*International Journal of Plant & Soil Science*

***Volume 35, Issue 19, Page 692-697, 2023; Article no.IJPSS.104652***
***ISSN: 2320-7035***

# Impact of Controlling Treatment on African Marigold (*Tagetus erecta* L.) with Special Reference to Economic Parameters

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***Authors' contributions***

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

***Article Information***

DOI: 10.9734/IJPSS/2023/v35i193600

**Open Peer Review History:**
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/104652

***Original Research Article***

***Received: 06/06/2023***
***Accepted: 12/08/2023***
***Published: 25/08/2023***

## ABSTRACT

The present investigation "Impact of controlling treatment on African marigold (*Tagetus erecta L.*) with special reference to Economic parameters" was carried out at the Department of Horticulture, Gochar Mahavidhyalaya, Rampur Maniharan, Saharanpur affiliated by CCSU, Meerut, Uttar Pradesh during 2017-18. During the study period various treatments were given to accelerate the growth of flowering and vegetative parameters of the selected species. All the vegetative and

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flowering parameters like plant spreading, diameter of plant, number of primary and secondary branches and in the flowering parameters i.e. bud initiation, number of flowers per plant, total flower yield was recorded maximum under $T_6$ (75% RDF + vermicompost + azotobacter) treatment, while all the values were found minimum under control treatment and there was a big difference between the output of said treatment. Economic parameters were found very close to the studied vegetative and flowering parameters as given treatment played a pivotal role to enhance the economic gain from selected flowering plant and the maximum CBR was also recorded under $T_6$ (75% RDF + vermicompost + azotobacter) treatment while the minimum CBR was recorded under control treatment.

*Keywords: Integrated nutrient management; African marigold; vermicompost; azotobacter.*

## 1. INTRODUCTION

From the time immemorial dates back about 1600 B.C. (The time of Aryans) as the Aryans were the great lover of flowers. Various flowers like lotus has described in Hindu Vedas. Atharvaveda mention asvatha (known as pipal). Rigveda also describe the Pipal tree and its importance. Flowering plants have described into Hindu scriptures Mahabharat and Ramayana as the beautiful garden as well as other ornamental trees/plants. The Ramayana explained the lake full of lotuses its sacredness and beauty. The lotus flower considered as a sacred flower and regarded by Hindus and the Buddhists. Evidences say that the Lord Buddha attains his enlightenment under a pipal tree, spread his new teaching under shady banyan and mango tree and take his last breath in Sal (*Shorea robusta*) grooves. The Rajput Rajas (King) established various garden in India. The king Man Singh (1590-1615 AD) began a garden at Amber fort near Jaipur and the same garden lately completed by Jai Singh (1699-1743 AD) [1].

In India marigold is one of the most commonly grown flowers and used extensively on religious and social functions in different forms. Because of their ease in cultivation, wide adaptability to varying soil and climatic conditions, long duration of flowering and attractively coloured flowers of excellent keeping quality, the marigolds have become one of the most popular flowers in our country. Flowers are sold in the market as loose or as garlands. Due to its variable height and colour marigold is especially use for decoration and included in landscape plans. The plants of *Tagetes* species yield a strong aromatic and essential oil called *Tagetes* oil. It is used for compounding high grade perfumes [2]. Cayrol [3] recommended nematode control in the bulb crops by green manuring or intercropping with African marigold.

In the present study, the economic parameters were selected to know the impact of INM on selected economic parameters i.e. flower yields (Q/ha), Effective flower yields (Q/ha), Gross realization, Total cost of cultivation and Cost Benefit Ratio (CBR).

