



The Efficacy of Different Mulching with Spacing on Growth and Yield of Strawberry (*Fragaria ananassa* Duch.) cv Chandler

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

An experiment was conducted at the Horticultural Research Farm of Babasaheb Bhimrao Ambedkar University, Lucknow. The experiment was performed to find out the most suitable mulching material and an ideal spacing for straw berry cultivation under Lucknow conditions. The

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experiment was laid out in a Factorial Randomized Block Design with three replications. The treatments comprised of three mulching materials viz. paddy straw, black polyethylene, and transparent polyethylene) with three spacings (30 x 15 cm and 30 x 20 cm and 30 x 30). On the basis of the statistical data, it is concluded that spacing of 30 x 30 cm with black polyethylene mulch was found to be the best in terms of plant growth viz. plant height, spread of plants, Number of flowers per plant, Number of leaves per plant, Fruit weight, Fruit length, Fruit diameter, Specific gravity of Fruit, and Fruit yield per plant, Fruit yield per plot, Fruit yield per plant and leaf area. However, there was slight difference in quality parameters among different treatments. The data recorded was significant difference in number of leaves per plant. Spacing 30x30 cm treatment S₃ gave the maximum number of leaves per plant (19.17), which was statistically similar (18.66) to at 30x20 cm spacing, while 30x15 cm spacing gave the minimum number of leaves per plant (17.89). Different mulching showed significant differences on the number of leaves per plant. The maximum number of leaves per plant was recorded in (21.23) from black polythene mulch (M₂) which was closely followed treatment (M₃) and maximum number of leaves per plant was recorded in (15.79) M₁ (Transparent polythene mulch).

Keywords: Spacings; mulching; yield; straw berry.

1. INTRODUCTION

Strawberry (*Fragaria x ananassa* Duch.) belongs to the rosaceae. It is a monocious octaploid (2n=56) hybrid of two octaploid species, namely, *Fragaria chilonensis* Duch and *Fragaria virginiana* Duch. Species with a basic chromosome number (x) of 7. Botanically, it is an aggregate fruit among the fruits, strawberry gives the quickest returns in the shortest possible time. It is a lucrative fruit with high market demand in India. Its commercial cultivation has recently begun in the country in India; Maharashtra is the leading state in the production of strawberry. Recently its area has considerably increased in Haryana and Punjab. It is desirable to enhance the yield of strawberry not only quantitatively but also qualitatively with ever limiting resource of cultivated lands. In India cultivated from September to April. In this point of view, strawberry may help to increase the availability of fruits in this lean period of the country. it is a major fruit of temperate region but it can be grown even in both tropical and subtropical region and the area under this crop in the sub-continent is increasing rapidly. It grows well in the winter especially October; November is the best time for its planting so that it can complete its life cycle before March. Being a winter season crop, it has to face a lot of natural advertise like poor soil moisture, temperature fluctuation and so on specially during flowering and fruiting. The time of planting is a limiting factor for strawberry because of the short winter in India and further more the production of strawberry depends greatly on the day temperature, humidity and day length. The cultivars are significantly influenced by weather conditions and planting time, with the

latter having a direct effect on day and night temperatures, day light intensity and photoperiod, which affect the floral induction, fruit size, quality and production. The fruit strawberry is a complete fruit with 98% edible portion. The fruit contains fair amounts of iron, anticancer compound called ellagic acid, vitamin A (60 iu/100g of edible portion) and contains (0.55%) available in the form of calcium pectate, which serves as an excellent ingredient for making jelly besides, it also has abundance of minerals, like potassium, calcium and phosphorus. Water constitutes about 90% of fruits. The mature soft fruit contains about 5% total sugars and 0.90 to 1.85% acid. The ripe fruits of strawberry contain slightly more lipids than unripe ones, with higher quantity of oleic acid and lesser of linoleic acid. It is know fact that mulching is the most important cultural practice in strawberry as it influences plant growth, yield and quality of fruits [1].

