



Effect of Mulching on Growth, Yield and Quality Attributes of (*Fragaria x ananassa*) in Dehradun Valley of Uttarakhand

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Authors' contributions

This work was carried out in collaboration among all authors. Author AS designed the study, performed the statistical analysis and wrote the first draft of the manuscript. Author PN guided the author AS to prepared the manuscript. Author s IA, AD and SP managed the literature searches and final edited the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

The Present experimental research was conducted during the year 2020-21 at Horticulture Research block, School of Agriculture Sciences, SGRR University, Dehradun, Uttarakhand to study the "Effect of Mulching on Growth, Yield and Quality Attributes of Strawberry (*Fragaria X ananassa*)"

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in Dehradun Valley of Uttarakhand". The field experiment was laid out in randomized block design with three replications and three treatments. The treatments were comprised with different mulching materials viz. control as without mulching (T1), straw mulching (T2) and Polythene mulching (T3). The planting of cultivar "Chandler" was done on first week of November, 2020 and observations were recorded at 30 DAT, 60 DAT, 90 DAT, 120 DAT, and 150 DAT and at final harvest. Significant results were obtained for different attributes of growth, yield, and quality as well as in terms of economics under the treatment of black polythene mulching (T3). The results showed that the Number of Flowers per Plant (24.08), Plant spread (48.06 cm), Fruit length (4.22 cm), Fruit diameter (3.80 cm), Fruit texture (5.9 lb), T.S.S. (8.92 °Brix) and Total juice content (84.05 %) However, the control (T1) reported maximum Titrable acidity (0.92 %).

Keywords: Chandler; economics; mulching; randomized; runners.

1. INTRODUCTION

Strawberry (*Fragaria x ananassa*) belongs to the family Rosaceae, is one of the important soft fruit of the world and has resulted from a cross between two wild strawberries: *Fragaria virginiana* (Meadow strawberry) and *Fragaria chiloensis* (Chilean strawberry). It is a herbaceous perennial plant which can be successfully cultivated in wide range of Agro climatic conditions from subtropics to temperate climate [1].

It is a rich source of Vitamin A (60 IU/100 g of edible fruit), Vitamin C (30-120 mg/100g of edible portion), Vitamin B1, niacin, Proteins and minerals like Phosphorous, Potassium, Calcium and Iron. The presence of ellagic acid is very helpful in preventing cancer occurrence of heart diseases and also the abundance of anthocyanins have made it more valuable fruit. The heart-shaped silhouette of the strawberry was the first clue that this fruit is good for health. These potent little packages protect your heart, lower your blood pressure, and guard against cancer. Packed with Vitamins, Fibre, and particularly high levels of antioxidants known as polyphenols helps in Wrinkle-prevention, strawberries are a sodium-free, fat-free, cholesterol-free, low-calorie food. They are among the top 20 fruits in antioxidant capacity and are a good source of manganese and potassium [1].

Poly vinyl chloride or polyethylene films are the plastic materials used for mulching. Owing to its greater permeability to long wave radiation it can increase temperature around the plants during night in winter which turns out to be beneficial for the plant growth. Hence, polyethylene film mulch is preferred as mulching material for crop production [2]. Now a days application of black plastic mulch film is becoming popular and very good results have been achieved particularly in rain fed agriculture [3]. The black polyethylene

mulch also checks all types of weeds in addition to soil moisture conservation therefore, black plastic mulch is more beneficial [4].

Mulching is extremely beneficial in terms of reducing soil temperature in summers and raises it in winters. It is in fact prevents the extremes of temperature. During summer, mulching conserves the soil moisture due to reduced evaporation. The cooling effect of soil helps in promoting root development. In general, the effect of mulching on the temperature regime of the soil varies according to the capacity of the mulching material to reflect and transmit solar energy. Mulches results in greater water content and lower the evaporation [5]. White mulches decrease soil temperature while clear plastic mulches increase soil temperature. The soil temperature can be higher up to 70C under clear mulch compared to bare soil. At night, condensation on the underside of the mulch absorbs the long wave radiation emitted by the soil thereby slowing cooling of the soil [6]. The ability of clear mulches to produce soil temperatures high enough to control weeds, plant pathogens and nematodes forms the basis for the soil solarization process.

2. MATERIALS AND METHODS

The field experiment was conducted on 2020-21 in the Horticulture Research Block of School of Agricultural Sciences, SGRR University, Dehradun, and Uttarakhand. The experiment was laid out in Randomized block design with three replications. Each replication consisted of three treatments. All the treatments were randomized separately in each replication.

