Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.2622

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **6 (1):** 942-947 (2018)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Evaluation of Snapdragon (*Antirrhinum majus* L.) Genotypes for Post Harvest and Seed Characters under *Tarai* Conditions of Uttarakhand

Rakesh Kumar[*], Santosh Kumar and Ajay Kumar Singh[1]**

Department of Horticulture, G. B. Pant University of Agriculture and Technology,Pantnagar, Uttarakhand, [1]SMS (Hort.) Research Station & KVK, Lohaghat, G. B. Pant University of Agriculture and Technology,Pantnagar, Uttarakhand, [*]&[**]Present Address: College of Horticulture, Banda Univerisity of Agriculture and Technology, Banda -210001 (U.P.)

*Corresponding Author E-mail: rakeshkashav53@gmail.com

Received: 21.02.2017 | Revised: 30.03.2017 | Accepted: 6.04.2017

ABSTRACT

Thirty-five genotypes of snapdragon (Antirrhinum majus L.) were evaluated for various post-harvest and seed paramenters under Tarai conditions of Uttarakhand during the years 2008-2010. The interpretations are made according to pooled data and results revealed significant variation among the genotypes for various post-harvest and seed parameters. Maximum vase life was recorded in SA-1 and minimum in PC x Sant 11, whereas water uptake by spike varied from 21.08 ml to 51.45 ml. Number of open florets per spike was recorded maximum in SA-1 and minimum in BP x Sant 11(4), while per cent opening of florets ranged from 48.51 % to 93.19 %. Early seed ripening was recorded in 56G and late in LB x KO(3)(R3). Number of pods per spike and 1000-seed weight was recorded maximum in SA-1 and minimum in BP x Sant 11(4) and V x Sant 11(4), respectively. Number of seeds per pod and weight of seeds per pod was recorded maximum in V x TS(P)(2) and Sant 22 x TS(P) and minimum in 56G and PC x Sant 22, respectively.

Key words: *Genotypes, Snapdragon, Seed, Vase-life, Post-harvest.*

INTRODUCTION

Snapdragon (*Antirrhinum majus* L.), also known as dog flower, is a popular winter season annual flowering plant belonging to family Scrophulariaceae. It is an important cut flower crop in the international market. But in India, it is not popular as a cut flower and is mainly grown in beds, pots, edging purpose, herbaceous border and in rock garden. Magnificent and charming flowers of many colours except blue, with numerous shades are borne on long terminal spikes. These spikes are in great demand as cut flowers in European countries. Flowers are having high keeping quality and they remain fresh from 6-25 days[9]. Evaluation is the first important step in any crop improvement programme. It is the basic tool for assessing the genetic variability present in any crop species, which could be exploited for its commercialization.

Cite this article: Kumar, R., Kumar, S. and Singh, A.K., Evaluation of Snapdragon (*Antirrhinum majus* L.) Genotypes for Post Harvest and Seed Characters under *Tarai* Conditions of Uttarakhand, *Int. J. Pure App. Biosci.* **6(1):** 942-947 (2018). doi: http://dx.doi.org/10.18782/2320-7051.2622

As there is always a demand for novel types having long vase life, uniform opening of florets and per cent opening of florets along with high seed yield. Despite the importance of this crop, only a limited work has been done. In view of this, present study was carried out to with the objective to evaluate the snapdragon genotypes with respect to various post-harvest and seed attributes.

MATERIAL AND METHODS

The present study was carried out at Model Floriculture Centre of G. B. P.U.A.&T., Pantnagar, during 2008-2010. The experiment was laid out in randomized block design (RBD) with three replications. Seeds of thirty-five genotypes of snapdragon were sown in nursery beds during month of September. The seedlings were ready for transplanting in the main field after one month. All the recommended cultural operations were performed during the experiment. Five plants were randomly selected in each genotype from each replication for collecting data. Observations were recorded for various post-harvest and seed characters *viz*., vase life, water uptake, number of open florets per spike, per cent opening of florets, days to seed ripening, number of seeds per pod, number of pods per spike, weight of seeds per pod and 1000-seed weight. The observed data of two years were subjected to statistical analysis and interpretations are made according to pooled results.