2. MATERIALS AND METHODS

2.1 Cultivars

Strawberry cultivar (chandler) collected from the Dr. Y. S. Parmar University of Horticulture & Forestry, Nauni, Himachal Pradesh and maintained in Horticulture Research Farm-I of the Department of Horticulture, Baba sahib Bhimrao Ambedkar University, Vidya-Vihar, Rae Bareli Road, Lucknow, (U.P.), India.

2.2 Details of Experiment

The experimental materials for the study comprised of three spacing of strawberry along

with three treatment of mulching including control laid out under Factorial Randomize Block Design and replicated thrice. Thus there were 9 treatments in each replication. Basal dose of Ammonium nitrate (34% N) 130(kg / ha), Superphosphate (25% P₂O₅) 400 (kg / ha), Potassium sulfate (50% K₂O) 364 (kg / ha).

2.3 Treatment Detail

A. Plant spacing (S)

There were three levels of plant spacing as follows:

- | | |
|----------------------------|----------------|
| 1. Plant spacing (30 x15) | S ₁ |
| 2. Plant spacing (30 x 20) | S ₂ |
| 3. Plant spacing (30 x 30) | S ₃ |

B. Mulch (M)

- | | |
|--------------------------|----------------|
| 1. Transparent mulches | M ₁ |
| 2. Black polythene mulch | M ₂ |
| 3. Paddy straw | M ₃ |

3. RESULTS AND DISCUSSION

3.1 Plant Height (cm)

The data recorded Table 1 on plant height after 30, 60 and 90 DAP was significant difference in plant height. Spacing 30x30cm treatment S₃ gave the maximum (12.60, 15.73 and 20.05cm) plant at 30, 60 and 90 DAP which was statistically similar (11.88, 15.28 and 19.54 cm) to at 30x20cm spacing, while 30x15cm spacing gave the minimum (11.56, 14.87 and 18.88cm) plant height at 30,60 and 90 DAP.

Different mulching showed significant differences on the plant height at 30, 60 and 90 DAP. The maximum plant height recorded(13.36, 16.26 and 22.09cm) at 30,60 and 90 DAPwas recorded from black polythene mulch (M₂) which was

closely followed treatment (M₃) and maximum plant height was recorded in (10.73, 14.25 and 17.03cm) at 30, 60 and 90 DAP was recorded from treatment M₁ (Transparent polythene mulch).

The plant height significantly differed by the interaction effect of spacing and mulch. The maximum plant height was recorded (13.67cm) at 30 DAP from the combined effect of S₃M₂ (Spacing 30x20cm and black polythene mulch), while the treatment combination S₁M₁ (Spacing 30x15cm and transparent polythene mulch) gave the minimum plant height (10.25cm). At 60 DAP non-significant variations in terms of plant height was also observed among the treatments and the highest plant height (16.28 cm) was observed from the treatment combination of S₃M₂ whereas the shortest (13.50cm) was recorded from S₁M₁. At 90 DAP the maximum plant height (24.09 cm) plant was recorded from the treatment combination of S₃M₂ and the minimum plant height recorded (20.35 cm) was recorded from S₁M₁.respectively) was observed in the treatment T₈ (30x30 + black polythene mulch).

3.2 Number of Leaves Per Plant

The data recorded Table 1 was significant difference in number of leaves per plant. Spacing 30x30 cm treatment S₃ gave the maximum number of leaves per plant (19.17), which was statistically similar (18.66) to at 30 x 20 cm spacing, while 30x15 cm spacing gave the minimum number of leaves per plant (17.89).

Different mulching showed significant differences on the number of leaves per plant. The maximum number of leaves per plant was recorded in (21.23) from black polythene mulch (M₂) which was closely followed treatment (M₃) and maximum number of leaves per plant was recorded in (15.79) M₁ (Transparent polythene mulch).

