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Effect of graded doses of fertilizers on flowering and yield attributes in sapota cv. Kalipatti

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Abstract

The research trial was conducted during the year 2018-19 at Sapota block of Department of Horticulture, College of Agriculture, Dapoli, Maharashtra to study effect of graded doses of fertilizers on flowering and yield attributes in sapota cv. Kalipatti. The fertilizer treatments were T₁ (1.5 Kg Each NPK + 100Kg FYM Tree⁻¹ Year⁻¹ in June), T₂ (3 Kg each NPK + 200Kg FYM Tree⁻¹ Year⁻¹ in June – Recommended dose), T₃ (4.5 Kg each NPK+ 300 Kg FYM Tree⁻¹ Year⁻¹ in two splits i.e., ½ in June and ½ in September) and T₄ (6 Kg each NPK + 400 Kg FYM Tree⁻¹ Year⁻¹ in three splits i.e., ⅓ in June, ⅓ in September and ⅓ in January). The significantly maximum number of flowers per shoot (12.52), number of fruit set (3.52), fruit set % (29.69%), number of retained fruits (1.76), fruit retention % (47.28%) and minimum period for fruit development (214.96 days) were observed with application of treatment T₄ i.e. 6 Kg each NPK + 400 Kg FYM Tree⁻¹ Year⁻¹ in three splits i.e., ⅓ in June, ⅓ in September and ⅓ in January. The application of treatment T₄ i.e. 6 Kg each NPK + 400 Kg FYM Tree⁻¹ Year⁻¹ in three splits i.e., ⅓ in June, ⅓ in September and ⅓ in January resulted in significantly maximum number of fruits per tree (429.46), fruit yield per tree (63.85 Kg) and yield per hectare (4.09 ton). While, the application of treatment T₁ i.e. 1.5 Kg Each NPK + 100Kg FYM Tree⁻¹ Year⁻¹ in June recorded significantly minimum number of fruits per tree (268.30), fruit yield per tree (29.63 Kg) and yield per hectare (1.89 ton).

Keywords: *Sapota, fertilizers, fruit set, yield*

Introduction

Sapota is one of the most important fruit in southern and western part of country due to its wide range of adaptability, low production cost and reasonable economic returns with very low pest and disease susceptibility. It is widely cultivated throughout tropics for its delicious fruits (Bose and Mitra, 1990) [2]. Sapota is an evergreen tree usually growing up to 10 m height. Being a hardy crop, it can be grown on wide range of soil and climatic conditions (Dutton, 1976) [5].

The application of organic and inorganic sources of nutrient may be helpful in increasing the vegetative as well as reproductive growth of sapota, which may ultimately result in better production of good quality fruits. Being an irrigated crop, the split application of fertilizers may be helpful for improving nutrient use efficiency and expected yield. Considering this fact the present investigation was undertaken to study the effect of graded doses of fertilizers on flowering and yield attributes in sapota cv. Kalipatti.

Material and methods

The research trial was conducted during the year 2018-19 at Sapota block of Department of Horticulture, College of Agriculture, Dapoli, Maharashtra. The uniformly grown 40 years old sapota (cv. Kalipatti) trees planted at 12.5m X 12.5 m spacing were selected for experiment. The experiment was laid out in Randomized Block Design with five replication and four treatments viz; T₁ (1.5 Kg Each NPK + 100Kg FYM Tree⁻¹ Year⁻¹ in June), T₂ (3 Kg each NPK + 200Kg FYM Tree⁻¹ Year⁻¹ in June – Recommended dose), T₃ (4.5 Kg each NPK+ 300 Kg FYM Tree⁻¹ Year⁻¹ in two splits i.e., ½ in June and ½ in September) and T₄ (6 Kg each NPK + 400 Kg FYM Tree⁻¹ Year⁻¹ in three splits i.e., ⅓ in June, ⅓ in September and ⅓ in January). Each treatment was given for two trees per replication. Recommended cultural practices like irrigation, plant protection, etc. were carried unvaryingly to experimental block. The observation on flowering (No. of flowers per shoot), fruit set and fruit retention, fruit development period and yield were recorded. The fruit set and fruit retention percentage was

calculated based on flowers per shoot and number of retained fruits. The data was analyzed statistically as per the method suggested by Panse and Sukhatme (1985)^[8].