## 2. MATERIALS AND METHODS

To calculate the Economic Parameters of selected flowering plant, the following method was used:

1) **Flower Yield per Hectare (q/ha):** The yield of flowers per hectare was calculated from the average weight of flowers per net plot converted into yield of flowers per hectare and expressed in quintal.
2) **Effective Flower Yield /ha (q):** Effective yield means, it is assumed that 10 % of total yield is wasted or damaged or not able to sold in the market. Flower Price Rs.1000/- per quintal
3) **Cost of Cultivation:** The expense incurred for all the cultivation operations from preparatory tillage to final harvesting including cost of inputs viz., seeds, fertilizers, pesticides, cultural practices etc. applied to each treatment were calculated on the basis of prevailing local charges.
4) **Cost Benefit Ratio (CBR):** Net returns of each treatment were calculated by deducting the total cost of cultivation from the gross returns. The Cost Benefit Ratio (CBR) was calculated on the bases of following formula.

$$Cost\ Benefit\ Ratio\ (CBR) = \frac{\text{Net Returns}}{\text{Cost of cultivation}}$$

## 3. RESULTS AND DISCUSSION

### 3.1 Flower Yields (Q/hectare)

The flower yields (Quintal/hectare) is an important parameter and play a key role to gain

more benefits and may be directly linked with gross realization (Rsha1). The flower yield is ranged from 94.33 Q/ha to 185.11 Q/ha found under different treatments. The maximum flower yield 185.11Q/ha was found under $T_6$ (75% RDF + vermicompost + azotobacter) treatment and this value was followed by 179.69 Q/ha under $T_4$ (100% RDF + Poultry manure) treatment and 178.56 Q/ha under $T_3$ (100% RDF + Vermicompost) treatment, while the minimum yield was found 94.33 Q/ha under $T_{17}$ (control) treatment, which is control treatment during first year of the study (Table 1).

### 3.2 Effective Flower Yield (Q/hectare)

Effective flower yield, it is assumed that 10% of total yield is wasted or damaged or not able to sold in the market. The maximum effective flower yield was found 166.6Q/ha and minimum effective flower yield was found 84.90 Q/ha under $T_6$ (75% RDF + vermicompost + azotobacter) and $T_{17}$ (control) treatment, respectively (Table 1).

Gross realization is also an economic parameter and this parameter is a final result of any crop. In this study, it was observed that the maximum gain of selected crop was found Rs.166000/- this income was followed by Rs. 161730/- under $T_4$ (100% RDF + Poultry manure) and Rs. 160710/- under $T_3$ (100% RDF + Vermicompost) treatment and minimum gain was recorded Rs.84900/- under $T_6$ (75% RDF + vermicompost + azotobacter) and $T_{17}$ (50% RDF + poultry manure + PSB) treatments, respectively (Table 1 & Fig. 1).

### 3.3 Total Cost of Cultivation (Rs/ha)

After the income of selected crop, there is an urgent need to study the total expenditure made in whole duration of the selected crop. It was recorded that the total expenditure of Rs.54580/ha was recorded for the treatment of best result, which is $T_6$ (75% RDF + vermicompost + azotobacter), and the value was followed by Rs 53255.76/- per hectare under $T_5$ (75% RDF + FYM + azotobacter) treatment while the amount of Rs 41552/-per hectare was recorded under $T_{17}$ (50% RDF + poultry manure + PSB) (control) treatment (Table 1& Fig. 1).

