International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(5): 2563-2565

Received: 12-09-2019
Accepted: 30-09-2019

MM Masu
Assistant Research Scientist, Office of Director of Research, Anand Agricultural University, Anand, Gujarat, India

JS Patel
Department of Horticulture, B. A. College of Agriculture, Anand Agricultural University, Anand, Gujarat, India

NI Shah
Department of Horticulture, B. A. College of Agriculture, Anand Agricultural University, Anand, Gujarat, India

HC Patel
Department of Horticulture, B. A. College of Agriculture, Anand Agricultural University, Anand, Gujarat, India

Corresponding Author:
MM Masu
Assistant Research Scientist, Office of Director of Research, Anand Agricultural University, Anand, Gujarat, India

Effect of integrated nutrient management on growth and flower yield of annual chrysanthemum (*Chrysanthemum coronarium* L.) cv. local

MM Masu, JS Patel, NI Shah and HC Patel

Abstract
The experiment was conducted on "effect of integrated nutrient management on growth and flower yield of annual chrysanthemum (*Chrysanthemum coronarium* L.) cv. Local" at College Flower Nursery, B. A. College of Agriculture, AAU, Anand. Among the different treatments, soil application of 75% RDN from chemical fertilizer + 12.50% N from FYM + 1 lit /ha PGPR consortium treatment recorded significantly maximum plant height (99.89 cm), number of branches (25.05), plant spread (N-S) *i.e.* 93.02 cm and (E-W) *i.e.* 86.08 cm at 90 days after transplanting, average weight of flower (7.70 g) and flower yield (12.37 t/ha). However, the significantly maximum diameter of flower (7.61 cm) and number of flowers/ plant (45.74) were obtained with the soil application of 50% RDN from chemical fertilizer + 25% nitrogen from FYM + 1 lit/ha PGPR consortium treatment.

Keywords: Integrated nutrient management, growth, flower yield, annual chrysanthemum, *Chrysanthemum coronarium* L.

Introduction
In Gujarat, the annual chrysanthemum is locally known as '*Vijali*'. It is a winter season annual flowering plant. It having white colour flower which are mainly used for making garlands, veni and for decoration in religious and social functions. Out of the various factors affecting the growth and flowering of chrysanthemum, balanced nutrition is very important. The growth and development of a plant, generally depends on their judicious feeding right from the beginning. Continuous application of imbalanced and excessive nutrients had effect to decline in nutrient use efficiency. The recent concept of integrated nutrient supply involving organic and biofertilizers has developed to meet the growing needs for nutrients under intensive cultivation. In integrated plant nutrient supply system, the basic goal is to maintain or possibly improve the soil fertility and plant nutrient supply to an optimum level for sustaining the desired crop productivity through optimization of benefits from all possible sources of plant nutrients in an integrated manner. Therefore, the present investigation proposed on effect of integrated nutrient management on growth and yield of annual white chrysanthemum.

Material and methods
The present investigation was conducted in College Flower Nursery, B. A. College of Agriculture, AAU, Anand from October 2014 – March 2017. The experiment was conducted in Randomized Block Design (RBD) with planting distance of 60 x 45 cm with 3 replications. The treatments were T_1- 100% RDN from chemical fertilizer (Control), T_2- 75% RDN + 25% RDN from FYM, T_3- 75% RDN from chemical fertilizer + 25% RDN from Castor cake, T_4- 75% RDN + 1 lit/ha PGPR consortium, T_5- 75% RDN from chemical fertilizer + 12.50% RDN from FYM + 12.5% RDN from Castor cake, T_6- 50% RDN from chemical fertilizer + 25% RDN from FYM + 25% RDN from Castor cake, T_7- 75% RDN from chemical fertilizer + 12.50% RDN from FYM + 1 lit/ha PGPR consortium, T_8 - 50% RDN from chemical fertilizer + 25% RDN from FYM + 1 lit/ha PGPR consortium. During the experiments, all organic manures *i.e.* full dose of FYM and castor cake, 50% nitrogen, full dose of P_2O_5 and K_2O from chemical fertilizers were applied as basal dose at the time of transplanting of seedlings While, remaining 50% nitrogen from chemical fertilizer was applied at 30 days after transplanting of seedlings. Treatments were calculated on the basis of Recommended dose of fertilizer 200 Kg nitrogen, 100 Kg phosphorus and 50 Kg potash per hectare. PGPR consortium was applied

according to treatment @ 5 ml/lit water for 20 minutes dipping of seedlings at the time of transplanting. Growth characters *viz.*, plant height (cm), number of branches per plant, plant spread (cm) at 30, 60 and 90 days after transplanting while**,** flower yield per plant and flower yield per hectare were recorded. The data presented were pooled of the three years i.e. 2014-15, 2015-16 and 2016-17.