Results and discussion

The flowering and fruiting parameters *viz.* number of flowers per shoot, fruit set, fruit retention and period for fruit development were significantly influenced by various graded doses of fertilizer application. The data on these parameters are presented in Table 1.

There was significantly maximum number of flowers per shoot (12.52) was recorded in T₄ which was followed by T₃ (11.38). The minimum number of flowers per shoot (10.28) was produced in T₁ which was at par with T₂ (10.66).

The perused data (Table 1) showed that the highest number of fruit was set (3.52) in treatment T₄ (6 Kg each NPK + 400 Kg FYM Tree⁻¹ Year⁻¹ in three splits *i.e.*, 1/3 in June, 1/3 in September and 1/3 in January) and it was followed by T₃ (2.84). The lowest fruit set (1.80 fruits) was recorded in T₁ (1.5 Kg Each NPK + 100Kg FYM Tree⁻¹ Year⁻¹ in June) and it was at par with T₂ (1.96).

Fruit set percentage was significantly influenced by the application of fertilizer doses in sapota (Table 1). The significantly maximum fruit set percentage (29.69%) was recorded in T₄ which was followed by T₃ (24.91%). The lowest fruit set per cent (17.50%) recorded in T₁ and was at par with T₂ (18.38%).

The significantly maximum number of fruit retained per shoot (1.76) in T₄ and it was followed by T₃ (1.26). The minimum number of fruit retained per shoot (0.7) in T₁ which was at par with T₂ (0.8).

It is clear from data (Table 1) that different doses of fertilizer treatments had significant influence on fruit retention

percentage. The highest fruit retention percentage (47.28%) was recorded in T₄ which was at par with T₃ (44.36%). Whereas lowest fruit retention percent was registered in T₁ (38.99%) and it was at par with T₂ (40.83%).

Under these treatments of split application of fertilizers along with graded amount of FYM, the prolonged availability of nutrients ensured during the growth period might have enhanced the flowering and increased number of flowers and fruit set percentage to an appreciable extent and increased availability of potash during fruit growth might have influenced in increased fruit retention.

The findings of the present investigation are in close conformity to the findings of Singh *et al.* (2003)^[10], Bavisker *et al.*, (2011)^[11] and Meena (2016)^[7] in sapota.

The data given Table 1 reveals that The period for fruit development (214.96 days) was significantly shorter in T₄ which was at par with T₃ (216.32 days) and was followed by T₂ (222.36). The maximum period for fruit development recorded in T₁ (226.12 days). Earliness in maturity of fruits might be influenced by prolonged availability of nutrients mainly potassium during the fruit development period in plants. This statement also agreed with the findings of Maskar *et al.* (2018)^[6].

The data on effect of fertilizer levels on yield and yield attributes of sapota cv. Kalipatti are presented in Table 2. The data revealed that the different graded dose of fertilizers significantly influenced number of fruits per tree. The significantly maximum number of fruits per tree (429.46) was recorded in T₄ (6 Kg each NPK + 400 Kg FYM Tree⁻¹ Year⁻¹ in three splits *i.e.*, 1/3 in June, 1/3 in September and 1/3 in January). It was followed by T₃ (379.32), T₂ (282.10) and minimum number of fruits per tree (241.45) recorded T₁ (1.5 Kg Each NPK + 100Kg FYM Tree⁻¹ Year⁻¹ in June).

