

IMPACT OF DIFFERENT ORGANIC MANURES ON YIELD PARAMETERS OF WATERMELON [*CITRULLUS LANATUS* (THUMBS) MANSF.] CV. 'SUGAR BABY' UNDER NORTH GUJARAT CONDITION

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Abstract: Watermelon [*Citrullus lanatus*] is a cucurbitaceous crop and is green vegetable, but in the ripe stage as refreshing fruit. Application of recommended dose of FYM @ 20 t/ha + NPK (100-50-50 kg NPK/ha) recorded the maximum fruit diameter (39.95 cm) which was followed by treatment of 100 % N of recommended dose in form of vermicompost (37.76 cm). While, the superior treatment gave highest Number of fruits per vine (3.38), Fruit weight/kg (3.19), Yield per vine kg (10.78) and Yield per ha (53.91).

Keywords: Watermelon, *Citrullus lanatus*, Neem cake, Vermicompost, FYM, Castor cake, Poultry manure

INTRODUCTION

Watermelon [*Citrullus lanatus* (Thumbs) Mansf.] is a cucurbitaceous crop, believed to be the native of Africa (Thompson and Kelley, 1957). Watermelon is green vegetable, but in the ripe stage as refreshing fruit. It cultivated in all parts of India. The important watermelon growing states are Madhya Pradesh, Rajasthan, Punjab and Maharashtra. In Gujarat, generally it is grown as riverbed crop in the sandy belts of Purna, Narmada, Tapi and other rivers. Watermelon is generally grown for its juicy flesh, which is sweeter in taste. The raw fruits can be used for vegetable pickling and candy making. The juice is also fermented and concentrated into sugar syrup, which is used in western countries for making beverages. According to Bose and Som (1986) the nutritive value of watermelon is as follows per 100 g of edible portion. Edible portion 78.00 per cent, water 95.89 per cent, calcium 11.00 mg, phosphorus 12.00 mg, iron 7.9 mg, thiamine 0.02 mg, riboflavin 0.04 mg, fibre 0.2 g, niacin 0.1 mg, carbohydrates 3.3 g, vitamin 1 mg, protein 0.2 g, fat 0.2 g, minerals 0.3 g and energy 16 K Cal. The watermelon is a summer crop. Hence, it is usually sown in the month of January and February in Gujarat state. The success of Indian Agriculture depends heavily on use of fertilizer and other modern inputs. Nutrients play an important role in improving productivity and quality of watermelon. Nitrogen increase plant height, assimilating area, size of fruits etc. Phosphorus is an equally essential nutrient as a constituent of nucleo-proteins, enzymes and high energy bonds, while, the potassium improves the quality of fruits with good keeping quality. The judicious use of chemical fertilizers increases the quality and quantity.

Nitrogen from castor cake becomes quickly available to plants because of decomposition of castor cake is faster than other bulky organic manures to low C: N ratio and it nitrifies quickly (Guar *et al.*, 1984). Castor cake is one of the important sources of organic manures. It contains 4.27 per cent N₂, 1.85 per cent P₂O₅ and 1.5 per cent K₂O along with a large quantity of organic matter (Patel *et al.*, 1992). Use of FYM increases soil organic matter content and have a greater residual effect than mineral fertilizers. FYM supplies all the essential nutrients, which improve the physico-chemical properties, water holding capacity and encourages the soil microbial activities. FYM is also advantageous for its residual value. It contains 0.75 per cent N₂, 0.20 per cent P₂O₅ and 0.50 per cent K₂O. Moreover in this experiment, vermicompost is adopted as organic manure produced by use of earth worms. It modifies soil physical, chemical and biochemical properties. It contains 3.0 per cent N₂, 1.0 per cent P₂O₅ and 1.5 per cent K₂O.

Neem cake is quick acting concentrated organic manures. Generally, neem cake contains 5.0 to 6.0 per cent N₂, 1.0 to 1.5 per cent P₂O₅ and 1.0 to 2.0 per cent K₂O. Keeping in view, the above facts, the present experiment was laid down in terms of growth and yield parameters of the watermelon crop.

MATERIAL AND METHOD

Location

The experiment was laid in SDAU University which is situated on 24° 19' N latitude and 72°E longitudes with an elevation of 154.52 meters above the sea level. It represents the North Gujarat Agro-climatic Zones, Sardarkrushinagar is situated 27 kms away from Palanpur.

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Climatic and Weather Conditions

The climate of Sardarkrushinagar is typically sub-tropical characterized by semi-arid and arid conditions having warm and humid monsoon, cool and dry winter and quite hot and dry summer. The rainfall is received from the month of June to September. In order to get an idea about the climatic conditions, an average weekly data on different weather parameter factors during the period of experimentation were obtained from the Agricultural Meteorological Observatory located at the Agronomy Farm, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar.

