The Andhra Agric. J 62(2): 403-407, 2015

Effect of Nutrition on Vase life of Garland Chrysanthemum (*Chrysanthemum coronarium* L.)

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ABSTRACT

Vase life of cut flowers was significantly influenced by the nitrogen and phosphorus levels. Among the individual effects, the highest vase life was recorded by the application of nitrogen at 150 kg ha^{-1} (6.8 and 10.8 days), phosphorus at 100 kg ha^{-1} (6.5 and 10.3 days) and during *kharif* and *rabi* seasons. The interaction between nitrogen and phosphorus was also found to be significant on vase life of flowers. It was also found to be at maximum with nitrogen at 150 kg ha^{-1} + phosphorus at 100 kg ha^{-1} closely followed by 150 kg ha^{-1} dose of both nutrients The flower quality in terms of size, weight was also found to be at maximum with nitrogen at 150 kg ha^{-1} + phosphorus at 100 kg ha^{-1} closely followed by 150 kg ha^{-1} dose of both nutrients

Key words : Garland chrysanthemum, Nutrition and Vase life.

Seasonal flower crops are very handy to a floriculturist because they produce greater economical yield within a shorter period of time. Many of them being seed propagated became lucrative for those involved in seed business. Besides producing attractive flowers of varied colour fit for diverse uses, seasonal flower crops offer yet another profitable option of seed production. Annual chrysanthemums, categorized under seasonal flower crops include several species. One such species is *Chrysanthemum coronarium*, commonly called as garland chrysanthemum. It is recently catching up in restricted locales in our country, supplementing the production of florist chrysanthemum. Since the flowers make a good arrangement in the vase, the present study was taken up to evaluate the vase life of garland chrysanthemum flowers as influenced by pre-harvest nutrition.

MATERIAL AND METHODS

The present study was carried out at Floriculture unit of Main Agricultural Research Station, Department of Horticulture, University of Agricultural Sciences, Dharwad, during the years 2007-2009 to evaluate the effect of graded levels of nitrogen and phosphorus on yield and quality of garland chrysanthemum (*C. coronarium* L.). There were 16 treatments consisting of 4 levels each of Nitrogen *viz.,* N_0 (0 kg ha^{-1}), N_1 (100 kg ha^{-1}), N_2 (150 kg ha^{-1}) and N_3 (200 kg ha^{-1}) and Phosphorous *viz.,* P_0 (0 kg ha^{-1}), P_1 (100 kg ha^{-1}), P_2 (150 kg ha^{-1}) and P_3 (200 kg ha^{-1}) with a constant level of Potassium (100 kg ha^{-1}). The experiment was laid out in 4^2 factorial randomized block design with three replications. The gross plot size was 3.0 x 2.1 m and the net plot size was 2.7 x 1.8 m. The spacing adopted was 30 cm both between rows and plants within a row.

The fertilizers *viz.,* urea for nitrogen, single super phosphate for phosphorous and muriate of potash for potassium were weighed as per the calculated quantities according to each of the treatment combinations mentioned above. Full dose of phosphorous and potassium along with half dose of nitrogen was applied basally to each plot. The remaining half dose of nitrogen was given at 30 days after transplanting. Flower quality parameters, *viz.* hundred flower weight, flower diameter and vase life were recorded both during *kharif* and *rabi*. The data recorded were analyzed statistically as per the procedures outlined by Panse and Sukhatme (1967).

RESULTS AND DISCUSSION

Flower diameter

There were significant differences in the flower diameter values among the different levels

of nitrogen, phosphorus and their interactions during both the seasons. During *kharif,* the largest flowers were obtained by the treatments N_2 (5.54 cm flower diameter), P_1 (5.29 cm) and their combination N_2P_1 (6.41 cm). N_2 was followed by N_3 (5.09 cm) whereas P_1 was followed by P_2 (4.83 cm) which was at par with P_3 (4.79 cm) and the combination N_2P_1 was followed by N_2P_2 (5.85 cm). During *rabi* N_2, P_1 and the combination N_2P_1 recorded the largest diameters of flowers (5.53 cm, 5.36 cm and 6.27 cm, respectively). N_2 level was followed by N_3 (4.94 cm) which was at par with N_1 (4.85 cm). P_1 and N_2P_1 were followed by P_2 and N_2P_2 with the flower diameter values of 4.90 cm and 5.73 cm, respectively.

Hundred flower weight

Influence of nitrogen and phosphorus levels and their interactions was found significant on hundred flower weight during both the seasons. During *kharif,* the heavier flowers were obtained by the treatments N_2 (hundred flower weight of 192.25 g), P_1 (168.16 g) and their combination N_2P_1 (227.68 g). N_2 was followed by N_3 (173.67 g) whereas P_1 was followed by P_2 (153.49 g) and the combination N_2P_1 was followed by N_2P_2 (207.82 g). During *rabi* N_2, P_1 and their combination recorded the highest weights of hundred flowers (207.62 g, 181.61 g and 245.90 g, respectively). They were correspondingly followed by N_3, P_2 and N_2P_2 with the hundred flower weights of 187.56 g, 165.77 g and 224.44 g, respectively.

