# Effect of nutrients and mulches on vegetative growth and yield characters in Strawberry (*Fragaria x ananassa* Duch.) cv. Chandler


## ABATRACT

A field experiment was conducted at the Horticulture Research Farm-1, of the Department of Horticulture, School of Agricultural Sciences and technology, Babasaheb Bhimrao Ambedkar University (A Central University), Vidya- Vihar, Rae Bareli Road, Lucknow to evaluate the significance of mulching and nutrients on the performances of Strawberry (*Fragaria* x *ananassa*) with respect to the vegetative and yield character's during 2019-20.The experiment was laid out in RBD having three replications. The result revealed significantly highest plant height (16.85 cm), number of leaves (20.72cm), length of leaf with petiole (26.88 cm), length of leaf (17.85cm), length of petiole (24.68 cm) in treatment $T_9$ (Black polythene FYM 100%) followed by the treatment $T_{10}$ (Black polythene vermi-compost 100%) at 90 Days after planting. However, treatment $T_1$ (control) showed poor performance with respect to all vegetative and yield parameters. Hence, the result led to the conclusion that adoption of Black polythene with FYM 100% in Strawberry enhances all growth and yield attributing parameters and black polythene with vermin-compost 100%showed second-best result.



**Keyword:** Strawberry, nutrients, mulches, growth and yield




## [1]. INTRODUCTION

"The Strawberry is a most important man made horticultural fruit crop. The modern cultivated octaploid Strawberry (*Fragaria X ananassa* Duch.) originated in France. It belongs to the family Rosaceae. It is one of the delicious and nutritious among soft fruit with wider adoptability. This crop is chiefly grown in the temperate world. However, it can be grown under sub-tropical climate and even at high altitude of tropical climate. Strawberry can be grown wide range of soil from heavy clays to light sand and gravels. However, strawberry plant grows well in sandy loam soil with pH of 5.5- 6.5 Anon 1956"[1]. "The strawberry requires an optimum day temperature

of $22^0$C & night temperature of $7^0$C to $13^0$C for maximum growth and development. In cold climate frost damage as well as winter injury greatly reduced yield of strawberry. Frost may damage center of open flower causing the characteristics 'Black eye' disease. Frost free site make strawberry cultivation comparatively easy, it is also grown under the green house and covered plastic. Flower before opening and after set are slightly more resistant to frost damage. Proper nutrition is very important for its profitable cultivation. 'Albinism' is a physiological disorder probably caused by certain climatic condition and extremes in nutrition. Being a quick growing crop, it is also suitable for the kitchen garden. The fruit of strawberry is a complete fruit with 98 % edible portion. The first plant of the cultivated strawberry (*Fragaria* x *ananassa*) has originated in France and the two American diploids *F.chiloensis* and *F.virginiana* considered in progenitors". [13]

The practice of applying mulch is as old agriculture itself Jacks et al.[2] Black polyethylene, sawdust, wheat straw, paddy straw, grasses, sugarcane trash, litters, crop residues etc. are common mulching materials used for covering plant basin. "Both organic and inorganic mulches are used in strawberry cultivation. Mulching protects fruits from soil contact, reduces the number of dirty fruits and prevents the occurrence of fruit rot. Mulching reduces the water evaporation by interfering the radiation falling on the soil surface ensuring better moisture regime and more availability of moisture" Gupta, 1978[3] Gupta 1985[4].