Table 1: Effect of fertilizers on flowering and fruiting characteristics of sapota cv. Kalipatti

Treatments	No. of flower/shoot	No. of fruit set/shoot	Fruit set (%)	No. of fruit retained/shoot	Fruit retention (%)	Fruit development Period (Days)
T ₁ (1.5 Kg Each NPK + 100Kg FYM Tree ⁻¹ Year ⁻¹ in June)	10.28	1.80	17.50	0.7	38.99	226.12
T ₂ (3 Kg each NPK + 200Kg FYM Tree ⁻¹ Year ⁻¹ in June)	10.66	1.96	18.38	0.8	40.83	222.36
T ₃ (4.5 Kg each NPK + 300 Kg FYM Tree ⁻¹ Year ⁻¹ in two splits <i>i.e.</i> , 1/2 in June and 1/2 in September)	11.38	2.84	24.91	1.26	44.36	216.32
T ₄ (6 Kg each NPK + 400 Kg FYM Tree ⁻¹ Year ⁻¹ in three splits <i>i.e.</i> , 1/3 in June, 1/3 in September and 1/3 in January)	12.52	3.52	29.69	1.76	47.28	214.96
Range	10.28	1.80	17.50	0.70	38.99	10.28
	12.52	3.52	29.69	1.76	47.28	12.52
Mean	11.21	2.53	22.62	1.13	42.86	219.94
SEm ±	0.12	0.12	0.40	0.04	0.97	0.69
CD @ 5%	0.38	0.37	1.24	0.12	3.00	2.13

Table 2: Effect of fertilizers on yield of sapota cv. Kalipatti

Treatments	Number of fruits / tree	Fruit yield / tree (Kg)	Yield / ha (t)
T ₁ (1.5 Kg Each NPK + 100Kg FYM Tree ⁻¹ Year ⁻¹ in June)	241.45	20.61	1.32
T ₂ (3 Kg each NPK + 200Kg FYM Tree ⁻¹ Year ⁻¹ in June)	282.10	34.16	2.19
T ₃ (4.5 Kg each NPK + 300 Kg FYM Tree ⁻¹ Year ⁻¹ in two splits <i>i.e.</i> , 1/2 in June and 1/2 in September)	379.32	48.78	3.12
T ₄ (6 Kg each NPK + 400 Kg FYM Tree ⁻¹ Year ⁻¹ in three splits <i>i.e.</i> , 1/3 in June, 1/3 in September and 1/3 in January)	429.46	63.85	4.09
Range	241.45	20.61	1.32
	429.46	63.85	4.09
Mean	333.08	41.85	2.68
SEm ±	1.18	0.17	0.01
CD @ 5%	3.63	0.54	0.03

The significantly highest fruit yield per tree (63.85 Kg) was recorded in T₄ (Table 4 and Fig 5) and it was followed by T₃ (48.78 Kg), T₂ (34.16 Kg) and lowest yield per tree (20.61 Kg) was recorded in T₁ (RDF).

The critical calculated data indicate that application of graded dose of fertilizers significantly enhanced the productivity of trees by increasing the yield per hectare (Table 1 and Fig. 6). The significantly maximum yield/ha (4.09t) was recorded in T₄ which was followed by T₃ (3.12 t), T₂ (2.19 t) and lowest yield (1.32 t/ha) was recorded in T₁. The significant increase in fruit yield and yield attributing parameters in sapota with application of graded dose of NPK along with organic manure may be due to vigorous shoot growth and higher retention percentage. The beneficial role of graded dose of fertilizers along with organic manure in improving soil physical, chemical and biological properties is well known which in turn helps in better nutrient absorption by plant and resulting in higher yield. Similar effects were recorded in sapota by Dalal *et al.* (2004) [4], Baviskar *et al.* (2011) [1], Varu (2012) [11], Satisha *et al.* (2014) [9], Meena (2016) [7] and Cheena *et al.* (2018) [3].

From the present investigation it is inferred that the application of fertilizer dose of 6 Kg each NPK + 400 Kg FYM Tree⁻¹ Year⁻¹ in three splits i.e., 1/3 in June, 1/3 in September and 1/3 in January has enhanced the flowering and yield in sapota cv. Kalipatti.

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