Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2017; 6(5): 2646-2650
Received: 12-07-2017
Accepted: 13-08-2017

MK Mahadik
Ph.D. Scholar, Department of Horticulture, Dr. P.D.K.V., Akola, Maharashtra, India

SR Dalal
Head, Section of Horticulture, College of Agriculture, Dr. P.D.K.V., Akola, Maharashtra, India

Disha A Patil
Ph.D. Scholar, Department of Horticulture, Dr. P.D.K.V., Akola, Maharashtra, India

SM Wararkar
Ph.D. Scholar, Department of Horticulture, Dr. P.D.K.V., Akola, Maharashtra, India

Correspondence
MK Mahadik
Ph.D. Scholar, Department of Horticulture, Dr. P.D.K.V., Akola, Maharashtra, India

Nutritional and economic studies in chrysanthemum CV. PDKV ragini

MK Mahadik, SR Dalal, Disha A Patil and SM Wararkar

Abstract
A field investigation entitled "nutritional and economic studies in chrysanthemum cv. PDKV Ragini" was carried out during the two successive years, 2014-15 and 2015-16 at Floriculture Unit, Department of Horticulture, Dr. PDKV, Akola. In which significantly maximum blooming period, longevity of intact flower, flower yield ha^{-1}, weight of flower, vase life of flower, length and diameter of peduncle of flower were recorded with the application of biofertilizers and 50% RDF (150:100:100 kg ha^{-1} of NPK) + 10 t ha^{-1} VC (50% N through VC). Also the similar treatment resulted in maximum economic returns i.e. higher B:C ratio.

Keywords: Chrysanthemum, economics, management, nutrient, quality, yield

Introduction
Chrysanthemum (*Dendranthema grandiflora* Tzvelev) is belongs to family Asteraceae is most interesting group among the ornamental plant in the world and represents perhaps the oldest ornamental flower. Integrated nutrient supply/management (INS) aims at maintenance or adjustment of soil fertility and of plant nutrient supply to an optimum level for sustaining the desired crop productivity through optimization of benefit from all possible sources of plant nutrients in an integrated manner (Verma *et al*. 2011) [19]. Chrysanthemum is a heavy feeder of nutrient specially nitrogen and phosphorus (Nalawadi, 1982) [10]. At present, these nutrients are supplied through chemical fertilizers. Due to raising cost of fertilizers, and also due to indiscriminate and continuous use of chemical fertilizers in intensive cropping system, there is imbalance of nutrients in soil which has an adverse effect on soil health, yield and quality of crop (Sunitha and Hunje, 2010) [17], it has become imperative to arrive at an INM practices for chrysanthemum to achieve the target yield at economized use of plant nutrients. Hence, an attempt was made to reduce the amount of nitrogenous, phosphatic and potassic fertilizers by substituting with organic manures and biofertilizers (*Azotobacter* and PSB). The use of INM in varying combinations was reported to be beneficial for increasing yield and quality of flowers. Hence, the adoption of this practice will be proved advantageous for the farmers.

Materials and Methods
The experiment was carried out during the winter season of the years 2014-15 and 2015-16, at Floriculture Unit, Department of Horticulture, Dr. PDKV, Akola The experiment was laid out in Split Plot Design with three replications and fourteen treatment combinations. The treatments comprised of two levels of biofertilizers i.e. with biofertilizers (Azotobacter and PSB @ 5 kg ha^{-1}) and without biofertilizers in main plot and seven combination of organic and inorganic fertilizers including one treatment of recommended dose of fertilizers *viz*., 100% RDF (300:200:200 kg ha^{-1}), 75% RDF + 15 t ha^{-1} FYM (25% N through FYM), 50% RDF +30 t ha^{-1} FYM (50% N through FYM), 75% RDF + 5 t ha^{-1} VC (25% N through VC), 50% RDF + 10 t ha^{-1} VC (50% N through VC), 75% RDF + 1.5 t ha^{-1} NC (25% N through NC) and 50% RDF + 3 t ha^{-1} NC (50% N through NC). The flowering parameters *viz*., blooming period and longevity of intact flower; flower yield and flower quality parameters*viz*., weight and vase life of flower, length and diameter of peduncle were recorded from five plants which were randomly selected and labeled in each plot.