## [2]. MATERIALS AND METHODS

The experiment was conducted at Horticulture Research Farm – I of Department of Horticulture, School of Agricultural Sciences and Technology, Babasaheb Bhimrao Ambedkar University, Lucknow, India; during the academic year of 2019-20 it is geographically situated in the subtropical tract of Central U.P. at $80^0$55' East longitude and $26^0$56' North latitude. The Horticulture Research Farm is situated at 10 Km away from the Lucknow Railway Station towards South-East in Lucknow Rae Bareli Road, Vidya-Vihar, near South City, Lucknow. "This region received an average annual rainfall of 650-750 mm which is distributed over a period of more than 100 days with peak period during July-August. It is also receiving scattered show during winter months. In general, the temperature ranges from $3.5^0$C to $45^0$C. The coldest month is January while, the maximum temperature is observed during May and June. The relative humidity (RH) is 50-77% in different season of the year. Lucknow is characterized by

sub-tropical climate with hot, dry summer and cold winter. The soil of experimental farm was saline with soil pH less than 8.2, Electrical conductivity more than 4.0 and sodium exchangeable percentage less than 15.0". [13]

**2.1 Experimental Materials: -** The runners of Chandler variety of strawberry were brought from the Central Institute of Temperate Horticulture, Kashmir (J&K) in the month of October, 2019. The runners were kept for two days in shade for hardening before transplanting in well-prepared beds under open field condition plots which were distributed randomly in three replications. Standard cultural practices were followed during the period of the experiment for maintaining the runners.

**2.2 Planting System and Crop Management: -** An area of 18 m x 7.80 m size was divided into 42 plots having the size of 1.8 m x 1.2 m and arranged in the three replications of 14 plots. The experiment was laid out in R. B. D. under 14treatments with spacing of 45 cm row to row and 30 cm plant to plant. The field was prepared with basal dose of N.P.K. fertilizer as indicated earlier. Sixteen plants, in each bed were transplanted and watered uniformly. Water was applied in channels between two beds. Mulching was done two days after transplanting black polythene (200 gauge) was used for covering the soil surface in the bed and also used white polythene (200 gauge) to cover the plots.



**Table 1: The details of treatments used in the experiments are given below.**

| | |
|---|---|
| $T_1$ | White Polythene |
| $T_2$ | White Polythene + FYM 100% |
| $T_3$ | White Polythene + vermi-compost 100% |
| $T_4$ | White Polythene + NPK 100% |
| $T_5$ | White polythene FYM 50%+ Vermi-compost 50% |
| $T_6$ | White Polythene FYM 50% + NPK 50% |
| $T_7$ | White polythene Vermi-compost 50% + NPK 50% |
| $T_8$ | Black Polythene |

| | |
|---|---|
| $T_9$ | Black polythene + FYM 100% |
| T1o | Black Polythene + Vermi-compost 100% |
| $T_{11}$ | Black polythene +NPK 100% |
| $T_{12}$ | Black Polythene FYM 50%+ Vermi-compost 50% |
| $T_{13}$ | Black Polythene FYM 50%+ Vermi-compost 50% |
| T14 | Black Polythene Vermi-compost 50%+ NPK 50% |

## [3.] RESULTS AND DISCUSSION:-

Among these mulching treatments, black polythene mulch showed significant superiority in reducing weed population over rest of the treatments. This effect may be due to smothering effect and causing physical barrier to photosynthetic activity imparted by polythene mulches due to which plant performance may have improved by better nutrient uptake by the plants. Which ultimately enhances the vegetative growth of the strawberry In case of nutrient FYM enhances the growth and yield possibly due to the modification in the soil environment viz., moderating soil temperature during early Growth of the crop which coincides with hot dry month that preserves soil moisture also contributed to increase the production of the more vegetative Growth and yield.

### [3.1] Growth Character:-

The plant height of various treatment combination has been represented in table-2, which was varied from (13.90) cm to (16.85) cm. In which, the maximum plant height was recorded in treatment $T_9$ (Black polythene + FYM 100%) showed value (16.85cm), followed by the treatment $T_{10}$ (Black polythene + vermi-compost 100 %) showed value (16.80 cm). However, the minimum plant height was recorded in treatment $T_1$ (control) showed value (13.90cm). Christopher Lourduraj et al. 1996 [5.] found that plastic mulch resulted in significantly higher plant height as compared to organic mulches in tomato. Mulching with black polythene enhanced growth of strawberry as compared with unmatched one Srivastava and Agrawal, 1965 [6].

