International Journal of Advanced Biochemistry Research

ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2025): 5.29
IJABR 2025; 9(8): 99-102
www.biochemjournal.com
Received: 09-05-2025
Accepted: 12-06-2025

Richa Sharma
M.Sc. Scholar, Department of Horticulture, Naini Agriculture Institute, SHUATS Prayagraj, Uttar Pradesh, India

Dr. Annjoe V Joseph
Assistant Professor, Department of Horticulture, Naini Agricultural Institute, SHUATS Prayagraj, Uttar Pradesh, India

Dr. Deepak Lall
Assistant Professor, Department of Horticulture, Naini Agricultural Institute, SHUATS Prayagraj, Uttar Pradesh, India

Corresponding Author:
Richa Sharma
M.Sc. Scholar, Department of Horticulture, Naini Agriculture Institute, SHUATS Prayagraj, Uttar Pradesh, India

Effect of different types of mulching in strawberry (*Fragaria x ananassa*) on growth and yield

Richa Sharma, Annjoe V Joseph and Deepak Lall

DOI: https://www.doi.org/10.33545/26174693.2025.v9.i8b.5103

Abstract
The experiment was conducted in the Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj, during the Rabi season spanning from November 2024 to February 2025. The primary objective of this study was to evaluate the impact of various organic and inorganic mulching materials on the growth and performance of the selected horticultural crop under the prevailing agro-climatic conditions. The experimental layout followed the principles of a Randomized Block Design (RBD), which included a total of eleven different treatments, namely: T_0 Control (Without mulching), T_1 Paddy straw, T_2 Wheat straw, T_3 Coconut coir, T_4 Peat moss, T_5 Saw dust, T_6 Black polythene, T_7 Transparent polythene, T_8 Blue polythene, T_9 Red polythene, and T_{10} Silver polythene. Each treatment was replicated three times to ensure the accuracy and statistical validity of the results. Within each replication block, treatments were randomly allotted to eliminate bias and to reduce the impact of variability in soil and environmental conditions. Throughout the crop growth period, all essential horticultural practices were followed uniformly across the plots, and comprehensive observations were recorded at regular intervals. These observations included key parameters related to vegetative growth, yield attributes, and quality indicators of the crop. The data thus collected were intended for statistical analysis to assess the influence of the various mulching treatments and to identify the most effective one for enhancing crop performance.

Keywords: Strawberry, mulching, growth, yields, quality

Introduction
The cultivated strawberry *(Fragaria x ananassa*) is one of the 'most important soft fruits of the world, suitable for growing under various agro-climatic condition. It belongs to the family Rosaceae and genus Fragaria, resulted from the hybridization of two wild American octoploid species. *F. chiloensis* and *F. virginiana.* USA is the world`s leading strawberry producer with California producing with California producing approximately 80 percent / of the US crop (Scott and Hancock). In India, strawberry is being 'commercially grown in Maharashtra, Madhya Pradesh, Karnataka and recently in North India. Strawberry is unique amongst the cultivated fruits. It is an herbaceous perennial, requiring different culture from the tree fruits. It has a short stem of about 2.5 cm height known as 'crown'. The crown produces leave at very close interval along the stem axis and flowers at terminal position on the stem axis. The edible 'berry' includes the ripened receptacle and hard achenes (true fruits and seeds). Berries, particularly strawberries, are an excellent source of vitamins (such as B1, B2, and niacin), as well as essential minerals like phosphorous, potassium, calcium, and iron. Strawberry cultivation is highly valued both for fresh market sales and in the processing industry. Worldwide, strawberries are grown on approximately 396,40 hectares (2019). Production around 9.6 million tones. In India, strawberries are cultivated in area about 2620 hectare with a total production of 20,010 MT (2023-24).

Strawberry cultivation is highly dependent on specific temperature and light conditions. It typically starts bearing fruit 40-60 days transplanting and is known as one of the first fruits to reach the market in spring. For strawberries to flower, they need temperature below 24-26C, short daylight hours, and cooler conditions. During the winter, the plants go dormant, but as the weather warms in spring, they resume growth and starts flowering. Strawberries are also very sensitive to drought, especially during flowering and fruit ripening, so they are usually grown with irrigation. In addition to environmental factors, the use of microclimate

techniques such as plastic mulches and low tunnels can help are often covered with plastic sheets to protect them from cold winds and frost, which helps maintain the right temperature and boosts fruit yield.