List 1. Treatments combination

Sl. No	Symbol	Treatments combination
T ₁	S ₁ M ₁	30x15 cm + Transparent mulching
T ₂	S ₁ M ₂	30x15 cm + Black polythene
T ₃	S ₁ M ₃	30x15 cm + Paddy straw
T ₄	S ₂ M ₁	30x20 cm + Transparent mulching
T ₅	S ₂ M ₂	30x20 cm + Black polythene
T ₆	S ₂ M ₃	30x20 cm + Paddy straw
T ₇	S ₃ M ₁	30x30 cm + Transparent mulching
T ₈	S ₃ M ₂	30x30 cm + Black polythene
T ₉	S ₃ M ₃	30x30 cm + Paddy straw

List 2. Details of layout

Name of crop	Strawberry (<i>Fragaria x ananassa</i> Duch.)
Number of treatments	09
Number of replication	03
Number of plants per plot	32, 24, 16
Total number of plants	648
Design	Factorial Randomized Block design
Gross experimental area	80.85 m ²
Net plot size	1.20 m x 1.20 m = 2.44 m ²
Plant spacing	30 x15cm, 30 x 20cm, 30 x 30cm, (Row to Row x Plant to Plant)
Date of transplanting (Cultivar: Chandler)	26 th October, 2019

The number of leaves per plant significantly differed by the interaction effect of spacing and mulch. The maximum number of leaves per plant was recorded (22.33) in the combined effect of S₃M₂ (Spacing 30x20 cm and black polythene mulch), while the treatment combination S₁M₁ (Spacing 30x15 cm and transparent polythene mulch) gave the minimum number of leaves per plant (15.00) was recorded from S₁M₁. The maximum number of leaves (22.33) was observed in the treatment T10 (30x30 + black polythene).

3.3 Number of Flowers per Plant

The observations recorded on number of flower per plant of strawberry as influenced by both the factors viz., planting distance and mulching and their interactions for the years 2019-20 analysis has been existing in Table 1.

The data recorded was significant difference in number of flower per plant. Spacing 30 x 30 cm treatment S₃ gave the maximum number of flowers per plant (20.39), which was statistically similar (18.77) to at 30x20 cm spacing, while 30 x 15 cm spacing gave the minimum number of flowers per plant (17.86).

Different mulching showed significant differences on the number of flowers per plant. The maximum number of flowers per plant was recorded in (21.73) from black polythene mulch (M₂) which was closely followed treatment (M₃) and minimum number of flowers per plant was recorded in (15.32) M₁ (Transparent polythene mulch).

The number of flowers per plant significantly differed by the interaction effect of spacing and mulch. The maximum number of flowers per plant was recorded (23.23) in the combined effect of S₃M₂ (Spacing 30x20 cm and black

polythene mulch), while the treatment combination S₁M₁ (Spacing 30x15 cm and transparent polythene mulch) gave the minimum number of flowers per plant (14.88) was recorded from S₁M₁. The number of flower (23.23) was associated in the treatment T8 (30 x 30 + black polythene).

3.4 Number of Fruits per Plant

The observations recorded on number of fruits per plant of strawberry as influenced by both the factors viz., planting distance and mulching and their interactions for the years 2019-20 analysis has been existing in Table 1.

The data recorded was significant difference in number of fruits per plant. Spacing 30 x 30 cm treatment S₃ gave the maximum number of fruits per plant (17.38), which was statistically similar (16.56) to at 30 x 20 cm spacing, while 30 x15 cm spacing gave the minimum number of fruits per plant (15.18).

Different mulching showed significant differences on the number of fruits per plant. The maximum number of fruits per plant was recorded in (19.75) from black polythene mulch (M₂) which was closely followed treatment (M₃) and minimum number of fruits per plant was recorded in (13.45) M₁ (Transparent polythene mulch).