RESULTS AND DISCUSSION

The study of data presented in Table 1 depicted significant variation among the genotypes for different traits related to post harvest keeping quality *viz*., vase life, water uptake, number of open florets per spike and percent opening of florets. Maximum vase life (11.95 days) was recorded in SA-1 and minimum (7.85 days) in PC x Sant 11. Variation in vase life might be due to senescing behaviour by producing higher amount of ethylene, poor carbohydrate reserves in flowers, osmotic concentration and pressure potential of petal cells which is influenced by genetic constitution, which varies from one genotype to other. Vascular blockage might be regarded as the major cause for wilting leading to reduction in longevity of cut flowers. The findings are in line with the results obtained by Jauhari and Singh[4], in snapdragon, Laxmi *et al*.[8], in chrysanthemum and Kandpal *et al*.[5], in gerbera.

Water uptake by spike varied from 21.08 ml in P24(8) to 51.45 ml in V x TS(P)(2). Variation in water uptake by different genotypes might be due to difference in leaf diffusive resistance in the field or difference in bacterial or fungal species gaining predominance in vase water, which is indirectly controlled by genes. The findings are in conformity with findings of Bala *et al*.[1], and Bhattcharjee *et al*.[2], in rose. The number of open florets per spike was recorded maximum (28.16) in SA-1 and minimum (4.84) in BP x Sant 11(4), whereas per cent opening of florets ranged from 48.51 % in PC x Sant 11 to 93.19 % in 65G. The variation might be due to genetic differences among the various genotypes. The results obtained by Jauhari and Singh[4], and Singh[12], in snapdragon, Swaroop *et al*.[13], in gladiolus are in line with the present findings. The data presented in Tables 2 and 3 depicted significant variation among the genotypes for different seed parameters *viz*., days taken to seed ripening, number of pods per spike, number of seeds per pod, weight of seeds per pod, 1000-seed weight and weight of seeds per plant. Early seed ripening (123.95 days) was recorded in 56G followed by P24(8) and KO x FS(3), whereas late seed ripening (164.32 days) was recorded in LB x KO(3)(R3).

Maximum number of pods per spike and 1000-seed weight was recorded in SA-1 and minimum number of pods per spike and 1000-seed weight was found in BP x Sant 11(4) and V x Sant 11(4), respectively. Number of seeds per pod was recorded maximum in V x TS(P)(2) and minimum in 56G, whereas weight of seeds per pod was found maximum in Sant 22 x TS(P). Weight of seeds per plant was recorded maximum in SA-1 and minimum in BP x Sant 11(4). Such

variability in seed parameters might be attributed to influence of genetic makeup of genotypes. Results are in line with the findings of Kumari and Misra[7], and Jauhari[4], in snapdragon, Singh and Singh[12], in marigold, Pant *et al*.[10],and Kem *et al*.[6], in gladiolus.

Table 1: Performance of snapdragon genotypes for different post-harvest parameters