Results and discussion
1. Flowering and yield parameters
1.1. Effect of biofertilizers
Blooming period, longevity of intact flower and flower yield ha^{-1} (Table 1) in chrysanthemum were significantly influenced by application of biofertilizer the treatment M_1 (i.e. application

of biofertilizers) recorded significantly maximum blooming period (55.10, 56.29 and 55.69 days, respectively), longevity of intact flower(13.34, 11.48 and 12.41 days, respectively)and flower yield ha^{-1}(17.88, 17.92 and 17.90 t, respectively), whereas, the treatment M_2 recorded significantly minimum blooming period (51.71, 52.76 and 52.24 days, respectively),longevity of intact flower(12.65, 10.60 and 11.62 days, respectively)and flower yield ha^{-1}(15.21, 15.23 and 15.22 t, respectively) during the years 2014-15, 2015-16and in pooled data. The longest blooming period resulted from higher longevity of flower on plant might be attributed to the increased protein synthesis, rapid nutrient mobilization and prevention of chlorophyll degradation due to sufficient amount of nutrient availability in *Azotobacter* and PSB enriched soils. The increase in yield with application of biofertilizers might be due to fact that, similar treatment recorded significantly maximum flower yield plant^{-1}. These results are in agreement with the findings of Patil *et al*. (2013) [15] in China aster, Moghadam and Shoor (2013) [9], Palagani *et al*. (2013) [12], Bohra and Kumar (2014) [4] and Palagani *et al*. (2015) [11] in chrysanthemum and Singh *et al*. (2015) [16] in marigold.

1.2. Effect of organic and inorganic fertilizers

The effect of organic and inorganic fertilizers (Table 1) on blooming period, longevity of intact flower and flower yield ha^{-1}in chrysanthemum was found to be significant.

During the years, 2014-15 and 2015-16 as well as in pooled data, the treatment S_5 recorded maximum blooming period (56.83, 60.67 and 58.75 days, respectively), longevity of intact flower(13.75, 11.66 and 12.70 days, respectively)and flower yield ha^{-1} (18.57, 19.40 and 18.98 t, respectively). Whereas, significantly minimum blooming period (49.67, 49.00 and 49.33 days, respectively), longevity of intact flower (11.97, 10.16 and 11.07 days, respectively) and flower yield ha^{-1}(13.95 14.10 and 14.03 t, respectively) were noted under the treatment S_1. Due to sufficient amount of nutrient availability in vermicompost enriched soil which caused increased protein synthesis, rapid nutrient mobilization and prevention of chlorophyll degradation which helped in increase in longevity of opened flower which ultimately resulted in maximum blooming period. The increased in flower yield ha^{-1} might be due to the indirect effect of more flower yield plant^{-1}as well as more flower weight (individual) as estimated by the application of vermicompost along with 50 % RDF. These results are in agreement with the findings of Patnvar *et al*. (2014) [13], Bohra and Kumar (2014) [4] and Palagani *et al*. (2015) [11] in chrysanthemum, Thumar*et al*. (2013) [18], Azmeera *et al*. (2015) and Singh *et al*. (2015) [16] in marigold and Hoda and Mona (2014) [6] in Petunia.

Table 1: Effect of integrated nutrient management on blooming period (days), longevity of intact flower (days) and flower yield ha^{-1} in chrysanthemum

