The Bioscan 11(1): 301-303, 2016 (Supplement on Agronomy)
AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES
www.thebioscan.in

EFFECT OF GROWTH PROMOTING SUBSTANCES ON THE FRUIT QUALITY OF REJUVENATED SAPOTA ORCHARD

MANGESH D. DABERAO*, P. S. JOSHI AND KUNTAL SATKAR
Department of Horticulture,
Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Krishi Nagar, AKOLA (M.S.) - 444 104, INDIA
e-mail: mangeshdaberao1@gmail.com

KEYWORDS
Sapota
Rejuvenated orchard
Growth promoting substances

Received on :
13.11.2015

Accepted on :
17.01.2016

***Corresponding author**

ABSTRACT
Major degradation in the quality of the fruits of the sapota occurs due to less care of the orchard. The rejuvenation of the old orchard is very desirable for obtaining good yield with good quality fruits. Keeping this in view, the present study was conducted to study the effect of growth promoting substances on the fruit quality of rejuvenated sapota orchard. The rejuvenated sapota trees were treated with different concentrations of growth promoting substances *i.e.,* GA_3 and KNO_3. The treatment T_9 (2% KNO_3 + 50 ppm GA_3) gave the best quality fruits in the rejuvenated sapota orchard. Treatment T_9 (2% KNO_3 + 50 ppm GA_3) shows maximum peel weight (18.30g), pulp weight (106.56 g), total soluble solids (22.15^{0}Brix), total sugars (19.01%)and seed weight (1.50g) whereas treatment T_1 Control (No spray) gave minimum peel weight (12.13 g), pulp weight (67.660g), total soluble solids (17.12^{0}Brix), total sugars (17.20%) and seed weight (1.23 g) and non significant results were observed for fruit moisture and acidity of the fruits.

INTRODUCTION

Sapota, popularly known in India as chiku, is native to tropical America. Sapota [*Manilkara achras* (Mill.) Forsberg] is a tropical fruit, belongs to family Sapotaceae. In India, sapota ranks fifth in both production and consumption next to mango, banana, citrus and grape. India is considered to be the largest producer of sapota in the world. (Tsomu *et al*. 2015) Various chemicals and PGRs has been used to improve and maintain quality by slowing down the metabolic activities of fruit. Among various plant growth regulators GA_3 and KNO_3 has received considerable attention in recent years due to its desirable effect in improving the quality of fruits of sapota. Growth regulators are an integral component of tree fruit production. Due to diversified use of productive land, it is necessary to increase the food production and growth regulators may a contributor in achieving the desired goal (Chaurasiy J. *et al.,* 2014). Generally, gibberellic acid is known for its anti-senescing properties which results in delaying ripening of fruits.GA_3 and KNO_3 improves the quality of fruit by increasing the TSS, and acidity of fruit. Similar results were observed by Khokhar *et al*. (2004) and Sarker *et al*. (2013).

Growth regulators are organic compounds other than nutrients; small amounts of which arecapable of modifying growth (Leopold, 1963). Among the growth regulators, auxin causes enlargement of plant cell and Gibberellins stimulates cell division, cell enlargement or both (Nickell, 1982). Gibberellic acid (GA) and Naphthalene acetic acid (NAA) exhibited beneficial effect in several crops (Thapa *et al.,* 2013; Mello *et al.,* 2012; Sharma and Sardana, 2012; Gayakvad *et al.*, 2014 Roy and Nasiruddin, 2011). Due to diversified use of productive land, it is necessary to increase the food production and growth regulators may a contributor in achieving the desired goal.

Keeping this in view the study was under taken on effect of growth promoting substances in rejuvenated sapota orchard with the objective to find out suitable growth promoting substances for higher fruit yield and quality of rejuvenated sapota orchard.

MATERIALS AND METHODS

The study was carried out in theorchard at Main Garden, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola , 2013. Forty five year old and uniform growing plants of rejuvenated sapota variety Kalipatti were selected for experimentation. Fruits of uniform size, colour and free from injuries were selected for the study. Application of KNO_3 with its different concentration and GA_3 also with its different concentration as individual treatment were spread in 1st week of July, August and September in 2013 during the course of investigation

The experimental data was analyzed in Randomized block design with three repetitions. Data were recorded periodically and analyzed statistically following the Randomized block design. The moisture of fruit was measured by electronic moisture balance. After separating the pulp from rind of selected fruits, the peel weight was recorded using electronic balance. After separating seeds and pulp, the pulp weight was recorded using electronic balance and after computing the mean, it was recorded as average pulp weight per fruit in

Table 1: Effect of growth promoting substances on Fruit moisture, Peel weight, Pulp weight

Treatment	Fruit moisture (%)	Peel weight (g)	Pulp weight (g)
T_1Control (No spray)	71.06	12.13	67.66
T_2(1% KNO_3)	71.79	13.41	72.83
T_3(2% KNO_3)	70.62	14.45	76.40
T_4(25 ppm GA_3)	72.67	14.85	73.30
T_5(50 ppm GA_3)	72.06	15.59	76.00
T_6(1% KNO_3 + 25 ppm GA_3)	71.59	15.50	83.79
T_7(1% KNO_3 + 50 ppm GA_3)	71.66	16.69	92.45
T_8(2% KNO_3 + 25 ppm GA_3)	72.13	16.74	103.56*
T_9(2% KNO_3 + 50 ppm GA_3)	73.2	18.30	106.56
'F' test	NS	Sig	Sig
SE (m) ±	0.50	0.63	3.15
CD at 5%	-	1.85	9.49

Table 2: Effect of growth promoting substances on Total soluble solids, Acidity Total sugar content and Seed weight.

