



# Economic Analysis of Marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gainda the Result under Multiple Organic Manure Treatments

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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/IJECC/2023/v13i92266

## 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/102410>

Original Research Article

Received: 01/05/2023

Accepted: 03/07/2023

Published: 07/07/2023

## ABSTRACT

The current study, Economic analysis of marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gainda the result under multiple organic manure treatments was conducted in 2021 and 2022 at the Department of Horticulture, Mansarovar Global University Sehore, Madhya Pradesh. The experiment was designed in R.B.D. with three replications and 13 treatments. Floral yield metrics such as cost of culture, gross returns, and net returns benefit cost ratio, as well as vegetative growth parameters, were all most efficiently boosted by fertilizer. As a result of the use of organic manures, the African marigold shown strong vegetative growth and flower output qualities.

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**Keywords:** Organic manure; marigold; growth; storage; benefit-cost ratio; gross return; net return.

## 1. INTRODUCTION

As talking about to loose flowers, marigold (*Tagetes sp.*) reigns supreme. It is one of the most widely produced flowers and is often utilised in religious and social occasions. It is a member of the Asteraceae family. There are 33 species in this genus, but only two are frequently cultivated in India: *Tagetes erecta* L., the African marigold, and *Tagetes patula* L., the French marigold.

“This family includes 1,600 genera and 23,000 species, in which herbs, shrubs, climbers and also medicinal plants are included” (Hussain et al., 2012), [1]. “The African marigold is the major one utilised for loose flower production in India. African marigold is indigenous to Central and South America, particularly Mexico, from where it spread to other areas of the world in the early 16th century” [2]. “Wide agro-climatic diversity is one of the leading states for commercial production of loose flowers, the most significant of which is African Marigold, which is farmed on a big scale primarily in India” (Mitra, 2010). The primary issues with marigold growing in India include a lack of off-season production technology, a lack of good scientific cultivation expertise, and extremely poor post-harvest management practices [3]

“Marigold were domesticated and used as an ornamental plant during pre-Columbian period before they were introduced in Europe and South Asia including India (Bailey, 1963). In India, *Tagetes erecta* & *Tagetes patula* are under commercial cultivation for cut flowers, but premium prices are for *Tagetes erecta*. Different varieties of African marigold vary in plant height and spread, flower size, quality and yield” [4].

“Integration of organic manures with fertilizers has been traditionally important inputs in crop production for the maintenance of soil fertility and yield stability. Continuous use of organic manures could undoubtedly meet the nutrient demand in less intensive production system in the low yield levels but would have inadequate in present exhaustive agriculture. Nevertheless, integrated use of fertilizer, organic manures and bio-fertilizer helps in maintaining yield stability and correcting of marginal deficiencies of secondary and micro nutrients enhancing efficiency of applied nutrients and providing favourable soil physical condition” [5].

“Agriculture, which largely depends on chemical fertilizers, pesticides herbicides etc, though resulted in increased production, has adversely affected the soil productivity and environmental quality. The heavy use of chemical fertilizers, pesticides and fungicides caused health hazards and environmental pollution now-a-days the organic farming is gaining great importance. It is similar to other sustainable farming systems, viz., permaculture, eco farming, etc., which are based on harmony with nature or near to the natural approach. Long term fertilizer experiments have made clear the negative impacts of continuous use of chemicals on soil health” [6].

“Vermicompost is an aerobically degraded organic matter which has undergone chemical disintegration by the enzymatic activity in the guts of worms and also enzymes of the associated microbial population. It improves physico-chemical properties of the soil, enhances the microbial crop growth and yield. It contains 0.80 to 1.10% N, 0.40 to 0.80% P<sub>2</sub>O<sub>5</sub> and 0.80 to 0.98% K<sub>2</sub>O, 10 to 52 ppm Cu, 186.60 ppm Zn, 930.00 ppm Fe and plant growth promoting substances such as NAA, cytokinins, gibberellins, etc” [7]. “Consequently, many farmers are seeking alternative practices like organic farming such as poultry manure, farm yard manure, vermicompost and compost to make crop cultivation sustainable. Organic farming is not mere non-chemical agriculture, but it is a system integrating relations between soil, plant and water. Organic farming helps in soil health, proper energy flow in soil, crop, water environment systems, keeps biological life cycle alive and helps in sustaining considerable levels in yield” [8].

