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Evaluation of the effect of different mulches on vegetative growth and yield of strawberry cv. Winter Dawn

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Abstract

The effect of organic and inorganic mulches on vegetative growth and yield of strawberry (*Fragaria × ananassa* Duch.) cv. Winter Dawn was studied during 2024-2025 at the Experimental Unit, Department of Horticulture, Tilak Dhari Post Graduate College, Jaunpur. Strawberry runners were planted in the last week of October at a spacing of 40 × 40 cm. The experiment was conducted in a randomized block design with eight treatments and three replications. The results showed a gradual increase in plant height, plant spread and number of leaves per plant as the crop grew and this increase continued up to 120 days after planting. At the final stage of crop growth, black polythene mulch recorded the maximum plant height (30.09 cm), plant spread (38.12 cm), and number of leaves per plant (34.99). White polythene mulch showed the next highest values for plant height (26.20 cm), plant spread (33.18 cm), and number of leaves per plant (14.09), while the control treatment recorded the minimum values. Black polythene mulch also resulted in the highest leaf length (8.20 cm), leaf breadth (11.56 cm), leaf area (95.44 cm²), number of runners per plant (6.68), and number of crowns per plant (5.20). However, paddy straw mulch produced the maximum yield per plant (396.13 g), yield per plot (4.75 kg), and yield per hectare (264.09 q ha⁻¹). The minimum values for all these parameters were recorded under the control treatment.

Keywords: Strawberry, plant height, plant spread, white polythene mulch, black polythene mulch, paddy straw mulch

Introduction

Strawberry (*Fragaria × ananassa* Duch.) is an important fruit crop belonging to the family Rosaceae and is classified as an aggregate fruit. Among berry crops, strawberry occupies a prominent position due to its high nutritional value, pleasant flavour, and wide range of culinary uses (Bardone, 2013) [1]. Globally, strawberry is one of the most important soft fruits after grapes (Mir *et al.*, 2017) [4]. Historical records indicate that strawberries were known to the Romans in pre-Christian times. However, the cultivation of the modern domesticated strawberry, an octaploid (8x) hybrid derived from *F. virginiana* and *F. chiloensis*, originated in France during the 17th century. The wild species *F. vesca* was distributed all over the northern hemisphere and was cultivated before the development of hybrid.

In India, strawberry is cultivated on approximately 3,000 ha, with an estimated annual production of about 13.52 thousand metric tonnes. Globally, both the area under cultivation and production of strawberry have increased considerably over time, with a substantial proportion of production now taking place under protected cultivation. The total global production of strawberry is estimated at about 9,125,913 tonnes annually. China is the largest producer of strawberry in the world, with an annual production of 3,801,865 tonnes, followed by the United States of America, which produces about 1,420,570 tonnes per year. Together, China and the United States contribute approximately 57 per cent of the total global strawberry production.

In India, strawberry is mainly cultivated in the Nilgiri Hills, Kashmir Valley, Himachal Pradesh, and Uttarakhand (Nainital and Dehradun districts). It is also grown in plateau regions such as Kalimpong (West Bengal) and Mahabaleshwar (Maharashtra), as well as in and around Bengaluru (Karnataka) and in the states of Uttar Pradesh, Delhi, Haryana, and

Punjab, Haryana (4.26 thousand tonnes), Maharashtra (3.28 thousand tonnes), and Jammu and Kashmir (2.83 thousand tonnes) are the major strawberry-producing states in India (NHB, 2021-22) ^[5]. Strawberry cultivation has gained popularity among growers in peri-urban areas due to its higher profitability and favourable market prices. As a result, both the area under cultivation and production of strawberry have increased in recent years (Sharma *et al.*, 2006) ^[9].