The number of fruits per plant significantly differed by the interaction effect of spacing and mulch. The maximum number of fruits per plant was recorded (20.87) in the combined effect of S₃M₂ (Spacing 30x20 cm and black polythene mulch), while the treatment combination S₁M₁ (Spacing 30x15 cm and transparent polythene mulch) gave the minimum number of fruits per plant (12.88) was recorded from S₁M₁.

3.5 Fruit Weight (gm)

The observations recorded on fruit weight of strawberry as influenced by the factors viz., planting distance and mulching and their interactions for the years 2019-20 analysis has been presented in Table 1.

The data recorded was significant difference in fruit weight. Spacing 30x30 cm treatment S_3 gave the maximum fruit weight (10.51), which was statistically similar (9.50) to at 30x20 cm spacing, while 30x15 cm spacing gave the minimum fruits weight (8.32).

Different mulching showed significant differences on the fruits weight. The maximum fruit weight was recorded in (10.15) from black polythene mulch (M_2) which was closely followed treatment (M_3) and maximum fruit weight was recorded in (8.09) M_1 (Transparent polythene mulch).

The fruit weight significantly differed by the interaction effect of spacing and mulch. The maximum fruit weight was recorded (11.75) in the combined effect of S_3M_2 (Spacing 30x20 cm and black polythene mulch), while the treatment combination S_1M_1 (Spacing 30x15 cm and transparent polythene mulch) gave the minimum fruit weight (7.70) was recorded from S_1M_1 . The fruit weight (11.75) was associated in the treatment T8 (30 x 30 + black polythene).

3.6 Fruit Length (mm)

The observations recorded on fruit length of strawberry as influenced by both the factors viz., planting distance and mulching and their interactions for the years 2019-20 analysis has been existing in Table 1.

The data recorded was significant difference in fruit length. Spacing 30 x 30 cm treatment S_3 gave the maximum fruit length (33.05), which was statistically similar (31.14) to at 30 x 20 cm spacing, while 30 x 15 cm spacing gave the minimum fruit length (30.37).

Different mulching showed significant differences on the fruit length. The maximum fruit length was recorded in (35.33) from black polythene mulch (M_2) which was closely followed treatment (M_3) and maximum fruit length was recorded in (27.87) M_1 (Transparent polythene mulch).

The fruit lengths significantly differed by the interaction effect of spacing and mulch. The maximum fruit length was recorded (35.66) in the

combined effect of S_3M_2 (Spacing 30x20 cm and black polythene mulch), while the treatment combination S_1M_1 (Spacing 30x15 cm and transparent polythene mulch) gave the minimum fruit length (27.08) was recorded from S_1M_1 . The fruit length (35.66) was associated in the treatment T8 (30x30 + black polythene).

3.7 Fruit Diameter (mm)

The observations recorded on fruit diameter of strawberry as influenced by both the factors viz., planting distance and mulching and their interactions for the years 2019-20 analysis has been portrayed in Table 1.

The data recorded was significant difference in fruit diameter. Spacing 30 x 30 cm treatment S_3 gave the maximum fruit diameter (25.99), which was statistically similar (25.80) to at 30x20 cm spacing, while 30x15 cm spacing gave the minimum fruit diameter (23.35).

Different mulching showed significant differences on the fruit diameter. The maximum fruit diameter was recorded in (26.49) from black polythene mulch (M_2) which was closely followed treatment (M_3) and maximum fruit diameter was recorded in (23.22) M_1 (Transparent polythene mulch) [2].

The fruit diameter significantly differed by the interaction effect of spacing and mulch. The maximum fruit diameter was recorded (27.50) in the combined effect of S_3M_2 (Spacing 30 x 20 cm and black polythene mulch), while the treatment combination S_1M_1 (Spacing 30x15 cm and transparent polythene mulch) gave the minimum fruit diameter (21.90) was recorded from S_1M_1 . The fruit diameter (27.50) was associated in the treatment T₈ (30 x 30 + black polythene) [3].

