

Growth and yield of Sweet Pepper (*Capsicum annum* L. var. *grossum*) varieties as influenced by plastic mulch

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Abstract

The field experiment entitled “Growth and yield of sweet pepper (*Capsicum annum* L. var. *grossum*) varieties as influenced by plastic mulch” was carried out during rabi season of 2021-2022 at “Campus for Research and Advanced Studies, Dhablan of the G.S.S.D.G.S. Khalsa College, Patiala”. The experiment was laid out in factorial randomized block design with eight treatments and four replications. Two varieties (Indra and California wonder) and four mulch (No mulch, black plastic mulch, transparent plastic mulch and silver plastic mulch) were used as treatment. Variety Indra recorded significantly higher plant height, leaf length, leaf breadth, number of branches plant⁻¹ and number of leaves plant⁻¹ at 30, 60, 90, 120 DAT and at harvest, fruit width, fruit length, fruit weight, number of fruits plant⁻¹ and fruit yield as compared to California wonder. Among plastic mulch, black plastic mulch remained at par with silver plastic mulch and recorded best in plant height, leaf length, leaf breadth, number of branches plant⁻¹ and number of leaves plant⁻¹ at 30, 60, 90, 120 DAT and at harvest, fruit width, fruit length, fruit weight, number of fruits plant⁻¹ and fruit yield as compared to silver plastic mulch.

Keywords: Sweet pepper, Mulch, Indra, California wonder

Introduction

Bell pepper (*Capsicum annum* L. var. *grossum*) is a popular crop of family Solanaceae. It is mainly grown in India during cooler part of the year (autumn–winter) when air temperatures are moderate (Shukla and Naik, 1993).

Plants of indra variety are medium tall, bushy having vigorous growth. Dark green leaves, dense foliage providing fruit shelter. Fruit is dark green, thick-walled and glossy with average weight of 80 to 90 g, length 10-12 cm, girth 10 cm having 3 - 4 lobes. Fruit setting starts in 50-55 days after transplanting. It has longer shelf life and ideal for long distance transportation.

The California wonder variety is with erect port, large square fruit 10 of 11 cm, spread out and pendants, going from green to red at maturity. Their flesh is fondant, thick and of sweet flavor, weighing an average

of 70 to 80 g. It is a part of the category of slightly sweet bell peppers. The California Wonder Pepper cultivation is almost identical to that of the eggplant. Seeds and plants need heat to grow for this purpose, mulching can be practiced.

Mulching is the process of covering soil around the plants with an organic and synthetic material to provide favorable condition for the plant growth, development and efficient production. It helps to reduce evaporation and retain moisture, reduce soil erosion, suppress weed growth and provide plant nutrients.

Plastic mulches affect plant micro-climate by modifying the soil water evaporation, thereby affecting plant growth and yield. The benefits from the use of plastic mulches include earlier and higher yield, negligible weed population, low soil evaporation, less soil compaction, greater water use efficiency, control of certain pests and a cleaner harvested product (Lamont, 1993).

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Material and Methods

The experiment was performed during winter season of 2021-2022 at the Campus for Research and Advanced Studies, G.S.S.D.G.S. Khalsa College, Patiala (Punjab). The field experiment was carried out with 8 treatments and 4 replications laid out in Factorial Randomized Block Design with treatment combination as T_1 : V1M0 Indra with no mulch, T_2 :V1M1 Indra with black plastic mulch, T_3 :V1M2 Indra with transparent plastic mulch, T_4 :V1M3 Indra with silver plastic mulch, T_5 :V₂M₀ California wonder with no mulch, T_6 :V₂M₁ California wonder with black plastic mulch, T_7 :V₂M₂ California wonder with transparent plastic mulch and T_8 :V₂M₃ California wonder with silver plastic mulch. The net plot size was 3.5 × 3.9 m. Crop nursery was sown on 1st November, 2021 with a spacing of 30 cm x 60 cm. Growth attributes were recorded at various stages starting from 30,60,90 and 120 DAT and at harvest which consists plant height (cm), leaf length(cm), leaf breadth(cm), number of branches plant⁻¹, number of leaves plant⁻¹. Similarly, all yield parameters like width of fruit(cm), length of fruit(cm), weight of fruit(g), number of fruits plant⁻¹, fruit yield (kg plot⁻¹) and fruit yield (q ha⁻¹) were also recorded.

