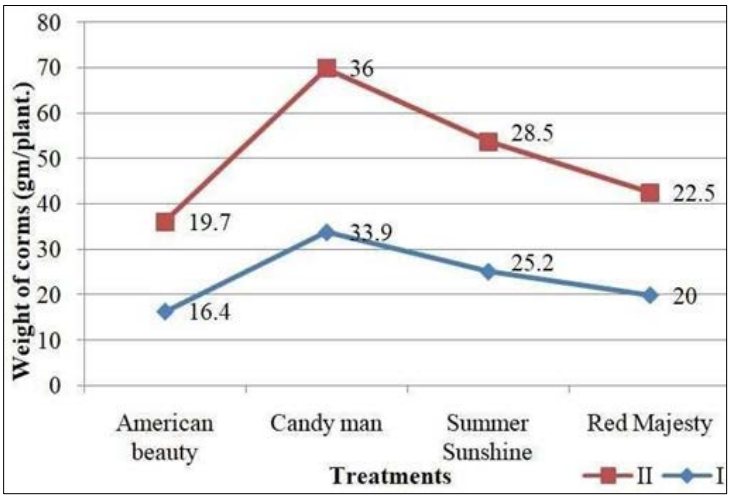

Fig 4: Yield of corms plant^{-1} (gm)

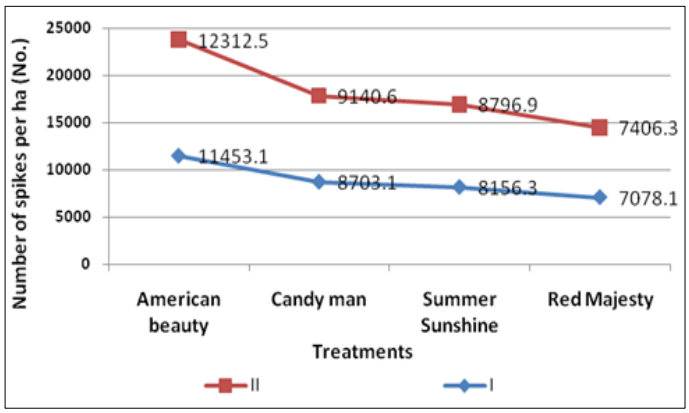

Fig 5: Number of spikes ha^{-1} (No.)

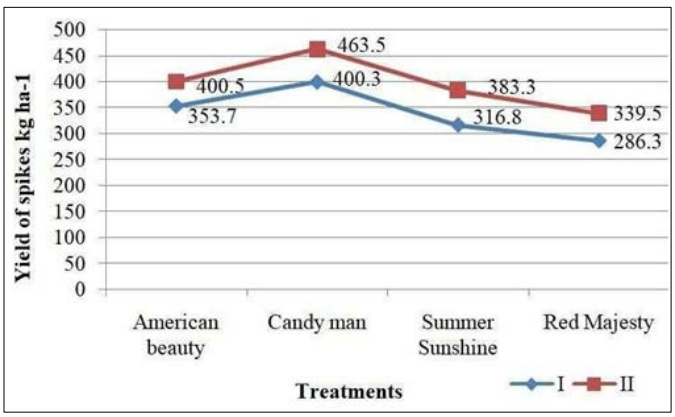

Fig 6: Yield of spikes ha^{-1} (kg)

Table 1: Growth performance of Gladiolus

Treatments	Plant height (cm)			Total number of leaves plant^{-1} (No.)			Length of leaves (cm)		
	I Year	II Year	Pooled	I Year	II Year	Pooled	I Year	II Year	Pooled
American Beauty	69.90	71.20	70.50	7.30	7.50	7.40	42.90	43.30	43.10
Candy man	77.30	78.0	77.70	8.00	8.30	8.10	51.90	52.30	52.10
Summer Sunshine	90.40	91.50	91.0	6.80	6.90	6.90	68.60	68.80	68.70
Red Majesty	88.70	93.40	91.10	8.10	9.30	8.70	53.10	53.50	53.30
SEm±	0.63	4.1	2.2	0.30	0.51	0.29	0.485	0.49	0.484
CD (P=0.05)	2.00	13.11	7.03	0.99	1.67	0.93	1.55	1.58	1.55

Table 2: Performance of Gladiolus for flowering parameters at 60 (DAP)