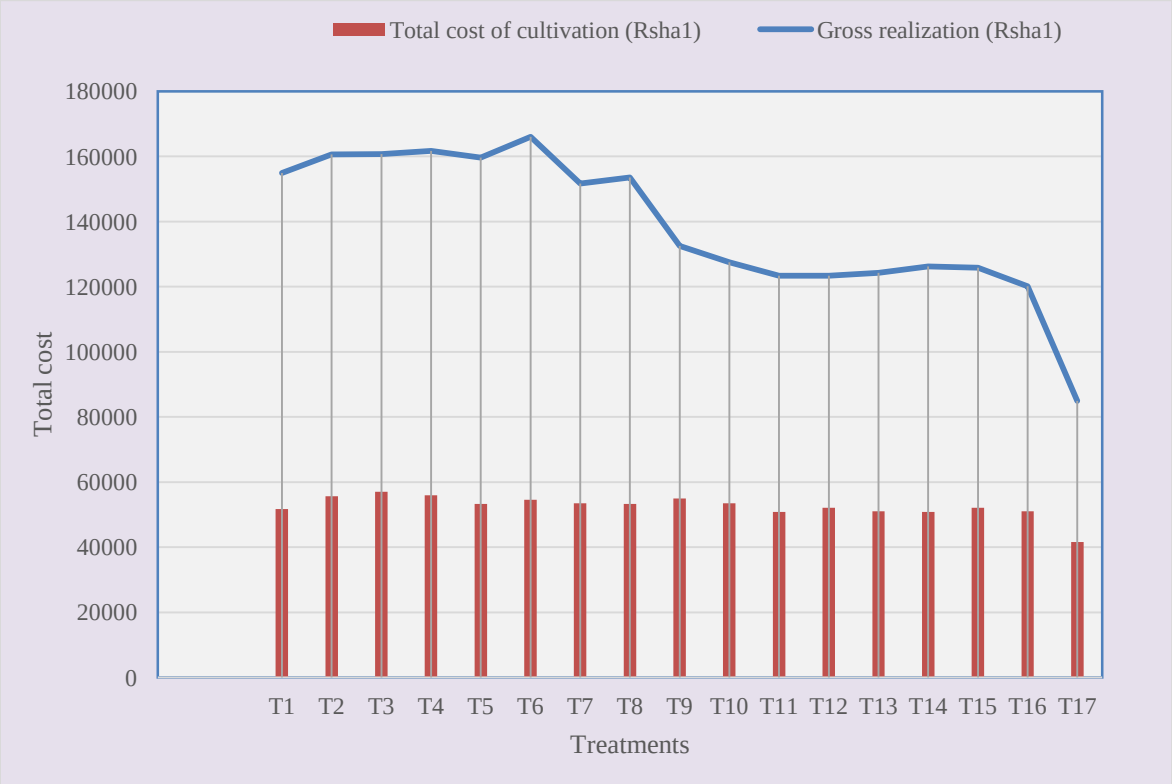


**Fig. 1. Total income and expenditure under selected treatments during the study period gross realization (Rs/ha)**

**Table 1. Total yield income and expenditure during the study period**

| Treatment | | Flower yield per hectare (q) | Effective flower yield/ha (q)* | Gross realization (Rsha1) | Total cost of cultivation (Rsha1) | Cost benefit ratio |
|---|---|---|---|---|---|---|
| 100% RDF | $T_1$ | 172.18 | 154.97 | 154970.00 | 51698.23 | 1:2.99 |
| 100% RDF + FYM | $T_2$ | 178.46 | 160.62 | 160620.00 | 55673.43 | 1:2.88 |
| 100% RDF + Vermicompost | $T_3$ | 178.56 | 160.71 | 160710.00 | 56998.23 | 1:2.81 |
| 100% RDF + Poultry manure | $T_4$ | 179.69 | 161.73 | 161730.00 | 55938.23 | 1:2.89 |
| 75% RDF + FYM + azotobacter | $T_5$ | 177.44 | 159.70 | 159700.00 | 53255.76 | 1:2.99 |
| 75% RDF + vermicompost + azotobacter | $T_6$ | 185.11 | 166.6 | 166000.00 | 54580.76 | 1:3.04 |
| 75% RDF + poultry manure + azotobacter | $T_7$ | 168.58 | 151.73 | 151730.00 | 53520.76 | 1:2.83 |
| 75% RDF + FYM + PSB | $T_8$ | 170.65 | 153.59 | 153590.00 | 53255.76 | 1:2.88 |
| 75% RDF + vermicompost + PSB | $T_9$ | 147.26 | 132.54 | 132540.00 | 54951.76 | 1:2.41 |
| 75% RDF + poultry manure + PSB | $T_{10}$ | 141.66 | 127.50 | 127500.00 | 53520.76 | 1:2.38 |
| 50% RDF + FYM + azotobacter | $T_{11}$ | 137.11 | 123.4 | 123400.00 | 50785.61 | 1:2.42 |
| 50% RDF + vermicompost + azotobacter | $T_{12}$ | 137.25 | 123.4 | 123400.00 | 52110.61 | 1:2.36 |
| 50% RDF + poultry manure + azotobacter | $T_{13}$ | 138.04 | 124.24 | 124240.00 | 51050.61 | 1:2.43 |
| 50% RDF + FYM + PSB | $T_{14}$ | 140.19 | 126.18 | 126180.00 | 50785.61 | 1:2.48 |
| 50% RDF + vermicompost + PSB | $T_{15}$ | 139.78 | 125.81 | 125810.00 | 52110.61 | 1:2.41 |
| 50% RDF + poultry manure + PSB | $T_{16}$ | 133.45 | 120.11 | 120110.00 | 51050.61 | 1:2.35 |
| Control | $T_{17}$ | 94.33 | 84.90 | 84900.00 | 41552.00 | 1:2.04 |