3.8 Specific Gravity of Fruit

The observations recorded on specific gravity of fruit of strawberry as influenced by both the factors viz., planting distance and mulching and their interactions for the years 2019-20 analysis has been shown in Table 2.

The data recorded was significant difference in specific gravity of fruit. Spacing 30 x 30 cm treatment S_3 gave the maximum specific gravity of fruit (0.97), which was statistically similar (0.96) to at 30 x 20 cm spacing, while 30 x 15 cm spacing gave the minimum specific gravity of fruit (0.95).

Different mulching showed significant differences on the specific gravity of fruit. The maximum specific gravity of fruit was recorded in (0.97) from black polythene mulch (M_2) which was closely followed treatment (M_3) and maximum specific gravity of fruit was recorded in (0.94) M_1 (Transparent polythene mulch) [4].

The fruit diameter significantly differed by the interaction effect of spacing and mulch. The maximum specific gravity of fruit was recorded (0.98) in the combined effect of S_3M_2 (Spacing 30 x 20 cm and black polythene mulch), while the treatment combination S_1M_1 (Spacing 30 x 15 cm and transparent polythene mulch) gave the minimum specific gravity of fruit (0.93) was recorded from S_1M_1 . The specific gravity of fruit (0.98) was associated in the treatment T8 (30 x 30 + black polythene) [5].

3.9 Juice (%)

The observations recorded on juice percentage of strawberry as influenced by both the factors viz., planting distance and mulching and their interactions for the years 2019-20 analysis has been presented in Table 2.

The data recorded was significant difference in juice percentage. Spacing 30 x 30 cm treatment S_3 gave the maximum juice percentage (89.93) which was statistically similar (88.16) to at 30 x 20 cm spacing, while 30 x 15 cm spacing gave the minimum juice percentage (86.64).

Different mulching showed significant differences on the juice percentage. The maximum juice percentage was recorded in (91.86) from black polythene mulch (M_2) which was closely followed treatment (M_3) and maximum specific juice percentage was recorded in (84.94) M_1 (Transparent polythene mulch) [6].

The fruit diameter significantly differed by the interaction effect of spacing and mulch. The maximum juice percentage was recorded (93.97) in the combined effect of S_3M_2 (Spacing 30x20 cm and black polythene mulch), while the treatment combination S_1M_1 (Spacing 30x15 cm and transparent polythene mulch) gave the minimum juice percentage (83.02) was recorded from S_1M_1 . The juice percentage (93.97) was associated in the treatment T8 (30 x 30 + black polythene) [7].

3.10 Fruit Yield per Plant (g)

The observations recorded on fruit yield per plant strawberry as influenced by both the factors viz.,

planting distance and mulching and their interactions for the years 2019-20 analysis has been reflected in Table 2.

The data recorded was significant difference in fruit yield per plant. Spacing 30 x 30 cm treatment S_3 gave the maximum fruit yield per plant (1.61), which was statistically similar (1.32) to at 30 x 20 cm spacing, while 30 x 15 cm spacing gave the minimum fruit yield per plant (1.12).

Different mulching showed significant differences on the fruit yield per plant. The maximum fruit yield per plant was recorded in (1.47) from black polythene mulch (M_2) which was closely followed treatment (M_3) and maximum specific fruit yield per plant was recorded in (1.15) M_1 (Transparent polythene mulch). The fruit yield per ha. (24.61) was associated in the treatment T8 (30 x 30 + black polythene) Ram et al. [8].

The reducing sugar significantly differed by the interaction effect of spacing and mulch. The maximum fruit yield per plant was recorded (1.85) in the combined effect of S_3M_2 (Spacing 30x20 cm and black polythene mulch), while the treatment combination S_1M_1 (Spacing 30x15 cm and transparent polythene mulch) gave the minimum fruit yield per plant (1.03) was recorded from S_1M_1 . [9].