Treatments	Blooming period (days)			Longevity of intact flower (days)			Flower yield ha^{-1} (t)		
Bio-fertilizers (M)	**2014-15**	**2015-16**	**Pooled**	**2014-15**	**2015-16**	**Pooled**	**2014-15**	**2015-16**	**Pooled**
M_1 – With bio-fertilizers	55.10	56.29	55.69	13.34	11.48	12.41	17.88	17.92	17.90
M_2 – Without bio-fertilizers	51.71	52.76	52.24	12.65	10.60	11.62	15.21	15.23	15.22
‘F’ Test	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig
SE (m) $\pm$	0.243	0.410	0.337	0.112	0.136	0.125	0.377	0.377	0.377
CD at 5%	1.477	2.493	1.322	0.681	0.827	0.488	2.292	2.292	1.479
Organic and inorganic fertilizers (S)									
S_1 -100 % RDF	49.67	49.00	49.33	11.97	10.16	11.07	13.95	14.10	14.03
S_2 – 75 % RDF + 15 t ha^{-1} FYM	53.83	54.83	54.33	12.99	11.08	12.03	16.59	16.63	16.61
S_3 – 50 % RDF + 30 t ha^{-1} FYM	54.67	56.67	55.67	13.38	11.22	12.30	17.21	16.93	17.07
S_4 – 75 % RDF + 5 t ha^{-1} VC	54.17	55.50	54.83	13.30	11.15	12.22	16.89	16.75	16.82
S_5 – 50 % RDF + 10 t ha^{-1} VC	56.83	60.67	58.75	13.75	11.66	12.70	18.57	19.40	18.98
S_6 – 75 % RDF + 1.5 t ha^{-1} NC	50.33	51.83	51.08	12.71	10.88	11.80	16.03	15.85	15.94
S_7 – 50 % RDF + 3 t ha^{-1} NC	54.33	53.17	53.75	12.86	11.12	11.99	16.56	16.39	16.47
‘F’ Test	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig
SE (m) $\pm$	0.840	0.959	0.368	0.182	0.112	0.062	0.284	0.389	0.139
CD at 5%	2.453	2.800	1.046	0.531	0.327	0.175	0.830	1.134	0.395
Interaction (M x S)									
‘F’ Test	NS	NS	NS	NS	Sig	NS	Sig	Sig	Sig
SE (m) $\pm$	1.189	1.356	0.736	0.751	0.158	0.123	0.402	0.550	0.278
CD at 5%	-	-	-	-	0.462	-	1.173	1.604	0.791

1.3. Interaction effect

The interaction effects due to biofertilizers along with organic and inorganic fertilizers (Table 2) on blooming period in chrysanthemum was found statistically non-significant. Whereas it was found significant for longevity of intact flower and flower yield ha^{-1}

During the year 2015-16, the longevity of intact flower was recorded significantly maximum with the treatment combination M_1S_5 (12.40 days) which was followed by the treatment combinations M_1S_3 and M_1S_4 (11.62 and 11.60 days, respectively), whereas significantly minimum longevity of intact flower was observed under the treatment combination M_2S_1 (10.02 days). The significant increase in longevity of intact flower with application of biofertilizers along with vermin compost and chemical fertilizers was also recorded by Bohra and Kumar (2014) [4] in chrysanthemum.

Significantly maximum flower yield ha^{-1}was harvested with the treatment combination M_1S_5 (20.91, 21.71 and 21.31 t, respectively) during the years 2014-15 and 2015-16 as well as in pooled data. Whereas, significantly minimum flower yield ha^{-1}was harvested under the treatment combination M_2S_1 (13.58 and 13.85 t, respectively) during 2014-15 and in pooled data. Whereas, during the year 2015-16 it was harvested minimum with the treatment combination M_1S_1 (14.08 t).The increased in flower yield ha^{-1} might be due to the combined beneficial effect of biofertilizersalong with 50% RDF and vermicompost. These results are similar with the results obtained by Patil and Agasimani (2013) [14] in China aster, Jadhav *et al*. (2014) [7] in African marigold, Airadevi (2014) [1] and Patnvar *et al*. (2014) [13] in chrysanthemum.

