

# **Effect of plant growth regulators on growth, yield and fruit quality of strawberry (*Fragaria × ananassa* Duch.) Cultivar Winter Dawn under polyhouse (Natural Ventilated Polyhouse)**

## **ABSTRACT-**

The present experiment entitled “**Effect of plant growth regulators on growth, yield and fruit quality of strawberry (*Fragaria × ananassa* Duch.) Cultivar Winter Dawn under polyhouse (Natural Ventilated Polyhouse)**” was conducted at Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during the session 2022 - 2024. The experiment was laid out in randomized block design, and the study consists of ten treatments with three replications including control. From the present investigation, it was concluded that the treatment T10 (NAA- 125 ppm) was found to be best in the term of vegetative Parameter, Flowering, Fruiting, Yield and Quality of Strawberry.

**Keywords:** Strawberry, NAA, Growth, Yield and Quality etc

## **INTRODUCTION-**

The modern cultivation strawberry (*Fragaria × ananassa* Duch) is a hybrid between two largely dioecious octaploid species, *Fragaria chiloensis* and *Fragaria virginiana*. *Fragaria* species belongs to the family Rosaceae, with basic chromosome number of  $x=7$ . However the cultivated strawberry, (*Fragaria × ananassa*), is an octaploid having chromosome number of  $2n=56$ . In addition to *Fragaria × ananassa* the genus *fragaria* includes at least 17 other species including diploids, tetraploids, octaploids and a hexaploids.

It is grown all over the world. Area is 21 hectare and production 200-ton/season average weights 20-30 g/fruit. Following the runaway successes of experiment plantation strawberry have today become a popular and lucrative source of income for megalaya farmers.

Strawberry is a slow growing herbaceous plant with a short perennial. Branch, crown and runners are produced in the axils of the leaves, which are normally trifoliate. Strawberry fruits are richest source of vitamin (both fat soluble A, D, E and K),

protein, minerals like calcium, iron, and phosphorus. Nutritionally strawberry is a low-calorie carbohydrate fruit but a rich source of Vitamin A (60 IU/100g of edible portion), Vitamin C (30-120mg/100g of edible portion) and fiber. Water is a major constituent (90%) of strawberry fruit.

The total world area and production of strawberry was 2.6 lakh and 3.61 MT respectively. Strawberries are grown throughout most of the parts of United States, Canada, European countries including France, Italy, United Kingdom, Bulgaria, Poland. In India, strawberry is cultivated in J & K, hills of Himachal Pradesh, Nainital, Dehradun, Mahabaleshwar, but Kashmir occupies a leading place for its successful and profitable cultivation increased due to introduction.

In India the total area of strawberry is 1000ha with production of 5000 MT. In India, Maharashtra is the leading state. The nutrition status of strawberry plant plays a vital role in determining the yield and yield attributing parameters since, it is a very sensitive plant to nutritional balance.

## 2. MATERIALS AND METHODS

### 2.1 Geographical Location of the Experimental Site

The experimental site is located in the sub-tropical region which is located at

250. 271 N latitude, 810.561 E longitude and 98 m above the mean sea level.

Area of Prayagraj district comes under subtropical belt in the south east of Uttar Pradesh, which experience extremely hot summer and fairly cold winter. The maximum temperature of the location reaches up to 46 °C – 48 °C and seldom falls as low as 4°C – 5°C. The relative humidity ranges between 20 to 94 percent. The average rainfall in this area is around 1013.4 mm annually.

## 2.2 Experimental Details

### 2.2.1 Treatment combinations

T0 Control, T1 Cycocel (500 ppm), T2 Cycocel (750 ppm), T3 Cycocel (1000 ppm), T4 Cycocel (1250 ppm), T5 Cycocel (1500 ppm), T6 NAA (25 ppm), T7 NAA (50 ppm), T8 NAA (75 ppm), T9 NAA (100 ppm), T10 NAA (125 ppm)

## 3. RESULT AND DISCUSSION-

### 3.1 Effect of plant growth regulators on growth, yield and fruit quality of strawberry (*Fragaria × ananassa* Duch.) Cultivar Winter Dawn under polyhouse (Natural Ventilated Polyhouse)

#### Plant height (cm)

At harvest, the superiority of treatment T10 (NAA, 125 ppm), registered maximum plant height (41.75 cm), which was found at par with T7 (NAA, 50 ppm) having the plant height of 40.67 cm. However the minimum plant height (19.21

cm) was recorded under the treatment Control (T<sub>0</sub>).

