



# Response of Different Organics Spray on Yield and Biochemical Characteristics of Sapota Fruits

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**Abstract:** An experiment was conducted to study the effect of different organic spray on yield and bio-chemical attributes of sapota [*Manilkara achras* (Mill.) Fosberg] cv. Kalipatti. Significant variation was noticed among the different treatments for all the characters studied. Result revealed highest physical and yield parameters like fruit weight (83.60g), fruit length (6.15cm), fruit diameter (5.78cm), number of marketable fruits (2553), marketable fruit weight (170.30kg/tree), min. number of damage of fruits (54.25), min. damage fruit weight (4.0 kg), total fruit yield (174.30 kg/tree) recorded in T<sub>9</sub> Novel Organic Liquid Fertilizer 5% (5 spray) also recorded minimum PLW% (2<sup>nd</sup>, 4<sup>th</sup> and ripening stage (3.34%, 5.09%, 8.09% respectively), acidity (0.121%), spoilage (6.25%), while maximum fruit firmness (13.81 kg cm<sup>-2</sup>), TSS (23.84° Brix), ascorbic acid (10.80 mg 100 g<sup>-1</sup>), reducing sugar (11.28%), total sugar (19.47%) and total phenol (133.87 mg 100 g<sup>-1</sup>).

**Keywords:** Novel, SPD, PLW, Absolute, Cow-urine, *Panchgavya*

Sapota botanically known as *Manilkara achras* (Mill.) Fosberg belongs to family Sapotaceae. It is popularly known as "chikoo" and important fruit crop of the tropical region. It is native to Tropical America especially Southern Mexico or Central America. However, it is commercially cultivated in India, The Philippines, Sri Lanka, Mexico, Venezuela, Guatemala and other countries of Central America. It is not much known when it was first introduced into India but Gholwad village of Maharashtra state is credited to have the first plantation of sapota in 1898 (Chadha 1992) and it is spread to the other states like Karnataka, Gujarat, Andhra Pradesh, West Bengal, Maharashtra and Tamil Nadu and now it occupies a significant position among the fruit crops in India. However, South Gujarat, Coastal Maharashtra and Karnataka are the major areas where, it is extensively cultivated. India is considered to be the largest producer of sapota in the world. The area and production of sapota cultivation in India is 97 thousand ha and 11.76 lakh million tonnes, respectively with productivity of 12.1 MT ha<sup>-1</sup>. In Gujarat, the area under sapota cultivation is 27.83 thousand ha with production of 3.1 lakh tonnes, with productivity of 11.0 MT ha<sup>-1</sup>. While in south Gujarat, the area under sapota cultivation is 13.03 thousand ha with 1.58 lakh tonnes of annual production wherein its cultivation is concentrated mainly in Navsari, Valsad and Surat districts.

The foliar application of cow urine, *panchagavya* and Novel Organic Liquid Nutrients plays a vital role in improving the quality and comparatively more effective for rapid recovery of plants. The foliar feeding of fruit tree has gained much importance in recent years, as nutrients applied through soil are needed in higher quantity because some amount leaches down and some become unavailable to the plant due to complex soil reactions. The yield parameters like average fruit weight, number of fruits per tree and yield per tree are increased by the spray of micronutrients.

## MATERIAL AND METHODS

The present investigation was undertaken during the years 2020-21 at Instructional farm, ASPEE College of Horticulture and Forestry, NAU, Navsari (Gujarat). Experiment out in SPD analysis (in CRD) was done taking season as subplot factor. The treatments comprises ten treatments such as T<sub>1</sub>: Cow-urine 2% (3 sprays), T<sub>2</sub>: Cow-urine 2% (4 sprays), T<sub>3</sub>: Cow-urine 2% (5 sprays) T<sub>4</sub>: *Panchgava* 3% (3 sprays), T<sub>5</sub>: *Panchgava* 3% (4 sprays), T<sub>6</sub>: *Panchgava* 3%(5 sprays), T<sub>7</sub>: Novel 5% (3 spray), T<sub>8</sub>: Novel 5% (4 spray), T<sub>9</sub>: Novel 5% (5 spray) and T<sub>10</sub>: Absolute control. The experiment was carried out on 32 years old trees. Observation recorded on following parameters (1) Physical and Yield parameters like fruit length (cm), fruit diameter (cm), fruit volume(cc), fruit weight(g), Number of marketable fruits per tree, Marketable fruits weight kg per tree, Number of damage fruits per tree, damage fruits weight kg per tree, total fruit yield kg per tree (2) physico-chemical attributes like PLW%, fruit firmness (kg cm<sup>-2</sup>), TSS (°Brix), Acidity (%), Ascorbic acid (mg 100g<sup>-1</sup>), Reducing sugar (%), Total sugar (%) and Total phenol (mg 100g<sup>-1</sup>). The two season data were pooled and statically analysed.