“Commercially, it is cultivated for loose flower production. Now a day, research in the field consequently, many farmers are seeking alternative practices like organic farming such as poultry manure, farm yard manure, goat manure, vermicompost and compost to make crop cultivation sustainable. Application of organics which is an important component in organic farming, apart from improving the soil physical, chemical and biological properties with direct impact on moisture retention, root growth and nutrient conservation, can also reduce the cost of production in agriculture”. [9].

While maintaining appropriate soil environmental conditions, which leads to ecologically

sustainable farming, alternative nutrient sources that are both economical and environmentally safe must be sought. As a result, the current experiment was carried out to investigate the influence of organic sources on marigold flower output in order to preserve soil health and the environment.

## 2. MATERIALS AND METHODS

African marigold (*Tagetes erecta* L.) growth, flowering, yield, and quality were the subjects of a field experiment named "Effect of organic manures on growth, flowering, yield, and quality in bhopal agro climatic conditions" cv. *Pusa narangi*. The experiment was conducted at Research Farm, Department of Horticulture, Mansarovar Global University, Sehore (M.P.). Three replications were used in the experiment, which was set up using a randomised block design. Each replication included thirteen treatments using various organic manures on African marigold (*Tagetes erecta* L.) cv. *Pusa Narangi Gaiinda*, including compost, farmyard manure, poultry manure, and vermicompost. The seedlings were transplanted in experimental field on 15 October during 2021-22. Before 25-30 days from planting, the organic manures (FYM, Poultry manure, Compost, and Vermicompost) were manually applied in each plot in accordance with the treatments. Five plants from each treatment in each replication were chosen at random for the thorough study on vegetative development, floral production, and flower yield.

Observations were recorded on growth and yield characters with the help of meter scale and vernier calipers and top balance respectively. The vase life of flowers were calculated by harvesting the flower at full open stage and keeping them at room temperature, the number of days were counted when petals lost turgidity and changed the colour. The treatments consisted of Farmyard manure 8,12,16, t/ha, Compost 8,12,16, t/ha, vermicompost 8,12,16, t/ha, Poultry manure 8,12,16, t/ha, were compared with control plot.

### 2.1 Cost of Cultivation (Rs./ha)

For different treatments total cost was calculated on the basis of prevailing market rates of fertilizer, field preparation, sowing of seeds, labour charges, cultural and intercultural operations etc.

### 2.2 Gross Returns (Rs./ha)

Gross returns are the total monetary value of economic produce and by-products obtained

from the crop raised in the different treatments is calculated based on the local market prices.

### 2.3 Net Returns (Rs./ha)

"It is computed by subtracting cost of cultivation from gross returns. It is good indicator of suitability of a cropping system since this represents the actual income of the farmer. Monetary returns for different treatments were calculated with the help of prevailing market rates of produce and different inputs used in the experiments" [9].

Net monetary returns (Rs./ ha) = Gross return (Rs./ha) – Cultivation cost (Rs./ha)

### 2.4 Benefit Cost Ratio

"It is the ratio of gross returns to cost of cultivation. It is expressed as returns per rupee invested. This index provides an estimate of the benefit a farmer derives for the expenditure he incurs in adopting a particular cropping system. Any value above 2.0 is considered safe as the farmer gets Rs.. 2 for every rupee invested" [9].

Benefit cost ratio = Gross returns (Rs./ha) / Cost of cultivation (Rs./ha)

## 3. RESULTS AND DISCUSSION

It is revealed from the data presented in Table 1 that among the organic manures application.

It was recorded that the maximum cost of cultivation (Rs. 190000 /ha), gross returns (Rs. 836452, 847970 and 842211 /ha) and net returns (Rs. 646452, 657970 and 652211 /ha) in first year, second year and pooled was recorded in treatment T<sub>13</sub> (Vermicompost 16 t/ha), while the maximum B:C ratio (4.4, 4.5 and 4.4) was found in treatment T<sub>10</sub> (Poultry manure 16 t/ha) and T<sub>13</sub> (Vermicompost 16 t/ha), whereas the minimum cost of cultivation (Rs. 150000/ha), gross returns (Rs. 537412, 549726 and 543569 /ha) and net returns (Rs. 387412, 399726 and 393569 /ha) in first year, second year and pooled was recorded in treatment T<sub>1</sub> (Control), while the minimum B:C ratio (3.4) was noted in treatment T<sub>2</sub> (Farmyard manure (FYM) 8 t/ha).