Materials and Methods

The present investigation was conducted during 2024-25 at the Experimental Unit of the Department of Horticulture, Tilak Dhari Post Graduate College, Jaunpur, Uttar Pradesh, India. The experimental site is located in a sub-tropical climatic zone and experiences three distinct seasons, namely winter, summer, and the rainy season. During winter (December-January), the minimum temperature may fall to about 5 °C or lower, and occasional rainfall and frost events may occur. In summer (May-June), the maximum temperature may rise up to about 45 °C. The region receives an annual rainfall ranging from 850 to 1,100 mm. The mean temperature varies between 15-20 °C during winter and 18-32 °C during summer. The maximum relative humidity recorded is about 95 per cent, while the minimum relative humidity is around 55 per cent. The treatments *viz.*, T₁.Black polythene mulch, T₂.Silver polythene mulch, T₃.Sugarcane bagasse mulch, T₄.Wheat straw mulch, T₅.White polythene mulch, T₆.Saw Dust mulch, T₇.Paddy straw mulch, T₈.Control (No mulch) were evaluated in Randomized Block Design. The recommended doses of manures and fertilizers were applied at the time of land preparation. Uniform and healthy strawberry runners were transplanted at a depth of 2-5 cm with a spacing of 40 × 40 cm during the last week of October. Other cultural practices, such as weeding, hoeing, irrigation, and plant protection measures against insect pests and diseases, were carried out as and when required. The observations were recorded on five randomly selected plants from each treatment to evaluate the effect of different mulches. The statistical analysis for Randomized Block Design was carried out using Panse and Sukhatme (1985) ^[6] method. At a 5% level of significance, the estimated 'F' value was compared to table F values. The difference was noted to be significant if the estimated 'F' value was more than the table value, and a critical difference was calculated for further comparison.

Results and Discussion

The data (Table-1) revealed that there was a steady rise in plant height, spread of plant and number of leaves plant⁻¹ with increase the age of the crop. The maximum height of the plant (8.17, 15.96, 23.26, 25.24, 28.67, 29.28 and 30.09 cm) and spread of the plant (15.00, 22.29, 27.30, 32.66, 35.52, 37.20 and 38.12 cm) were encountered under black polythene mulch followed by plant height (7.69, 13.55, 19.36, 22.19, 25.34, 25.93 and 26.20 cm) and plant spread (13.33, 19.43, 23.24, 27.28, 30.20, 32.13 and 33.18 cm) in white polythene mulch at 30 DAP, 45 DAP, 60 DAP, 75 DAP, 90 DAP, 105 DAP and 120 DAP respectively. The minimum height of plant (3.09, 5.00, 8.99, 9.94, 10.81,

11.33 and 11.58 cm) and spread of plant (5.43, 6.17, 7.22, 8.30, 9.28, 10.14 and 11.16 cm) were recorded in control.

The data (Table-2) showed that maximum number of leaves/plant (13.31, 25.10, 31.16, 34.66, 38.11, 39.41 and 40.21) were recorded under black polythene mulch and minimum number of leaves/plant (5.62, 10.84, 11.36, 11.90, 13.26, 13.50 and 14.18) was recorded in control (No mulch) at 30, 45, 60, 75, 90, 105 and 120 DAP respectively. The present findings are in agreement with the results of Kumar *et al.* (2017) ^[3], who reported that black polythene mulch reduces soil moisture loss through evaporation and increases soil temperature during the early growth period, thereby promoting rapid vegetative growth. Paddy straw mulch also showed favourable effects, which corroborate the findings of Thakur *et al.* (2019) ^[12], who attributed similar responses to improved soil moisture conservation and the addition of organic matter.

The consistently lower plant height observed under the control treatment highlights the importance of mulching for achieving optimum growth in strawberry. In addition to conserving soil moisture, mulching creates a favourable thermal regime around the crown region, which enhances lateral growth and ultimately results in increased plant spread, as also reported by Patel *et al.* (2016) ^[8]. Similar increases in leaf number under mulched conditions were reported by Singh *et al.*, 2018 ^[11], who linked the effect to reduced soil moisture stress and better nutrient availability.

The number of runners plant⁻¹ varied from 2.87 to 6.68. The range for crowns plant⁻¹ was from 2.46 to 5.20. The maximum number of runners plant⁻¹ (6.68) and crowns plant⁻¹ (5.20) were recorded under black polythene mulch whereas, runners/plant (2.87) and crowns/plant (2.46) minimum under control. The number of crown plant⁻¹ followed the same trend, with black polythene mulch maximum runners, indicating stronger plant vigour. (Patel *et al.*, 2016) ^[8].