Sr. No.	Germplasm	Vase life (days)			Water uptake (ml)			Number of open florets per spike			Per cent opening of florets (%)		
		I year	II year	Mean	I year	II year	Mean	I year	II year	Mean	I year	II year	Mean
1.	PC x FS	8.45	9.82	9.14	28.50	35.18	31.84	16.35	18.20	17.28	74.25	67.50	70.87
2	KO x BP	8.00	8.50	8.25	24.65	28.40	26.53	15.48	14.65	15.07	69.70	65.48	67.59
3.	LB x Sant 11(3)	8.30	9.33	8.81	28.67	34.25	31.46	9.25	11.25	10.25	71.39	72.35	71.87
4.	KO x Sant 22(1)	9.67	8.66	9.17	41.52	36.15	38.84	15.62	18.64	17.13	66.77	78.60	72.68
5.	48G	9.44	8.50	8.97	31.57	28.00	29.79	11.50	13.50	12.50	71.05	66.45	68.75
6.	50G	9.57	9.33	9.45	31.25	26.20	28.73	21.48	22.85	22.17	73.47	70.84	72.16
7.	56G	8.33	9.00	8.67	26.00	29.45	27.73	7.66	7.45	7.55	64.08	72.58	68.33
8.	58G	11.30	10.00	10.65	41.15	42.55	41.85	18.52	16.20	17.36	69.40	66.24	67.82
9.	71G	10.85	9.35	10.10	40.80	38.46	39.63	19.75	21.84	20.80	76.64	66.28	71.46
10.	KO x FS(3)	9.20	8.45	8.83	30.62	33.25	31.94	16.80	15.64	16.22	88.09	84.52	86.31
11.	LB x KO(3)	11.50	9.22	10.36	42.78	44.50	43.64	22.34	24.88	23.61	64.42	61.35	62.89
12.	V x TS(P)(2)	10.80	10.18	10.49	53.25	49.65	51.45	18.54	22.34	20.44	72.82	84.15	78.49
13.	P26(3)	8.56	9.50	9.03	29.54	25.60	27.57	7.62	8.65	8.14	61.74	65.30	63.52
14.	LB x PC	10.00	9.32	9.66	33.58	30.15	31.87	11.42	12.45	11.94	70.05	64.87	67.46
15.	PC x Sant 11	7.15	8.55	7.85	32.44	34.67	33.56	7.25	9.66	8.46	52.77	44.25	48.51
16.	BP x Sant 11(4)	7.89	9.67	8.78	34.25	30.04	32.15	4.35	5.32	4.84	55.66	58.25	56.96
17.	Sant 11 x TS(P)	9.25	11.45	10.35	31.50	32.44	31.97	14.85	15.24	15.05	68.38	66.85	67.61
18.	98G	11.20	9.65	10.43	35.90	38.68	37.29	13.47	12.48	12.98	65.34	60.35	62.85
19.	62G	8.54	10.20	9.37	28.00	27.52	27.76	11.25	9.65	10.45	64.48	69.84	67.16
20	65G	8.00	8.75	8.38	25.64	28.30	26.97	9.58	9.15	9.37	92.14	94.25	93.19
21.	51G	10.55	10.45	10.50	47.66	54.50	51.08	9.47	10.25	9.86	73.75	68.00	70.88
22.	P30(3)	8.54	9.15	8.85	29.54	32.00	30.77	8.22	10.80	9.51	71.98	66.50	69.24
23.	PC x V(3)	9.25	10.66	9.95	31.66	33.40	32.53	16.40	15.62	16.01	58.95	62.25	60.60
24.	LB x V(2)	8.78	9.14	8.96	33.45	38.45	35.95	8.00	9.25	8.63	68.10	72.35	70.23
25.	PC x Sant 22	8.00	8.25	8.13	25.34	32.65	29.00	11.24	10.34	10.79	86.31	89.25	87.78
26.	Sant 11 x Sant 22	10.66	9.35	10.00	36.40	41.00	38.70	13.80	14.58	14.19	65.99	60.25	63.12
27.	SA-1 x TS(P)	8.45	9.82	9.14	28.14	32.50	30.32	7.35	5.34	6.35	62.61	68.94	65.78
28	V x Sant 11(4)	9.55	9.42	9.49	39.54	45.22	42.38	8.45	9.85	9.15	63.10	66.35	64.73
29.	V x TS(P)(4)	8.45	9.50	8.98	28.47	35.80	32.14	15.24	14.25	14.75	72.55	68.42	70.49
30.	SA-1	11.25	12.65	11.95	52.60	42.80	47.70	29.84	26.47	28.16	90.81	89.65	90.23
31.	LB x KO(3)R3	9.70	8.66	9.18	36.54	38.50	37.52	21.34	22.35	21.85	80.10	72.54	76.32
32.	Sant 22 x TS(P)	10.52	10.00	10.26	32.00	33.92	32.96	14.65	15.92	15.29	68.13	71.35	69.74
33.	V x SA-1(3)	10.33	9.85	10.09	39.55	42.15	40.85	17.35	15.48	16.42	71.74	76.25	74.00
34.	LB x SA-1(1)	9.00	9.50	9.25	34.54	34.20	34.37	14.25	16.72	15.49	65.20	72.66	68.93
35.	P24(8)	8.25	9.15	8.70	19.50	22.65	21.08	13.64	10.58	12.11	93.07	90.12	91.59
C.D. at 5%		1.28	1.70	0.91	5.19	7.63	4.73	5.37	5.02	4.13	15.57	14.26	10.15