3. RESULTS AND DISCUSSION

The findings of the present investigation were recorded and are thoroughly discussed below:

3.1 Number of Flowers

Both straw and black polythene mulches recorded higher number of flowers as compared to control. However, the maximum number of flowers per plant (62.71) was obtained under black polythene mulching (T₃). This might be attributed to more number of flowers produced by vigorous plants under black polythene mulch, which is in conformity with the findings of [7].

3.2 Plant Spread (CM)

Plant spread was found significantly maximum (48.06) under black polythene mulching (T₃) as compared to rest of the treatments. This might be due to the presence of adequate moisture in the soil which is vital for plant growth not only because plant needs water for their physiological processes but also for nutrient solubility and their availability in soil solution [8] and [9].

List 1. Treatment details

Treatment Symbol	Treatment Combination
T ₁	Control (without any mulching)
T ₂	Paddy straw mulching
T ₃	Black polythene mulching

Table 1. Growth parameters

Treatment	Number of Flowers/ Plant	Plant Spread (cm)
T ₁	15.30	29.624
T ₂	16.97	30.946
T ₃	24.08	39.994
C.D. (P=0.05)	5.91	1.97
SE(m) ±	1.78	0.59
SE(d) ±	2.52	0.84
C.V.	19.25	3.96

Table 2. Yield parameters

Treatment	Fruit Length (cm)	Fruit Diameter (cm)	Fruit Texture (lb.)
T ₁	3.16	2.68	5.1
T ₂	3.40	3.49	5.5
T ₃	4.22	3.8	5.9
C.D. (P=0.05)	0.24	0.19	N/A
SE(m) ±	0.06	0.04	0.32
SE(d) ±	0.08	0.06	0.46
C.V.	2.89	2.53	10.36

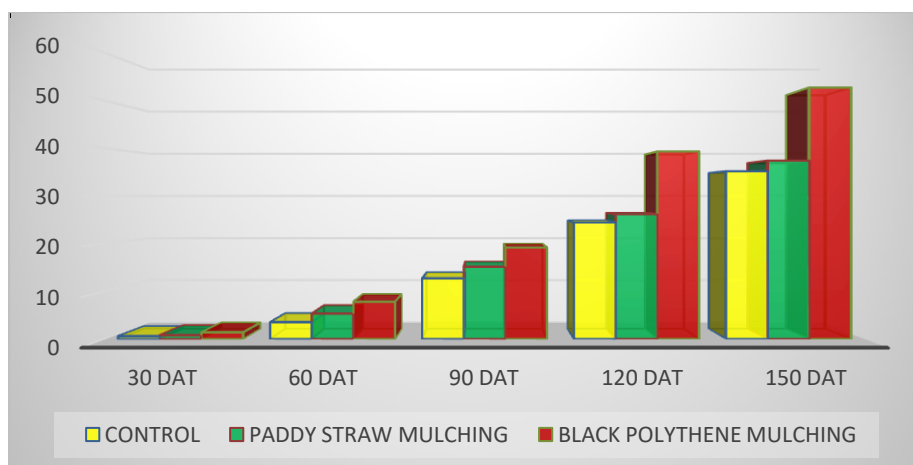


Fig. 1. Number of flowers

Table 3. Quality parameters

Treatment	T.S.S. (^o Brix)	Juice Content (%)	Titration Acidity (%)
T ₁	6.88	67.86	0.92
T ₂	7.54	72.14	0.81
T ₃	8.92	84.05	0.72
C.D. (P=0.05)	0.80	0.22	0.085
SE(m) ±	0.20	0.05	0.021
SE(d) ±	0.28	0.07	0.030
C.V.	4.46	0.12	4.471