*(1)*Effective yield means, it is assumed that 10 % of total yield is wasted or damaged or not able to sold in the market. (2) Flower Price Rs.1000/- per quintal*

### 3.4 Cost Benefit Ratio (CBR)

The ratio of cost and benefit shows directly the $T_6$ treatment is the best treatment to gain more income with less expenditure, the best ratio of cost and benefit was analyzed 1:3.04, the value of cost benefit ratio was followed by 1:2.99 under $T_1$ (100% RDF) and $T_5$ (75% RDF + FYM + azotobacter) treatment while the minimum cost benefit ratio was analyzed under $T_{17}$ (50% RDF + poultry manure + PSB) treatment which is 1:2.04. The study directly shows that the $T_6$ (75% RDF + vermicompost + azotobacter) treatment is best treatment with a very good correlation of cost and benefit.

Sharma et al. [4] made a similar study and found that the integrated nutrient management can play a key role to enhance the growth of flowering parameters as well as economic parameters for the selected species in his study and the study clearly shown the big difference among all the given treatment and reference treatment. Prasad et al. [5] worked in the same direction on thje selected species of dahlia and found that the recommended dose of fertilizers (RDFs) played a major role to gain more output of flowering parameters of selected species. During this study the RDF for Dahlia (N:P:K) 100:120:100 kg per hectare was used for the species was studied along with organic fertilizers and bio fertilizers (Azotobacter). In this study various parameters for the selected species were studied like flower bud emergence, flower diameter, flower weight, flower yield per plant, flower yield per hectare and observed that the maximum value for the selected parameters were 57.40 days, 63.89 gm, 697.81 gm, 9.87 and 9.60t/ha respectively under $T_4$ (75%RDF + vermicompost @1.25 t/ha), while the minimum value of all selected parameter were recorded under control ($T_0$) treatment. So, the study clearly shows the positive effect of given treatment to accelerate the plant, flowering and economic growth parameters.

Similar studies were made by the different researcher and found the same observations, they mentioned the role of biochemical fertilizers to gain the growth of plant and other flowering parameter of selected plant. All the findings are in accordance with the studies Gupta [6], Chandrikapure, et al. [7], Dhadake et al. [8] and Sunitha et al. [9] and found that the INM can play pivotal role to accelerate the growth of flowering parameters and can also enhance the economy of the farmers.

## 4. CONCLUSION

The present study shown that all the vegetative and flowering parameters like plant spreading, diameter of plant, number of primary and secondary branches and in the flowering parameters i.e. bud initiation, number of flowers per plant, total flower yield was positively influenced by the given treatment. Economic parameters were found positively influenced under $T_6$ (75% RDF + Vermicompost + Azotobacter) treatment while the minimum Cost Benefit Ratio was recorded under control treatment. So the present study directly shown that the given treatment can play a significant role in the economic gain.

## CONFERENCE DISCLAIMER

Some part of this manuscript was previously presented in the conference: 6th International Conference on Strategies and Challenges in Agricultural and Life Science for Food Security and Sustainable Environment (SCALFE-2023) on April 28-30, 2023 in Himachal Pradesh University, Summer Hill, Shimla, HP, India. Web Link of the proceeding: https://www.shobhituniversity.ac.in/pdf/Souvenir-Abstract%20Book-Shimla-HPU-SCALFE-2023.pdf

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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