Results and Discussion

Growth parameters

a) Varieties

The growth parameters such as Plant height, Leaf length and Leaf breadth, Number of branches plant⁻¹ and Number of leaves plant⁻¹ were significantly influenced by the Variety Indra. Significantly highest

plant height (95.53 cm) was recorded with the Indra as compared to California Wonder (87.81 cm) also Indra has maximum leaf length (8.60 cm) as compared to California wonder (8.15 cm). Variety Indra (4.90 cm) recorded significantly higher leaf breadth as compared to California wonder (4.64 cm). Variety Indra produced significantly higher number of branches plant⁻¹ (21.09) as compared to California wonder (18.07). Indra produced significantly higher number of leaves plant⁻¹(103.39) as compared to California wonder (92.55).

b) Plastic mulch

The growth parameters such as plant height, leaf length, leaf breadth, number of branches plant⁻¹ and Number of leaves plant⁻¹ was significantly influenced by the black plastic mulch. Maximum plant height (99.41cm) was recorded with the black plastic mulch but it was at par with silver plastic mulch (95.04 cm). Higher length of leaf (9.01 cm) was recorded with the black plastic mulch it was at par with silver plastic mulch (8.74 cm). Maximum leaf breadth (5.13 cm) was measured with black plastic mulch and it was at par with silver plastic mulch (4.98 cm). Highest number of branches per plant (23.91) were also produced with black plastic mulch as compared to no mulch and transparent plastic mulch, but it was at par with silver plastic mulch (19.78). Maximum number of leaves plant⁻¹(104.79) that were produced with black plastic mulch it was at par with silver plastic mulch (101.37). These results were in agreement with Diaz-Perez (2010) who reported maximum plant height

Table 1: Effect of plastic mulch on growth parameters of sweet pepper varieties

Treatments	Plant height (cm)	Leaf length (cm)	Leaf breadth (cm)	No. of branches plant ⁻¹	No. of leaves plant ⁻¹
Varieties					
Indra	95.53	8.60	4.90	21.09	103.39
California wonder	87.81	8.15	4.64	18.07	92.55
SEm±	1.02	0.15	0.08	0.58	1.08
C.D. at 5 %	3.00	0.43	0.24	1.71	3.17
Plastic mulch					
No mulch	83.66	7.40	4.21	16.12	89.41
Black plastic mulch	99.41	9.01	5.13	23.91	104.79
Transparent plastic mulch	88.62	8.37	4.76	18.50	96.31
Silver plastic mulch	95.04	8.74	4.98	19.78	101.37
SEm±	1.44	0.21	0.12	0.82	1.52
C.D. at 5 %	4.25	0.60	0.34	2.41	4.48

Table 2: Effect of plastic mulch on yield parameters of sweet pepper varieties

Treatments	Fruit length (cm)	Fruit width (cm)	Weight of fruit (g)	No. of fruits plant ⁻¹	Fruit yield (kg plot ⁻¹)	Fruit yield (q ha ⁻¹)
Varieties						
Indra	6.37	4.78	81.25	11.91	60.56	358.10
California wonder	6.07	4.14	75.80	10.50	49.90	284.36
SEm±	0.07	0.07	1.02	0.26	1.32	13.14
C.D. at 5 %	0.21	0.20	3.00	0.77	3.87	38.64
Plastic mulch						
No mulch	5.84	4.38	70.22	10.09	44.34	249.35
Black plastic mulch	6.57	4.88	85.15	12.22	65.10	377.22
Transparent plastic mulch	6.04	4.56	77.65	11.02	53.31	312.11
Silver plastic mulch	6.29	4.02	81.08	11.51	58.18	346.24
SEm±	0.10	0.10	1.44	0.37	1.86	18.58
C.D. at 5 %	0.30	0.29	4.24	1.09	5.47	54.64

with black plastic mulching in bell pepper. Similar results were also reported by Debbaram *et al.* (2019).