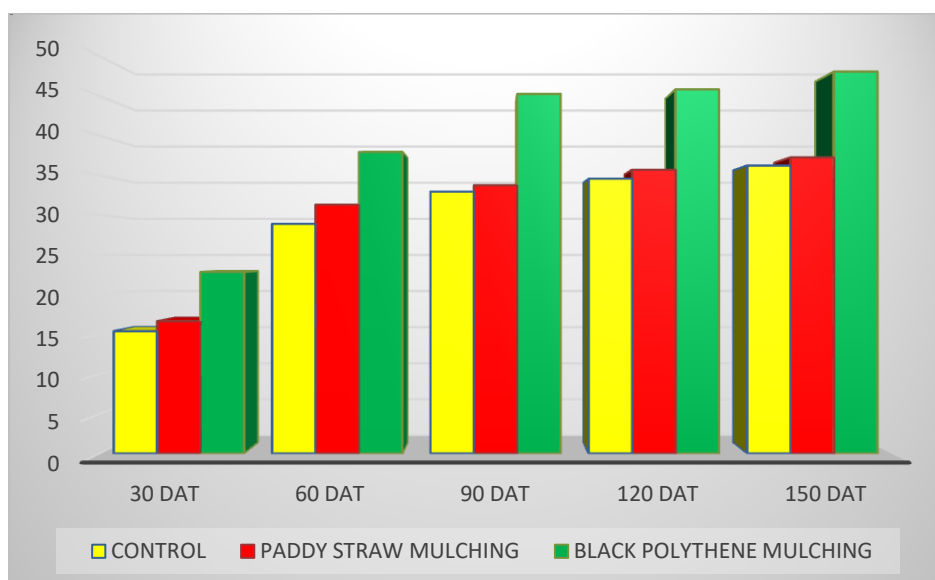


Fig. 2. Plant spread (cm)

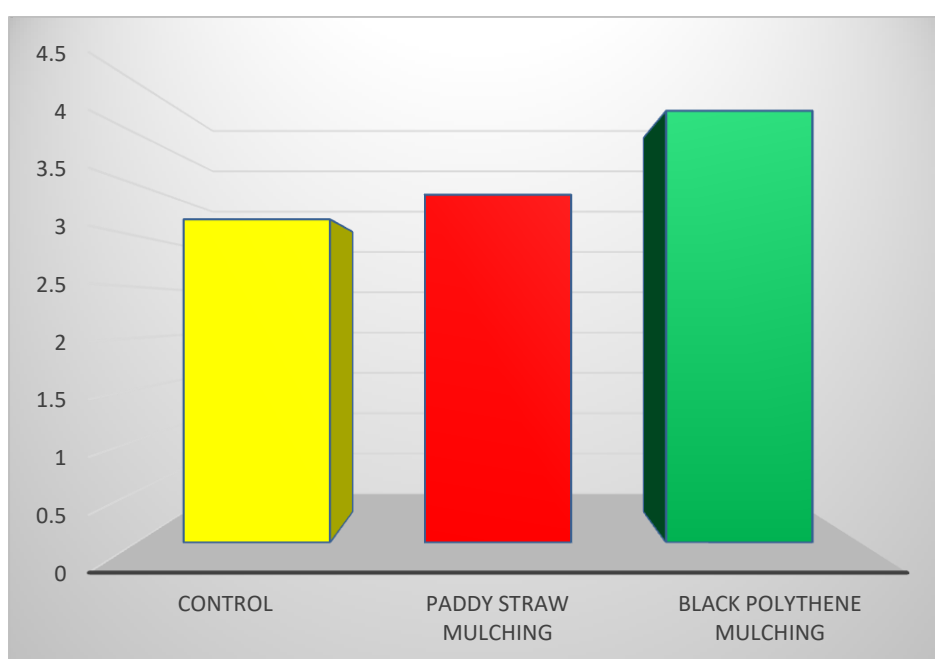


Fig. 3. Fruit length (cm)

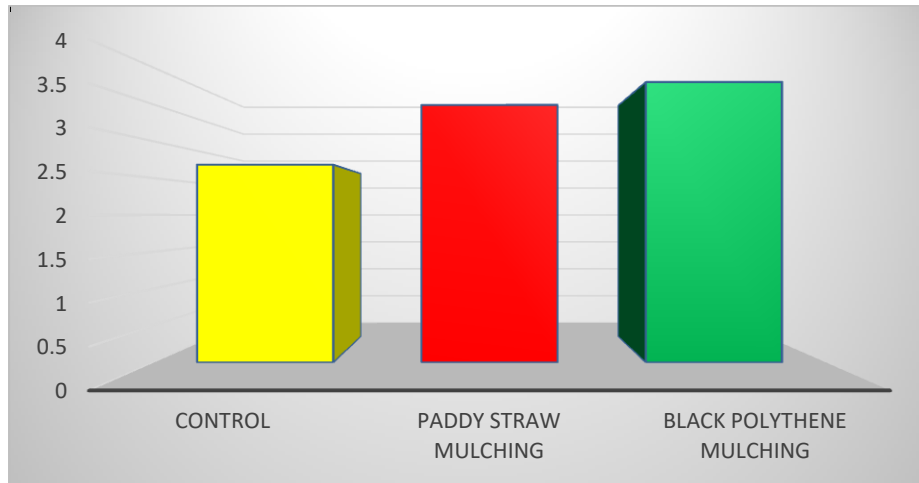


Fig. 4. Fruits diameter (cm)