Treatments	Number of spikes plant^{-1} (No.)			Total number of florets spikes^{-1} (No.)			First emergence of spike (Days)			Weight of spikes (gm)		
	I Year	II Year	Pooled	I Year	II Year	Pooled	I Year	II Year	Pooled	I Year	II Year	Pooled
American Beauty	1.80	2.0	1.90	11.89	12.20	12.0	57.40	59.40	58.40	30.90	32.60	31.70
Candy man	1.40	1.50	1.40	16.65	17.30	17.0	67.20	68.30	67.80	46.0	50.80	48.40
Summer Sunshine	1.30	1.40	1.30	12.85	13.10	13.0	49.60	49.70	49.60	38.8	43.60	41.20
Red Majesty	1.10	1.20	1.20	13.95	14.20	14.0	66.80	67.20	67.00	40.6	45.60	43.10
SEm±	0.04	0.05	0.04	0.36	0.32	0.31	0.65	0.5	0.55	1.02	1.3	0.77
CD (P=0.05)	0.13	0.16	0.14	1.17	1.02	1.07	2.08	1.59	1.75	3.25	4.15	2.47

Table 3: Performance of yield attributing parameters (Corms) of Gladiolus

Treatments	Number of corms plant^{-1} (No.)			Number of corms ha^{-1} (No.)			Weight of corms plant^{-1} (gm)			Yield of corms ha^{-1} (kg)		
	I Year	II Year	Pooled	I Year	II Year	Pooled	I Year	II Year	Pooled	I Year	II Year	Pooled
American Beauty	2.690	2.70	2.70	16812.50	16875.00	16843.80	16.40	19.70	18.10	102.60	101.70	102.10
Candy man	1.480	1.49	1.50	9265.60	9312.50	9289.10	33.90	36.00	34.90	212.00	225.00	218.50
Summer Sunshine	2.48	2.50	2.50	15500.00	15625.0	15562.50	25.20	28.50	26.80	157.80	137.30	147.50
Red Majesty	2.36	2.39	2.40	14750.00	14937.50	14843.80	20.0	22.50	21.20	117.90	140.50	129.20
SEm±	0.24	0.26	0.32	1505.72	1633.07	1325.99	1.43	1.21	1.04	9.34	12.46	6.28
CD (P=0.05)	0.77	0.84	1.03	4817.07	5224.49	4242.09	4.59	3.89	3.33	29.90	39.88	20.11

Table 4: Performance of yield attributing parameters (Spikes) of Gladiolus

Treatments	Number of spikes ha^{-1} (No.)			Yield of spikes ha^{-1} (kg)		
	I Year	II Year	Pooled	I Year	II Year	Pooled
American Beauty	11453.10	12312.50	11882.80	353.70	400.50	377.10
Candyman	8703.10	9140.60	8921.90	400.30	463.50	431.90
Summer Sunshine	8156.30	8796.90	8476.60	316.80	383.30	350.0
Red Majesty	7078.10	7406.30	7242.20	286.30	339.50	312.90
SEm±	256.44	349.42	282.74	13.958	21.672	15.828
CD (P=0.05)	820.39	1117.87	904.54	44.655	69.333	50.66

Conclusion

The estimated area of bund is approximately 3, 79,250 ha. this area is almost wasted which reduces the net cropped area which further reduce the average productivity of the State (Singh *et al.* 2016). In some parts of Chhattisgarh bund is utilized by farmers for pulse production especially pigeon pea in kharif but pigeon pea is long duration crop generally damaged by monkey, infested by many insect pest and grazing after rice harvest, to overcome aforesaid problems American beauty and summer sunshine varieties of Gladiolus one of the best option to grow on bund condition of rice.

