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## Effect of organic inputs on yield and quality of custard apple (*Annona squamosa* L.)

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### Abstract

The present investigation entitled, "Effect of organic inputs on yield and quality of custard apple (*Annona squamosa* L.)" was conducted at College Farm, College of Horticulture, Sardarkrushinagar Dantiwada Agricultural University, Jagudan, Dist. Mehsana during July, 2023 to December, 2023. The experiment was laid out in Randomized Block Design using eight treatments viz., T<sub>1</sub> (75% RDN through *Ghanjeevamrut* + 25% RDN through FYM), T<sub>2</sub> (75% RDN through *Ghanjeevamrut* + 25% RDN through Vermicompost), T<sub>3</sub> (75% RDN through *Ghanjeevamrut* + 25% RDN through Poultry manure), T<sub>4</sub> (75% RDN through *Ghanjeevamrut* + 25% RDN through Castor cake), T<sub>5</sub> (50% RDN through *Ghanjeevamrut* + 50% RDN through FYM), T<sub>6</sub> (50% RDN through *Ghanjeevamrut* + 50% RDN through Vermicompost), T<sub>7</sub> (50% RDN through *Ghanjeevamrut* + 50% RDN through Poultry manure) and T<sub>8</sub> (50% RDN through *Ghanjeevamrut* + 50% RDN through Castor cake). These treatments were replicated thrice in open field condition. The distance between plant to plant and row to row is 6 m × 6 m. Result showed that the application of 50% *Ghanjeevamrut* + 50% Poultry manure (T<sub>7</sub>) gave significantly maximum number of fruits per tree (95.13), weight of pulp (86.40 g), weight of peel (96.65 g), weight of fruit (202.78 g), yield per tree (18.16 kg), yield per hectare (5.05 t), TSS (25.67 °Brix), total sugar (21.30%), reducing sugar (19.38%), non-reducing sugar (1.91%), ascorbic acid (20.45 mg/100 g pulp) and minimum weight of seed (19.73 g) were found better than other treatment of T<sub>7</sub>.

**Keywords:** Custard apple, organic inputs, yield, quality

### Introduction

Custard apple (*Annona squamosa* L.) is one of the most important dry land fruit crops in India. It originated in tropical region of America. It is widely distributed throughout the tropical and sub-tropical region. Custard apple belongs to family Annonaceae and comprises of 40 genera and 120 species of which only five of them are edible. Custard apple flowers during May to August. High temperature, low atmospheric humidity, lack of irrigation and natural stress during this period results into a smaller number of flowers, poor fruit set, low yield and poor quality fruits. In recent times, attention has been directed towards organic manure because of the rising cost of inorganic fertilizers coupled with their inability to give the soil the desired sound health. Due to increasing use of chemical fertilizers, the soil properties have also been declined. Continuous use of inorganic fertilizers hazards the soil health in respect to physical, chemical and biological properties of soil. Therefore, it is necessary to minimize the application of inorganic fertilizers by substituting with organics. Organic manures on the other hand are eco-friendly and cheaper. Minimizing chemical fertilizers and increasing organic manure is crucial for sustainable agriculture and environmental health. While organic manure increases soil structure, fertility and minimizes erosion, chemical fertilizers have the potential to deteriorate soil quality and pollute water sources. This transformation mitigates the effects of climate change through carbon absorption, biodiversity preservation and soil health maintenance, all of which contribute to long-term sustainability. Additionally, it satisfies consumer desire for more nutritious foods with lower pesticide residue levels.