3.11 Fruit Yield per Plot (kg)

The observations recorded on fruit yield per plot strawberry as influenced by both the factors viz., planting distance and mulching and their interactions for the years 2019-20 analysis has been represented in Table 2.

The data recorded was significant difference in fruit yield per plot. Spacing 30x30 cm treatment S_3 gave the maximum fruit yield per plot (2.87), which was statistically similar (2.36) to at 30x20 cm spacing, while 30x15 cm spacing gave the minimum fruit yield per plot (1.90).

Different mulching showed significant differences on the fruit yield per plot. The maximum fruit yield per plot per plot was recorded in (2.80) from black polythene mulch (M_2) which was closely followed treatment (M_2) and minimum specific fruit yield per plot was recorded in (1.82) M_3 (Straw mulch) [10].

The reducing sugar significantly differed by the interaction effect of spacing and mulch. The maximum fruit yield per plot was recorded (3.54)

Table 1. Effect of various spacing and mulching on vegetative attributes

Treatment	Plant height (cm)			Number of flowers per plant	Number of leaves per plant	Number of fruits per plant	Fruits weight (g)	Fruit length (mm)	Fruit diameter (mm)
	30 DAP	60 DAP	90 DAP						
Spacing									
S ₁	11.56	14.87	18.88	17.86	17.89	15.18	8.32	30.37	23.35
S ₂	11.88	15.28	19.54	18.77	18.66	16.56	9.50	31.14	25.80
S ₃	12.60	15.73	20.05	20.39	19.70	17.38	10.51	33.05	25.99
C.D	0.235	0.542	0.32	0.22	0.26	0.50	0.12	1.09	0.07
S.E.(d)	0.110	0.254	0.06	0.10	0.12	0.24	0.06	0.51	0.03
S.E.(m)	0.078	0.179	0.04	0.07	0.08	0.16	0.04	0.36	0.02
Mulching									
M ₁	10.73	14.25	17.03	15.32	15.79	13.45	8.09	27.87	23.22
M ₂	13.36	16.28	22.09	21.73	21.23	19.75	10.15	35.33	26.49
M ₃	11.95	15.53	19.35	19.97	18.89	15.93	10.10	31.36	25.42
C.D	0.235	0.54	0.13	0.23	0.26	0.55	0.13	1.07	0.08
S.E.(d)	0.110	0.25	0.6	0.11	0.12	0.23	0.07	0.48	0.04
S.E.(m)	0.078	0.31	0.04	0.08	0.08	0.17	0.05	0.38	0.03
Interaction									
S ₁ M ₁	10.25	13.50	16.53	14.88	15.00	12.88	7.70	27.08	21.90
S ₁ M ₂	13.09	15.90	21.90	21.12	20.58	18.30	8.02	35.02	25.23
S ₁ M ₃	11.33	15.22	18.22	17.59	18.11	14.38	9.25	29.02	22.92
S ₂ M ₁	10.77	14.22	17.09	15.22	15.50	13.53	7.89	27.58	24.33
S ₂ M ₂	13.33	16.11	22.05	20.86	20.80	20.08	10.68	35.33	26.75
S ₂ M ₃	11.54	15.52	19.50	20.25	18.66	16.09	9.93	30.53	26.33
S ₃ M ₁	11.17	15.05	17.48	15.87	16.87	13.95	8.68	28.97	23.45
S ₃ M ₂	13.67	16.28	22.33	23.23	22.33	20.87	11.75	35.66	27.50
S ₃ M ₃	12.98	15.86	20.05	19.97	19.90	17.32	11.12	34.53	27.02
C.D	0.407	N/A	0.22	0.38	N/A	0.86	0.22	1.89	0.13
S.E.(d)	0.190	0.43	0.10	0.18	0.21	0.40	0.10	0.88	0.06
S.E.(m)	0.135	0.31	0.07	0.12	0.15	0.28	0.07	0.62	0.04