At harvest, the superiority of treatment T<sub>10</sub> (NAA, 125 ppm), registered maximum number of leaves per plant (59.35), which was found at par with T<sub>7</sub> (NAA, 50 ppm) having the number of leaves per plant of 57.25. However the minimum number of leaves per plant (40.59) was recorded under the treatment Control (T<sub>0</sub>).

The leaf area at harvest, the superiority of treatment T<sub>10</sub> (NAA, 125 ppm), registered maximum leaf area (95.90 cm<sup>2</sup>), which was found at par with T<sub>8</sub> (NAA, 75 ppm) having the leaf area of 96.72 cm<sup>2</sup>. However the minimum leaf area (89.32 cm<sup>2</sup>) was recorded under the treatment Control (T<sub>0</sub>).

The plant spread from E-W, the maximum plant spread (55.49 cm) was recorded under the treatment T<sub>10</sub> (NAA, 125 ppm) which was found at par with T<sub>4</sub> (Cycocel, 1250 ppm) having the plant spread 54.22 cm. However, the lowest plant spread (30.60 cm) was confirmed under the treatment T<sub>0</sub>.

Maximum number of runners was recorded with T<sub>10</sub> (NAA, 125 ppm) T<sub>9</sub> and T<sub>5</sub> (4.67). Closely followed by T<sub>8</sub> (4.33). Minimum number of runners was recorded in T<sub>0</sub> (2.67).

Maximum number of days taken first

harvest was recorded with T<sub>0</sub> (control) 62.33. Closely followed by T<sub>1</sub> (Cycocel, 500 ppm) (61.25). Minimum number of days to taken first harvest was recorded in T<sub>10</sub> (NAA, 125 ppm) (53.38).

Maximum number of days taken final harvest was recorded with T<sub>10</sub> (NAA, 125 ppm) 96.12. Closely followed by T<sub>9</sub> (NAA, 100 ppm) (93.01). Minimum number of days to taken final harvest was recorded in T<sub>0</sub> control (85.95).

Maximum number of flowers per plant was recorded with T<sub>10</sub> (NAA, 125 ppm) 58.77. Closely followed by T<sub>9</sub> (NAA, 100 ppm) (54.56). Minimum number of flowers per plant was recorded in T<sub>0</sub> control (35.89).

Maximum number of fruits per plant and was recorded with T<sub>10</sub> (NAA, 125 ppm) with 30.25. Closely followed by T<sub>7</sub> (NAA, 125 ppm) (29.50). Minimum number of fruits per plant was recorded in T<sub>0</sub> control (17.44).

Maximum fruit length of fruit was recorded with T<sub>10</sub> (NAA, 125 ppm) 4.95 mm closely followed by T<sub>6</sub> (NAA, 25 ppm) (4.72 cm). Minimum fruit length was recorded in T<sub>0</sub> control (2.92 cm).

Maximum fruit weight (g) was recorded with T<sub>10</sub> (NAA, 125 ppm) 26.17 g closely followed by T<sub>9</sub> (26.05 g). Minimum fruit weight (g) was

recorded in T0 control (22.29 g).

The data presented in the revealed the fruit yield per plant (kg) was significantly influenced by different treatments. Maximum fruit yield per plant (kg) was recorded with T10 (NAA, 125 ppm), 0.79 kg closely followed by T7 (0.72 kg). Minimum fruit yield per plant (kg) was recorded in T0 control (0.39 kg).

Maximum fruit yield (q per ha) was recorded with T10 (NAA, 125 ppm) 39.58 q/ha closely followed by T7 (36.05 q/ha). Minimum fruit yield (q per ha) was recorded in T0 control (19.44 q/ha).

Maximum acidity percentage of

fruit was recorded with T10 (NAA, 50 ppm) 5.23 closely followed by T5 (5.13). Minimum acidity percentage of fruit was recorded in T10 (NAA, 125 ppm) (4.87). Maximum TSS of fruit was recorded with T9 (NAA, 100 ppm) 7.42 closely followed by T6 (7.38). Minimum TSS of fruit was recorded in T0 control (6.36). Maximum ascorbic acid of fruit was recorded with T4 (Cycocel, 1250 ppm), 57.40 closely followed by T7 (55.99). Minimum ascorbic acid of fruit was recorded in T0 control (49.70).

