

Effect of Biofertilizers, GA_3 and Micronutrients on Yield and Economics of Sapota cv. Kalipatti

R.Y. KHOPADE, A. N. PATEL, S. A. HIRAY AND N. J. GHADAGE

Department of Fruit Science, ASPEE College of Horticulture and Forestry,
Navsari Agricultural University, Navsari 396450 (Gujarat).
email: rrohan91@gmail.com

ABSTRACT

A field experiment was conducted to study the response of biofertilizers (*Azospirillum* and PSB), GA_3 and micronutrient mixture grade 4 on yield and economics of sapota trees at FRS, Gandevi (Navsari Agricultural University, Navsari). Results of the experiment revealed that application of 75% RDF + Biofertilizers (*Azospirillum* + PSB) @ 40 ml/ tree + GA_3 @ 50 ppm + micronutrient mixture Grade 4 @ 0.5% resulted in significantly higher fruit weight, no. of fruits per tree, yield (kg/ tree) and yield (t/ ha) with highest benefit cost ratio of 4.45 in sapota cv. Kalipatti.

Key words Biofertilizers (*Azospirillum* and PSB), GA_3 and Micronutrient mixture grade 4, RDF (Recommended Dose of Fertilizer)

Sapota or sapodilla (*Manilkara achras* (Mill) Forsberg) synonym (*Achras zapota*) commonly known as 'chiku' is an evergreen fruit tree native of Tropical America especially, South Mexico (Chundawat, 1998). India is considered to be the largest producer of sapota in the world. The major sapota producing states in India are Karnataka, Maharashtra, Gujarat, Andhra Pradesh and Tamil Nadu (Bose and Mitra, 1990). Research based information on use of bio-fertilizers, PGR's and micronutrients in combination with chemical fertilizers is very scanty. Considering the importance and future scope of sapota fruit, it was decided to conduct the present experiment for research under South Gujarat agro climatic conditions.

MATERIALS AND METHODS

A field experiment was conducted to study the response of biofertilizers (*Azospirillum* and PSB), GA_3 and micronutrient mixture grade 4 on yield and economics of Twenty Four years old sapota trees during the year 2013-14 at FRS,

Gandevi (Navsari Agricultural university, Navsari).

The present investigation was laid out in Randomized Block Design including nine treatments comprising

- T₁ - 100% RDF (control),
- T₂ - 100% RDF + Biofertilizers (*Azospirillum* + PSB) @ 40 ml/ tree,
- T₃ - 100% RDF + GA_3 @ 50 ppm,
- T₄ - 100% RDF + micronutrient mixture Grade 4 @ 0.5%,
- T₅ - 100% RDF + Biofertilizers (*Azospirillum* + PSB) @ 40 ml/ tree + GA_3 @ 50 ppm + micronutrient mixture Grade 4 @ 0.5%,
- T₆ - 75% RDF + Biofertilizers (*Azospirillum* + PSB) @ 40 ml/ tree,
- T₇ - 75% RDF + GA_3 @ 50 ppm,
- T₈ - 75% RDF + micronutrient mixture Grade 4 @ 0.5% and
- T₉ - 75% RDF + Biofertilizers (*Azospirillum* + PSB) @ 40 ml/ tree + GA_3 @ 50 ppm + micronutrient mixture Grade 4 @ 0.5% and replicated thrice.

As per the treatments soil application of RDF (1000:500:500 g NPK/ tree) was carried in two equal splits *i.e.* in June and October. Liquid formulation of *Azospirillum* and PSB (40 ml each/ tree) was applied in the soil in the month of July. Foliar spray of GA_3 @50 ppm and micronutrient mixture Grade 4 @ 0.5% was applied in the month of November and December respectively.

RESULT AND DISCUSSION

Data regarding yield and yield contributing characters presented in Table 1. clearly indicate that, average weight of fruit was significantly influenced by different treatments. The highest

Table 1. Effect of biofertilizers, GA₃ and micronutrients on yield and economics of sapota cv. Kalipatti

Treatment	Average fruit weight (g)	No. of fruits per tree	Yield (kg/ tree)	Yield (t/ ha)	B:C ratio
T ₁	62.1	2263.7	143.3	14.3	3.06
T ₂	63.5	2435.2	155.0	15.5	3.16
T ₃	71.0	2667.3	191.0	19.1	4.20
T ₄	66.6	2650.6	176.4	17.6	3.17
T ₅	72.3	3043.6	215.2	21.5	4.15
T ₆	64.2	2549.7	162.8	16.3	3.37
T ₇	68.5	2651.0	181.6	18.2	4.17
T ₈	64.7	2620.4	169.1	16.9	3.18
T ₉	72.2	3298.7	232.6	23.3	4.45
S.Em (±)	2.4	188.3	16.1	1.61	-
CD at 5%	7.2	564.7	48.4	4.8	-
CV	6.25	12.14	15.49	15.49	-

average fruit weight (72.3 g) was recorded in T₅ - 100% RDF + Biofertilizers (*Azospirillum* + PSB) @ 40 ml/ tree + GA₃ @ 50 ppm + micronutrient mixture Grade 4 @ 0.5% and found at par with treatment T₃, T₄, T₇ and T₉.