Table 2: Interaction effect of integrated nutrient management on blooming period (days), longevity of intact flower (days) and flower yield ha^{-1} in chrysanthemum

Treatments	Blooming period (days)			Longevity of intact flower (days)			Flower yield ha^{-1} (t)		
	2014-15	2015-16	Pooled	2014-15	2015-16	Pooled	2014-15	2015-16	Pooled
M_1S_1- Biofertilizers + 100 % RDF	51.67	50.67	51.17	12.77	10.31	11.54	14.33	14.08	14.21
M_1S_2- Biofertilizers + 75% RDF + 15 t ha^{-1} FYM	55.33	56.33	55.83	13.40	11.58	12.49	17.96	18.05	18.00
M_1S_3- Biofertilizers + 50% RDF + 30 t ha^{-1} FYM	56.67	58.33	57.50	13.69	11.62	12.65	18.49	18.22	18.36
M_1S_4- Biofertilizers + 75% RDF + 5 t ha^{-1} VC	55.67	57.33	56.50	13.52	11.60	12.56	18.22	18.15	18.18
M_1S_5- Biofertilizers + 50% RDF + 10 t ha^{-1} VC	58.33	62.67	60.50	14.03	12.40	13.22	20.91	21.71	21.31
M_1S_6- Biofertilizers + 75% RDF + 1.5 t ha^{-1} NC	53.33	54.00	53.67	12.85	11.35	12.10	17.45	17.37	17.41
M_1S_7- Biofertilizers + 50% RDF + 3 t ha^{-1} NC	54.67	54.67	54.67	13.12	11.47	12.29	17.78	17.87	17.83
M_2S_1- 100 % RDF	47.67	47.33	47.50	11.17	10.02	10.59	13.58	14.12	13.85
M_2S_2- 75% RDF + 15 t ha^{-1} FYM	52.33	53.33	52.83	12.57	10.59	11.58	15.22	15.20	15.21
M_2S_3- 50% RDF + 30 t ha^{-1} FYM	52.67	55.00	53.83	13.07	10.83	11.95	15.92	15.64	15.78
M_2S_4- 75% RDF + 5 t ha^{-1} VC	52.67	53.67	53.17	13.08	10.69	11.88	15.56	15.36	15.46
M_2S_5- 50% RDF + 10 t ha^{-1} VC	55.33	58.67	57.00	13.47	10.91	12.19	16.22	17.09	16.66
M_2S_6- 75% RDF + 1.5 t ha^{-1} NC	47.33	49.67	48.50	12.57	10.40	11.49	14.60	14.32	14.46
M_2S_7- 50% RDF + 3 t ha^{-1} NC	54.00	51.67	52.83	12.61	10.77	11.69	15.34	14.91	15.12
'F' Test	NS	NS	NS	NS	Sig	NS	Sig	Sig	Sig
SE (m) ±	1.189	1.356	0.736	0.751	0.158	0.123	0.402	0.550	0.278
CD at 5%	-	-	-	-	0.462	-	1.173	1.604	0.791

2. Flower quality parameters
2.1. Effect of biofertilizers
The flower quality parameters (Table 3) were significantly influenced by application of biofertilizers (*Azotobacter* and PSB). During the years 2014-15, 2015-16 and in pooled data, the treatment M_1 recorded significantly maximum weight of flower (4.82, 4.48 and 4.65 g, respectively), vase life of flower (10.44, 10.13 and 10.28 days, respectively), peduncle length (11.89, 11.05 and 11.47 cm, respectively) and peduncle diameter (2.14, 2.09 and 2.11 mm, respectively).Whereas, the treatment M_2 recorded significantly minimum weight of flower (4.46, 4.19 and 4.32 g, respectively), vase life of flower (9.54, 9.23 and 9.39 days, respectively), peduncle length (10.99, 10.19 and 10.60 cm, respectively) and peduncle diameter (1.97, 1.92 and 1.95 mm, respectively). *Azotobacter* and PSB lead to the enhanced level of auxins which divert the photo assimilates to the developing flower buds, resulting in increased petal number and flower weight. The increase in the flower stalk (peduncle) length and diameter might be due to, better nutrient uptake and photosynthesis. Source and sink relationship besides excellent physiological and biochemical activities due to presence of biofertilizers, these might have attributed to sufficient supply of macro and micronutrients. Similar results were also obtained by Airadevi and Mathad (2012) [2] in chrysanthemum and Dalawai and Naik (2014) [5] in carnation