Choice of Variety

The watermelon variety 'Sugar Baby' was selected for the present study because, it is suitable for summer planting. Fruits are round and yellowish green in colour gives high yields and hence preferred

by the growers. The seeds were obtained from National Seeds Corporation, Ahmedabad.

Fertilizer Application

For one hectare, 20 tonnes of FYM is required. The chemical fertilizer 100 kg N₂, 50 kg P₂O₅, 50 kg K₂O and the different organic manures like castor cake, vermicompost, neem cake and poultry manure and were applied in pit as per the requirement of different treatments.

Seed Sowing

The seed sowing was done by dibbling method with the three seeds per hill, at a depth of 2 – 3 cm in the rows, which was prepared before sowing. The inter row spacing of 2.0 m and intra row spacing of 1.0 m was maintained. After germination, the thinning was done so as to keep only one vigorously growing seedling per hill.

Experimental Details

The details of the experiment are as under:

1.	Experimental Detail			
	[A]	Treatments	:	7 (Seven)
	[B]	Treatments details	:	
	T ₁	100 % N of recommended dose in form of FYM		
	T ₂	100 % N of recommended dose in form of castor cake		
	T ₃	100 % N of recommended dose in form of vermicompost		
	T ₄	100 % N of recommended dose in form of Neem cake		
	T ₅	100 % N of recommended dose in form of poultry manure		
	T ₆	Recommended dose of FYM @ 20 t/ha + NPK (100-50-50 kg NPK/ha)		
	T ₇	NPK (100-50-50 kg NPK/ha)		
	[C]	Design	:	Randomized Block Design (RBD)
	[D]	Replications	:	4 (Four)
	[E]	Crops and variety	:	Watermelon Cv. "Sugar Baby"
	[F]	Seed rate	:	3 – 4 kg ha ⁻¹
	[G]	Planting distance	:	2.0 m X 1.0 m
	[H]	Number of rows per plot	:	2
	[I]	Number of plant per plot	:	8
	[J]	Total number of plots	:	28
	[K]	Total area under experiment	:	560 sq.m.
	[L]	Size of plot	:	4.00 m x 4.00 m
	[M]	Soil	:	Sandy loam

Preparation of Material

Well decomposed organic manures like FYM, castor cake, vermicompost, neem cake, poultry manure and recommended dose of fertilizer were selected. According to the requirement of each treatment, the required quantity of material was weighted separately. The total quantity required for the experiment was FYM (182 kg), castor cake (14.64 kg), vermicompost (21.32 kg), neem cake (12.26 kg), poultry manure (21.12 kg), chemical fertilizer, Diammonium phosphate (1.5 kg), Ammonium sulphate (5.0 kg) and Murate of Potash (1.06 kg).

RESULT AND DISCUSSION

Fruit Character

Average diameter of fruit (cm)

A perusal of the data indicated that the differences in the diameter of fruits were found to be significant. Maximum diameter of fruit was recorded in treatment of recommended dose of FYM @ 20 t/ha + NPK 100-50-50 kg NPK/ha (39.95 cm) followed by treatment of 100 % N of recommended dose in form of vermicompost (37.76 cm) and both were at par.

Minimum diameter of fruit was recorded in the treatment of 100 % N of recommended dose in form of Neem cake (23.84 cm) (Table: 1).

Yield Character

Number of fruits per vine

From the data (Table: 1), it is seen that the differences in the number of fruits per vine arising due to different treatments were significant. The data show that all the treatments were significant.

A perusal of the data revealed that the highest number of fruits per vine was recorded in treatment of recommended dose of FYM @ 20 t/ha + NPK (100-50-50 kg NPK/ha) (3.38) followed by treatment of 100 % N of recommended dose in form of vermicompost (3.00), which were at par. The lowest number of fruits per vine (2.44) was obtained in the treatment of 100 % N of recommended dose in form of Neem cake.

Average fruit weight (kg)

It is quite apparent from the data (Table: 1) that fruit weight was significantly increased with all the treatments. Maximum fruit weight was recorded in treatment of recommended dose of FYM @ 20 t/ha + NPK (100-50-50 kg NPK/ha) (3.19 kg) followed by treatment of 100 % N of recommended dose in form of vermicompost (3.14 kg), which were at par. Minimum fruit weight was observed in treatment of 100 % N of recommended dose in form of Neem cake (2.01 kg).

Fruit yield per vine (kg)

From the data (Table: 1), it is seen that the differences in the fruit yield per vine arising due to different treatments were significant. A perusal of the data revealed that the highest yield per vine was recorded in treatment of recommended dose of FYM @ 20 t/ha + NPK (100-50-50 kg NPK/ha) (10.78 kg) followed by treatment of 100 % N of recommended dose in form of vermicompost (9.42 kg). The lowest fruit yield per vine was obtained in the treatment of 100 % N of recommended dose in form of Neem cake (4.90 kg).