No. of fruits were significantly influenced by the different treatment. An application of 75% RDF + Biofertilizers (*Azospirillum* + PSB) @ 40 ml/ tree + GA₃ @ 50 ppm + micronutrient mixture Grade 4 @ 0.5% (T₉) recorded higher no. of fruits per tree (3298.7) in Kalipatti sapota and it not differ, similarly with treatment T₅ (Table 1).

The results on yield (kg/ tree) and yield (t/ ha) also indicated that an application of 75% RDF + Biofertilizers (*Azospirillum* + PSB) @ 40 ml/ tree + GA₃ @ 50 ppm + micronutrient mixture Grade 4 @ 0.5% (T₉) resulted in maximum fruit yield (232.6 kg/ tree and 23.3 t/ ha) in sapota cv. Kalipatti and found at par with treatment T₅ & T₃ (Table 1).

Economics of sapota cultivation cv. Kalipatti is worked out and presented in Table. 1. Results revealed that highest benefit cost ratio (4.45) was obtained in the treatment T₉ - 75% RDF + Biofertilizers (*Azospirillum* + PSB) @ 40 ml/ tree + GA₃ @ 50 ppm + micronutrient mixture Grade 4 @ 0.5% which is followed by treatment T₃ - 100% RDF + GA₃ @ 50 ppm with benefit cost ratio of 4.20.

Azospirillum lipofereum (a symbiotic nitrogen fixing biofertilizer) produces growth-promoting substances like indole acetic acid (IAA), gibberellins, pantothenic acid, thiamine and niacin. It promotes root proliferation and improves the plant growth and yield. While, the PSB secrete organic acids, which dissolve this unavailable phosphate into soluble form and make it available to the plants. Foliar application of GA₃ contributes to flower development, increase in fruit size by cell division and elongation with a parthenocarpic effect *i.e.* less no. of seeds in fruit that turned into maximum fruit weight. Supplementation of multi- micronutrients through foliar spray which resulted in its enhanced absorption and assimilation during the crops growth period which provided balanced nutrition to the crops.

Thus, increase in fruit weight, no. of fruits per tree, yield and B:C ratio may be attributed due to combined effect of biofertilizers, GA₃ and micronutrient mixture grade 4 along with the RDF.

The results obtained in present study regarding combined response of biofertilizers, GA₃ and micronutrients along with chemical fertilizers on growth, yield and quality characters are in line with findings of Baviskar *et al.*, 2011 in sapota, Patel *et al.*, 2009 in citrus, Yadav *et al.*, 2011 in mango and Patel *et al.*, 2012 in banana.

LITERATURE CITED

- Chundawat, B. S. 1998. Sapota, *Agrotech Publication Academy*, Udaipur.
- Baviskar, M. N.; Bharad, S. G.; Dod, V. N and Barne, V. G. 2011. Effect of integrated nutrient management on yield and quality of sapota. *Plant Archives*, **11**(2):661-663.
- Bose, T. K. and Mitra S. K. 1990. Fruits: Tropical and subtropical, *NayaProkash*, 565-566.
- Patel, V. B.; Singh, S.K.; Ram, A.; Lata, N.; Singh, A. K. and Singh, L. 2009. Microbial and inorganic fertilizers application influenced vegetative growth, yield, leaf nutrient status and soil microbial biomass in sweet orange cv. Mosambi. *Indian J. Hort.*, **66**(2):163-168.
- Patel, C. R.; Patel, N. L.; Patel, V. K.; Rymbai, H. and Joshi, M. C. 2012. Effect of INM on growth and yield of banana cv. Grand Naine. *Asian J. Hort.*, **7**(2):445-448.
- Yadav, A. K.; Singh, J. K. and Singh, H. K. 2011. Studies on integrated nutrient management in flowering, fruiting, yield and quality of mango cv. Amrapali under high density orcharding. *Indian Journal of Horticulture*, **68**(4):453-460.

Received on 04-09-2015

Accepted on 07-09-2015