2.2. Effect of organic and inorganic fertilizers
The effect of organic and inorganic fertilizers (Table 3) on flower quality parameters was found to be significant. During the years 2014-15, 2015-16 and in pooled data, the treatment S_5 recorded significantly maximum weight of flower (4.89, 4.77 and 4.83 g, respectively), vase life of flower (10.61, 10.28 and 10.44 days, respectively), peduncle length (12.04 11.49 11.77 cm)and peduncle diameter (2.16 2.17 2.16 mm). Whereas, significantly minimum weight of flower (4.34, 4.02 and 4.18 g, respectively), vase life of flower (9.19, 8.90 and 9.04 days, respectively), peduncle length (10.66 9.73 10.19 cm) and peduncle diameter (1.92 1.83 1.88 mm)were noted under the treatment S_1.The increase in flower quality parameters with application of vermicompost along with chemical fertilizers could be due to the increased photosynthetic activity which, in turn, might have favored an increased accumulation of dry matter and also efficient partitioning of photosynthates towards the sink. The increase in vase life of flower with application of vemicompost along with 50 % RDF might be ascribed to breaking of apical dominance, followed by easy and better translocation of nutrients to the flowers. This might also be due to the growth promoting substances like auxins and cytokinins present in vermicompost might have stimulated the cell division which could have resulted in to increase in length of pedicel. It might be attributed to the nature of interaction of physiological and growth parameters by way of increased dry matter production which is in conformity with the findings of Kumar *et al*. (2013) [8] and Azmeera *et al.* (2015) [3] in marigold, Patil *et al*. (2013) [15] in China aster, Bohra and Kumar (2014) [4] and Palagani *et al*. (2015) [11] in chrysanthemum.

Table 3. Effect of integrated nutrient management on quality parameters of chrysanthemum flower

Treatments	Weight of flower head (g)			Vase life of flower (days)			Length of peduncle (cm)			Diameter of peduncle (mm)		
	2014-15	2015-16	Pooled	2014-15	2015-16	Pooled	2014-15	2015-16	Pooled	2014-15	2015-16	Pooled
Bio-fertilizers (M)												
M_1 – With bio-fertilizers	4.82	4.48	4.65	10.44	10.13	10.28	11.89	11.05	11.47	2.14	2.09	2.11
M_2 – Without bio-fertilizers	4.46	4.19	4.32	9.54	9.23	9.39	10.99	10.19	10.60	1.97	1.92	1.95
'F' Test	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig
SE (m) ±	0.061	0.046	0.054	0.136	0.139	0.137	0.100	0.137	0.120	0.020	0.026	0.023
CD at 5%	0.374	0.282	0.214	0.827	0.844	0.539	0.606	0.835	0.471	0.122	0.157	0.090
Organic and inorganic fertilizers (S)												
S_1 -100 % RDF	4.34	4.02	4.18	9.19	8.90	9.04	10.66	9.73	10.19	1.92	1.83	1.88
S_2 – 75 % RDF + 15 t ha^{-1} FYM	4.62	4.34	4.48	10.04	9.72	9.88	11.45	10.70	11.07	2.06	2.02	2.04
S_3 – 50 % RDF + 30 t ha^{-1} FYM	4.73	4.35	4.54	10.18	9.86	10.02	11.72	10.75	11.23	2.09	2.03	2.06
S_4 – 75 % RDF + 5 t ha^{-1} VC	4.66	4.33	4.49	10.14	9.82	9.98	11.52	10.67	11.10	2.07	2.01	2.04
S_5 – 50 % RDF + 10 t ha^{-1} VC	4.89	4.77	4.83	10.61	10.28	10.44	12.04	11.49	11.77	2.16	2.17	2.16
S_6 – 75 % RDF + 1.5 t ha^{-1} NC	4.57	4.22	4.39	9.82	9.51	9.67	11.24	10.42	10.83	2.02	1.96	1.99
S_7 – 50 % RDF + 3 t ha^{-1} NC	4.65	4.30	4.48	9.97	9.66	9.81	11.49	10.61	11.05	2.07	2.00	2.03