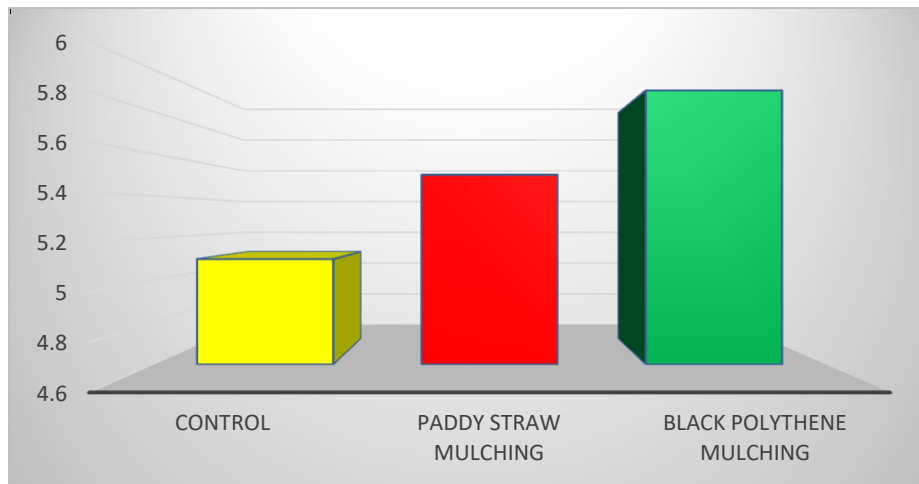


Fig. 5. Fruit texture (lb.)

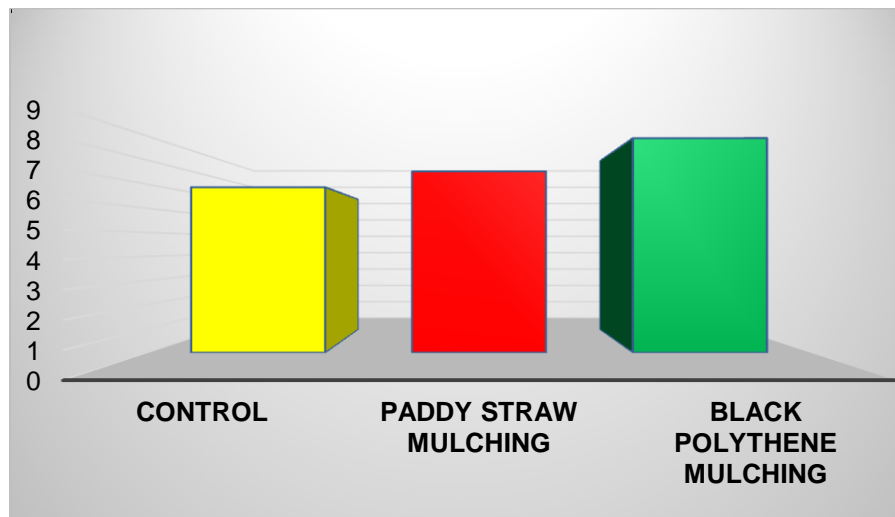


Fig. 6. T.S.S (°BRIX)

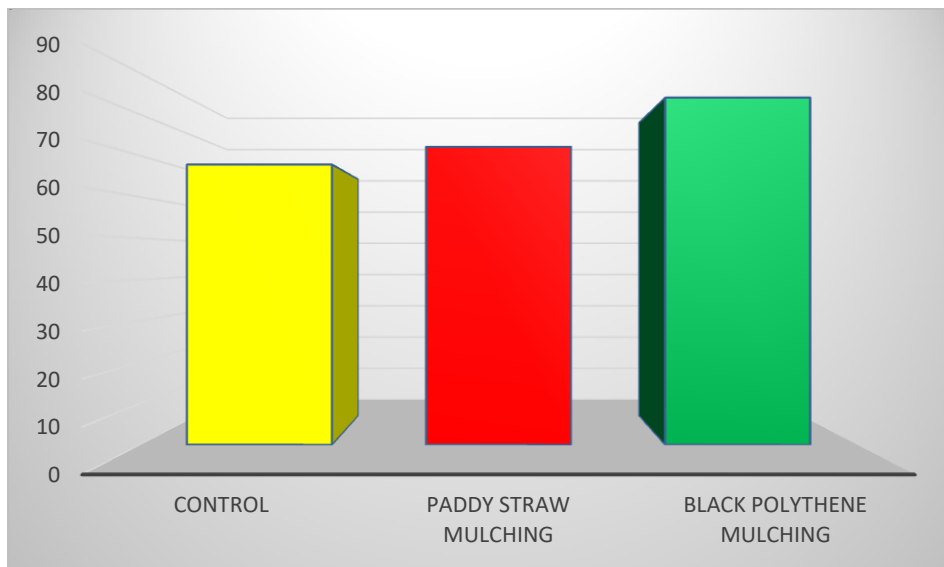


Fig. 7. Juice content (%)