### Materials and Methods

The present investigation was conducted during 2023-24 at College Farm, College of

Horticulture, Sardarkrushinagar Dantiwada Agricultural University, Jagudan, Mehsana, Gujarat. The soil of experimental field was loamy sand in texture, low in organic carbon and available nitrogen, medium in available phosphorus and potassium and moderately alkaline in reaction. Twelve month old orchard of custard apple cv. 'Sindhani' were used for the experiment. Full dose of *Ghanjeevamrut*, FYM and vermicompost applied as per treatments. Poultry manure and castor cake was decomposed in the field one month before the application. Full dose of poultry manure and castor cake applied as per treatments at 15 cm depth by ring method which was prepared one meter away from the main trunk of custard apple plant. Application was done at 5<sup>th</sup> July, 2023. There was total eight treatments viz.; T<sub>1</sub> (75% RDN through *Ghanjeevamrut* + 25% RDN through FYM), T<sub>2</sub> (75% RDN through *Ghanjeevamrut* + 25% RDN through Vermicompost), T<sub>3</sub> (75% RDN through *Ghanjeevamrut* + 25% RDN through Poultry manure), T<sub>4</sub> (75% RDN through *Ghanjeevamrut* + 25% RDN through Castor cake), T<sub>5</sub> (50% RDN through *Ghanjeevamrut* + 50% RDN through FYM), T<sub>6</sub> (50% RDN through *Ghanjeevamrut* + 50% RDN through Vermicompost), T<sub>7</sub> (50% RDN through *Ghanjeevamrut* + 50% RDN through Poultry manure) and T<sub>8</sub> (50% RDN through *Ghanjeevamrut* + 50% RDN through Castor cake). The experiment was laid out in Randomized Block Design (RBD) in open field condition with three replications. During the experiment in any of the treatment recommended dose of fertilizer (RDF) was not applied. On the basis of recommended dose of nitrogen (RDN) and nitrogen content in organic manures was calculated and applied. Further P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O were also not provided by any chemical mean. All the organic manure applied as basal application. Common use of *jeevamrut* was given at 60 days after application of treatments as drenching. Observations on yield and quality parameters of

custard apple were recorded and analyzed statistically.

## Results and Discussion

### Yield parameters

The yield characters viz., number of fruits per tree, weight of pulp (g), weight of seed (g), weight of peel (g), weight of fruit (g), yield per tree (kg) and yield per hectare (t) has been significantly influenced with the application of *Ghanjeevamrut* along with Poultry manure (Table 1). It can be inferred from the data that maximum number of fruits per tree (95.13), weight of pulp (86.40 g), weight of peel (96.65 g), weight of fruit (202.78 g), yield per tree (18.16 kg), yield per hectare (5.05 t) and minimum weight of seed (19.73 g) was observed from the treatment T<sub>7</sub> (50% RDN through *Ghanjeevamrut* + 50% RDN through Poultry manure) which was statistically at par with treatment T<sub>6</sub>. It might be due to high amount of nitrogen in combination with phosphorus and potassium present in poultry manure in comparison to other organic sources enhanced more growth and metabolic transport which leads ultimately the increased fruit yield. In addition to this potassium act as a catalyst in the formation of more complex substances and act as an accelerator of enzymatic activity which were beneficial in early emergence of flower buds and increased fruit set; resulted in fruit retention and increased yield (Yadav *et al.*, 2012) [9]. Poultry manure supplies plant nutrients like N, P, K, and trace elements like Ca, Mg, S, Cu, Na, Fe, Mn, B, Mo, Zn and others which increases meristematic and physiological activities and produces adequate photosynthates for fruit production (Adjei *et al.*, 2023) [11]. These findings are consistent with the observations of Osman and IE (2010) [6] in fig, Kurer *et al.* (2017) [4] and Marathe *et al.* (2017) [5] in pomegranate, Pradeep and Saravanan (2018) [7] and Soni *et al.* (2018) [8] in strawberry.