'F' Test	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig
SE (m) ±	0.046	0.085	0.027	0.096	0.093	0.038	0.149	0.138	0.059	0.026	0.026	0.011
CD at 5%	0.134	0.249	0.079	0.280	0.271	0.109	0.434	0.404	0.167	0.077	0.076	0.030
Interaction (M x S)												
'F' Test	NS	NS	NS	Sig	Sig	Sig	NS	NS	NS	NS	NS	NS
SE (m) ±	0.065	0.120	0.055	0.136	0.131	0.077	0.210	0.196	0.117	0.037	0.037	0.021
CD at 5%	-	-	-	0.396	0.383	0.219	-	-	-	-	-	-

2.3. Interaction effect
An interaction effect due to biofertilizers along with organic and inorganic fertilizers (Table 4) on quality parameters of chrysanthemum flower was found to be non-significant except for vase life of flower which was significantly influenced.

Table 4: Interaction effect of integrated nutrient management on quality parameters of chrysanthemum flower

Treatments	Weight of flower head (g)			Vase life of flower (days)			Length of peduncle (cm)			Diameter of peduncle (mm)		
	2014-15	2015-16	Pooled	2014-15	2015-16	Pooled	2014-15	2015-16	Pooled	2014-15	2015-16	Pooled
M_1S_1- Biofertilizers + 100 % RDF	4.48	3.94	4.21	9.35	9.07	9.21	10.93	9.87	10.40	1.98	1.86	1.92
M_1S_2- Biofertilizers + 75% RDF + 15 t ha^{-1} FYM	4.79	4.49	4.64	10.53	10.21	10.37	11.92	11.08	11.50	2.15	2.09	2.12
M_1S_3- Biofertilizers + 50% RDF + 30 t ha^{-1} FYM	4.90	4.51	4.70	10.59	10.27	10.43	12.21	11.12	11.67	2.15	2.10	2.12
M_1S_4- Biofertilizers + 75% RDF + 5 t ha^{-1} VC	4.84	4.50	4.67	10.56	10.24	10.40	11.95	11.11	11.53	2.15	2.09	2.12
M_1S_5- Biofertilizers + 50% RDF + 10 t ha^{-1} VC	5.18	5.02	5.10	11.31	10.97	11.14	12.77	12.20	12.48	2.29	2.30	2.29
M_1S_6- Biofertilizers + 75% RDF + 1.5 t ha^{-1} NC	4.74	4.41	4.57	10.33	10.02	10.17	11.69	10.87	11.28	2.10	2.05	2.08
M_1S_7- Biofertilizers + 50% RDF + 3 t ha^{-1} NC	4.78	4.49	4.64	10.43	10.11	10.27	11.80	11.08	11.44	2.13	2.09	2.11
M_2S_1- 100 % RDF	4.21	4.11	4.16	9.03	8.73	8.88	10.39	9.59	9.99	1.87	1.81	1.84
M_2S_2- 75% RDF + 15 t ha^{-1} FYM	4.45	4.18	4.32	9.55	9.23	9.39	10.98	10.31	10.65	1.98	1.94	1.96
M_2S_3- 50% RDF + 30 t ha^{-1} FYM	4.57	4.20	4.38	9.77	9.45	9.61	11.23	10.37	10.80	2.02	1.95	1.99
M_2S_4- 75% RDF + 5 t ha^{-1} VC	4.49	4.15	4.32	9.71	9.39	9.55	11.09	10.24	10.66	2.00	1.93	1.96
M_2S_5- 50% RDF + 10 t ha^{-1} VC	4.59	4.52	4.56	9.91	9.58	9.75	11.32	10.78	11.05	2.04	2.03	2.03
M_2S_6- 75% RDF + 1.5 t ha^{-1} NC	4.39	4.04	4.21	9.32	9.01	9.17	10.79	9.96	10.37	1.93	1.88	1.90
M_2S_7- 50% RDF + 3 t ha^{-1} NC	4.52	4.11	4.31	9.52	9.20	9.36	11.17	10.14	10.65	2.01	1.91	1.96
'F' Test	NS	NS	NS	Sig	Sig	Sig	NS	NS	NS	NS	NS	NS
SE (m) ±	0.065	0.120	0.055	0.136	0.131	0.077	0.210	0.196	0.117	0.037	0.037	0.021
CD at 5%	-	-	-	0.396	0.383	0.219	-	-	-	-	-	-