Result and discussion

Three year pooled data presented in Table-1 indicated that there were significant differences on plant height and number of branches at 30, 60 and 90 days after transplanting.

The soil application of 75% RDN + 12.50% RDN from FYM + 12.50% RDN from castor cake treatment (T_5) recorded significantly maximum plant height at 30 days (35.53 cm) and 60 days (57.56 cm) after transplanting. However, the significantly maximum plant height (99.89 cm) at 90 days after transplanting was found with soil application of 75% RDN + 12.50% RDN from FYM + 1 lit /ha PGPR consortium (T_7). Application of nitrogen encourages the formation of new cells, cell division and cell elongation. Thus results in vigorous growth of root system which ultimately helps in better absorption and utilization of nutrients from soil solution as well as applied nitrogen and organic manures which reflected in terms of better overall plant growth.

Table 1: Effect of integrated nutrient management on plant height and number of branches at 30, 60 and 90 days after transplanting of annual chrysanthemum

Treatments	Plant height (cm)			Number of branches		
	30 DATP	60 DATP	90 DATP	30 DATP	60 DATP	90 DATP
T_1	33.78	54.92	88.73	6.51	13.18	18.06
T_2	34.10	52.55	84.40	5.78	14.34	20.65
T_3	33.80	53.96	87.45	5.58	11.58	19.09
T_4	34.98	56.43	89.36	5.67	15.49	22.37
T_5	35.53	57.56	89.59	4.93	12.36	19.54
T_6	33.99	56.85	90.79	5.31	12.56	20.14
T_7	28.64	53.13	99.89	4.47	16.84	25.05
T_8	31.36	53.72	98.07	4.69	15.48	21.64
S.Em±	1.05	2.02	2.51	0.28	0.74	0.87
CD at 5%	2.98	NS	7.11	0.78	2.08	2.49
CV%	10.59	12.74	9.54	15.93	17.58	14.39

The significantly maximum number of branches (6.51) at 30 days after transplanting was found with the soil application of 100% RDN (T_1). Whereas, the soil application of 75% RDN from chemical fertilizer + 12.50% RDN from FYM + 1 lit /ha PGPR consortium treatment (T_7) obtained significantly maximum number of branches at 60 days (16.84) and 90 days (25.05) after transplanting. It might be due to the beneficial effect of Farm Yard Manure (FYM) and Biofertilizers (PGPR consortium) in combination with recommended dose of inorganic fertilizers which lead to better root proliferation, uptake of nutrients and water and better plant growth in terms of number of branches and plant spread.

Table 2: Effect of integrated nutrient management on plant spread (N-S) and (E-W) at 30, 60 and 90 days after transplanting of annual chrysanthemum

Treatments	plant spread (N-S) (cm)			plant spread (E-W) (cm)		
	30 DATP	60 DATP	90 DATP	30 DATP	60 DATP	90 DATP
T_1	62.51	73.45	82.43	58.03	67.12	75.49
T_2	62.71	71.64	79.72	57.37	65.48	73.63
T_3	68.45	76.76	85.15	61.62	69.93	77.94
T_4	63.93	72.55	82.42	55.88	68.74	75.16
T_5	61.57	73.21	84.19	58.23	70.46	75.91
T_6	61.62	73.62	83.46	56.47	72.86	75.51
T_7	73.32	83.66	93.02	69.13	80.60	86.08
T_8	70.52	83.33	92.30	69.07	80.69	86.06
S.Em±	1.74	1.75	2.00	1.48	1.64	2.04
CD at 5%	4.94	4.96	5.67	4.20	4.65	5.79
CV%	8.99	7.96	8.08	8.26	7.12	9.03

Three year pooled data presented in Table-2 revealed that there was significant differences on plant spread (N-S) and (E-W) at 30, 60 and 90 days after transplanting.

The significantly maximum plant spread (N-S) was found with soil application of 75% RDN from chemical fertilizer + 12.50% RDN from FYM + 1 lit/ha PGPR consortium (T_7) at 30 days (73.32 cm), 60 days (83.66 cm) and 90 days (93.02 cm) after transplanting.

In case of plant spread (E-W), the soil application of 75% RDN from chemical fertilizer + 12.50% RDN from FYM + 1 litre/ha PGPR consortium treatment (T_7) recorded significantly maximum plant spread at 30 days (69.13 cm) and 90 days (86.08 cm) after transplanting. However, the significantly maximum plant spread (E-W) at 60 days (80.69 cm) after transplanting was recorded with the soil application of 50% RDN from chemical fertilizer + 25% RDN from FYM + 1 lit/ha PGPR consortium(T_8). Similar results in growth parameters were also obtained by Nikam *et al.* (2018) [3] and Panchal (2009) [4] in annual chrysanthemum.