Strawberry cultivation in India became popular in the 1960s. States like Himachal Pradesh, Uttaranchal, and Maharashtra are the leading producers of strawberries. The fruit is also grown in the hills of Uttar Pradesh, Jammu Kashmir, West Bengal (specifically the Darjeeling hills), and the Nilgiris hills in India.

Vermiculture, or the use of earthworms and vermicompost, can play a significant role in maintaining a healthy and biologically active soil ecosystem. Incorporating earthworms along with nutrients through vermicompost can help improve soil quality. However, relying solely on synthetic fertilizers, especially when used imbalanced or inadequately, diminishes their efficiency over time.

Studies across India have shown that over-reliance on fertilizers alone leads to unsustainable crop productivity. A more integrated approach-combining chemical with organic inputs like green manure, FYM, compost, and biofertilizers can help bridge the gap between nutrient supply and crop demand, improve nutrient use efficiency, and ensure balanced nutrition for better crop productivity and quality. Many studies have highlighted the positive effects of mulching on strawberry production (Das; Daugaard; Kher *et., al* 2010; Bakshi *et., al* 2014) [2, 3].

Mulching plays a key role in growing strawberries successfully. It not only helps retain soil moisture but also boosts plant growth and enhances fruit quality, as noted by Hassan *et., al* (2000) [1]. There are two main types of mulch: organic and inorganic. Organic mulches come from natural sources like plants and animals. Common examples include crop residues like straw and hay, peanut shells, compost made from leaves, and wood materials such as sawdust, wood chips, and shavings. Animal manure is also used. provide warmth to the crop and significantly affect the fruit size, weight, and biochemical content (Shiukhy *et., al* 2014). One effective organic mulch is a mix of straw and vetch. This combination offers several environmental advantages. It helps add nitrogen to the soil, recycles nutrients, and suppresses weed growth.

Methods and Materials

The Present Research "Effect of Different Types of Mulching in Strawberry on Growth and Yield (*Fragaria x ananassa*)" was carried out at research field, Department of Horticulture, Sam Higginbottom University of Horticulture of Agriculture, Technology and Sciences, Prayagraj, During November, 2024 to February, 2025. The area is situated on the south of Prayagraj on the right bank of Yamuna at Rewa road at a distance of about 6 km from Prayagraj city. It is situated at 25°24' 30''North latitude 81°51' 10" East longitude and 98 m above mean sea level. The area of Prayagraj district comes under subtropical belt in the south east of Uttar Pradesh, which experience extremely hot summer and fairy cold winter. The maximum temperature of the location reaches up to 46 °C - 48 °C and seldom falls as low 4 °C-5 °C. The relative humidity ranges between 20 to 94 per cent. The average rainfall in this area is around 1013.4 mm annually.

The experiment was laid out using Randomized Block Design comprising of 11 treatments and 3 replications. The different treatment was allocated in each replication, namely: T_0 Control (Without mulching), T_1 Paddy straw, T_2 Wheat straw, T_3 Coconut coir, T_4 Peat moss, T_5 Saw dust, T_6 Black polythene, T_7 Transparent polythene, T_8 Blue polythene, T_9 Red polythene, and T_{10} Silver polythene. Each treatment was replicated three times to ensure the accuracy and statistical validity of the results. The experimental field was brought to fine tilth by ploughing and harrowing by tractor. The experimental site was divided into small plots of 1m X 1m.

Results and Discussion

1. Growth Parameters

A) Number of leaves per plant: The number of leaves per plant, recorded at 30, 60, 90, and 120 days after transplanting (DAT), showed significant variation among treatments. Black polythene mulch (T_6) consistently produced the highest leaf count (15.08 at 120 DAT), followed by red polythene (T_9) and peat moss (T_4) with 14.58 and 14.08 leaves, respectively. The control (T_0) had the lowest values. These results highlight the positive effect of synthetic mulches, particularly black polythene, on enhancing vegetative growth in strawberries.