During the years 2014-15 and 2015-16 as well as in pooled data, significantly maximum vase life was recorded with the treatment combination M_1S_5 (11.31, 10.97 and11.14 days, respectively). Whereas, significantly minimum vase life was observed under the treatment combination M_2S_1 (9.03, 8.73 and8.88 days, respectively). This might be due to combined beneficial effect of biofertilizers along with vermicompost and chemical fertilizers. These findings are in close agreement with the findings of Patil *et al*. (2013) [15] in China aster.

3. Economic attributes
3.1. B:C ratio
The economic aspect i.e. B:C ratio (Table 5) was significantly influenced by application of biofertilizers along with organic and inorganic fertilizers.

Table 5: Effect of integrated nutrient management on B:C ratio

Treatments	Cost Benefit Ratio		
	2014-15	2015-16	Pooled Mean
M_1S_1- Biofertilizers + 100 % RDF	2.16	2.11	2.14
M_1S_2- Biofertilizers + 75% RDF + 15 t ha^{-1} FYM	2.70	2.72	2.71
M_1S_3- Biofertilizers + 50% RDF + 30 t ha^{-1} FYM	2.36	2.31	2.33
M_1S_4- Biofertilizers + 75% RDF + 5 t ha^{-1} VC	2.75	2.74	2.75
M_1S_5- Biofertilizers + 50% RDF + 10 t ha^{-1} VC	2.79	2.94	2.87
M_1S_6- Biofertilizers + 75% RDF + 1.5 t ha^{-1} NC	2.69	2.67	2.68
M_1S_7- Biofertilizers + 50% RDF + 3 t ha^{-1} NC	2.24	2.26	2.25
M_2S_1- 100 % RDF	1.60	1.71	1.66
M_2S_2- 75% RDF + 15 t ha^{-1} FYM	2.14	2.14	2.14
M_2S_3- 50% RDF + 30 t ha^{-1} FYM	1.89	1.84	1.87
M_2S_4- 75% RDF + 5 t ha^{-1} VC	2.21	2.17	2.19
M_2S_5- 50% RDF + 10 t ha^{-1} VC	1.95	2.11	2.03
M_2S_6- 75% RDF + 1.5 t ha^{-1} NC	2.09	2.03	2.06
M_2S_7- 50% RDF + 3 t ha^{-1} NC	1.80	1.72	1.76

During both the years (i.e. 2014-15 and 2015-16) as well as in pooled data, in economic treatment, the benefit cost ratio showed that, treatment combination M_1S_5 wasmost remunerative for cultivation of chrysanthemum with maximum B:C ratio (2.79, 2.94and 2.87, respectively) which was followed by treatment combination M_1S_4 (2.75, 2.74and 2.75, respectively). Whereas, treatment combination M_2S_1 was recorded minimum B:C ratio (1.60, 1.71and 1.66, respectively). The higher net returns and B:C ratio in the above treatments combinations due to higher flower yield of good quality which fetch good market prices comparatively less cost of the manures. Above result are similar to the results obtained by Verma *et al*. (2011) [19] and Airadevi and Mathad (2012) [2] who registered higher net returns and B:C ratio in chrysanthemum by application of vermicompost in substitution with 50% RDF along with biofertilizers (*Azotobacter* and PSB).

