The Pharma Innovation Journal 2018; 7(1): 303-305

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2018; 7(1): 303-305

www.thepharmajournal.com
Received: 21-11-2017
Accepted: 22-12-2017

Atul Yadav
Department of Horticulture, N.D. U. A & T. Kumarganj, Faizabad, Uttar Pradesh, India

Bhanu Pratap
Department of Horticulture, N.D. U. A & T. Kumarganj, Faizabad, Uttar Pradesh, India

Shivam
Department of Extension Education, N.D. U. A & T. Kumarganj, Faizabad, Uttar Pradesh, India.

Ashwani Kumar
UPCAR, Lucknow, Uttar Pradesh, India

Angelina Patro
M.I.T & S. Rayagada, Odisha, India

Correspondence
Atul Yadav
Department of Horticulture, N.D. U. A & T. Kumarganj, Faizabad, Uttar Pradesh, India

Assess the effect of micronutrients and plant growth regulators on quality parameters of strawberry cv. Chandler

Atul Yadav, Bhanu Pratap, Shivam, Ashwani Kumar and Angelina Patro

Abstract
Strawberry is one of the most important temperate fruits and also can be cultivated in subtropical. It is a delicious fruit which edible part is succulent thalamus rich in good amount of vitamin 'C' and vitamin A, minerals such as potassium, calcium and phosphorus. The present investigation based on the micronutrients, (Borax, $ZnSO_4$) and plant growth regulators on strawberry cv. "Chandler", was conducted during 2016-17. The experiment was conducted with the using of Randomized Block Design with three replications. The observations were recorded on quality parameters *viz.*, length diameter ratio, specific gravity, total soluble solids, reducing, non-reducing and total sugars. The study revealed that the maximum length diameter ratio (1.54), specific gravity (1.62), total soluble solids (8.06 ˚Brix), reducing sugars (5.45 %), non-reducing sugars (2.58 %) and total sugars (8.03 %) recorded with the application of $ZnSO_4$ (0.4%) + NAA (15 ppm).

Keywords: Micro-nutrients, PGR, quality parameters

Introduction
The cultivated strawberry (*Fragaria x ananassa* Duch.) is a man made hybrid that was originated from the hybridization of two American species *Fragaria chilioensis* and *Fragaria virgianana* in France in seventeen century. The strawberry is a monoecious octoploid hybrid with chromosome number 2n = 56 and belongs to the family Rosaceae. India early afford to popularize it's cultivation in Himachal Pradesh and foot hills of Uttarakhand.

But at present time strawberry give quicker and very high return per unit area through of applied new techniques and capital investment. Strawberry is one of the most important temperate fruits and also can be cultivated in subtropical (Gurugram, Sonipat, Meerut, Saharanpur and Muzzafarpur) and Tropical (Maharashtra and Karnataka) and grown in temperate region (Nanital, Solan, Kullu, Srinagar and hills of Darjeeling).

Strawberry is a delicious fruit which edible part is succulent thalamus rich in good amount of vitamin 'C' (30-120mg/100 g of fruit) and vitamin A (60 I.U. / 100 g of fruit), minerals such as potassium (164mg), calcium (21mg), and phosphorus (21 mg). The total carbohydrate in the fruit is (8.5-9.2g), protein (0.7g), fat (0.5g) and fibre Sharma and Singh, (1994). In addition to fresh consumption it has special chemical by the fruit processing units for preparation of jam, Ice cream, Syrup and for canning. Strawberry behaves annual in subtropical and perennial in temperate region. Some important cultivar like Chandller, Sweet Charley, Pusa Early and Dogles are most popular cultivar for subtropical area and the crop is ready for harvesting within 6 month after planting. The strawberry requires optimum day temperature 22 ^{0}C and night temperature7^0 to 13 ^{0}C for maximum growth and development, frost as well as winter injury seriously reduced yield. Strawberry can grow in wide range of soil as heavy clay to light sand and gravel. However, strawberry plant grown well in sandy loam soil at pH 5.5 to 6.5. It is heavy feeder crop for more production. Micro nutrients such as Zinc sulphate, Magnese sulphate, Copper sulphate play important role in increasing vegetative growth, flowering, fruiting yield and quality Optimum Zinc, Magnesium, Copper contain in the plant leaves corresponded to maximum growth of strawberry plant. It also increased in yield and fruit weight. Lack of Zinc causes cholorosis often appears as yellow mottling, between the veins in younger leaves reduced stem growth and magnese deficiency symptoms first appear in older leaves with cholorosis between veins. Copper deficiency results stunted growth rossetting.