B) Plant height (cm): Statistical analysis revealed significant differences in plant height among mulching treatments. Black polythene (T_6) consistently produced the tallest plants (25.10 cm at 120 DAT), followed by red polythene (T_9) and peat moss (T_4). The control (T_0) showed the shortest growth across all stages. These results confirm the positive impact of mulching, especially synthetic types, on enhancing vegetative growth in strawberries

C) Plant spread (cm): Mulching significantly improved plant spread in strawberries, with black polythene (T_6) showing the highest spread at all stages, reaching 34.13 cm at 120 DAT. The control (T_0) had the lowest at 27.83 cm. This highlights the role of mulching in enhancing vegetative growth through better moisture and temperature regulation

2. Yield Parameters

D) Days to first flowering: Flowering in strawberries occurred between 38-70 DAT, significantly influenced by mulching. The earliest flowering (39 DAT) was under T_6 (black polythene mulch), while the latest (64 DAT) was in the control (T_0). Black polythene mulch promoted earlier flowering by improving soil conditions, as confirmed by statistical analysis

E) No. of flower per plant: Significant differences in flower count per strawberry plant were observed across mulching treatments at 60, 90, and 120 DAT. Peak flowering (90-120 DAT) was highest in T_6 (black polythene mulch) with 20.00 flowers, and lowest in control (T_0) with 8.33, confirming the positive impact of synthetic mulches on flowering

F) No. of fruits per plant: Mulching significantly affected fruit yield per strawberry plant. T_6 (black polythene) had the highest yield (16.67 fruits), while control (T_0) had the lowest (5.33). Improved soil conditions under mulches boosted yield, with black polythene showing the best results.

G) Average weight of strawberry (gm): Mulching significantly influenced strawberry fruit weight. T_6 (black polythene) showed the highest weight (14.83 g),

while control (T_0) had the lowest (7.90 g). Improved soil conditions under mulches enhanced fruit size, with black polythene being most effective.

H) Average weight of strawberry per plot (kg): Mulching significantly increased strawberry fruit weight, with T_6 (black polythene) showing the highest (14.83 g) and T_0 (control) the lowest (7.90 g). Improved soil conditions under mulches enhanced fruit size, making black polythene the most effective.

I) Total yield of strawberry per hectare (t): Mulching boosted strawberry yield, with T_6 (black polythene) producing the highest (14.8 kg) and T_0 (control) the lowest (2.5 kg). Improved soil conditions under mulch enhanced growth, confirming black polythene as the most effective.

Table 1: Effect of Different Types of Mulching in Strawberry on Growth (*Fragaria x ananassa*)

T. No.	Treatment Details	Number of leaves per plant	Plant Height (cm)	Plant Spread (cm)
T_0	Without Mulching	8.75	14.83	27.83
T_1	Paddy Straw	12.17	22.50	31.73
T_2	Wheat Straw	11.58	21.90	31.37
T_3	Coconut Coir	12.58	22.87	32.10
T_4	Peat Moss	14.08	24.07	33.13
T_5	Saw Dust	10.58	20.10	30.27
T_6	Black Polythene	15.08	25.10	34.13
T_7	Transparent Polythene	9.67	19.07	29.53
T_8	Blue Polythene	13.08	23.10	32.80
T_9	Red Polythene	14.58	24.57	33.67
T_{10}	Silver Polythene	11.17	20.87	30.83
F-Test		S	S	S
S.E d (±)		0.43	0.35	0.24
C.D at 5%		0.89	0.72	0.51

Table 2: Effect of Different Types of Mulching in Strawberry on Yield (*Fragaria x ananassa*)

T. No.	Treatment Details	Days To First Flowering	No. of flowers per plant	No. of Fruits Per Plant	Average Yield Per Plant (gm)
T_0	Without Mulching	64.00	8.33	5.33	7.90
T_1	Paddy Straw	56.00	16.67	14.33	11.57
T_2	Wheat Straw	57.33	16.33	13.67	10.80
T_3	Coconut Coir	52.00	17.67	15.00	11.93
T_4	Peat Moss	46.67	19.00	15.67	13.23
T_5	Saw Dust	62.33	12.67	11.33	9.60
T_6	Black Polythene	39.00	20.00	16.67	14.83
T_7	Transparent Polythene	63.67	11.00	9.33	8.93
T_8	Blue Polythene	48.00	18.00	15.33	12.77
T_9	Red Polythene	42.00	19.33	16.00	13.80
T_{10}	Silver Polythene	61.33	15.33	12.67	10.03
F-Test		S	S	S	S
S.E d (±)		1.90	1.04	1.15	0.27
C.D at 5%		3.97	2.17	2.40	0.57

Conclusion

- The present study conclusively demonstrates that different mulching materials significantly influence the growth, yield, quality, and economic performance of strawberry *(Fragaria × ananassa)* cv. Chandler.
- Among all treatments, black polythene mulch (T_6) consistently outperformed others across all measured parameters, including vegetative growth (number of leaves, plant height, and spread), yield components (flowering time, number of flowers and fruits, average fruit weight, plot yield, and total yield per hectare), and quality traits (total soluble solids and sugar content).
- T_6 also proved economically superior with the highest gross and net returns and a benefit-cost ratio of 14.83, followed closely by red polythene (T_9) and peat moss (T_4).
- These findings highlight black polythene mulch as the most effective and economically viable strategy for improving strawberry productivity and fruit quality under the agro-climatic conditions of Prayagraj.