Table 2: Performance of snapdragon genotypes for different seed parameters

Sr. No.	Germplasm	Days taken to seed ripening			Number of pods per spike			Number of seeds per pod			Weight of seeds per pod (mg)		
		I year	II year	Mean	I year	II year	Mean	I year	II year	Mean	I year	II year	Mean
1.	PC x FS	128.42	135.40	131.91	18.50	14.75	16.63	414.25	319.48	366.87	37.28	41.32	39.30
2	KO x BP	133.86	142.66	138.26	16.45	13.25	14.85	287.18	308.55	297.87	35.80	31.65	33.73
3.	LB x Sant 11(3)	128.00	132.45	130.23	10.25	14.00	12.13	311.44	328.02	319.73	36.11	39.55	37.83
4.	KO x Sant 22(1)	136.40	140.22	138.31	20.60	16.25	18.43	426.54	435.80	431.17	40.55	36.24	38.40
5.	48G	158.62	155.35	156.99	14.35	16.33	15.34	347.66	324.80	336.23	37.64	38.20	37.92
6.	50G	151.24	156.40	153.82	22.15	20.85	21.50	198.40	215.47	206.94	18.49	23.54	21.02
7.	56G	125.24	122.65	123.95	8.00	7.26	7.63	159.24	128.42	143.83	17.55	15.42	16.49
8.	58G	134.47	138.92	136.70	24.60	22.06	23.33	255.45	238.12	246.79	26.33	29.84	28.09
9.	71G	154.25	158.00	156.13	25.65	24.00	24.83	428.94	476.55	452.75	41.66	42.58	42.12
10.	KO x FS(3)	124.60	132.00	128.30	18.55	17.15	17.85	171.08	156.24	163.66	15.84	18.33	17.09
11.	LB x KO(3)	154.87	162.40	158.64	26.00	29.66	27.83	431.60	468.20	449.90	42.30	49.80	46.05
12.	V x TS(P)(2)	164.80	158.33	161.57	25.50	26.20	25.85	566.46	532.00	549.23	45.28	42.81	44.05
13.	P26(3)	128.66	135.45	132.06	9.66	12.55	11.11	215.80	234.58	225.19	19.21	18.42	18.82
14.	LB x PC	141.24	136.66	138.95	13.08	16.25	14.67	425.25	462.38	443.82	37.20	31.65	34.43
15.	PC x Sant 11	145.42	144.27	144.85	10.25	11.67	10.96	324.00	298.60	311.30	25.49	22.50	24.00
16.	BP x Sant 11(4)	127.84	136.15	132.00	6.50	7.55	7.03	239.72	219.80	229.76	22.89	19.32	21.11
17.	Sant 11 x TS(P)	147.33	142.00	144.67	17.45	18.45	17.95	164.55	182.64	173.60	17.36	12.46	14.91
18.	98G	148.00	153.75	150.88	16.40	17.62	17.01	426.33	451.16	438.75	39.24	33.50	36.37
19.	62G	136.65	128.61	132.63	15.25	16.00	15.63	295.80	275.81	285.81	22.46	21.54	22.00
20	65G	137.50	133.42	135.46	10.45	9.40	9.93	295.61	265.48	280.55	25.91	22.00	23.96
21.	51G	141.21	148.74	144.98	12.00	13.60	12.80	518.06	548.45	533.26	54.34	60.25	57.30
22.	P30(3)	127.81	134.28	131.05	11.65	12.45	12.05	191.20	176.33	183.77	17.62	15.34	16.48
23.	PC x V(3)	139.52	146.35	142.94	22.25	24.35	23.30	207.59	225.47	216.53	16.25	15.48	15.87
24.	LB x V(2)	165.54	162.08	163.81	11.45	9.33	10.39	342.54	338.00	340.27	25.66	24.61	25.14
25.	PC x Sant 22	129.33	130.48	129.91	13.07	8.25	10.66	148.67	176.54	162.61	12.00	9.45	10.73
26.	Sant 11 x Sant 22	155.26	156.47	155.87	18.20	18.65	18.43	245.58	215.40	230.49	22.17	25.64	23.91
27.	SA-1 x TS(P)	140.00	138.40	139.20	8.23	9.60	8.92	157.25	174.55	165.90	16.49	24.60	20.55
28	V x Sant 11(4)	161.28	165.92	163.60	19.25	21.45	20.35	412.66	386.24	399.45	28.64	19.52	24.08
29.	V x TS(P)(4)	132.62	130.25	131.44	19.45	20.05	19.75	226.33	235.41	230.87	21.81	28.00	24.91
30.	SA-1	154.20	154.35	154.28	34.20	36.18	35.19	462.75	508.64	485.70	38.60	33.58	36.09
31.	LB x KO(3)R3	162.28	166.75	164.52	20.25	27.45	23.85	312.00	322.50	317.25	27.66	25.94	26.80
32.	Sant 22 x TS(P)	145.36	152.00	148.68	17.67	19.45	18.56	492.54	515.47	504.01	62.98	58.46	60.72
33.	V x SA-1(3)	142.80	149.85	146.33	19.28	20.60	19.94	369.47	378.51	373.99	31.47	33.25	32.36
34.	LB x SA-1(1)	165.24	158.64	161.94	16.80	19.25	18.03	392.40	375.58	383.99	33.66	38.41	36.04
35.	P24(8)	128.75	122.55	125.65	12.45	15.80	14.13	146.64	178.20	162.42	14.25	16.84	15.55
C.D. at 5%		8.29	9.67	6.65	3.95	4.74	3.11	26.01	43.13	27.70	7.83	6.73	5.62