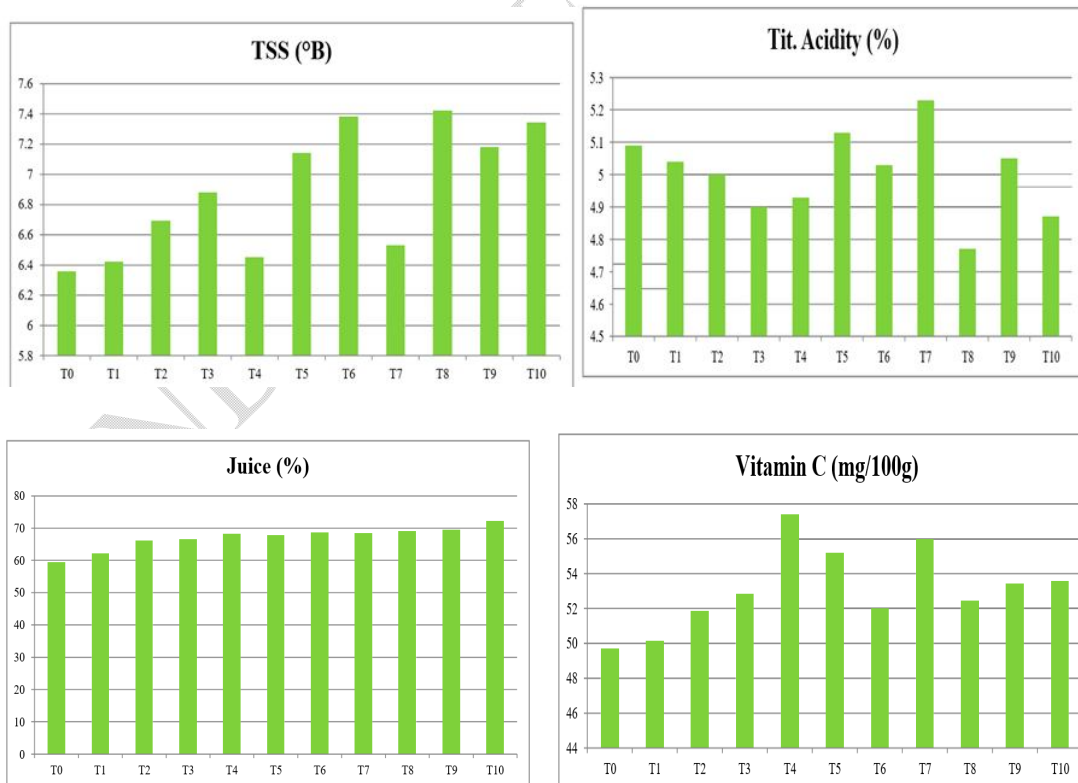
treatment	Plant height	No. of leaves /plant	Leaf area	No. of runners	Days taken to first harvest	Days taken to final harvest	No of flowers /plant	No of fruits /plant
T0	19.21	40.59	89.32	2.67	62.33	85.95	35.89	17.44
T1	22.21	42.65	91.81	3.67	61.25	91.12	39.72	19.74
T2	23.64	43.63	92.61	3.67	59.49	91.49	41.72	20.41
T3	23.91	46.21	93.1	4.33	60.57	91.56	45.82	22
T4	24.78	44.42	91.83	4.33	59.38	92.33	48.93	24.73
T5	28.76	45.2	92.93	4.67	59.9	89.26	47.8	26.37
T6	30.33	51.88	93.67	3.44	58.39	89.6	50.46	27.82
T7	40.67	57.26	94.56	3.66	57.39	91.01	51.66	29.5
T8	29.68	48.25	96.72	4.33	55.17	89.79	52.96	22.02
T9	31.24	53.8	95.67	4.67	54.74	93.01	54.56	25.89
T10	41.75	59.35	95.9	4.67	53.38	96.12	58.77	30.25
F test	S	S	S	S	S	S	S	S
CD at 5%	1.84	1.61	0.63	0.19	0.75	0.6	1.84	1.17

treatment	Fruit length	Fruit diameter	Fruit weight (g)	Fruit yield plant(kg)	Fruit yield(q/hac)
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SEm±	1.01	0.89	0.35	0.11	0.41	0.33	1.01	0.64
CV	22.81	11.03	2.25	15.79	4.15	2.2	13.51	12.86