Materials and Methods

The geographical experimental site is situated 42 km away from Faizabad district head quarter and lies between alatitude of 24.47^0 and 26.56^0 North and longitude of 82.12^0 and 83.89^0 East on elevation of about 113 meter above mean sea level in between the bank of Gomti and Saryu rivers. The site is located in typical belt saline and alkaline of indogangetic plains of eastern Uttar Pradesh.

Treatment details (combinations)

T_0: Control
T_1: Borax- (0.3%)
T_2: $ZnSO_4$ (0.4 %)
T_3 : NAA (15 ppm)
T_4: GA_3 (50 ppm)
T_5: Borax – (0.3%) + NAA (15 ppm)
T_6: Borax – (0.3%) + GA_3 (15 ppm)
T_7: $ZnSO_4$ (0.4 %) +NAA (15 ppm)
T_8: $ZnSO_4$ (0.4 %) + GA_3 (50 ppm)

Quality parameters

Total soluble solid (TSS ^{0}Brix)

The total soluble solids of the berry juice were determined with the help of Erma Hand Refractometer, the TSS values measured in ^{0}Brix **(AOAC, 1980)** were expressed as per cent.

Reducing sugars (%)

To determine the reducing sugars, 10g pulp was crushed with distilled water. Filtered with muslin cloth and volume was maintained up to 100 ml. five ml aliquat was taken with 5 ml fehling solution 'A' and 'B' in 100 ml conical flask and was titrated against 1 per cent glucose solution, while boiling by using methylene blue as indicators. The end point was marked by the appearance of brick red colour.

Non-reducing sugar (%)

Non reducing sugar was estimated by deducting the quantity of reducing sugars from total invest sugars and multiplied by factor 0.95. The results were expressed as per cent for non reducing sugar.

Non reducing sugar (%) = Total sugar (%) - Reducing sugar (%) × 0.95

Total sugars (%)

Out of 100 ml sample, 5ml aliquot was taken mixed with 3 drop of HCl and kept overnight. Next day, 2-3 drop phenolphthalein indicator was added and neutralized with 30 per cent sodium hydroxide (NaOH) solution. It was titrated against 1.0 per cent glucose in boiling solution titrated using methylene blue as indicator. The appearance of brick red colour was marked as the end point the results were expressed as per cent for total sugar (Lane and Eynone, 1923).

3.5.4.6: pH of the fruit juice

The pH of fruit juice was calculated by pH meter averaged and analysis.

Results and Discussion

Length diameter ratio

Length diameter ratio of strawberry varied and influenced by the application of chemicals (Table-1). Average fruit size recorded with the maximum fruit length and width with combined application of $ZnSO_4$ 0.4% + NAA 15 ppm. Similar findings were also recorded by Singh *et al*. (2007), Rana and Chandel (2003) and Prashant *et al*. (2013) in strawberry.

Specific gravity

The treatments significantly improved specific gravity contents of fruits over control. The maximum specific gravity (1.62) were recorded with application of T_7 ($ZnSO_4$ @ 0.4%% + NAA @15 ppm) followed by T_6- Borax- (0.3%) + GA_3 (50ppm), is (1.58) (Table-1). The minimum specific gravity (1.30) was recorded in control.

Total soluble solids

Total soluble solids in fruit have been enhanced significantly by chemicals spray especially Borax- (0.3%) + GA_3 (50ppm). The maximum TSS was recorded with Borax- (0.3%) + GA_3 (50ppm). The increase in TSS content of fruit may be explained by the fact that applied nutrients (Boran) are helpful in photosynthetic activity which ultimately led to the accumulation of carbohydrates which help in increase of TSS content of strawberry fruit. The results of presented investigation are also in conformity with findings by Prashant *et al*. (2013) who noticed highest TSS in strawberry cv. Chandler with application of GA_3.