Table 2. Effect of various spacing and mulching on yield attributes

Treatment	Specific gravity of Fruit	Juice (%)	Fruit yield per plant (g)	Fruit yield per plot (kg)	Fruit yield per ha (Q)
Spacing					
S₁	0.95	86.64	82.72	1.90	13.20
S₂	0.96	88.16	102.36	2.36	16.42
S₃	0.97	89.93	123.99	2.87	19.92
C.D	N/A	0.55	3.10	0.09	0.62
S.E.(d)	0.07	0.25	1.45	0.05	0.29
S.E.(m)	0.05	0.18	1.02	0.04	0.20
Mulching					
M₁	0.94	84.94	78.60	2.51	17.46
M₂	0.97	91.86	116.62	2.80	19.43
M₃	0.96	87.93	113.85	1.82	12.65
C.D	N/A	0.54	3.01	0.10	0.70
S.E.(d)	0.06	0.26	1.50	0.04	0.20
S.E.(m)	0.06	0.19	1.03	0.03	0.26
Interaction					
S₁M₁	0.93	83.02	68.40	2.18	15.20
S₁M₂	0.97	90.02	79.82	1.91	13.30
S₁M₃	0.96	86.90	99.96	1.16	11.10
S₂M₁	0.95	85.33	75.31	2.41	16.73
S₂M₂	0.97	91.60	122.37	2.93	20.39
S₂M₃	0.96	87.56	109.40	1.75	12.15
S₃M₁	0.96	86.48	92.11	2.94	20.47
S₃M₂	0.98	93.97	147.69	3.54	24.61
S₃M₃	0.97	89.35	132.85	2.11	14.68
C.D	N/A	N/A	5.37	0.15	1.07
S.E.(d)	0.13	0.44	2.51	0.07	0.50
S.E.(m)	0.09	0.31	1.77	0.05	0.35

in the combined effect of S₃M₂ (Spacing 30×20 cm and black polythene mulch), while the treatment combination S₁M₃ (Spacing 30×15 cm and straw mulch) gave the minimum fruit yield per plot (1.60) was recorded from S₁M₃. The fruit yield per plot (3.54) was associated in the treatment T8 (30 x 30 + black polythene) [11].

3.12 Fruit Yield per ha (q)

The observations recorded on fruit yield per ha. strawberry as influenced by both the factors viz., planting distance and mulching and their interactions for the years 2019-20 analysis has been displayed in Table 2.

The data recorded was significant difference in fruit yield per ha. Spacing 30×30 cm treatment S₃ gave the maximum fruit yield per ha. (19.92), which was statistically similar (16.42) to at 30 x 20 cm spacing, while 30 x15 cm spacing gave the minimum fruit yield per ha. (13.20).

Different mulching showed significant differences on the fruit yield per ha. The maximum fruit yield per plot per ha. was recorded in (19.43) from black polythene mulch (M₂) which was closely followed treatment (M₂) and maximum specific fruit yield per ha was recorded in (12.65) M₃ (straw mulch). Sharma [12].

The reducing sugar significantly differed by the interaction effect of spacing and mulch. The maximum fruit yield per ha. was recorded (24.61) in the combined effect of S₃M₂ (Spacing 30 × 20 cm and black polythene mulch), while the treatment combination S₁M₃ (Spacing 30×15 cm and straw mulch) gave the minimum fruit yield per ha. (11.10) was recorded from S₁M₃ [13].

4. CONCLUSION

The overall results obtained from this present investigation clearly revealed that the application of S₃M₂(30 x 30 + black polythene) significantly the plant height (cm), number of leaves, number of flower, fruit length (mm), fruit diameter (mm), specific gravity, juice (%), number of fruit per plant, fruit weight (g), fruit yield per plant(g), fruit yield per plot (kg), fruit yield per ha (t), performed better response of growth, yield and quality traits in strawberry under Lucknow condition.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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