Cumulative water uptake

There were significant differences among nitrogen, phosphorus doses and their interactions with respect to cumulative water uptake by the flowers kept in vase during both seasons. Among nitrogen levels, N_3 recorded the highest cumulative water uptake (29.44 g and 28.3 g) whereas phosphorus level P_1 was the highest in cumulative water uptake among phosphorus levels (30.14 g and 29.36 g) during *kharif* and *rabi* seasons. Among the interactions N_2P_1 recorded the highest value of cumulative water uptake (34.35 g and 33.73 g) during both the seasons.

Cumulative water loss

Significant differences were observed among nitrogen, phosphorus doses and their interactions with respect to cumulative water loss by the flowers kept in vase during both seasons. Among nitrogen levels N_3 recorded the highest cumulative water loss (29.59 g and 31.49 g) whereas phosphorus level P_1 was highest in cumulative water loss among phosphorus levels (27.88 g and 298 g) during *kharif* and *rabi* seasons. Among the interactions N_3P_1 recorded the highest value of cumulative water loss (31.36 g and 33.14 g) during both the seasons.

Uptake to loss ratio

Water uptake to loss ratio exhibited significant differences among nitrogen, phosphorus doses and their interactions during both seasons. Among nitrogen levels N_2 recorded the highest loss to uptake (1.02 and 0.93) whereas phosphorus level P_1 was highest in loss to uptake ratio among phosphorus levels (1.08 and 0.98) during *kharif* and *rabi* seasons. Among the interactions N_2P_1 recorded the highest value of uptake to loss ratio (1.20 and 1.10) during both the seasons.

Vase life

The effect of nitrogen and phosphorus levels and their interactions was found significant on vase life of garland chrysanthemum flowers during both the seasons (plate 5). The highest vase life was recorded by N_2 (6.8 and 10.8 days), P_1 (6.5 and 10.3 days) and N_2P_1 combination (7.6 and 12.1 days) during *kharif* and *rabi* seasons, respectively. N_3 (6.0 and 9.6 days), P_2 (5.9 and 9.4 days) and N_2P_2 combination (6.9 and 11.0 days) followed the most superior treatments during both the seasons.

Vase life of cut flowers was significantly influenced by the nitrogen and phosphorus levels. Maximum vase life was recorded by the flowers produced from the plants that received nitrogen at 150 kg ha^{-1} level and phosphorus at 100 kg ha^{-1}. This may be attributed to the proper development of flowers with appropriate proportion of protoplasm in the tissue of flower parts. Thus, the flowers could have better weight, compared to the flowers from the other treatments. Thus such flowers could retain freshness for relatively longer time sustaining a better water balance as evident from the results on water uptake and loss.

The interaction between nitrogen and phosphorus was also found to be significant on vase

Table 1. Flower quality parameters as influenced by nitrogen and phosphorus levels in garland chrysanthemum during *kharif* and *rabi.*

Treat ment	Flower diameter (cm)					Hundred flower weight (g)				
	Kharif									
	P_0	P_1	P_2	P_3	Mean	P_0	P_1	P_2	P_3	Mean
N_0	3.60	4.27	3.90	3.89	3.92	76.71	94.35	86.12	91.94	87.28
N_1	4.50	5.35	4.88	4.62	4.84	117.46	163.61	149.34	143.52	143.48
N_2	4.97	6.41	5.85	4.95	5.54	163.79	227.68	207.82	169.69	192.25
N_3	6.10	5.15	4.70	4.41	5.09	171.80	186.99	170.67	165.20	173.67
Mean	4.79	5.29	4.83	4.47	4.85	132.44	168.16	153.49	142.59	149.17
	S Em		CD at 5%			S Em		CD at 5%		
N	0.037		0.114			2.551		7.853		
P	0.034		0.105			1.912		5.894		
N x P	0.113		0.328			6.351		18.351		
	Rabi									
Treatment	P_0	P_1	P_2	P_3	Mean	P_0	P_1	P_2	P_3	Mean
N_0	3.73	4.61	4.21	3.92	4.11	82.84	101.90	93.01	99.30	94.26
N_1	4.58	5.35	4.88	4.59	4.85	126.85	176.70	161.29	155.00	154.96
N_2	4.86	6.27	5.73	5.27	5.53	176.89	245.90	224.44	183.26	207.62
N_3	5.32	5.23	4.77	4.44	4.94	185.54	201.95	184.33	178.42	187.56
Mean	4.62	5.36	4.90	4.56	4.86	143.03	181.61	165.77	153.99	161.10
	S Em		CD at 5%			S Em		CD at 5%		
N	0.046		0.143			2.751		8.472		
P	0.037		0.113			2.072		6.372		
N x P	0.094		0.272			6.861		19.813		