|                  |   |
|------------------|---|
| 3 Sprays         | 1 <sup>st</sup> March, 1 <sup>st</sup> May and 15 <sup>th</sup> October   |
| 4 Sprays         | 1 <sup>st</sup> March, 15 <sup>th</sup> March, 1 <sup>st</sup> May and 15 <sup>th</sup> October                       |
| 5 Sprays         | 1 <sup>st</sup> March, 15 <sup>th</sup> March, 1 <sup>st</sup> May, 15 <sup>th</sup> May and 15 <sup>th</sup> October |
| Absolute Control | No spray  |

## RESULT AND DISCUSSION

**Physical and yield parameters:** The data on different physical parameters characters are presented in Table 1. The data revealed that maximum fruit weight (83.60 g), fruit length (6.15 cm), fruit

diameter (5.78 cm) and fruit volume (76.19cc) observed in T<sub>9</sub> (5 Sprays of Novel Organic Liquid Nutrients @ 5%) whereas, the lowest fruit weight (69.49 g), fruit length (4.55 cm), fruit diameter (4.54 cm) and fruit volume (60.75cc) was noted in T<sub>10</sub> (absolute control). Similar findings were reported by (Parmar 2016, Bhatt et al 2012, Gurjar et al 2017). The variation in fruit weight, length, diameters and volume may be due to the Zn and Fe nutrition received by the plants via foliar application of 5 Sprays of Novel Organic Liquid Nutrients @ 5% which play vital role to promote starch formation and suitable cell enlargement cell division in plants, respectively thus, the cumulative effect of micronutrients Fe and Zn might have proved beneficial for fruit growth (Nehete et al 2011).

The data on different yield parameters characters are presented in Table 1. The data revealed that maximum number of marketable fruits per tree (2553), marketable fruits weight per tree (170.30 kg tree<sup>-1</sup>), number of damage fruits (54.25) and min. damage fruits weight per tree (4.0 kg tree<sup>-1</sup>) and fruit yield per tree (174.30 kg tree<sup>-1</sup>) was observed in T<sub>9</sub> (5 Sprays of Novel Organic Liquid Nutrients @ 5%) whereas, the lowest number of marketable fruits per tree (2104.50), marketable fruits weight per tree (124.81 kg tree<sup>-1</sup>), number of damage fruits (67.0) and damage fruits weight per tree (5.17 kg tree<sup>-1</sup>) and fruit yield per tree (130 kg tree<sup>-1</sup>) was noted in T<sub>10</sub> (absolute control). It might be due to Novel Organic Liquid Nutrients contain zinc which plays a vital role to promote carbonic anhydrase is a metalloenzyme that requires Zn as a cofactor and is involved in diverse biological processes including pH regulation, CO<sub>2</sub> transfer, ionic exchange, respiration, CO<sub>2</sub> photosynthetic fixation and stomatal closure. Starch formation and iron are required for suitable cell enlargement and cell division in plants. Similar findings were reported by (Parmar et al 2017).

**Physico-chemical attributes:** The physico-chemical attributes

characters viz., minimum acidity (0.121 %), spoilage (6.25 %) and PLW % at 2<sup>nd</sup> day, 4<sup>th</sup> day, and at ripening stage respectively recorded (3.34 %, 5.09 % and 8.09 %), It might be due to Ca present in Novel Organic Liquid Fertilizer reduce the decaying and maintain the firmness of fruit and minimizing the rate of respiration, protein break down and disease incidence (Gupta et al. 1980). while, maximum fruit firmness (13.81 kg cm<sup>-2</sup>) and TSS (23.84°B) it might be due to the influence of nutrients on physiological processes such as respiration and photosynthesis, which enhanced the supply of dry matter, minerals and carbohydrates towards the developing fruits (Rani et al 2017). Ascorbic acid (10.80 mg 100 g<sup>-1</sup>) content was increase it might be due to the catalytic activity of zinc and iron on its bio-synthesis from its precursor (glucose-6-phosphate) or inhibition of its conversation into dehydro ascorbic acid by enzyme ascorbic acid oxidation or both. Maximum total sugar (19.47 %) and reducing sugar (11.28 %) This might be due to zinc released from Novel Organic Liquid Nutrients promote hydrolysis of starch into sugars and acts as a catalyst in oxidation-reduction processes in plants. Sapota possesses climacteric phenomenon which triggers the dramatic changes in respiration. Potassium content in Novel Organic liquid Nutrients could be involved to enhance photosynthetic efficiency of the leaves and a possible increase in translocation of assimilates into the fruit. Sugar content might also be affected by respirational demand and adequate supply of nutrients, synthesis of invertase and starch splitting enzymes (Ram and Prasad 1988). Total phenol (133.87 mg 100 g<sup>-1</sup>) It might be due to Novel Organic Liquid Nutrients regulate the DNA, RNA, protein synthesis, gene action and cell division in plants. All parameters were found maximum with 5 sprays of 5 % Novel Organic Liquid Nutrients. Whereas, the maximum acidity (0.13%), spoilage (16.56 %) and PLW % at 2<sup>nd</sup> day, 4<sup>th</sup> day, and at ripening stage respectively recorded