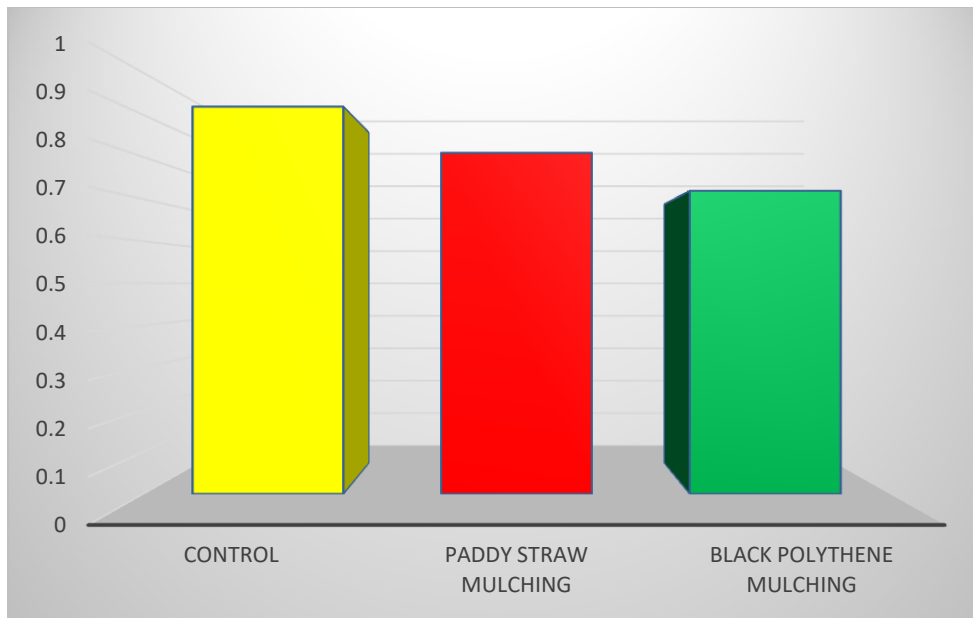


Fig. 8. Titrable acidity (%)

3.3 Fruit Length (CM) and Fruit Diameter (CM)

Fruit length (4.22 cm) and fruit diameter (3.80 cm) under black polythene mulch (T_3) was found significantly higher in comparison to all other treatments. The larger fruit size under black polythene mulch was attributed to more plant growth and development under micro-climatic condition resulting in better nutrient uptake. Increase in fruit size due to mulching had also been reported by Nagalakshmi et al. [7] and Singh et al. [10].

3.4 T.S.S. ($^{\circ}$ BRIX) and Total Juice Content (%)

The data depicts that the application of black polythene mulch recorded maximum T.S.S. (8.92° B) and total juice content (84.05 %). Higher fruit quality is related to weed free environment, higher moisture conservation and maximum nutrient uptake under black polythene mulch treatment. These results are in conformity with the findings of [11] and [12].

3.5 Titrable Acidity (%)

The titrable acidity was high in fruits harvested from the control treatment (T₃) (0.92%). The variation in titrable acidity of strawberry fruits harvested from the plants applied with different mulches might be due to variation in the translocation of photo assimilates from source to sink. These results were in conformity with the findings of [13] and [14] in guava.

4. CONCLUSION

On the basis of present experimental research on “Effect of Mulching on Growth, Yield and Quality Attributes of Strawberry (*Fragaria X ananassa*) in Dehradun Valley of Uttarakhand” in cultivar “Chandler”, it can be concluded that among different mulching materials, black polythene mulch (T₃) was found to be most effective for influencing various growth parameters such as- number of flowers /plant, plant spread (cm), yield parameters like fruit length (cm), fruit diameter (cm), fruit texture (lb) and quality parameters like T.S.S. (°Brix) and total juice content (%). However, the titrable acidity (%) was found maximum in control (T₁).

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CONSENT AND ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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