The different treatments exerted a significant effect on leaf length, leaf breadth, and leaf area (Table 2). Plants mulched with black polythene produced the largest and most numerous leaves, recording a maximum leaf length of 8.20 cm, leaf breadth of 11.56 cm, and leaf area of 96.72 cm². An increase in leaf area enhances photosynthetic efficiency, which ultimately contributes to improved fruit development (Cocco *et al.*, 2011) ^[2]. Paddy straw mulch and white polythene mulch resulted in comparable values, although slightly lower than those recorded under black polythene mulch. The control treatment recorded the minimum leaf length and leaf area, which may be attributed to unfavourable soil moisture and temperature conditions.

Data (Table-2) analysis revealed that maximum yield plant⁻¹ 396.13 g, plot⁻¹ 4.75 kg and hectare⁻¹ 264.08 q were obtained under paddy straw mulch, followed by black polythene mulch and wheat straw mulch. The lowest yield 99.51 g plant⁻¹, 1.19 kg and 66.33 q ha⁻¹ was recorded in control. These results are in line with Patel *et al.*, 2015 ^[7], who found significantly higher fruit yield in strawberry under mulched conditions compared to control. Singh *et al.*, 2010 ^[10] also observed that black polythene mulch improved fruit yield by more than 50% over unmulched plots.

Table 1: Effects of organic and inorganic mulches on plant height (cm) and plant spread (cm) of strawberry cv. Winter Dawn.

Treatments	Plant height (cm) at DAP							Plant spread (cm) at DAP						
	30	45	60	75	90	105	120	30	45	60	75	90	105	120
T ₁ (Black Polythene)	8.17	15.96	23.26	25.24	28.67	29.28	30.09	15.00	22.29	27.3	32.66	35.52	37.20	38.12
T ₂ (Silver Polythene)	5.11	7.58	12.14	17.23	19.12	19.65	20.48	8.39	11.18	13.35	15.32	17.94	17.68	18.10
T ₃ (Sugarcane Bagasse)	4.56	5.85	10.90	13.76	17.79	18.39	19.02	7.10	8.31	9.34	10.33	12.07	12.67	13.10
T ₄ (Wheat Straw)	5.56	7.87	12.16	17.53	19.47	20.29	20.95	10.30	14.22	16.34	19.88	20.95	22.39	22.50
T ₅ (White Polythene)	7.69	13.55	19.36	22.19	25.34	25.93	26.2	13.33	19.43	23.24	27.28	30.20	32.13	33.18
T ₆ (Saw Dust)	4.97	6.59	11.61	15.07	18.2	19.10	20.05	7.59	9.17	11.40	12.66	14.38	15.17	15.61
T ₇ (Paddy Straw)	6.15	10.03	14.46	18.80	20.61	21.5	22.04	12.50	16.70	20.90	23.68	27.12	27.32	28.10
T ₈ (Control)	3.09	5.00	8.99	9.94	10.81	11.33	11.58	5.43	6.17	7.22	8.30	9.28	10.14	11.16
CD at 5%	0.434	0.589	0.653	1.113	0.875	0.758	0.465	0.799	0.774	0.759	0.973	0.832	0.675	0.521

Table 2: Effects of organic and inorganic mulches on number of leaves plant⁻¹, number of runners plant⁻¹, number of crowns plant⁻¹, leaf length (cm), leaf width (cm), leaf area (cm²), yield plant⁻¹, yield plot⁻¹ and yield ha⁻¹ of strawberry cv. Winter Dawn.