As the data of length of leaf with petiole per plant shown in the table-2, indicated that the maximum length of leaf with petiole was found in the treatment $T_9$ (Black polythene + FYM 100%) (26.88 cm) followed by length of leaf with petiole treatment $T_{10}$ (black polythene +

vermin-compost 100%) (25.75cm). the minimum length of leaf with petiole find out in the treatment $T_1$ Control (22.65).

Findings of number of leaves per plant as influenced by different treatment combinations and the relevant data are presented in table-2, which recorded from (14.45) to (20.72) at the 90 days after planting. Minimum number of leaves was found in treatment $T_1$ control (14.45). The maximum number of leaves was recorded in treatment $T_9$ (20.72) (Black polythene + FYM 100%) followed by treatment $T_{10}$ (Black polythene + vermin-compost 100%) (20.45). Chattopadhyay and Sarad, Gurung (1993) [7] reported that mulching with black polythene resulted in best vegetative growth, pseudo stem height, girth, leaf, number and sucker production in banana cv. Giant Cavendish.

The data regarding length of leaf under different treatment combination presented in table number-2, the maximum length of leaf was assessed in the treatment $T_9$ (Black polythene + FYM 100%) 17.85 cm followed by the length of leaf occurs in treatment $T_{10}$ (Black polythene + vermi-compost 100%) 17.65 cm. The minimum length of leaf found in the treatment $T_1$ Control (11.55) cm. Gaiwat et al. 2004 [8.] reported that grass mulch increased vegetative growth in term of number of shoot/ branch and leaf area as compared to polythene mulch in Nagpur Mandarin.

It is clear data presented in the table number-2. Length of petiole varies from 17.58 cm to 24.68 cm. Maximum length of petiole observed in the treatment $T_9$ (Black polythene + FYM 100%) 24.68 cm followed by length of petiole treatment $T_{10}$ (23.55) cm. Lowest length of petiole regarded in treatment $T_1$ Control (17.58) cm. Byun et al. 1989 [9.] reported the black polythene mulch increased tree height, leaf area, leaf petiole length and number of branches in young jujube tree.

**[3.2]Yield character**

The data presented in table-3 indicates that maximum No. of picking (5.42, 6.82, 17.54) were noted treatment nine at 60, 80, 90 days after planting respectively. Where treatment $T_{10}$ which was significantly followed by the black polythene with vermi-compost application observed data calculated (4.29, 6.35, 16.65) at 60, 80, 90 days after planting respectively.

However, the minimum harvesting data calculated (1.83, 3.15, 15.25) under controlled plants treatment at 60, 80, 90 days after planting respectively. Plastic mulch increased yield of strawberry and keep fruit clean Martin and Westphalen, 1983 [10].

The mean values presented in table-3 clearly indicate that the maximum length of fruit was recorded under Black Polythene with FYM (42.88) at treatment nine followed by treatment $T_{10}$ (38.32) with effect of Black Polythene Vermi-compost However, the minimum fruit length (28.93) was observed under controlled $T_1$.

Findings of width of fruit clearly indicate that the maximum width of fruits were recorded under Black Polythene with FYM (27.98) at treatment $T_9$. Followed by $T_{10}$ (26.88) with effect of Black Polythene Vermi-compost However, the minimum fruit width (21.48) was observed under controlled $T_1$.

Data regarding yield per plant presented under different treatment combination in table-3 indicates that the maximum yield per plant were recorded under black polythene with FYM (188.25) at treatment nine followed by $T_{10}$ (180.45) with effect of Black Polythene Vermi-compost However, the minimum yield per plant (100.66) was observed under controlled $T_1$. Ali and Gaur 2004 [11] reported the mulching significantly increased no of fruits, fruit weight and fruit yield. Maximum number of fruits (13.75), Fruit weight (7.9g) & fruit yield (109.68/plant) were recorded in black polythene mulch plants, while minimum in control.