Yield parameters

a) Varieties

The yield parameters such as Fruit length (cm), Fruit width (cm), Weight of Fruit (g), Number of Fruits plant⁻¹, Fruit yield (kg plot⁻¹) and Fruit yield (q ha⁻¹) has higher value in variety Indra Highest fruit length (6.37 cm) was measured in variety Indra as compared to California Wonder (6.07 cm). Highest fruit width (4.78 cm) was measured in variety Indra as compared to California wonder (4.14 cm). Significantly highest fruit weight (81.25 g) was attained in variety Indra as compared to California wonder (75.80 g). Significantly highest number of fruit plant⁻¹(11.91) was obtained in variety Indra as compared to California wonder (10.50). Maximum fruit yield kg plot⁻¹(60.56 kg) was obtained in variety Indra as compared to California wonder (49.90 kg). Significantly maximum fruit yield (358.10 q ha⁻¹) was obtained in variety Indra as compared to California Wonder (284.36 q ha⁻¹).

b) Plastic mulch

The yield parameters such as Fruit width (cm), Fruit length (cm), weight of Fruit (g), Number of fruits plant⁻¹, Fruit yield kg plot⁻¹, Fruit yield q ha⁻¹ has higher value in black plastic mulch Significantly maximum fruit length (6.57 cm) was measured with black plastic mulch and it was at par with silver plastic mulch (6.29 cm). Significantly maximum fruit width (4.88 cm) was measured with black plastic mulch and was at par with silver plastic mulch (4.02 cm). Black plastic mulch recorded significantly higher fruit weight (85.15 g)

which was at par with silver plastic mulch (81.08 g). The maximum number of fruits plant⁻¹ (12.22) was recorded in black plastic mulch that was at par with silver plastic mulch (11.51). Maximum fruit yield (65.10 kg plot⁻¹) was obtained in black plastic mulch and it was at par with silver plastic mulch (58.18 kg plot⁻¹). Black plastic mulch recorded significantly highest fruit yield (377.22 q ha⁻¹) which was at par with silver plastic mulch (346.24q ha⁻¹).

b) Plastic mulch

The yield parameters such as Fruit width (cm), Fruit length (cm), weight of Fruit (g), Number of fruits plant⁻¹, Fruit yield kg plot⁻¹, Fruit yield q ha⁻¹ has higher value in black plastic mulch Significantly maximum fruit length (6.57 cm) was measured with black plastic mulch and it was at par with silver plastic mulch (6.29 cm). Significantly maximum fruit width (4.88 cm) was measured with black plastic mulch and was at par with silver plastic mulch (4.02 cm). Black plastic mulch recorded significantly higher fruit weight (85.15 g) which was at par with silver plastic mulch (81.08 g). The maximum number of fruits plant⁻¹ (12.22) was recorded in black plastic mulch that was at par with silver plastic mulch (11.51). Maximum fruit yield (65.10 kg plot⁻¹) was obtained in black plastic mulch and it was at par with silver plastic mulch (58.18 kg plot⁻¹). Black plastic mulch recorded significantly highest fruit yield (377.22 q ha⁻¹) which was at par with silver plastic mulch (346.24q ha⁻¹). The similar result has been found Larios and Santos (1997), Belel (2012) and Kaur *et al.* (2017).

Conclusion

Keeping in view the objectives framed for undertaking study and the results obtained after experimental period, under mentioned conclusions may be drawn.

Variety Indra recorded significantly higher growth parameters such as Plant height (95.53 cm), Number of leaves plant⁻¹ (103.39) and Leaf length (8.60 cm) and Number of branches plant⁻¹ (21.09) and Yield attributes viz., Number of fruits plant⁻¹ (11.91), Fruit length (6.37 cm), and Fruit yield kg plot⁻¹ (60.56), fruit yield q ha⁻¹ (358.10).

By the use of black plastic mulch, significantly higher growth parameters such as Plant height (99.41 cm), Number of leaves plant⁻¹ (104.79), Leaf length (9.01 cm), leaf breadth (5.13) and Number of branches plant⁻¹ (23.91) and Yield attributes viz., Number of fruits plant⁻¹ Fruit length (6.57 cm) fruit width (4.88 cm), Fruit yield kg plot⁻¹ (65.10), Fruit yield q ha⁻¹ (377.12) were obtained.

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