The maximum cost of cultivation (Rs. /ha), gross returns (Rs. /ha) and net returns (Rs. /ha) in first year, second year and pooled was recorded in treatment T<sub>13</sub> (Vermicompost 16 t/ha), while the maximum B:C ratio was found in treatment T<sub>10</sub> (Poultry manure 16 t/ha) and T<sub>13</sub> (Vermicompost 16 t/ha), whereas the minimum cost of cultivation

Table 1. Effect of organic manures on economics of the treatments of African marigold

Treatments detail	Total cost (Rs./ha)	Economics of the treatments								
		Gross returns (Rs./ha)			Net returns (Rs./ha)			B:C ratio		
		I <sup>st</sup> Year	II <sup>nd</sup> Year	Pooled	I <sup>st</sup> Year	II <sup>nd</sup> Year	Pooled	I <sup>st</sup> Year	II <sup>nd</sup> Year	Pooled
T <sub>1</sub> -Control is 0	150000	537412	549726	543569	387412	399726	393569	3.6	3.7	3.6
T <sub>2</sub> -Farmyard manure (FYM) 8 t/ha	172000	576328	578433	577381	404328	406433	405381	3.4	3.4	3.4
T <sub>3</sub> -Farmyard manure (FYM) 12 t/ha	178000	674769	666168	670468	496769	488168	492468	3.8	3.7	3.8
T <sub>4</sub> -Farmyard manure (FYM) 16 t/ha	184000	781873	784247	783060	597873	600247	599060	4.2	4.3	4.3
T <sub>5</sub> -Compost 8 t/ha	170000	602920	596519	599719	432920	426519	429719	3.5	3.5	3.5
T <sub>6</sub> -Compost 12 t/ha	176000	711987	716086	714036	535987	540086	538036	4.0	4.1	4.1
T <sub>7</sub> -Compost 16 t/ha	182000	803325	801054	802189	621325	619054	620189	4.4	4.4	4.4
T <sub>8</sub> -Poultry manure 8t/ha	174000	628175	618638	623407	454175	444638	449407	3.6	3.6	3.6
T <sub>9</sub> -Poultry manure 12 t/ha	180000	728605	739687	734146	548605	559687	554146	4.0	4.1	4.1
T <sub>10</sub> -Poultry manure 16 t/ha	186000	816042	832676	824359	630042	646676	638359	4.4	4.5	4.4
T <sub>11</sub> -Vermi compost 8 t/ha	178000	647306	640056	643681	469306	462056	465681	3.6	3.6	3.6
T <sub>12</sub> -Vermi compost 12 t/ha	184000	762790	757075	759932	578790	573075	575932	4.1	4.1	4.1
T <sub>13</sub> -Vermi compost 16 t/ha	190000	836452	847970	842211	646452	657970	652211	4.4	4.5	4.4