**Table 1.** Effect of different organic spray on physical and yield parameters of sapota cv. Kalipatti (pooled data of a winter and summer seasons)

| Treatments  | Fruit weight (g) | Fruit length (cm) | Fruit diameter (cm) | Fruit volume (cc) | Number of marketable fruit tree <sup>-1</sup> | Marketable fruit weight kg tree <sup>-1</sup> | Number of damage fruit tree <sup>-1</sup> | damage fruit weight kg tree <sup>-1</sup> | Total fruit yield kg tree <sup>-1</sup> |
|---|------------------|-------------------|---------------------|-------------------|---|---|---|---|---|
| T <sub>1</sub> : Cow urine 2 % (3 spray)                      | 71.73            | 4.75              | 4.68                | 63.05             | 2166.75                                       | 144.63  | 58.50                                     | 4.37                                      | 149.00                                  |
| T <sub>2</sub> : Cow urine 2 % (4 spray)                      | 73.65            | 4.97              | 4.83                | 66.30             | 2220.75                                       | 148.23  | 53.00                                     | 3.69                                      | 151.93                                  |
| T <sub>3</sub> : Cow urine 2 % (5 spray)                      | 79.38            | 5.75              | 5.53                | 71.51             | 2394.25                                       | 159.78  | 49.75                                     | 3.55                                      | 163.33                                  |
| T <sub>4</sub> : Panchagavya 3 % (3 spray)                    | 75.19            | 5.43              | 4.99                | 66.99             | 2268.75                                       | 151.45  | 61.75                                     | 4.93                                      | 156.39                                  |
| T <sub>5</sub> : Panchagavya 3 % (4 spray)                    | 76.72            | 5.55              | 5.30                | 69.45             | 2347.25                                       | 156.66  | 60.25                                     | 5.02                                      | 161.69                                  |
| T <sub>6</sub> : Panchagavya 3 % (5 spray)                    | 82.13            | 5.90              | 5.62                | 74.93             | 2436.00                                       | 162.64  | 56.50                                     | 4.16                                      | 166.81                                  |
| T <sub>7</sub> : Novel Organic Liquid Nutrients 5 % (3 spray) | 76.31            | 5.48              | 5.14                | 67.95             | 2298.50                                       | 153.44  | 64.75                                     | 4.84                                      | 158.29                                  |
| T <sub>8</sub> : Novel Organic Liquid Nutrients 5 % (4 spray) | 82.31            | 6.05              | 5.69                | 75.24             | 2501.00                                       | 166.89  | 64.00                                     | 4.72                                      | 171.61                                  |
| T <sub>9</sub> : Novel Organic Liquid Nutrients 5 % (5 spray) | 83.60            | 6.15              | 5.78                | 76.19             | 2553.00                                       | 170.30  | 54.25                                     | 4.00                                      | 174.30                                  |
| T <sub>10</sub> : Absolute control                            | 69.49            | 4.55              | 4.54                | 60.75             | 2104.50                                       | 124.81  | 67.00                                     | 5.17                                      | 130.00                                  |
| S. Em. ±  | 1.15             | 0.072             | 0.057               | 0.47              | 50.07   | 3.27  | 1.75                                      | 0.13                                      | 3.59                                    |
| C.D. at 5 %   | 3.34             | 0.213             | 0.165               | 1.34              | 144.60  | 9.46  | 5.06                                      | 0.38                                      | 10.37                                   |
| C.V. %  | 4.24             | 3.70              | 3.09                | 1.93              | 4.30  | 4.26  | 5.95                                      | 5.96                                      | 4.54                                    |

