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## Effect of organic manure and inorganic fertilizer on growth, curd yield and quality of cauliflower

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### Abstract

The present investigation aimed to find out the “Effect of Organic Manure and Inorganic Fertilizer on Growth, Curd Yield and Quality of Cauliflower.” was conducted on cauliflower at Agricultural Research Farm, Suresh Gyan Vihar University, Mahal, Jagatpura, Jaipur (Rajasthan) during the rabi season 2023-24. The experiment was laid out in Randomized Block Design. Replicated thrice with 10 treatment combinations, comprising, T<sub>1</sub> Control, T<sub>2</sub> 100% RDF+ 2.5 t ha<sup>-1</sup> Vermicompost, T<sub>3</sub> 100% RDF+ 3 t ha<sup>-1</sup> Poultry manure, T<sub>4</sub> 100% RDF + 20 t ha<sup>-1</sup> FYM, T<sub>5</sub> 75% RDF + 2.5 t ha<sup>-1</sup> vermicompost, T<sub>6</sub> 75% RDF + 3 t ha<sup>-1</sup> Poultry manure, T<sub>7</sub> 75% RDF + 20 t ha<sup>-1</sup> FYM, T<sub>8</sub> 50% RDF + 2.5 t ha<sup>-1</sup> vermicompost, T<sub>9</sub> 50% RDF + 3 t ha<sup>-1</sup> Poultry manure and T<sub>10</sub> 50% RDF + 20 t ha<sup>-1</sup> FYM. The application of organic and inorganic was found most effective improve growth and yield parameter like maximum plant height (23.73 and 36.95 cm at 30 and 60 DAS, maximum number of leaves were recorded in (11.15 and 16.09) at 30 and 60 DAT respectively), T<sub>2</sub> (100% RDF + 2.5 t ha<sup>-1</sup> vermicompost), Highest leaf length (45.63 cm), The maximum curd weight (332.01 g), maximum yield per plot (13.95 kg) was obtained, Maximum total soluble solids (8.74 °Brix) was recorded with treatment T<sub>2</sub> (100% RDF + 2.5 t ha<sup>-1</sup> vermicompost), maximum ascorbic acid content of 68.46 mg/100 g were recorded with T<sub>2</sub> (100% RDF + 2.5 t ha<sup>-1</sup> vermicompost).

**Keywords:** Organic manure inorganic fertilizer, cauliflower

### Introduction

Cauliflower (*Brassica oleracea* var. *botrytis*) belongs to the Brassicaceae family and is one of the most essential Cole crops. Cauliflower was introduced in India in 1822, the leading cauliflower-producing countries of the world are China and India regarding yield per hectare of land (Dhaliwal, 2008) [4]. The economic part of cauliflower and known as "curd," is used as a vegetable in making curries, soups, and pickles. Pieces of cauliflower (buttons) are also used to prepare pakoras. The excess cauliflower is dried and preserved for use in the off- season. It is a highly nutritious and delicious vegetable with vitamins A and C and minerals like calcium, iron, and iodine (Gocher *et al.*, 2017) [5]. It is rich in nutritional value and provides 50 mg of vitamin C, 40 I.U. carotene, 30 calories, 8 g carbohydrate, and 90% water per 100 g edible part. India contributes 32.5% of the world's total production of cauliflower.

Chemical fertilizers increase the crop production but their overuse to increase the crop production has long run impact on soil health, ecology and other natural resources which affect living organisms including beneficial soil microorganisms and human beings (Merentola *et al.*, 2012) [6]. Among the nutrients required by the crop, nitrogen is the most deficient element especially in coarse textured sandy soil of Rajasthan. Availability of nitrogen is important for growing plants as it is major indispensable constituent of protein and nucleic acid. Being a part of plant hormones, it is involved in regulating plant growth and developmental processes. An adequate supply of nitrogen is associated with vigorous vegetative growth and more efficient use of available inputs finally leading to higher productivity.

Organic manures supply both macro and micro plant elements. Apart from supplying plant nutrients, they favour aggregation of fine soil particles, thereby promoting good soil structure and it is also essential for healthy development of soil micro-organisms which further carry out

biochemical transformations, play active role in decomposing organic matter and help in releasing the essential plant nutrients. Vermicompost is a mixture of worm casting, organic materials, humus, living earthworm, their cocoons and other organisms. Vermicompost is helpful in reducing C: N ratio, increased humic acid content and provide most of macro as well as micro nutrients in the readily available chelated form to the plants such as nitrate exchangeable phosphorus, soluble potassium, calcium and magnesium (Talashilkar *et al.*, 1999) <sup>[12]</sup>. This also contains biologically active substances such as plant growth regulators. It also reduces soil erosion, dedourification of obnoxious smell destruction of pathogens and detoxification of soil pollutant (Ali and Jahan, 2001) <sup>[11]</sup>. Improvement in the soil structure due to FYM application leads to a better environment for root development. FYM also improves soil water holding capacity (Chaurasia *et al.*, 2008) <sup>[13]</sup>.