**Table 1:** Effect of organic inputs on yield of custard apple

Treatments	Number of fruits per tree	Weight of pulp (g)	Weight of seed (g)	Weight of peel (g)	Weight of fruit (g)	Yield per tree (kg)	Yield per hectare (t)
T <sub>1</sub>	80.70	65.27	25.50	78.76	169.53	13.39	3.72
T <sub>2</sub>	82.87	75.56	22.93	84.45	182.94	14.61	4.06
T <sub>3</sub>	85.37	75.36	22.79	85.87	184.02	14.68	4.08
T <sub>4</sub>	82.88	72.28	23.94	82.35	178.57	14.29	3.97
T <sub>5</sub>	81.29	74.40	23.19	83.88	181.47	14.44	4.01
T <sub>6</sub>	88.49	84.17	20.68	92.98	198.83	16.83	4.68
T <sub>7</sub>	95.13	86.40	19.73	96.65	202.78	18.16	5.05
T <sub>8</sub>	83.00	73.78	24.25	86.50	184.52	15.10	4.20
S.Em. ±	2.33	3.37	0.91	3.30	4.36	0.89	0.25
C.D. at 5%	7.06	10.22	2.77	10.01	13.22	2.70	0.75
C.V. (%)	4.74	7.69	6.90	6.61	4.07	10.16	10.16

### Quality parameters

The application of *Ghanjeevamrut* and Poultry manure has significantly influenced various quality attributes viz., total soluble solids (°Brix), reducing sugar (%), non-reducing sugar (%), total sugar (%), ascorbic acid (mg/100 g pulp) of custard apple cv. 'Sindhani' (Table 2). The data clearly revealed that maximum total soluble solid (25.67 °Brix), total sugar (21.30%), reducing sugar (19.38%), non-reducing sugar (1.91%) and ascorbic acid (20.45 mg/100 g pulp) was noticed in T<sub>7</sub> treatment application of 50% *Ghanjeevamrut* + 50% Poultry manure which is statistically at par with T<sub>6</sub> treatment. It seems that increased absorption of nitrogen and phosphorus might play a regulatory role by promoting vigorous plant growth and photosynthesis. This leads to higher production of

carbohydrates, starch and other compounds. As fruits ripen, they draw heavily on these carbohydrate reserves from the stem and roots. Consequently, this process likely enhances the overall quality of the fruit, including higher levels of TSS like sugars, which contribute to their sweetness and other desirable characteristics. The improvement of total sugar attribute might be due to improvement of soil physical properties such as porosity, water holding capacity, decreased bulk density and tendency of soil toward neutral pH range which turn increased microbial biomass in rhizosphere resulting continuous supplement to the plant (Dadashpour and Jouki, 2012) [2]. The results were also accordance with the findings of Osman and IE (2010) [6] in fig, Yadav *et al.* (2012) [9] in guava and Jangid *et al.* (2021) [3] in custard apple.

**Table 2:** Effect of organic inputs on quality characters of custard apple

Treatments	Total soluble solid (°Brix)	Total sugar (%)	Reducing sugar (%)	Non- reducing sugar (%)	Ascorbic acid (mg/100 g pulp)
T <sub>1</sub>	22.97	19.28	17.55	1.74	17.77
T <sub>2</sub>	23.55	19.63	17.85	1.78	18.70
T <sub>3</sub>	23.71	19.91	18.12	1.79	19.10
T <sub>4</sub>	23.25	19.44	17.71	1.72	18.11
T <sub>5</sub>	23.61	19.35	17.59	1.76	18.00
T <sub>6</sub>	24.15	20.38	18.53	1.85	19.37
T <sub>7</sub>	25.67	21.30	19.38	1.91	20.45
T <sub>8</sub>	23.73	19.74	17.92	1.82	18.57
S.Em. ±	0.46	0.35	0.36	0.03	0.43
C.D. at 5%	1.39	1.06	1.08	0.08	1.29
C.V. (%)	3.33	3.04	3.42	2.60	3.94

### Conclusion

On the basis of experimental results, it can be concluded that the basal application of 50% RDN through poultry manure (4.68 kg/plant) along with 50% RDN through *Ghanjeevamrut* (9.39 kg/plant) was found beneficial for getting higher yield and better quality of custard apple.

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