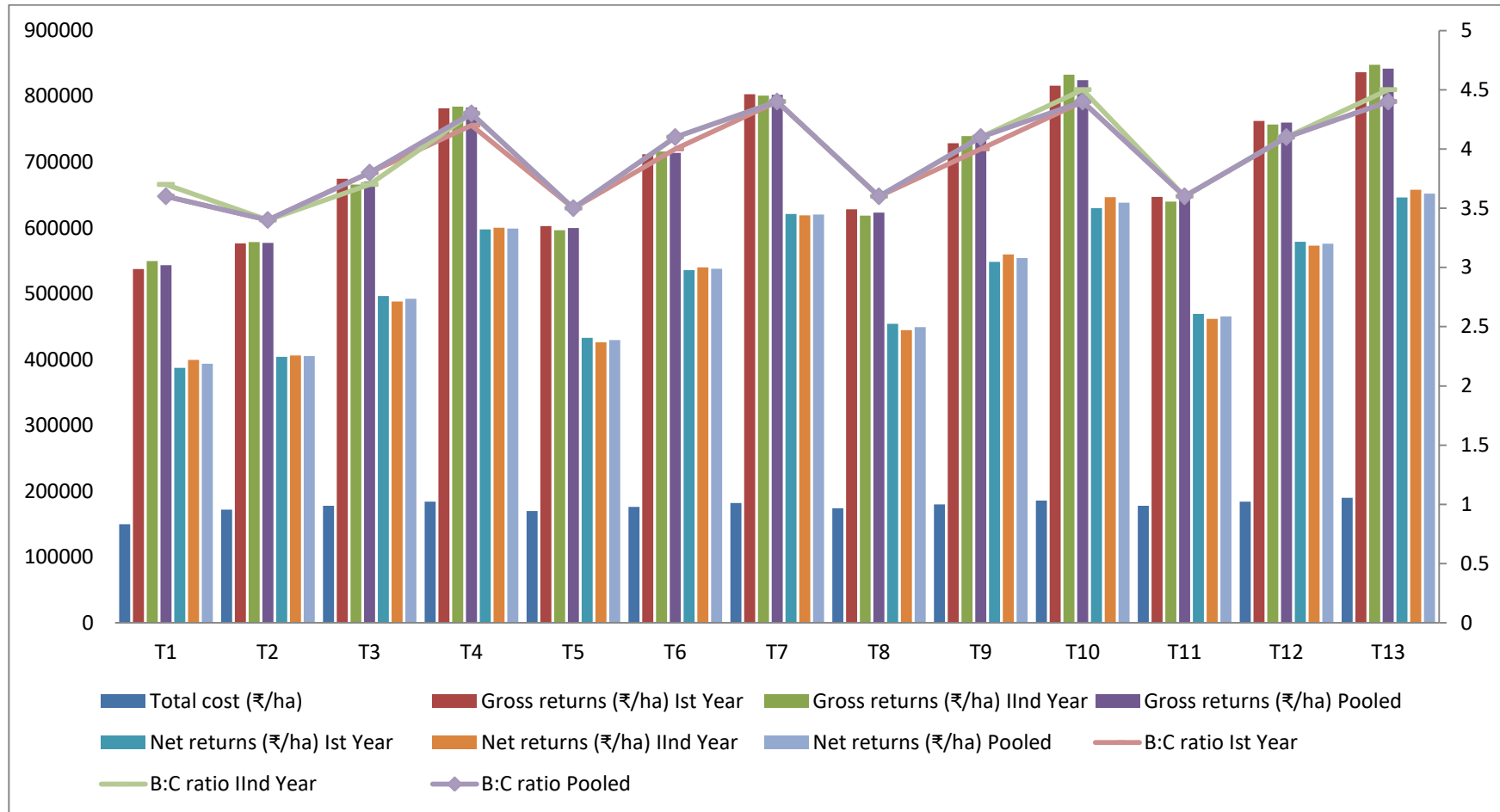


Fig. 1. Effect of organic manures on economics of the treatments of African marigold

(Rs./ha), gross returns (Rs./ha) and net returns (Rs./ha) in first year, second year and pooled was recorded in treatment T<sub>1</sub> (Control), while the minimum B:C ratio was observed in treatment T<sub>2</sub> (Farmyard manure (FYM) 8 t/ha). The beneficial effect of vermicompost, poultry manure and FYM are in close conformity with those of Arancon et al. [10] and Sharma et al. [11].

Vara Prasad Rao [12] who worked out "the economics of production of cut flowers grown in polyhouse in Sindhudurg and Ratnagiri districts of Maharashtra state wherein it was indicated that the profitability of gerbera after deducting subsidy for polyhouse from the total cost of production was Rs. 3,15,366 with gross returns of Rs. 4,03,200 and net return of Rs. 87,834. The cost-economics were in line with the output-input" [13-15].

#### 4. CONCLUSION

Result concluded that, the maximum cost of cultivation (Rs./ha), gross returns (Rs./ha) and net returns (Rs./ha) in first year, second year and pooled was recorded in treatment T<sub>13</sub> (Vermicompost 16 t/ha), while the maximum B:C ratio was found in treatment T<sub>10</sub> (Poultry manure 16 t/ha) and T<sub>13</sub> (Vermicompost 16 t/ha).

Plant nutrients obtained from organic sources have a significant impact on crop development, either by accelerating the respiratory process or by raising cell likelihood through a combination of all of these processes. It has been observed that, among organic sources of nutrients, poultry manure proved to be the best source of organic manure, aiding in the improvement of soil physicochemical characteristics (pH, EC, organic carbon, macro and micro nutrients) due to its higher analytical values.

On the basis of the result obtained after completion of present investigation, following suggestions are being made for future line of work:

- ❖ The further research work is needed to confirm the findings of the present investigation.
- ❖ The different organic manure may also be tested for growth, floral yield and quality of African marigold.
- ❖ The different dose of organic manure may also be tested for growth, floral yield and quality of African marigold.

#### ACKNOWLEDGEMENT

The authors are thankful to the Faculty of Agriculture Science and Technology, Mansarovar Global University, for providing all the facilities and resources possible.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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