Table 1 : Variation in fruit parameters with different treatment efficacy

T0	2.92	2.69	22.29	0.39	19.44
T1	3.35	2.71	24.55	0.48	24.23
T2	3.58	2.96	24.46	0.5	24.96
T3	3.67	3.36	23.87	0.53	26.26
T4	3.74	3.01	23.51	0.58	29.07
T5	4.24	3.22	25.64	0.68	33.81
T6	4.72	3.57	24.57	0.68	34.18
T7	3.84	3.79	24.44	0.72	36.05
T8	4.17	3.56	24.24	0.53	26.69
T9	4.54	3.6	26.05	0.7	34.89
T10	4.94	3.82	26.17	0.79	39.58
F test	S	S	S	S	S
CDat 5%	0.17	0.12	0.37	0.34	1.67
SEm±	0.09	0.06	0.2	0.39	2.89
CV	14.61	11.84	2.64	1.88	8.43



**Fig .1 Bar graph showing treatment variation for different parameters**

## CONCLUSION

The application of PGRS on fruit Strawberry cv. Winter dawn, it also helps in maintaining the soil growth of the fruits at a desired level. It can be concluded that, for better vegetative growth, yield and quality Strawberry fruits. It is concluded that the treatment T10 (NAA125 ppm) was found best in terms of vegetative growth and yield characters of strawberry. The economics of the treatment T10 was found best in terms of B:C ratio 3.25 of strawberry. So application of this PGRScan be recommended to growers after few more conjunctive trials.

## REFERENCES-

- Aakharova, O.M. (1981), Application of growth regulators in strawberry propagation.
- Doklady MOSK-S-Kh-Ak. Ad.I.M.K.A. Timiyazeva (Russia). 256:33–37.
- Abdullah, Shakir & Wani, Ab Waheed & Sharma, Ankur & Singh, Gurpreet & Zarina,. (2023). Improving Production and Quality of Strawberry (*Fragaria × ananassa* Duch.) Cv. Chandler with Plant Growth Regulators: A Study in Northern Punjab. *International Journal of Plant & Soil Science*. 35. 170-176. 10.9734/ijpss/2023/v35i213959.
- Agafonov, N.V., Blinovski, I.K. and Solovei, E.P.(1978). The preparation jury as strawberry. *Sodovodstvo* (Russian). No. 6: 29-30
- Ahire, Dipakkumar. (2017). Effect of PGR on growth, yield and quality of strawberry (*Fragaria x ananassa* Duch) cv. Sweet Charlie. 10. 8817-8819.
- Asrey, R., Jain, O.K. and Singh, R.(2000-01). Effect of plant growth regulators on growth and survival of strawberry runners under semi arid region of Punjab. *Indian J. Plant Physiology*, 8(2): 196-198.
- Beer, Karma & Syamal, Alok. (2017). Effect of Organic, Inorganic and Bio-Fertilizer on Growth, Flowering, Yield and Quality of Strawberry (*Fragaria × Ananassa* Duch.) cv. Chandler. *International Journal of Current Microbiology and Applied Sciences*. 6.2932-2939. 10.20546/ijemas.2017.605.332.
- Brahamachari, V.S. and Rani, R.(2001) Effect of growth substances on productivity, cracking, ripening and quality of fruits in litchi. *Orissa-j. Hort*. 299 (1): 41-45.
- Brahamachari, V.S., Mandal, A.K., Kumar, R. and Rani, R.(1995). Effect of growth substances of fruit set and physico-chemical characteristics of sardar guava. *Recant Horti*. 2 (1): 127-131.
- Deka, P.C. and Shadeque, A.C. (1996). Effect of foliar spray of cycocel on fruit characters and Ascorbic acid content of sweet pepper (*Capsicum annum* var.

grossum L. Sendt). New Agriculturist.  
7(1): 7-10.

Dwivedi, M.P.(1987). Effect of  
photoperiod and growth regulators on  
vegetative growth, flowering and yield of  
strawberry. Ph.D. thesis, Dr. Y.S Parmar  
University of Horticulture and forestry,  
Solan , India

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