References

1. Anonymous. Annual Report National Horticulture Mission. 2018, 7-8.
2. Anonymous. Horticultural Statistics at a Glance. 2018, 10-13.
3. Basavaraju TB, Prashanth M, Maheswarappa HP. Performance of flower crops as intercrops in coconut garden in southern dry region of Karn. J of Plant. Crops. 2018;46(1):52-56.
4. Bhardwaj D, Ansari MW, Sahoo RK, Tuteja N. Biofertilizers function as key player in sustainable agriculture by improving soil fertility, plant tolerance and crop. 2014.
5. Gupta P, Pathak AC, Banafar RNS. Studies on the performance of Gladiolus cultivar in Malwa region of Madhya Pradesh. South In. Hort. 2002;50(4-6):641-644.
6. Kadam GB, Kumar N, Saha TN, Dhiman MR, Gupta N, Prasad KV. Studies of the identification of indigenous varieties of Gladiolus for commercial traits. Int. J. Curr. Micr. App. Sci. 2020;9(8):1671-1678.
7. Kishanswaroop. Morphological variation and evaluation of Gladiolus germplasm. In. J. of Agril. Sci. 2010;80(8):742-745.
8. Kumar M, Kumar V, Singh JB, Prakash S. Evaluation of Gladiolus variteties under Western Uttar Pradesh condition. Prog. Res. 2007;2(1-2):79-81.
9. Kumar PH, Kulkarni BS. Genetic variability in Gladiolus for growth and flowering characters (*Gladiolus hybridus*). J. of Hort. Sci. 2009;4(2):177-180.
10. Kumar R. Evaluation of exotic Gladiolus under sub-tropical mid hills of Meghalaya. In. J. of Agril. Sci. 2009;79(2):115-117.
11. Kumari S, Patel BS, Mahawer LN. Influence of gebberallic acid and planting dates on vegetative growth and flower production in Gladiolus cv. Yellow Frilled. Prog. Hort. 2011;43(2):219-224.
12. Methela NJ, Al-Zihad MR, Islam MS, Rahman MH. Effect of spacing and corm size on growth and spike

production of Gladiolus. Asian J Med. Biol. Res. 2019;5(3):226-230.
13. Mukhopadhyay TK, Yadav LP. Effect of corms size and spacing on growth, flowering and corm production in Gladiolus. Hryn. J. of Sci. 1984;13:95-99.
14. Negi SS, Sharma TVRS, Raghava SPS, Srinivasan VR. Variability studies in Gladiolus. In. J of Hort. 1986;39:269-72.
15. Padma M, Kumar MR. Evaluation of Gladiolus varieties in high altitude tribal zone of Andhra Pradesh. Orissa J. of Hort. 2004;32(2):95-98.
16. Poornima G, Kumari DP, Seetharamip GK. Evaluation of China aster (*Callistephus chinensis* (L.) Ness) genotypes under hill zone of Karnataka. J. of Orna. Hort. 2006;9(3):208-211.
17. Rahul K, Sanjay K, Yadav YC. Genetic variability, heritability, genetic advance, correlation coefficient and path analysis in Gladiolus. In. J. of Hort. 2012;69(3):369-373.
18. Ramachandrudu K, Thangam M. Performance of Gladiolus varieties under agro-climatic conditions of Goa. J of Orna. Hort. 2008;11(2):91-97.
19. Rani R, Singh C. Evaluation of different Gladiolus variteties for quality flower production J. Res. Birsa Agric Univ. 2005;17(2):227-230.
20. Rao AN, Daniel C, Brainard Kumar V, Ladha JK, Johnson DE. Preventive Weed Management in Direct-seeded Rice: Targeting the weed seed bank. Adv. In Agro. 2017;144:45-142.
21. Saini RS, Gupta AK, Yamadgni RV. Performance of different variteties of Gladiolus (*Gladiolus grandiflorus* L.) Hissar conditions. South In. Hort. 1991;39(2):99-101.
22. Saleem M, Ahmad I, Khan MA. Cultivar Effects on Growth, Yield and Cormel Production of Gladiolus (*Gladiolus grandiflorus* L.) J. of Orn. and Hort. Plants. 2013;3(1):39-48.
23. Thakur N, Bhuj BD, Srivastav RK, Chand S. Assessment of genetic variability and correlation in Gladiolus germplasm. Prog. Hort. 2015;47(3):490-496.
24. Tirkey T, Tamrakar S, Sharma G, Varma LS, Sahu MK. Performance of Gladiolus variteties under different planting dates for vegetative and floral characters under Chhattisgarh plains. J. of Pharm. and Phyto. Chem. 2019;8(6):1191-1195.
25. Zosiamliana JH, Reddy GSN, Rymbai H. Growth, flowering and yield character of some variteties of China aster (*Callistephus chinensis* L.). J. Nat. prod. Plant Res. 2012;2(2):302-305.
26. Zubair M, Khan FW, Akhtar S, Ayub G. Planting dates affect floral characteristics of Gladiolus under the soil and climatic conditions of Peshawar. Paki. J of Bio. Sci. 2006;9(9):1669-1676.
27. Zubair M, Gohar A, Abdur R, Amin NU, Masood A, Ara N. Preflowering growth of Gladiolus in response to staggered planting. Pak. J Bot. 2013;45(4):1329-1338.