Three year pooled data presented in Table-3 indicated that there were significant differences on diameter of flower, number of flowers per plant. The soil application of 50% RDN from chemical fertilizer + 25% RDN from FYM + 1 litre/ ha PGPR consortium treatment (T_8) found significantly maximum diameter of flower (7.61 cm) and number of flowers per plant (45.74). However, the significantly

maximum average weight of flower (7.70 g) was recorded with the soil application of 75% RDN from chemical fertilizer + 12.5% RDN from FYM + 1 litre/ha PGPR consortium (T_7). It might be due to possible role of PGPR through atmospheric nitrogen fixation, better root proliferation, uptake of nutrients and water. More photosynthesis enhanced food accumulation which might have resulted in better growth and subsequently higher number of flowers per plant. Similar results were obtained by Meshram *et al.* (2008) [2] and Singh & Nigam (2015) [5] in annual chrysanthemum.

Table 3: Effect of integrated nutrient management on quality and yield of annual chrysanthemum

Treatments	Diameter of flower (cm)	Number of flowers per plant	Average weight of flower(g)	Flower yield per plant (g)	Flower yield (t/ha)
T_1	6.85	35.67	6.43	231.66	8.58
T_2	7.02	37.30	6.63	246.42	9.13
T_3	6.87	39.68	6.75	267.98	9.92
T_4	7.13	38.81	6.32	245.27	9.08
T_5	6.55	39.92	6.73	268.47	9.95
T_6	7.17	39.84	7.00	278.97	10.34
T_7	7.57	43.34	7.70	333.92	12.37
T_8	7.61	45.74	7.27	332.40	12.31
S.Em±	0.09	1.09	0.13	8.93	0.35
CD at 5%	0.26	3.08	0.37	25.30	0.98
CV%	4.31	7.52	6.24	9.33	9.97

Three year pooled data presented in Table-3 revealed that there were significant differences found on flower yield per plant and flower yield per hectare.

The soil application of 75% RDN from chemical fertilizer + 12.5% RDN from FYM + 1 litre/ha PGPR consortium treatment (T_7) recorded significantly maximum flower yield (333.92 g per plant) and flower yield (12.37 t per ha). The increase in flower yield may be due to the fact that phyto hormones stimulated by the consortium, which motivated root growth and induced changes in root morphology, which in turn affected assimilation of nutrients. The increased flower production could be ascribed to accelerated growth parameters like number of branches per plant and plant spread. Similar results were also obtained by Angadi (2014) [1] and Teja *et al*. (2017) [6] in annual chrysanthemum.

Conclusion:

The result obtain from the research experiment concluded that the significantly maximum plant height, number of branches, plant spread, average weight of flower and flower yield was recorded with the soil application of 75% RDN from chemical fertilizer + 12.50% RDN from FYM + 1 litre/ha PGPR consortium treatment Whereas, the soil application of 50% RDN from chemical fertilizer + 25% RDN from FYM + 1 lit/ha PGPR consortium treatment obtained significantly maximum diameter of flower and number of flowers per plant of annual chrysanthemum.

References

1. Angadi AP. Effect of integrated nutrient management on yield, economics and nutrient uptake of garland chrysanthemum (*Chrysanthemum coronarium* L.) The Asian J Horticulture. 2014; 9(1): 132-135.
2. Meshram N, Badge S, Bhongle SA, Khiratkar SD. Effect of bioinoculants with graded doses of NPK on flowering, yield attributes and economics of annual chrysanthemum. J Soils Crops. 2008; 18(1):217-220.
3. Nikam BS, Badge SA, Pawar AR. Growth and seed yield of annual chrysanthemum as influenced by different levels of nitrogen and potassium. Int. J Curr. Microbiol. App. Sci. 2018; 7(09):563-568.
4. Panchal RV. Effect of biofertilizers and chemical nitrogenous fertilizer on growth, flowering and yield of annual white chrysanthemum (*Chrysanthemum coronarium* L.) under middle Gujarat condition. M.Sc. (Agri.) Thesis, Anand Agriculture University, Anand (Gujarat), 2009.
5. Singh J, Nigam R. Effect of PGRs and inorganic fertilizers on vegetative growth and flowering behavior of chrysanthemum, Horti Flora Res. Spectrum. 2015; 4(3):273-276.
6. Teja RP, Bhaskar VV, Dorajeerao AVD, Subbaramamma P. Effect of graded levels of nitrogen and potassium on Growth and flower yield of annual chrysanthemum (*Chrysanthemum coronarium* L.). Plant Archives. 2017; 17(2):1371-1376.