Table 3: 1000-seed weight and weight of seeds per plant in different genotypes of snapdragon

Sr. No.	Germplasm	1000 seed weight (mg)			Weight of seeds per plant (g)		
		I year	II year	Mean	I year	II year	Mean
1.	PC x FS	78.46	108.25	93.36	8.31	8.42	8.37
2	KO x BP	102.15	92.65	97.40	6.44	5.26	5.85
3.	LB x Sant 11(3)	84.28	85.44	84.86	5.12	4.72	4.92
4.	KO x Sant 22(1)	80.42	70.60	75.51	4.75	5.21	4.98
5.	48G	92.05	112.64	102.35	4.82	4.96	4.89
6.	50G	86.44	88.32	87.38	4.72	4.76	4.74
7.	56G	98.35	94.12	96.24	2.17	2.11	2.14
8.	58G	77.25	96.34	86.80	6.34	7.12	6.73
9.	71G	83.11	86.32	84.72	5.22	5.78	5.50
10.	KO x FS(3)	86.94	102.47	94.71	12.12	11.67	11.89
11.	LB x KO(3)	97.50	106.24	101.87	11.37	11.55	11.46
12.	V x TS(P)(2)	110.60	110.28	110.44	13.10	12.57	12.84
13.	P26(3)	96.80	76.35	86.58	5.16	5.22	5.19
14.	LB x PC	76.55	68.15	72.35	11.00	11.32	11.16
15.	PC x Sant 11	72.14	72.30	72.22	3.67	3.74	3.70
16.	BP x Sant 11(4)	84.62	94.55	89.59	1.94	1.86	1.90
17.	Sant 11 x TS(P)	98.10	64.87	81.49	6.51	5.30	5.91
18.	98G	76.32	67.46	71.89	6.17	6.24	6.21
19.	62G	67.44	72.83	70.14	4.84	4.97	4.91
20	65G	73.80	84.62	79.21	6.11	6.18	6.15
21.	51G	106.20	118.45	112.33	13.17	12.44	12.81
22.	P30(3)	85.90	92.47	89.19	10.46	10.14	10.30
23.	PC x V(3)	80.64	88.14	84.39	9.22	9.37	9.30
24.	LB x V(2)	74.32	71.60	72.96	4.15	4.02	4.09
25.	PC x Sant 22	72.66	58.22	65.44	4.14	3.85	4.00
26.	Sant 11 x Sant 22	64.58	115.64	90.11	5.17	5.05	5.11
27.	SA-1 x TS(P)	92.33	92.80	92.56	2.10	2.18	2.14
28	V x Sant 11(4)	68.40	55.21	61.80	2.12	2.14	2.13
29.	V x TS(P)(4)	81.24	112.47	96.86	9.74	9.62	9.68
30.	SA-1	114.35	113.05	113.70	13.24	14.18	13.71
31.	LB x KO(3)R3	83.06	76.82	79.94	4.13	4.34	4.24
32.	Sant 22 x TS(P)	78.05	73.38	75.72	9.38	8.24	8.81
33.	V x SA-1(3)	74.68	79.35	77.02	5.14	5.34	5.24
34.	LB x SA-1(1)	82.66	82.99	82.83	7.35	7.02	7.19
35.	P24(8)	86.54	86.65	86.60	8.44	8.37	8.41
C.D. at 5%		6.12	7.05	4.20	0.94	0.31	0.50

