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Flowering of Gladiolus cv Jester Gold as Affected by Different Doses of Nitrogen, Phosphorus and Potassium

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Abstract

An experiment was carried out to study the effects of nitrogen (20, 40, 60, 80 g/m^2) with phosphorus (5, 10, 20 g/m^2) and potassium (15, 20, 25 g/m^2) and one control without fertilization application on flowering of gladiolus cv Jester Gold in randomized block design during 2000-01 and 2001-02. Application of lower doses of $N_{20}P_5$g/m^2 resulted into earliest first floret showing color (112.81 days), while higher doses of nitrogen and phosphorus $N_{80}P_{20}$ g/m^2 delayed it (120.34 days), took more time to full opening of first floret (3.73 days), maximum diameter of first floret on third day (10.78 cm), florets /spike (14.23), spike length (73.48 cm), rachis length (44.36 cm), durability of spike (12.80 days) and useful life of spike (7.50 days). However, maximum florets remain open at a time (4.54) was noted in $N_{60}P_{20}$ g/m^2.
Key words : Gladiolus, Flowering, Nitrogen, Phosphorus, Potassium.

Gladiolus is an important flower crop whose spikes are commercially used as cut flower since it lasts longer. Among agronomical practices, proper fertilization per unit area is the most important factor governing flowering and quality of spike. Since work done in this line is scanty, hence the present investigation was undertaken to ascertain the optimum requirement of nitrogen, phosphorus and potassium on flowering and quality of gladiolus spikes under agro-climate conditions of Delhi.

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Methods

The experiment was conducted on gladiolus cv jester Gold in FRBD during *rabi* season of 2000-01 and 2001-02 in the Division of Floriculture and Landscaping, IARI, New Delhi. The treatments consisted of four levels of nitrogen (20,40, 60, 80 g/m^2), three levels of phosphorus (5, 10, 20 g/m^2) and three levels of potassium (15, 20, 25 g/m^2) and one control without fertilizer treatment. Nitrogen was applied with phosphorus and potassium separately. In all, there were 25 treatments. The net plot size was 1.5 m × 1.0 m. Each plot was planted with 30 corms at a distance of 40 cm × 20 cm and a depth of 5 cm in the first fortnight of October in each year. Nitrogen was applied as calcium ammonium nitrate (CAN) into two split, first half as basal dose at the time of planting along with full dose of phosphorus as single super phosphate (SSP) and potassium as muriate of potash (MOP), and the second half at spike emergence to all the treatments. The soil of experimental farm was loam in texture having pH 8.3 with 0.50% organic carbon, 165-kg/ha available phosphorus and 310 kg/ha available potassium. Data of both the years were pooled and analyzed statistically.

Results and Discussion

Table 1 revealed that different dose of nitrogen, phosphorus and potassium had no significant influence on number of florets open at first and the durability of the first floret. However, plants supplied with lower dose of $N_{20}P_5$ g/m^2 showed marked earliness (112.81 days) in days to first floret showing color, while higher doses of $N_{80}P_{20}$ g/m^2 delayed it consider-

Table 1. Flowering of gladiolus cv Jester Gold as affected by different doses of nitrogen, phosphorus and potassium.

Doses (g/m)	First floret showing color (days)	Full opening of first floret from first floret showing color (days)	Full opening of last floret from first floret showing color (days)	Diameter of 1st floret on 3rd day (cm)	Durability of first floret (days)	Florets open at first
Control	113.70	2.05	8.91	7.46	2.88	1.57
$N_{20}P_5$	112.81	2.50	9.61	8.19	3.05	1.57
$N_{20}P_{10}$	113.50	2.63	9.68	8.25	3.07	1.59
$N_{20}P_{20}$	115.03	2.71	10.42	8.33	3.20	1.61
$N_{40}P_5$	115.54	3.05	11.29	9.48	3.37	1.61
$N_{40}P_{10}$	115.67	3.06	11.33	9.51	3.33	1.57
$N_{40}P_{20}$	116.36	3.33	11.40	9.86	3.38	1.62
$N_{60}P_5$	116.82	3.12	12.38	10.06	3.59	1.47
$N_{60}P_{10}$	116.95	3.27	12,49	10.13	3.61	1.61
$N_{60}P_{20}$	117.40	3.35	12.67	10.30	3.67	1.67
$N_{80}P_5$	117.99	3.58	12.66	10.63	3.51	1.70
$N_{80}P_{10}$	118.51	3.64	12.66	10.68	3.56	1.80
$N_{80}P_{20}$	120.34	3.73	12.64	10.78	3.56	1.74
$N_{20}K_{15}$	114.85	2.54	9.21	8.35	3.05	1.52
$N_{20}K_{20}$	114.89	2.61	9.28	8.62	3.12	1.57
$N_{20}K_{25}$	115.19	2.66	9.32	8.69	3.09	1.54
$N_{40}K_{15}$	116.08	3.56	10.33	9.91	3.22	1.61
$N_{40}K_{20}$	116.00	3.63	10.36	9.95	3.25	1.62
$N_{40}K_{25}$	116.39	3.67	10.41	10.04	3.26	1.60
$N_{60}K_{15}$	117.33	3.35	11.41	10.02	3.46	1.62
$N_{60}K_{20}$	117.62	3.48	11.52	10.03	3.51	1.64
$N_{60}K_{25}$	117.92	3.61	11.60	10.40	3.51	1.62
$N_{80}K_{15}$	119.02	3.41	11.61	10.46	3.50	1.61
$N_{80}K_{20}$	118.88	3.50	11.64	10.48	3.58	1.59
$N_{80}K_{25}$	118.52	3.55	11.73	10.52	3.52	1.61
CD at 5%	1.73	0.10	0.45	0.31	NS	NS

ably. Higher doses of nitrogen and phosphorus also showed significant influence on the days to complete opening of the first and last floret from the date of first floret showing color.