References

1. Hassan GI, Godara AK, Kumar J, Hucheche AD. Effect of different mulches on the yield and quality of 'Oso Grande' strawberry (*Fragaria* × *ananassa*). Indian J Agric Sci. 2000;70(3):184.
2. Kher R, Baba JA, Bakshi P, Wali VK. Effect of planting time and mulching material on quality of strawberry. J Res SKUAST-Jammu. 2010;9(1):54-62.
3. Bakshi P, Bhat D, Wali VK, Sharma A, Iqbal M. Growth, yield and quality of strawberry cv. Chandler as influenced by various mulching materials. Afr J Agric Res. 2014;9:701-7016.
4. Sundararajan V, Dinesh S, Rajasekaran S. Image processing on mobile devices: an overview. In: Proc IEEE Int Conf Comput Intell Comput Res. 2014. p. 1-5.
5. Hou F, Zhang L, Xie B, Dong S, Zhang H, Li A, *et al*. Effect of plastic mulching on the photosynthetic capacity, endogenous hormones and root yield of summer-sown sweet potato (*Ipomoea batatas* (L.) Lam.) in Northern China. Acta Physiol Plant. 2015;37(8):164.

6. Domínguez P, Medina JJ, Miranda L, López-Aranda JM, Ariza MT, Soria C, *et al*. Effect of planting and harvesting dates on strawberry fruit quality under high tunnels. Int J Fruit Sci. 2016;16(3):228-238.
7. Dąbrowska G, Kotecki A. The effect of mulching on growth and yield of strawberry cv. 'Senga Sengana' under different nitrogen fertilization. Acta Physiol Plant. 2016;38(6):144.
8. Hassan GI, Godara AK, Kumar J, Hucheche AD. Corollary use of mulches and PGRs on physicochemical properties of strawberry (*Fragaria* × *ananassa*) cv. Camarosa in polytunnel. Plant Arch. 2018;18(2):1745-1750.
9. Ikram S, Abassi UA, Khalid N. Strawberry (*Fragaria* × *ananassa* Duch): phytochemicals, nutraceuticals and health benefits—a brief review. World J Biol Biotechnol. 2019;4(3):25.
10. Hussain SZ, Bhat TA, Dar MA. Strawberry (*Fragaria* × *ananassa*): morphology, taxonomy, composition and health benefits. In: Fruits grown in highland regions of the Himalayas. Cham: Springer Nature Switzerland AG; 2021. p. 219-230.
11. Wani RA, Baba JA, Hakeem S, Prasad VM. Impact of integrated nutrient management on growth, yield and quality of strawberry (*Fragaria* × *ananassa* Duch.) cultivation in India. Int J Plant Environ. 2021;7(2):1-7.
12. Joshi D, Awasthi P, Bogati S, Shah P, Adhikari S, Singh Bohara S, *et al*. Effect of different mulching materials on growth and yield of cucumber (*Cucumis sativus* cv. Bhaktapur local) in Gokuleshwor, Baitadi. Trop Agrobiodivers. 2022;3(2):30-35.
13. Semwal A, Singh S, Nautiyal P, Pandey S. Effect of mulching on growth, yield and economics of strawberry (*Fragaria* × *ananassa*) under subtropical conditions of Uttarakhand. Int J Agric Environ Biotechnol. 2022;15(4):819-825.
14. Pandey V, Mishra A, Singh D, Kumar P. Agronomic biofortification of arable crops: a sustainable approach to enrich the nutritional security. Sci World J. 2023;3(5):647-650.
15. Adamović B, Cabilovski R, Vojnović Đ, Ilin Ž. Effect of mulching on nutrient uptake and efficiency of fertilizers in mid-early cabbage production. Acta Sci Pol Hortorum Cultus. 2023;22(3):69-80.
16. Semwal A, Singh S, Nautiyal P, Pandey S. Effect of mulching under environmental conditions of Uttarakhand. Int J Environ Clim Change. 2023;13(6):268-275. Article No.: IJECC.98363.