**Table 2.** Effect of different organic spray on physico-chemical parameters of sapota cv. Kalipatti (pooled data of a winter and summer seasons)

| Treatments  | PLW % at 2 <sup>nd</sup> day | PLW % at 4 <sup>th</sup> day | PLW % at ripening | Fruit firmness (kg cm <sup>-2</sup> ) | TSS (°B) | Acidity (%) | Ascorbic acid (mg 100 g <sup>-1</sup> ) | Total sugar (%) | Reducing sugar (%) | Total phenol (mg 100 g <sup>-1</sup> ) |
|---|------------------------------|------------------------------|-------------------|---------------------------------------|----------|-------------|---|-----------------|--------------------|--|
| T <sub>1</sub> : Cow urine 2 % (3 spray)                      | 4.69                         | 6.55                         | 8.93              | 10.56                                 | 19.62    | 0.127       | 9.96                                    | 16.49           | 10.37              | 121.17                                 |
| T <sub>2</sub> : Cow urine 2 % (4 spray)                      | 4.45                         | 6.50                         | 8.79              | 11.42                                 | 19.68    | 0.128       | 10.30                                   | 16.95           | 10.52              | 123.39                                 |
| T <sub>3</sub> : Cow urine 2 % (5 spray)                      | 3.79                         | 5.63                         | 8.49              | 13.34                                 | 21.21    | 0.125       | 10.50                                   | 18.28           | 10.97              | 129.02                                 |
| T <sub>4</sub> : Panchagavya 3 % (3 spray)                    | 4.35                         | 6.32                         | 8.74              | 10.67                                 | 19.95    | 0.129       | 10.21                                   | 17.16           | 10.51              | 125.12                                 |
| T <sub>5</sub> : Panchagavya 3 % (4 spray)                    | 3.94                         | 6.17                         | 8.57              | 11.58                                 | 20.19    | 0.127       | 10.39                                   | 17.21           | 10.63              | 128.23                                 |
| T <sub>6</sub> : Panchagavya 3 % (5 spray)                    | 3.51                         | 5.27                         | 8.36              | 13.29                                 | 23.09    | 0.124       | 10.59                                   | 18.66           | 11.00              | 131.26                                 |
| T <sub>7</sub> : Novel Organic Liquid Nutrients 5 % (3 spray) | 4.19                         | 6.27                         | 8.65              | 10.90                                 | 20.94    | 0.126       | 10.35                                   | 17.55           | 10.79              | 126.17                                 |
| T <sub>8</sub> : Novel Organic Liquid Nutrients 5 % (4 spray) | 3.44                         | 5.15                         | 8.32              | 13.58                                 | 23.39    | 0.122       | 10.66                                   | 19.15           | 11.13              | 133.06                                 |
| T <sub>9</sub> : Novel Organic Liquid Nutrients 5 % (5 spray) | 3.34                         | 5.09                         | 8.09              | 13.81                                 | 23.84    | 0.121       | 10.80                                   | 19.47           | 11.28              | 133.87                                 |
| T <sub>10</sub> : Absolute control                            | 5.10                         | 6.77                         | 9.36              | 9.42                                  | 19.28    | 0.130       | 9.32                                    | 16.11           | 9.84               | 118.70                                 |
| S. Em. ±  | 0.05                         | 0.06                         | 0.07              | 0.13                                  | 0.18     | 0.0025      | 0.066                                   | 0.19            | 0.28               | 0.68                                   |
| C.D. at 5 %   | 0.14                         | 0.18                         | 0.22              | 0.38                                  | 0.53     | 0.0072      | 0.190                                   | 0.55            | 0.82               | 1.97                                   |
| C.V. %  | 3.46                         | 2.93                         | 2.53              | 3.15                                  | 2.49     | 6.44        | 1.81                                    | 3.06            | 7.58               | 1.52                                   |

(5.10 %, 6.77 % and 9.36 %) while, minimum firmness (9.42 kg cm<sup>-2</sup>), TSS (19.28°B), ascorbic acid (9.32 mg 100 g<sup>-1</sup>) total sugar (16.11 %) and reducing sugar (9.84 %), Total phenol (118.70 mg 100 g<sup>-1</sup>) was observed in T<sub>10</sub> (absolute control). Similar results were also observed by (Bhowmick and Banik 2011, Nehete et al 2011, Bhatt et al 2012, Chandra and Singh 2015).

### CONCLUSION

Result of present study revealed that among the investigation of two seasons, it can be concluded that 5 foliar sprays of Novel Organic Liquid Nutrients at 5 % was most effective for improving fruit physical, yield, as well as reducing spoilage, maintaining firmness and extending the shelf life with optimal retention of fruit quality in sapota cv. Kalipatti.

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