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Short communication

Effect of nutrient replenishment through organic fertilizers in sapota cv. Kalipatti

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Sapota (*Manilkara acharas* (Mill) Fosberg) Sapodilla or *Chiku* is emerging as one of the important fruits. The total estimated land under the crop area is around 23,824 ha with annual production of 3.38 lakh tonnes (Singh, 9), which has increased to 52, 000 ha in 2001-02 and production to 5.94 lakh tonnes (Anon, 1). Gujarat is one of the important sapota growing state with the area under the crop is extending to warm and dry areas from the traditional coastal climate. Sapota is being grown successfully even in rainfed conditions of central Gujarat (Raturi and Hiwale, 8). Continuous use of chemical fertilizers has hazardous effect ion overall soil health. This has resulted in spoilage of soil physical and chemical properties resulting in stagnation in yield of the crop, and if the trend continues will have disastrous consequences. In recent years, concept of integrated nutrient supply involving combined use of organic and chemical fertilizers is being initiated to overcome the problem of deterioration of soil health and crop production. Proper soil management ensuring continuous maintenance and buildup of soil fertility is indispensable for increased productivity. In view of this, to make the soil sustainable slowly but steadily, without reducing the productivity, an experiment was carried out to reduce the use of chemical fertilizer and at the same time improve sustainability of soil through application of organic fertilizers from available sources like FYM, castor cake and groundnut cake was carried out at CHES, Vejalpur.

The experiment was initiated to minimize the use of chemical fertilizers by meeting 50 percent requirement of nitrogen through organic fertilizers. The fertilizers dose recommended by Bhuva *et al.* (1991) of 1000 g nitrogen, 500 g phosphorus and 500 g potassium for a grownup tree of 10-year-age was used as standard for formulating the treatments. Following seven treatments were applied to the grownup ten-year-old plant: T1- Castor cake (10 kg) per plant; T2- ½ Castor cake (5 kg)+ ½ recommended fertilizer dose; T3- FYM (100 kg); T4- ½ FYM (50 kg) + ½ recommended fertilizer dose; T5- Ground nut cake (8 kg);T6- ½ Ground cake (4 kg) + ½ recommended fertilizer dose; and T7- Recommended dose of fertilizer (1000 g N, 500 g P, 500 g K)

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All the organic fertilizers were applied on the on-set of monsoon wher as mix dose of organic and chemical fertilizer was applied in the two splits. The experiment was carried out in rainfed conditions with three replication in RBD design during 2004-05. The average yearly rainfall during the period was 950 mm. The experimental soil was formed from mixed alluvium of basalt, quartzite, and granite genesis with buried layer of limestone and area fall under semi-arid hot climate with no surplus water. The experimental soil had pH of 7.9 with depth ranging from 0.70 m to 1 m Anonymous (2). Leaf sampling was done as suggested by Annapurna *et al.* (3) and leaf analysis as suggested by Yoshida *et al.* (11).

The results of the study revealed that application of different fertilizer treatments had non-significant effect on growth parameter of sapota cv. Kalipatti (Table 1). Leaf nutrient composition in respect of Nitrogen and Potassium were influenced significantly. However, Phosphorus content of the leaf was non-significantly influenced. Maximum N content was recorded in 50:50 application of caster cake and recommended dose of fertilizer (T2). Whereas, maximum potash content was observed in T3 (100 % FYM) (Table 2). Application of organic manure found to have significant influence on soil moisture content after two and five months of cessation of monsoon and it was maximum in 50:50 application of FYM and recommended dose of fertilizer (T4), closely followed by 100 percent castor cake application (T1) as compared to chemical fertilizer application, indicating that application of organic fertilizer helped in higher retention of soil moisture for longer period. (Kale and Jagtap, 6) also reported increased RWC in sapota Kalipatti with application 2.0 percent power oil.