Treatments	Number of leaves plant ⁻¹ at DAP							Runner plant ⁻¹	Crown plant ⁻¹	Leaf length (cm)	Leaf width (cm)	Leaf area (cm ²)	Yield plant (g)	Yield plot (kg)	Yield (q. ha ⁻¹)
	30	45	60	75	90	105	120								
T ₁ (Black Polythene)	13.31	25.10	31.16	34.99	38.11	39.41	40.21	6.68	5.20	8.20	11.56	96.72	292.95	3.51	195.37
T ₂ (Silver Polythene)	8.96	17.28	19.39	21.22	22.32	20.75	21.26	4.23	3.87	6.74	8.94	92.80	137.80	1.65	91.87
T ₃ (Sugarcane Bagasse)	7.45	13.4	14.5	15.04	15.5	17.40	18.19	3.33	2.99	6.13	8.76	89.80	145.90	1.75	97.20
T ₄ (Wheat Straw)	9.32	18.32	20.93	23.21	24.15	25.09	23.16	5.07	3.89	6.98	9.43	94.40	220.73	2.64	147.15
T ₅ (White Polythene)	10.96	22.11	28.09	27.87	33.22	34.05	34.10	3.64	3.33	7.91	10.59	95.44	119.10	1.42	79.40
T ₆ (Saw Dust)	8.21	15.18	17.31	19.11	20.34	21.01	18.04	3.48	3.07	6.17	8.76	92.18	166.38	1.99	110.91
T ₇ (Paddy Straw)	9.7	19.20	23.05	25.93	27.33	28.13	29.15	5.67	4.86	7.40	9.97	94.71	396.13	4.75	264.08
T ₈ (Control)	5.62	10.84	11.36	11.90	13.26	13.5	14.18	2.87	2.46	5.26	7.72	87.18	99.51	1.19	66.33
CD at 5%	1.061	0.774	1.026	3.565	0.760	1.191	1.056	0.620	0.421	0.516	0.435	1.291	10.554	0.127	7.034

Conclusion

The study demonstrated that mulching significantly influenced the vegetative growth and yield of strawberry cv. Winter Dawn. Black polythene mulch was most effective in enhancing vegetative growth, recording the highest values for plant height, plant spread, leaf attributes, and number of runners and crowns per plant. Paddy straw mulch produced the maximum yield per plant, per plot and per hectare. Thus, black polythene mulch is recommended for improving vegetative growth, whereas paddy straw mulch is more suitable for maximizing yield.

References

- Bardone E. Strawberry fields forever. *Ethnologia Europaea*. 2013;43(2):30-46.
- Cocco C, Giardini L, Ferrante A. Leaf area and photosynthetic efficiency in relation to mulch use in strawberry. *Scientia Horticulturae*. 2011;130(1):25-31.
- Kumar R, Singh S, Pandey S. Effect of black polyethylene mulch on growth and yield of strawberry cv. Chandler. *Environment and Ecology*. 2017;35(1A):275-279.
- Mir MM, Iqbal UI, Sheikh MSM, Mir SA, Rehman MUR, Banday SA, Rather GH. New horizons in diversification of temperate fruit crops. In: *Plant biodiversity: monitoring, assessment and conservation*. Wallingford (UK): CABI; 2017. p. 18-35.
- National Horticulture Board. Indian horticulture database 2021-2022 [Internet]. 2022 [cited 2026 Mar 30]. Available from: <https://static.pib.gov.in/WriteReadData/specificdocs/documents/2022/jul/doc202271470601.pdf>
- Panse VG, Sukhatme PV. Statistical methods for agricultural workers. 4th ed. New Delhi: ICAR; 1985. p. 109.
- Patel NL, Patel BN, Patel JR. Effect of organic and inorganic mulching on yield and quality of strawberry under South Gujarat conditions. *Asian Journal of Horticulture*. 2015;10(1):86-91.
- Patel P, Singh SK, Kumar S. Response of strawberry to different mulching materials. *Journal of Hill Agriculture*. 2016;7(2):169-174.
- Sharma RR, Krishna H, Patel VB, Dahuja A, Singh R. Fruit calcium content and lipooxygenase activity in relation to albinism disorder in strawberry. *Scientia Horticulturae*. 2006;107(2):150-154.
- Singh AK, Singh SK, Pandey AK, Rajan K, Kumar A. Effect of drip irrigation and polyethylene mulch on productivity and quality of strawberry (*Fragaria × ananassa* Duch.). *Hortiflora Research Spectrum*. 2010;1(2):131-134.
- Singh R, Sharma RR, Kumar S, Gupta RK, Patil RT. Vermicompost substitution influences growth, physiological disorders, fruit yield and quality of strawberry (*Fragaria × ananassa* Duch.). *Bioresource Technology*. 2018;99:8507-8511.
- Thakur BR, Sharma G, Singh S. Effect of organic mulches on growth and yield attributes of strawberry under mid-hill conditions. *Horticultural Journal*. 2019;32(1):45-49.