### Materials and Methods

The experiment was conducted at the conducted at the Agricultural Research Farm, Suresh Gyan Vihar University, Mahal, Jagatpura, Jaipur during Rabi season 2023-2024. The cauliflower variety "Pusa ketki" was used as experimental materials. The seeds of this variety was collected from RARI Durgapura Jaipur. Seed rate 500 g ha<sup>-1</sup>. The experiment was conducted to study the effect organic and inorganic manure on growth, yield and quality of cauliflower.

### Results and Discussion

#### Effect of organic manure and inorganic fertilizer on growth parameters:

Effect of organic manure and inorganic fertilizer was found significantly influenced on all growth parameters. The data was presented in Table 1. The highest plant height was recorded in T<sub>2</sub> (23.73 and 36.95 cm) at 30 and 60 DAS respectively), with 100% RDF+ 2.5 t ha<sup>-1</sup> Vermicompost. The lowest plant height was recorded in T<sub>1</sub> (13.68 and 25.31 cm) at 30 and 60 DAS respectively) with Control. Maximum number of leaves were recorded in T<sub>2</sub> (11.15 and 16.09) at 30 and 60 DAT respectively), (100% RDF + 2.5 t ha<sup>-1</sup> Vermicompost), which is over the following among the treatments. Highest leaf length (45.63 cm) was recorded in treatment T<sub>2</sub> (100% RDF + 2.5 t ha<sup>-1</sup> Vermicompost). Treatment T<sub>8</sub> (44.01 cm), T<sub>5</sub> (44.30 cm) was statistically over with treatments T<sub>3</sub> (42.17 cm), T<sub>4</sub> (42.32 cm). The availability of nutrients leads to more uptakes of nutrients in the plant, which is essential for the proper growth and development of plants. Nitrogen is the part of chlorophyll pigment which helps in photosynthesis. More photosynthesis leads to more plant growth in terms of more plant height (Singh *et al.*, 2020) <sup>[11]</sup>. In cauliflower Chahal *et al.*, 2019 <sup>[2]</sup> also observed that the application of 100% N.P.K. through inorganic fertilizers and 25% N substituted through vermicompost had maximum plant height. The experimental treatments substantially impacted differences in the number of leaves per plant and leaf length. The number of leaves per plant continuously increased in T<sub>2</sub> (11.15 and 16.09) at 30 and 60 DAT respectively), Highest leaf length (44.63 cm), (100% RDF + 2.5 t ha<sup>-1</sup> vermicompost). The addition of organic manures, which have solubilizing effects on the soil nutrients, was found to substantially impact leaf number. Chelating actions on metal ions are also present. As a result, they made more nutrients available to the plants. Similar results were observed by Singh *et al.*, 2020 <sup>[11]</sup> and Neupane *et al.*, 2020 <sup>[7]</sup>.

#### Effect of organic manure and inorganic fertilizer on yield parameters:

Effect of organic manure and inorganic fertilizer was found significantly influenced on all yield parameters. The data was presented in Table 2. Maximum curd weight (332.01 g) was observed in T<sub>2</sub> (100% RDF + 2.5 t ha<sup>-1</sup> Vermicompost which was statistically over with treatment T<sub>5</sub> (324.32 g) and T<sub>8</sub> (324.32 g). Maximum yield per plot (13.95 kg) was obtained with treatment T<sub>2</sub> (100% RDF + 2.5 t ha<sup>-1</sup> Vermicompost). Treatment T<sub>5</sub>, T<sub>8</sub> and T<sub>4</sub> (13.62, 13.41 and 12.78 kg/plot) was statistically at par respectively. The increase in curd yield caused by vermicompost fertilization in conjunction with inorganic fertilizers could be attributed to an increased supply of nutrients and a proliferous root system that allows for more excellent absorption of water and nutrients and the physical environment. The results were consistent with those found in cauliflower (Wani *et al.*, 2010) <sup>[13]</sup>, and the same effect was found by Neupane *et al.*, (2020) <sup>[7]</sup>, that the application of 50% N through RDF + 50% N had maximum curd weight. Vermicompost's contribution to increasing yields can be due to the balanced C: N ratio and improved availability of essential plant nutrients, resulting in increased rate and efficiency of metabolic processes and high protein and carbohydrate assimilation.