CONCLUSION

On the basis of above results, it can be concluded that genotype 58G, V x TS(P)(2), 51G and SA-1 can be used for cut flower purpose and KO x FS(3), LB x KO(3), V x TS(P)(2) and SA-1 can be used for seed production purpose.

REFERENCES

1. Bala, M., Kumar, R. and Singh, K., Evaluation of rose (*Rosa* spp.) cultivars for post-harvest attributes. *J. Orna. Hort.* **11(1):** 7-78 (2008).
2. Bhattacharjee, S.K. Postharvest life of cut roses as affected by varietal differences. *S. Indian Hort.* **42(5):** 331-334 (1994).
3. Jauhari, S. Hybrid breeding in snapdragon (*Antirrhinum majus* L.). Ph.D. Thesis, Horticulture (Floriculture and Landscaping), G. B. Pant Univ. of Agriculture and Technology, Pantnagar (2006).
4. Jauhari, S. and Singh, A.K. Evaluation of inbred and their F_1's for flowering and postharvest attributes in snapdragon (*Antirrhinum majus* L.). *J. Orna. Hort.* **9(2):** 91-96 (2006).
5. Kandpal, K., Kumar, S., Srivastava, R. and Chandra, R. Evaluation of gerbera (*Gerbera jamesonii*) cultivars under *Tarai* conditions. *J. Orna. Hort.* **6(3):** 252-255(2003).
6. Kem, J.C., Yadav, S.K. and Kumar, S. Performance of Gladiolus cultivars under valley conditions of Uttaranchal. *Prog. Hort.* **35(1):** 08-110 (2003).
7. Kumari, J. and Misra, K.K. Morphological characterization and evaluation of snapdragon genotypes for cut flower and seed production purpose under *Tarai* conditions of Uttarakhand. *J. Orna. Hort.* **12(1):** 62-67 (2009).
8. Laxmi, P., Pratap, M. and Reddy, S.A. Evaluation of yellow coloured chrysanthemum (*Dendranthema grandiflora* L.) cultivars for growth, flowering and yield. *The Orrisa J. Hort.* **36(1):** 116-119 (2008).
9. Martin, W.J. and Stimart, D.P. Early generation evaluation in *Antirrhinum majus* for prediction of cut flower post-harvest longevity. *J. Amer. Soc. Hort. Sci.* **128(6):** 876-880 (2003).
10. Pant, C.C., Lal, S.D. and Shah, D. Performance of some gladiolus cultivars under U.P. hills conditions. *Recent Hort.* **14:** 73-75 (1998).
11. Singh, A.K. Evaluation of snapdragon (*Antirrhinum majus* L.) germplasm. *Prog. Hort.* **37(1):** 96-99 (2005).
12. Singh, D. and Singh, A.K. Evaluation of French marigold (*Tagetes patula* Linn.) and Wild marigold (*Tagetes minuta* Linn.) under sub-mountainous *Tarai* conditions. *J. Orna. Hort.* **8(2):** 134-136 (2005).
13. Swaroop, K., Singh, K.P. and Singh, K.P. Performance of gladiolus under Delhi condition. *J. Orna. Hort.* **8(1):** 32-35 (2005).