The mean values presented in table-3 clearly indicate that the maximum weight of fruit/berry was recorded under Black Polythene with FYM (28.55) at $T_9$. Followed by $T_{10}$ (27.66) with effect of Black Polythene Vermi-compost However, the minimum weight of fruit/berry (18.84) was observed under controlled $T_1$. Kasperbauer 2000 [12] observed that most commonly used plastic mulch color is black in strawberry and also reported that the yield per plant and size per berry were greater over the red plastic mulch.

## 4. CONCLUSION

From the investigation with nutrient and mulches on strawberry cv. Chandler it can safely be concluded that $T_9$ (Black polythene + FYM 100%) significantly increase the growth and yield characters i.e. plant height, number of leaves per plant, length of leaves, length of petioles and

total number of fruits, content of fruits, whereas, $T_9$ produced maximum weight of fruits. It can be recommended to the strawberry growers for obtaining a better quality of winter season strawberry fruits in Lucknow condition.

**Table 2: Variation in growth parameters by application of different treatment**

| Treatments | Growth parameter | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Plant height (cm) | | | Length of leaves with petioles per plant(cm) | | | No. of leaves(cm) | | | Length of leaves (cm) | | | Length of petioles (cm) | | |
| | 30 | 60 | 90 | 30 | 60 | 90 | 30 | 60 | 90 | 30 | 60 | 90 | 30 | 60 | 90 |
| $T_1$ | 4.53 | 6.95 | 13.90 | 8.35 | 12.65 | 22.65 | 2.54 | 10.85 | 14.45 | 3.52 | 5.75 | 11.55 | 5.80 | 14.75 | 17.58 |
| $T_2$ | 4.93 | 7.88 | 15.58 | 9.56 | 16.45 | 24.60 | 4.22 | 12.25 | 17.54 | 4.85 | 7.85 | 15.65 | 7.65 | 11.92 | 22.96 |
| $T_3$ | 4.78 | 7.88 | 15.40 | 9.45 | 16.25 | 24.45 | 3.75 | 12.40 | 15.68 | 4.95 | 7.00 | 15.64 | 7.65 | 14.75 | 22.65 |
| $T_4$ | 5.40 | 8.32 | 15.90 | 8.62 | 15.79 | 23.90 | 3.25 | 11.38 | 17.75 | 4.69 | 6.25 | 14.35 | 6.85 | 12.50 | 20.59 |
| $T_5$ | 3.84 | 7.98 | 14.68 | 8.89 | 16.15 | 24.55 | 3.72 | 11.74 | 16.49 | 4.88 | 6.79 | 14.52 | 7.85 | 14.45 | 23.43 |
| $T_6$ | 3.55 | 6.74 | 14.66 | 8.65 | 15.77 | 20.28 | 3.23 | 11.85 | 17.25 | 4.75 | 6.32 | 14.75 | 7.42 | 13.62 | 22.15 |
| $T_7$ | 4.20 | 8.39 | 13.89 | 8.82 | 14.78 | 24.62 | 3.46 | 11.79 | 16.82 | 4.89 | 6.38 | 15.23 | 7.38 | 14.60 | 23.20 |
| $T_8$ | 3.98 | 8.59 | 14.78 | 8.52 | 14.95 | 22.98 | 2.78 | 11.20 | 17.26 | 4.66 | 5.95 | 13.63 | 6.96 | 14.40 | 20.35 |
| $T_9$ | 7.29 | 10.82 | 16.85 | 11.35 | 18.55 | 26.88 | 5.88 | 15.45 | 20.72 | 6.86 | 10.32 | 17.85 | 9.84 | 17.23 | 24.68 |
| $T_{10}$ | 7.14 | 10.78 | 16.80 | 10.69 | 17.42 | 25.75 | 4.82 | 14.64 | 20.45 | 6.84 | 9.92 | 17.65 | 8.73 | 16.27 | 23.55 |
| $T_{11}$ | 5.60 | 8.65 | 14.90 | 9.38 | 16.50 | 21.20 | 4.41 | 12.55 | 18.35 | 5.28 | 7.95 | 15.52 | 8.60 | 15.35 | 20.46 |
| $T_{12}$ | 4.06 | 9.55 | 15.76 | 9.85 | 16.85 | 22.90 | 4.53 | 13.67 | 19.25 | 5.52 | 8.50 | 16.45 | 8.62 | 15.58 | 22.76 |
| $T_{13}$ | 4.53 | 8.86 | 13.97 | 9.65 | 16.76 | 25.36 | 4.29 | 12.77 | 18.50 | 5.32 | 8.15 | 15.78 | 8.55 | 16.13 | 21.55 |
| $T_{14}$ | 5.26 | 9.92 | 15.68 | 9.75 | 16.79 | 24.55 | 3.54 | 13.50 | 18.75 | 5.48 | 6.33 | 16.28 | 8.49 | 14.36 | 23.48 |
| **S.E m(±)** | 0.20 | 0.35 | 0.64 | 0.39 | 0.65 | 1.03 | 0.15 | 0.51 | 0.71 | 0.20 | 0.29 | 0.61 | 0.31 | 0.63 | 0.91 |
| **C.D. (P=0.05)** | 0.59 | 1.02 | 1.87 | 1.13 | 1.92 | 3.01 | 0.43 | 1.50 | 2.09 | 0.58 | 0.84 | 1.79 | 0.92 | 1.84 | 2.68 |