#### Effect of organic manure and inorganic fertilizer on quality parameters:

Effect of organic manure and inorganic fertilizer was found significantly influenced on all quality parameters. The data was presented in Table 2. Maximum total soluble solids (8.74°Brix) was recorded with treatment T<sub>2</sub> (100% RDF + 2.5 t ha<sup>-1</sup> Vermicompost), which was significant over with respectively treatments. The maximum ascorbic acid content of 68.46mg/100 g was recorded with T<sub>2</sub> (100% RDF + 2.5 t ha<sup>-1</sup> Vermicompost) and the minimum ascorbic acid content of 28.50 mg/100 g was reported in T<sub>1</sub> (control). The increased T.S.S. content evidently showed that the stored food materials undergo either partial or complete hydrolysis and provide substrate for respiration. Being an essential component which might be involved in the respiratory process in the cell system and plant system, this could have naturally resulted in the conversion of reserved food material to soluble simple sugar. This may be the probable cause for the increase in T.S.S. content. Several other workers have also observed similar results it was supported by Rao *et al.*, 2001, Pansare *et al.*, (1994) <sup>[8]</sup>. Vitamin – C influenced by factors such as nutrient balance, soil health, environmental conditions, and cultivar selection similar reported by Singh *et al.*, (2020) <sup>[11]</sup> and Shree *et al.*, (2014) <sup>[10]</sup>.

### Conclusion

On the basis of present investigation, it can be concluded that for getting higher growth, yield and quality of cauliflower should be nourished with T<sub>2</sub> (100% RDF + 2.5 t ha<sup>-1</sup> Vermicompost). We can suggest to farmer according to found that result.

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**Conflict of interest:** The authors declare that there is no conflict of interest among all co-authors.

### Ethical statement

This article does not contain any studies with human participants or animals performed by any of the author.

**Table 1:** Effect organic and inorganic on plant height, number of Leaves at 30 and 60 DAS and leaf length of cauliflower

Sr. No.	Treatments	Plant height (cm)		Number of Leaves		Leaf length (cm)
		30 DAS	60 DAS	30 DAS	60 DAS	
T <sub>1</sub>	Control	13.68	25.31	5.14	8.52	31.47
T <sub>2</sub>	100% RDF+ 2.5 t ha <sup>-1</sup> Vermicompost	23.73	36.95	11.15	16.09	45.63
T <sub>3</sub>	100% RDF+ 3 t ha <sup>-1</sup> Poultry manure	18.19	33.22	7.13	13.04	42.17
T <sub>4</sub>	100% RDF+ 20 t ha <sup>-1</sup> FYM	18.65	33.06	7.47	13.42	42.32
T <sub>5</sub>	75% RDF + 2.5 t ha <sup>-1</sup> Vermicompost	20.88	36.22	9.32	14.32	44.30
T <sub>6</sub>	75% RDF + 3 t ha <sup>-1</sup> Poultry manure	17.18	31.55	6.14	12.30	37.54
T <sub>7</sub>	75% RDF + 20 t ha <sup>-1</sup> FYM	17.74	32.90	6.30	12.65	40.14
T <sub>8</sub>	50% RDF + 2.5 t ha <sup>-1</sup> Vermicompost	20.00	35.47	8.25	14.14	44.01
T <sub>9</sub>	50% RDF + 3 t ha <sup>-1</sup> Poultry manure	15.88	29.00	6.00	11.12	36.14
T <sub>10</sub>	50% RDF + 20 t ha <sup>-1</sup> FYM	16.98	31.24	6.05	11.24	36.58
	SEm ±	1.59	1.84	0.39	0.38	0.79
	CD @ 5%	5.08	5.90	1.25	1.20	2.53
	CV%	15.03	9.83	9.31	5.13	3.42

**Table 2:** Effect organic and inorganic on yield and quality of cauliflower

Sr. No.	Treatments	Average weight of curd (g)	Yield /plot (kg)	TSS (°Brix)	Ascorbic acid mg/100
T <sub>1</sub>	Control	160.35	6.74	4.83	38.50
T <sub>2</sub>	100% RDF+ 2.5 t ha <sup>-1</sup> Vermicompost	332.01	13.95	8.74	68.46
T <sub>3</sub>	100% RDF+ 3 t ha <sup>-1</sup> Poultry manure	295.36	12.41	7.16	58.68
T <sub>4</sub>	100% RDF+ 20 t ha <sup>-1</sup> FYM	304.32	12.78	7.23	60.66
T <sub>5</sub>	75% RDF + 2.5 t ha <sup>-1</sup> Vermicompost	324.32	13.62	7.79	64.49
T <sub>6</sub>	75% RDF + 3 t ha <sup>-1</sup> Poultry manure	275.36	11.57	6.42	63.77
T <sub>7</sub>	75% RDF + 20 t ha <sup>-1</sup> FYM	280.21	11.77	6.89	54.75
T <sub>8</sub>	50% RDF + 2.5 t ha <sup>-1</sup> Vermicompost	319.32	13.41	7.26	61.42
T <sub>9</sub>	50% RDF + 3 t ha <sup>-1</sup> Poultry manure	265.27	11.14	6.26	52.23
T <sub>10</sub>	50% RDF + 20 t ha <sup>-1</sup> FYM	271.32	11.40	6.34	52.39
	SEm ±	6.21	0.39	0.23	1.67
	CD @ 5%	19.87	1.25	0.73	5.33
	CV%	3.80	5.68	5.77	5.02

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