Table 2 shows that higher dose of nitrogen and phosphorus (i.e. $N_{80}P_{20}$ g/m^2) showed considerably positive influence on spike length (73.48 cm), rachis length (44.36 cm), number of florets per spike (14.23) compared to control. The possible reason could be due to the presence of calcium in CAN and sulfur in SSP which participated in higher protein synthesis and thus improved the vegetative growth, dry matter accumulation and partitioning to the developing spikes. Beneficial effects of nitrogen and phosphorus on floral characters have been reported in gladiolus (1—3).

Longer useful life (7.50 days) and durability of whole spike (12.80 days) resulted from higher doses of nitrogen and phosphorus, i. e. $N_{80}P_{20}$ g/m^2. The obvious reason being that the spikes produced were longer with more number of florets. Calcium is generally seen as a protective element in reducing the rate of plant senescence (4).

Gladiolus plants took minimum days to flowering and completion of opening of all the florets in the spike when nitrogen,phosphorus and potassium were not applied or when applied at lower levels. Application of higher doses, on the other hand, resulted in plants taking a longer time to first floret showing color, complete opening of first and last floret from the date of first floret showing color. The possible reason for this trend might be due to the reason that high doses of nitrogen and phosphorus encouraged vigorous growth, more photosynthetic area for

Table 2. Flowering of gladiolus cv Jester Gold as affected by different doses of nitrogen, phosphorus and potassium.

Doses (g/m^2)	Florets remaining open at a time	Florets/ spike	Spike length (cm)	Rachis length (cm)	Durability of spike (days)	Useful life of spike (days)
Control	3.62	10.26	56.90	35.05	8.79	5.71
$N_{20}P_5$	4.06	11.86	62.19	38.35	10.41	6.89
$N_{20}P_{10}$	4.11	11.96	62.84	35.36	10.45	7.05
$N_{20}P_{20}$	4.17	12.05	63.14	39.28	10.59	7.08
$N_{40}P_5$	4.21	12.08	65.54	40.86	11.29	7.17
$N_{40}P_{10}$	4.22	12.18	66.88	40.56	12.06	7.25
$N_{40}P_{20}$	4.33	12.43	67.71	41.39	11.91	7.33
$N_{60}P_5$	4.39	13.15	68.95	42.34	12.59	7.29
$N_{60}P_{10}$	4.41	13.26	70.70	43.04	11.95	7.34
$N_{60}P_{20}$	4.52	13.36	71.77	42.97	12.53	7.36
$N_{80}P_5$	4.33	13.85	69.07	42.77	12.41	7.37
$N_{80}P_{10}$	4.31	14.06	70.51	42.40	12.49	7.39
$N_{80}P_{20}$	4.38	14.23	73.48	44.36	12.80	7.50
$N_{20}K_{15}$	4.03	10.33	60.22	37.00	10.33	6.91
$N_{20}K_{20}$	4.07	10.54	61.22	37.38	10.35	7.16
$N_{20}K_{25}$	4.13	10.66	61.87	38.33	10.42	7.15
$N_{40}K_{15}$	4.19	11.28	62.86	39.37	11.35	7.15
$N_{40}K_{20}$	4.18	11.47	63.66	39.57	11.20	7.23
$N_{40}K_{25}$	4.23	11.53	63.61	39.84	11.17	7.19
$N_{60}K_{15}$	4.38	11.81	64.63	40.44	11.33	7.23
$N_{60}K_{20}$	4.39	11.66	65.68	39.74	11.44	7.23
$N_{60}K_{25}$	4.39	12.03	66.65	40.35	11.54	7.38
$N_{80}K_{15}$	3.84	12.88	67.75	41.17	11.33	7.40
$N_{80}K_{20}$	3.84	12.95	68.51	40.76	11.35	7.44
$N_{80}K_{25}$	3.87	13.04	69.24	41.16	11.48	7.43
CD at 5%	0.06	0.36	1.94	1.05	0.33	0.21

greater production and mobilization of photosynthates, which ultimately delayed the reproductive phase. Similar observations were also made earlier (5, 6). The highest number of florets remaining open at a time (4.54) on the spike in the field was recorded on plants treated with the $N_{60}P_{20}$ g/m^2. This finding confirms the earlier observations (7, 8).

Higher rates of nitrogen and phosphorus application resulted in longer spike and rachis, bigger size and more number of florets per spike. Ample supply of nutrient elements might have resulted in increased number and size of cells of and enhanced meristematic activities, leading to marked improvement in these characters. Corroborative findings were also reported earlier in gladiolus (9, 10). Higher doses of nitrogen and phosphorus at the rate of $N_{80}P_{20}$ g/m^2 can be used for the production of quality spikes of gladiolus Jester Gold.

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