Fruit yield (t/ha)

It is clearly seen from the data (Table: 1) that the differences in the fruit yield per hectare arising due to different treatment were significant. The treatment recommended dose of FYM @ 20 t/ha + NPK (100-50-50 kg NPK/ha) had the highest yield (53.91 t/ha) and the treatment of 100 % N of recommended dose in form of Neem cake had the lowest yield (24.52 t/ha).

Thus, from the point of view of yield, the treatment recommended dose of FYM @ 20 t/ha + NPK (100-50-50 kg NPK/ha) was found to be effective in increasing the yield as compared to the other treatments. The above findings are in agreement with the findings of Tuzel et al. (2003) conducted an experiment under greenhouse conditions for organic cucumber (Cv. Sardes) production using two irrigation levels (30 and 50 cb soil water tensions) and four organic fertilizers (30 t FYM ha⁻¹ + E 2001 + Allgrow Bioplasma; 50 t FYM ha⁻¹; 30 t chicken manure ha⁻¹ + E 2001 + Allgrow Bioplasma and 50 t FYM ha⁻¹). They observed that farm yard manure and chicken manure + E 2001 + Allgrow Bioplasma applied under 50 cb of soil water tension had the highest yield. Chaudhary *et al.*, (2004) studied that organic waste returned to the soil can maintain, enhanced soil quality, fertility, productivity through favourable effect on soil properties and other processes. Vermicompost technology for composting of organic waste remarkable effective for reduction in processing time of decomposition and produce good quality compost in terms of nutrient. Agu (2004) observed that application of poultry manure @ 20 t ha⁻¹ significantly increased the growth and yield of pumpkin above the control. A maximum yield of pumpkin fruits was also obtained with application 20 tonne poultry manure per hectare and Umamaheswarappa (2002) suggested that application of 120 kg N ha⁻¹ + 100 kg P ha⁻¹ + 30 kg K ha⁻¹ with FYM recorded the highest yield and appeared to be optimum for bottlegourd Cv. Arka Bahar production in the southern dry region of Karnataka.

Table 1. Effect of various organic manures on yield components of watermelon crop

Treatments		Fruit diameter cm	Number of fruits per vine	Fruit weight kg	Yield per vine	Yield per hectare (t)
T ₁	100 % N of recommended dose in form of FYM	32.52	2.94	2.91	8.56	42.77
T ₂	100 % N of recommended dose in form of castor cake	28.76	2.69	2.68	7.21	36.04
T ₃	100 % N of recommended dose in form of vermicompost	37.76	3.00	3.14	9.42	47.1
T ₄	100 % N of recommended dose in form of Neem cake	23.84	2.44	2.01	4.9	24.52

T ₅	100 % N of recommended dose in form of poultry manure	25.75	2.68	2.2	5.92	29.59
T ₆	Recommended dose of FYM @ 20 t/ha + NPK (100-50-50 kg NPK/ha)	39.95	3.38	3.19	10.78	53.91
T ₇	NPK (100-50-50 kg NPK/ha)	29.05	2.75	2.88	7.92	39.6
	S.Em. ±	0.955	0.14	0.07	0.21	0.56
	C.D. at 5 %	2.838	0.41	0.2	0.63	1.65
	C.V. %	9.326	14.83	7.52	8.12	4.26

REFERENCES

Agu, C.M. (2004). Growth and yield responses of pumpkin (*Cucurbita maxima*) to poultry manure application and staking techniques in Southeastern Nigeria. *J. Sustainable Agriculture*, **24** (2): 5-10.

Bose, T.K. and Som, M.G. (1986). Vegetable crops in India. Publ. Naya Prokash, Calcutta.

Chaudhary, D.R., Bhandari, S.C. and Sukla, L.M. (2004). Role of Vermicompost in Sustainable Agriculture. *A Review Agric. Rev.*, **25** (1): 29-39.

Gaur, A.C., Neelakantan, S. and Dargan, K.S. (1984). "Organic manures" Indian Council of Agricultural Research, New Delhi. p.38.

Patel, B.A., Patel, R.H., Patel, M.V. and Amin, A.U. (1992). Effect of combined application of organic sources and inorganic fertilizers on wheat. *Indian J. Agron.*, **37** (1): 52-54.

Thompson and Kelly (1957). Cultivation aspects of cucurbitaceous. *Crops Sci. Hort.*, **2**: 41-50.

Tuzel, Y., Gul, A., Tuzel, I.H., Ongun, A.R. and Abou-Hadid, A.F. (2003). Organic cucumber production under greenhouse conditions. *Acta Horticulturae*. **608**: 149-157.

Umamaheswarappa, P., Krisnappa, K.S., Muthu, M.P., Gowda, V.N. and Murthy, P.V. (2002). Flowering, fruit set, fruit size and yield of bottle gourd in relation to varying levels of N, P and K in Southern dry region of Karnataka.