Treatment	Total soluble solids (°Brix)	Acidity (%)	Total Sugar Content (%)	Seed weight(g)
T_1Control (No spray)	17.12	0.028 (0.16)	17.20(4.14)	1.23
T_2(1% KNO_3)	19.00	0.025 (0.15)	17.33 (4.16)	1.25
T_3(2% KNO_3)	19.25	0.025 (0.15)	18.33(4.28)	1.25
T_4(25 ppm GA_3)	19.32	0.025 (0.15)	18.70*(4.32)	1.25
T_5(50 ppm GA_3)	20.25	0.024 (0.15)	18.53(4.30)	1.33
T_6(1% KNO_3 + 25 ppm GA_3)	20.45	0.025 (0.15)	18.55(4.30)	1.37
T_7(1% KNO_3 + 50 ppm GA_3)	20.62	0.021 (0.14)	18.70* (4.32)	1.46
T_8(2% KNO_3 + 25 ppm GA_3)	20.51	0.021 (0.14)	18.85*(4.34)	1.45
T_9(2% KNO_3 + 50 ppm GA_3)	22.15	0.019 (0.13)	19.01 (4.36)	1.50
'F' test	Sig	NS	Sig	Sig
SE (m) ±	0.44	0.002	0.17	0.04
CD at 5%	1.35	0.008	0.36	0.12

Figures in parenthesis denoted the square root transformed value; Figure with (*) mark denoted the at par value

gram. TSS was determined by Digital refractrometer and expressed in ºBrix, acidity of fruits by AOAC method (Anon, 1984), total sugars of fruits were recorded by a method as suggested by Ranganna (1979). (Sundararajan *et al.*, 1969, Patil *et al.*, 2010, Hegazi *et al.*, 2011.)

RESULTS AND DISCUSSION

From the investigation it was recorded that peel weight as influenced by various treatments of growth promoting substances was found maximum in T_9 2% KNO_3 + 50 ppm GA_3 (18.30 g followed by T_8 (16.74 g) and T_7 (16.69 g) , while minimum peel weight (12.13 g) was recorded in treatment T_1 (control , No spray). The results are in accordance with Sarker *et al*. (2013) in mango. The maximum pulp weight (106.56 g) was observed in T_9 (2% KNO_3 + 50 ppm GA_3) which was statistically at par with T_8 (103.56 g), while minimum pulp weight (67.66 g) was recorded in treatment T_1 (control). The increase in pulp weight is due application of GA_3 which stimulated the functioning of a number of enzymes in the physiological process which probably caused an increase in pulp percentage. The results are in conformity with results of earlier workers Hegazi *et al*. (2011) in olive , Benjawan*et al*. (2006) in mango.

The total soluble solids as influenced by the application of growth promoting substances indicated that, the highest total soluble solids (22.15°Brix) was found with treatment T_9 (2% KNO_3 + 50 ppm GA_3), while lowest total soluble solids (17.12 ^{0}Brix) was recorded with treatment T_1 (control). The results are in accordance with Sundararajan *et al*. (1969) in guava, Kumar *et al*. (1975) in sweet lime, Dhawan *et al* (1981) in grapes. Maximum total sugar (19.01%) was recorded by T_9 whereas minimum (17.20%) with No spray These findings are in line with the findings of Syamal and Chhonkar (1984) in aonla; Bondopadhyay an Sen (1998) in sapota

The data in respect of acidity influenced by growth promoting substances gave non significant results. Ghosh and Chattopadhyay (1999) indicated that plants treated with 2% KNO_3 + 50 ppm GA_3, however increased TSS and total sugars in the fruits and non significant results for fruit acidity which is identical to the present results.

The seed weight was significantly influenced by growth promoting substances. The data clearly indicated that seed weight was significantly influenced by various treatments of growth promoting substances. It was observed that maximum seed weight (1.50 g) was observed in T_9 (2% KNO_3 + 50 ppm GA_3) which was statistically at par with T_8 (1.45 g) and T_7 (1.46 g), while minimum seed weight (1.23g) was recorded in treatment T_1 (control). These findings are in line with the findings of Patil *et al*. (2010) in sapota.

REFERENCES

Anon 1984. Official Methods of Analysis.Association of official Analytical Chemists (AOAC), 14th edition, Washington D.C. U.S.A.

Benjawan, Chutichudet, P. Chutichudet and Chanaboon, T. 2006. Effect of Gibberellin(GA_3) on fruit yield and quality of Kew mango (*Mangifera* L,) cv . Srisaket 007 in Northeast Thailand. *Pakistan J.*

Biological sciences. **9(8):** 1542-1546. (c.f.www.ansi.com).