## Table.3 Variation in yield parameters by application of different treatments

| Treatments | Yield parameter | | | | | | |
|---|---|---|---|---|---|---|---|
| | No. of pickings | | | Length of fruit (cm) | Width of fruit (mm) | Yield of fruit per plant (g) | Weight of fruit berry (g) |
| | 60 | 80 | 90 | | | | |
| $T_1$ | 1.83 | 3.15 | 15.25 | 28.93 | 21.48 | 100.66 | 18.84 |
| $T_2$ | 3.29 | 4.56 | 14.33 | 35.84 | 23.85 | 149.27 | 25.34 |
| $T_3$ | 3.53 | 5.43 | 13.84 | 36.58 | 24.73 | 145.68 | 22.14 |
| $T_4$ | 2.62 | 3.69 | 15.38 | 34.25 | 23.28 | 134.86 | 26.55 |
| $T_5$ | 2.62 | 4.38 | 14.26 | 32.62 | 24.55 | 143.52 | 24.80 |
| $T_6$ | 3.23 | 4.26 | 13.22 | 35.44 | 22.96 | 131.82 | 21.00 |
| $T_7$ | 1.55 | 3.72 | 15.48 | 33.38 | 23.18 | 138.22 | 23.77 |
| $T_8$ | 1.92 | 5.10 | 16.18 | 30.92 | 21.52 | 125.48 | 20.84 |
| $T_9$ | 5.42 | 6.82 | 17.54 | 42.88 | 27.98 | 188.25 | 28.55 |
| $T_{10}$ | 4.29 | 6.35 | 16.65 | 38.32 | 26.88 | 180.45 | 27.66 |
| $T_{11}$ | 3.67 | 5.77 | 15.85 | 36.65 | 25.43 | 151.28 | 26.33 |
| $T_{12}$ | 2.75 | 5.47 | 14.78 | 37.59 | 22.67 | 168.87 | 24.45 |
| $T_{13}$ | 3.88 | 3.82 | 13.72 | 38.15 | 21.82 | 175.20 | 22.59 |
| $T_{14}$ | 3.63 | 3.63 | 14.55 | 33.15 | 25.87 | 166.15 | 21.87 |
| **S.E m(±)** | 0.11 | 0.18 | 0.64 | 1.43 | 1.02 | 5.87 | 0.98 |
| **C.D. (P=0.05)** | 0.34 | 0.53 | 1.89 | 4.18 | 2.98 | 17.18 | 2.87 |

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