life of flowers. It was also found to be at maximum with nitrogen at 150 kg ha^{-1} + phosphorus at 100 kg ha^{-1} closely followed by 150 kg ha^{-1} dose of both nutrients. This may be attributed to the reason that there was a better development in the reproductive organs in terms of cell wall strength, membrane integrity, better proportion of hydrophyllic colloids in the protoplasm, because of optimum availability of both nitrogen and phosphorus at N_{150}: P_{100} level compared to other dosages. Similar results were observed by Sonawane *et al.* (2008) and Monish *et al.* (2008) in china aster. The flower quality in terms of size, weight was also found to be at maximum with nitrogen at 150 kg ha^{-1} + phosphorus at 100 kg ha^{-1} closely followed by 150 kg ha^{-1} dose of both nutrients.

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Table 2. Cumulative water uptake, cumulative water loss, uptake to loss ratio and vase life of flowers as influenced by nitrogen and phosphorus levels in garland chrysanthemum during *kharif* and *rabi*

Treatment	Cumulative water uptake (g)					Cumulative water loss (g)					Uptake to loss ratio					Vase life (days)				
	Kharif																			
	P_0	P_1	P_2	P_3	Mean	P_0	P_1	P_2	P_3	Mean	P_0	P_1	P_2	P_3	Mean	P_0	P_1	P_2	P_3	Mean
N_0	13.84	25.61	23.37	21.57	21.10	17.61	25.98	23.71	23.43	22.68	0.79	0.99	0.99	0.92	0.92	4.1	5.5	5.1	5.0	4.9
N_1	17.87	26.86	24.51	27.51	24.19	22.18	25.44	24.38	26.82	24.70	0.81	1.06	1.01	1.03	0.97	5.1	6.2	5.7	5.4	5.6
N_2	19.60	34.35	31.36	28.04	28.34	23.74	28.73	29.15	28.45	27.52	0.83	1.20	1.08	0.99	1.02	6.2	7.6	6.9	6.4	6.8
N_3	23.06	33.73	30.79	30.20	29.44	26.33	31.36	30.92	29.74	29.59	0.88	1.08	1.00	1.02	0.99	6.0	6.5	6.0	5.3	6.0
Mean	18.59	30.14	27.51	26.83	25.77	22.47	27.88	27.04	27.11	26.12	0.82	1.08	1.02	0.99	0.98	5.3	6.5	5.9	5.6	5.8
	S Em		CD at 5%			S Em		CD at 5%			S Em		CD at 5%			S Em		CD at 5%		
N	3.69		11.38			5.22		16.09			0.009		0.027			0.051		0.156		
P	3.57		10.99			4.42		13.61			0.005		0.016			0.049		0.151		
N x P	8.23		23.76			12.56		36.26			0.016		0.047			0.122		0.353		
	Rabi																			
Treatment	P_0	P_1	P_2	P_3	Mean	P_0	P_1	P_2	P_3	Mean	P_0	P_1	P_2	P_3	Mean	P_0	P_1	P_2	P_3	Mean
N_0	13.26	24.98	22.80	21.03	20.52	19.22	28.07	25.62	25.50	24.60	0.69	0.89	0.89	0.82	0.82	6.4	9.1	8.3	7.7	7.9
N_1	16.72	26.23	23.94	26.97	23.47	23.55	27.33	26.31	29.00	26.55	0.71	0.96	0.91	0.93	0.88	7.9	9.7	8.8	8.9	8.8
N_2	19.02	33.73	30.79	26.97	27.63	26.06	30.66	31.41	30.30	29.61	0.73	1.10	0.98	0.89	0.93	9.8	12.1	11.0	10.2	10.8
N_3	22.48	32.48	29.65	28.58	28.30	28.82	33.14	32.94	31.07	31.49	0.78	0.98	0.90	0.92	0.90	9.6	10.6	9.6	8.8	9.6
Mean	17.87	29.36	26.80	25.89	24.98	24.41	29.80	29.07	28.97	28.06	0.73	0.98	0.92	0.89	0.88	8.4	10.3	9.4	8.9	9.3
	S Em		CD at 5%			S Em		CD at 5%			S Em		CD at 5%			S Em		CD at 5%		
N	3.32		10.24			4.42		13.63			0.009		0.027			0.068		0.208		
P	3.10		9.55			3.86		11.88			0.005		0.017			0.069		0.211		
N x P	8.08		23.33			11.18		32.30			0.016		0.047			0.197		0.568		

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(Received on 06.04.2012 and revised on 22.01.2014)