Data on soil health parameters like pH, EC and percent organic carbon content indicated that the pH of the soil was reduced after application of organic fertilizers as compared with initial soil pH. The soil PH was maximum in T1 but was on par with RDF, which was least. The electrical conductivity of the soil was maximum in T3. Organic carbon content of the soil was maximum where organic fertilizers were applied compared to where chemical fertilizers were applied (Table 3).

Table 1. Growth parameters of sapota in organic and fertilizer application.

Treatment	Plant height (m)	Stock dia . (cm)	Scion dia. (cm)	Plant spread (m)	
				NS	EW
Castor cake	4.11	29.33	23.33	7.96	7.83
50% G. cake + 50% RDF	4.21	27.00	27.00	7.56	6.73
FYM	4.25	26.16	21.33	7.56	7.06
50% FYM + 50% RDF	4.45	30.00	28.33	8.2	7.93
50% G. cake + 50% RDF	4.73	29.00	23.33	8.06	7.40
G. cake	4.31	31.00	26.33	8.23	8.46
RDF	4.48	25.66	22.66	7.76	7.90
CD at 5%	NS	NS	4.12	NS	0.96

Table 2. Effect of organic and chemical fertilizers on leaf nutrient composition (%) and soil moisture of sapota.

Treatment	Leaf nutrient						Soil moisture	
	N%	P%	K%	Ca	Mg	S	Two month	Five month
Castor cake	2.4	0.117	0.67	1.68	0.40	0.82	10.57	6.57
50% G. cake + 50% RDF	2.67	0.116	0.40	1.55	0.41	0.88	9.75	6.40
FYM	2.32	0.120	0.82	1.85	0.51	0.94	9.82	6.53
50% FYM + 50% RDF	2.3	0.117	0.58	1.53	0.39	0.91	12.22	7.26
50% G. cake + 50% RDF	2.34	0.120	0.37	1.65	0.41	0.80	9.35	7.13
G. cake	2.61	0.111	0.48	1.63	0.41	0.79	9.47	6.53
RDF	2.61	0.120	0.51	1.25	0.35	0.68	8.57	6.13
CD at 5%	0.24	NS	0.08	0.21	0.04	0.11	0.78	0.41

Number of fruit set per shoot and yield per plant indicated that there were significant differences amongst the treatments. It was maximum in T4 (Table 3). Kale and Jagtap (6) also revealed that increased dose of nitrogen resulted in increased productivity of sapota Kalipatti. Bhatt *et al.* (4) reported that at GAU, Paria farm inclusion of 500 g castor cake significantly increased fruit production. Patil *et al.* (7) in a trial at Mahatma Phule Agricultural University, Rahuri found that application of increased level of nitrogen resulted in linear increase in number and total weight of fruits at harvest. While phosphorus and potash were effective only at lower levels. Singh *et al.* (10) also observed that increased dose of nitrogen resulted in increased

Table 3. Effect of organic and chemical fertilizers on soil composition, fruit set and yield.

Treatment	PH	EC	OC (%)	No. of fruits shoot	Yield/plant (kg)
Castor cake	6.700	0.716	1.11	46.25	81.25
50% C. cake + 50% RDF	6.526	0.463	1.02	48.75	84.00
FYM	6.466	0.536	1.11	54.50	85.00
50% FYM + 50% RDF	6.540	0.793	1.08	60.00	92.00
50% G. cake + 50% RDF	6.533	0.583	1.08	44.50	80.75
G. cake	6.616	0.633	1.09	44.50	78.50
RDF	6.426	0.623	0.83	50.75	86.00
Initial Soil	7.443	0.203	0.71	-	-
CD at 5%	0.386	0.165	0.12	9.82	5.64

RDF- Recommended dose of fertilizer

fruit set. Thus, results clearly indicated that application of organic fertilizer either singly on in combination with RDF (recommended dose of fertilizer) improved nutrient composition of plant and soil at the same time increased fruit set, retention and yield per plant. Thus, mixed dose of organic and chemical fertilizers should be applied to improve productivity of plant and sustainability of soil.

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