Bondopadhyay, A. and Sen, S. K. 1998. Studies on the maturity standards of sapota cv. *Cricket Ball under Bengal conditions*. Progressive Horticulture, **30(34):** 123-127.

Chaurasiy, J., Meena, M. L., Singh, H. D., Adarsh, A. and Mishra, P. K. 2014. Effect of GA_3 and NAA on growth and yield of cabbage (*Brassica oleracea var. capitata* l.) cv. Pride of India.*The Bioscan.* **9(3):** 1139-1141.

Dhawan, S. S., Chauhan, K. S. and Jindal, P. C. 1981. Effects of gibberellic acid, ethephon and girdling on fruit quality and ripening in ' KismishCharni' grape (*Vitisvinifera* L.). National symposium on Tropical and Sub tropical FruitCrops. I.I.H.R., Bangalore. pp. 21-24.

Gayakvad, P., Jadeja, D. B., Tandel, M. B., Parmar, M. R., Bhalawe, S. and Nayak, D. 2014. Effect of foliar application of GA3, ethrel andcopper sulphate on flowering behaviour and yield of JatrophaCurcas L. *The Bioscan*. **9(2):** 485-490.

Ghosh, S. N. and Chattopadhyay, N. 1999. Foliar application of urea on yield and physico-chemical composition of mango fruits cv. Himsagar under rainfed condition. *Hort. J.* **12(1):** 21-24.

Hegazi, E. S., Sam ira Mohamed, M., El Sonbaty, M. R., Abd El- Naby S. K. M. and El-Sharony, T. F. 2011. Effect of Potassium Nitrate on Vegetative Growth, Nutritional Status, Yield and Fruit Quality of Olive cv. "Picual". *J. Horticultural Science and Ornamental Plants*, **3(3):** 252-258.

Khokhar, U. U., Prashad, J. and Sharma, M. K. 2004. Influence of growth regulators on growth, yield and quality of strawberry cv. Chandler. *Haryana J. Horticultural Sciences.* **33(3&4):** 186-188.

Kumar, R., Singh, J. R. and Gupta, O. P. 1975. Effect of growth regulators on fruit set, fruit drop and quality of sweet lime (*Citrus limetoides* Tanaka). *Haryana J. Horticultural Sciences*. **4(314):** 123-129.

Leopold, A. C. 1963. Auxins and Plant Growth, Berkeley and LosAngeles, University of California Press. p. 5.

Mello, S. C., Matsuzaki, R. T., Campagnol, R. and Mattiuz, C. F. 2012. Effects of plant growth regulators in ornamental kale (Brassicaoleracea var. acephala). *Acta Horticulturae.* **937:** 245-251.

Nickell, L. G. 1982. Plant Growth Regulators, Springer-Verlag Berlin Heidelberg, NewYork. pp.1-3.

Patil, M. B., Munde, G. R., Nainwad, R. V. and Mane, S. S. 2010. Studies on effect of p plant growth regulator on physical characters of sapota. *The Asian J. Hort*. **6(1):** 98-100.

Ranganna, S. 1979. Manual of analysis of fruit and vegetable products.*Tata McGraw Hill Publishing Company Ltd.,* New Delhi.

Roy, R. and Nasiruddin, K. M. 2011. Effect of different level of GA3on growth and yield of cabbage. *J. Environment Science and Natural Resources.* **4(2):** 79-82.

Sarker Babul Chandra and Rahim, M. A. 2013. Yield and quality of mango (Mangifer*A. indic*a l.) as influenced by foliar application of potassium nitrate and urea. *Bangladesh J. Agril. Res.* **38(1):** 145-154.

Sharma, P. and Sardana, V. 2012. Effect of growth regulating substanceson the chlorophyll, nitrate reductase, leghaemoglobin content andyield in groundnut (Arachishypogaea). *The Bioscan*. **7(1):** 13-17.

Sundarajan, S., Shanmugavelu, K. G. and Muthuswamy, S. 1969. A note on the effect of gibberellic acid on the fruit set, size and quality of fruits on certain varieties of guava. *South Indian Horticulture*. **17(1/2):** 41-42.

Syamal, M. M. and Chhonkar, V. S. 1984. Effect of plant growth regulators on physico- chemical composition of aonla fruits. *South Indian Horticulture*. **32(3):** 156-159.

Thapa, U., Das, R., Mandal, A. R. and Debanath, S. 2013. Influenceof GA3 and NAA on growth, yield and quality attributing charactersof sprouting broccoli [Brassica oleracea (L.) var. Italica Plenk]. *Crop Research (Hisar)*. **46(1/3):** 192-195.

Tsomu, T., Patel, H. C., Thakkar, R. M., Ajang, M. and Vasara, R. P. 2015. Response of post-harvest treatments of chemical and plant growth regulators on biochemical characteristics of sapota fruit cv. Kalipatti. *The Bioscan.* **10(1):** 33-36.