References

1. Airadevi PA. Effect of integrated nutrient management on yield, economics and nutrient uptake of garland chrysanthemum (*Chrysanthemum coronarium* L.). Asian J Hort. 2014; 9(1):132-135.
2. Airadevi PA, Mathad JC. Effect of INM on growth, yield and economics of garland chrysanthemum. Asian J Soil Sci. 7(1):93-97.
3. Azmeera V, Prasad VM, Singh D. Effect of integrated nutrient management on flowering and shelf life of African marigold (*Tageteserecta* L.) cv. Pusabasantigainda. Research J Agric. Sci. 2015; 6(4):732-734.
4. Bohra Mamta, Kumar A. Studies on effect of organic manures and bioinoculants on vegetative and floral attributes of chrysanthemum cv. Littledarlling. The Bioscan. 2014; 9(3):1007-1010.
5. Dalawai B, Naik B Hemla. Integrated nutrient management studies in carnation (*Dianthus cariyophyllus* L.) cv. Soto under protected condition. Int. J Agric. Sci & Vet. Med. 2014; 2(3):18-24.
6. Hoda E El-Mokadem, Mona S. Effect of bio and chemical fertilizers on growth and flowering of *Petunia hybrida* plants. Am. J Plant Physiol. 2014; 9(2):68-77.
7. Jadhav PB, Singh Alka, Mangave BD, Patil NB, Patel D J, Dekhane SS, *et al*. Effect of organic and inorganic fertilizers on growth and yield of African marigold (*Tageteserecta* L.) cv. Pusa Basanti Gainda. Annals of Biological Research. 2014; 5(9):10-14.
8. Kumar S, Singh JP, Mohan B, Nathiram, Rajbeer. Influence of integrated nutrient management on growth, flowering and yield parameters of marigold (*Tageteserecta*L.) CV. Pusa Basanti Gainda. Asian J Hort. 2013; 8(1):118-121.
9. Moghadam MZ, Shoor M. Effect of vermicompost and two bacterial biofertilizers on some quality parameters of petunia. Not. Sci. Biol. 2013; 5(2):226-231.
10. Nalawadi UG. Nutritional studies in some varieties of marigold (*Tageteserecta* L.). Ph.D. Thesis Unpub. Submitted to, UAS, Bangalore, 1982.
11. Palagani Neelima, Barad AV, Bhosale Nilima. Responsof chrysanthemum (*Chrysanthemum morifolium* R.) cv. IIHR-6 to integrated nutrient management. Bioinfolet. 2015; 12(1A):79-84.
12. Palagani Neelima, Barad AV, Bhosale Nilima, Thumar BV. Influence of integrated plant nutrition on growth and flower yield of chrysanthemum (*Chrysanthemum morifolium* Ramat.) cv. IIHR-6 under Saurashtra conditions. Asian J Hort. 2013; 8(2):502-506.
13. Patanwar Mridubhashini, Sharma G, Banjare Chetna, Chandravanshi Deepika, Sahu Eshu. Growth and development of chrysanthemum (*Dendranthema grandiflora* Tzvelev) as influenced by integrated nutrient management. 2014; 6(Special issue):459-462.
14. Patil VS, Agasimani AD. Effect of integrated nutrient management on growth and yield parameters in China aster (*Callistephus chinensis*). Mysore J Agric. Sci. 2013; 47(2):267-272.
15. Patil RS, Hanumanthappa M, Hagde Jayalakshmi N, Maheshwar KJ, Nagesha L. Effect of integrated nutrient management on growth, yield and vase life of China aster (*Callistephus chinensis* L. Nees) for coastal Karnataka. Environ & Eco. 2013; 31(2C):1104-1106.
16. Singh PS, Prakash Kumar M, Malik S, Singh MK, Kumar A. Effect of integrated nutrient management on growth, flowering and yield in marigold (*Tagetes erecta* L.). Annals of Hort. 2015; 8(1):73-80.
17. Sunitha HM, Hunje R. Effect of plant population and integrated nutrient management on growth, seed yield and quality of African marigold (*Tagetes erecta* L.). Karnataka J Agric. Sci. 2010; 23(5):783-786.
18. Thumar BV, Barad AV, Neelima P, Bhosale Nilima. Effect of integrated system of plant nutrition management on growth, yield and flower quality of African marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gainda. Asian J Hort. 2013; 8(2):466-469.
19. Verma SK, Angadi SG, Patil VS, Mokashi AN, Mathad JC, Mummigatti UV et al. Growth, yield and quality of chrysanthemum (*Chrysanthemum morifolium* Ramat.) cv. Raja as influenced by integrated nutrient management. Karnataka J Agric. Sci. 2011; 24(5):681-683.