PH of the fruit juice

The pH of the fruit juice was recorded non-significantly improved pH of the fruit juice contents of fruits over control. The maximum pH of the fruit juice (3.93) were recorded with application of T_4 -GA_3 (50ppm) followed by T_5-Borax- (0.3%) + NAA (15 ppm) (3.76) is the minimum pH of the Fruit Juice (3.56) were recorded in control

Acidity

The acidity per cent in fruit juice was recorded significantly by chemical spray. However, maximum reduction was reported with the combined application of Borax- (0.3 %) + GA_3 (50ppm). However, minimum reduction acidity was recorded in control. Similar findings were reported in strawberry by Shahu *et al.*, (2005) in strawberry.

Reducing sugars non-reducing sugar and Total sugars:

The reducing, non-reducing and total sugars contents in fruit juice of strawberry have been increased by nutrient spray (Table-1). However, the highest level of reducing, non-reducing and total sugars was analyzed with application of Borax- (0.3%) + GA_3 (50ppm). The significant increase in sugar contents might be due to accumulation of carbohydrates in strawberry fruits as a result of increased supply/ absorption of Zn, Mn and Cu. Another reason might be due to synergetic effect on nitrogen as well as others eliments in the sugar metabolism of strawberry fruits as reported by Rudenko *et al.*, (1984) and Rana and Chandel (2003) in strawberry and Qin Xuan Nan (1996) in orange.

Table 1: Effect of micro-nutrients and plant growth regulators on quality attributes of strawberry cv. Chandler

Treatments	Length diameter ratio of the fruit	Specific Gravity	Total soluble solids (˚Brix)	Reducing sugars	Non-reducing sugar	Total sugars (%)	pH of the Fruit Juice	Acidity (%)
T_0 : Control	1.25	1.30	6.89	3.60	1.92	5.52	3.65	0.76
T_1 : Borax- (0.3%)	1.28	1.39	7.09	4.52	2.14	6.66	3.73	0.68
T_2 :$ZnSO_4$ (0.4%)	1.36	1.26	7.33	4.67	2.11	6.78	3.73	0.76
T_3 :NAA (15 ppm)	1.40	1.39	7.23	4.55	2.14	6.69	3.56	0.75
T_4 :GA_3 (50ppm)	1.43	1.55	7.05	5.06	2.56	7.62	3.93	0.76
T_5 : Borax- (0.3%) + :NAA (15 ppm)	1.40	1.54	8.00	4.31	2.33	6.64	3.76	0.68
T_6: Borax- (0.3%)+ GA_3 (50ppm)	1.48	1.58	8.03	4.43	2.09	6.52	3.63	0.62
T_7 :$ZnSO_4$ (0.4%)+ NAA (15 ppm)	1.54	1.62	8.06	5.45	2.58	8.03	3.68	0.73
T_8 :$ZnSO_4$ (0.4%)+ GA_3 (50ppm)	1.45	1.52	8.00	4.83	2.34	7.17	3.57	0.72
SE m±	0.01	0.07	0.31	0.16	0.11	0.20	0.15	0.72
C.D. at 5%	0.03	0.20	0.94	0.49	0.35	0.62	NS	NS

References

1. A.O.A.C. Official Method of Analysis of the Association of Official Analytical Chemists. (Ed. William Hortwitz). Benzamin Franklin Station, Washington, D.C., 1980.
2. LANE H, EYNON L. Determination of reducing sugar by means of Fehling's solution with methylene blue as internal indicator. Journal of the Society of Chemistry Industry, London, v. 1923; 42:32-37.
3. Parshant B, Jasrotia A, Sharma A, Rai PK, Wali VK, Kumar R. Pre-harvest application of iron and zinc influences growth, yield, quality and runner production of strawberry (*Fragaria x ananassa*) cv Chandler. Indian Journal of Agricultural Sciences; 2013; 83(6):678-684.
4. Qin XuanNan. Foliar spray of B, Zn and Mg and their effects on fruit production and quality of Jincheng orange (*Citrus sinensis*). [Chinese] Journal of Southwest Agricultural University; 1996; 18(1):40-45.
5. Rana RK, Chandel JS. Effect of bio-fertilzer and nitrogen growth, yield and fruit quality of strawberry. Prog. Hort. 2003; 35(1):23-30.
6. Singh JK, Prasad J, Singh HK. Effect of micro-nutrients and plant growth regulators on yield and physico-chemical characteristics of aonla fruit in cv. Narendra Aonla-10. Indian Journal of Horticulture, 2007; 64(2):216-218.