

## STUDIES ON MULCHES FOR GROWTH, YIELD AND QUALITY OF CHILLI [*Capsicum annuum* (L.)]

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### ABSTRACT

A field experiment was conducted at Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal, Puducherry to evaluate the effect of different mulches on growth, yield and quality of hybrid chilli. Mulch treatments used in the study were black polythene, black on silver, black on white mulch, leaf litter at 6, 9 and 12 t ha<sup>-1</sup> and bare soil as control. The results revealed that mulch materials significantly influenced the growth and yield parameters over control. Chilli mulched with black on white polythene recorded the highest plant height (130.21 cm), fruit length (14.77 cm), fruit girth (5.17 cm), fresh fruit weight (9.04 g), green fruit yield plot<sup>-1</sup> (8.84 kg) and green fruit yield (189.2 q ha<sup>-1</sup>), ripe fruit yield (177.85 q ha<sup>-1</sup>) and capsaicin (0.64 per cent) with high benefit : cost ratio (3.11). Whereas, chilli mulched with black polythene recorded the lowest weed density (4.56 sq. m<sup>-1</sup>) followed by double coated black on white polythene (5.53 sq. m<sup>-1</sup>).

(Key words: Chilli, mulches, growth, yield, quality)

### INTRODUCTION

Chillies [*Capsicum annuum* (L.)] are rich in vitamin A, vitamin C, calcium and iron and can be used as a medicine to treat asthma, coughs and sore throats. It is also called as nature's wonder, hot pepper and cayenne pepper (Guldekar, 2018). Chilli is fourth most important vegetable crops in the world and first in Asia (Nawkhare *et al.*, 2017). At present, the average yield of our country is quite low (1 t ha<sup>-1</sup>) as compared to the well developed countries like USA, South Korea, Taiwan *etc.* where the average yield is between 3-4 t ha<sup>-1</sup>. Chilli is sensitive to water stress. To improve the productivity of crops where either water deficiency or excess frequently occurs, proper water management is necessary. Mulching stimulates the microbial activity in soil through improvement of soil agro physical properties. Mulches also conserve soil moisture and retain heat as well as it suppresses weed growth. The greatest benefit from plastic mulch is that the soil temperature in the planting bed is raised, promoting faster crop development and earlier harvest and more uniform soil moisture is maintained and irrigation frequency can be reduced. Therefore, considering the importance of different mulches in various vegetable crops, the present investigation was undertaken to study the effect of different mulches on growth, yield and quality of chilli.

### MATERIALS AND METHODS

An experiment was carried out in the Department of Horticulture, Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal, UT of Puducherry. Plot size of 4 m<sup>2</sup> raised beds were prepared and regular package of practices were followed. The beds were covered with different plastic mulching materials *viz.*, black polythene, black on silver, black on white mulch and various levels of organic mulches *viz.*, 6, 9 and 12 t ha<sup>-1</sup> with control (no mulch). Four weeks old hybrid chilli seedlings were transplanted with a spacing of 60 cm x 50 cm and the trial was carried out with seven treatments in a Randomized Block Design with four replications. The various biometrical observations were recorded and data were statistically processed as suggested by Rangaswamy (1995).

### RESULTS AND DISCUSSION

The results revealed that mulch materials significantly influenced the growth and yield parameters over control (Table 1). Among the different mulches, black on white, black mulches and black on silver showed superior performance in plant height than control, indicating mulches had positive effect on chilli hybrid. The tallest plant (130.21cm) was observed in black on white polythene

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**Table 1. Effect of mulching on growth, yield and quality of chilli**

Treatments	Plant height (cm)	Fruit length (cm)	Fruit girth (cm)	Fresh fruit weight (g)	Green fruit yield (kg plot <sup>-1</sup> )	Green fruit yield ha <sup>-1</sup> (q)	Ripe fruit yield ha <sup>-1</sup> (q)	Capsaicin (per cent)	Weed density (No. sq. m <sup>-1</sup> )	Benefit : Cost Ratio
T <sub>1</sub> - No mulch	63.90	6.85	2.44	2.78	3.70	74.97	64.85	0.28	53.60	0.58
T <sub>2</sub> - Organic mulch @ 6 t ha <sup>-1</sup>	90.70	9.55	2.66	3.48	4.04	92.43	82.85	0.32	16.83	1.00
T <sub>3</sub> - Organic mulch @ 9 t ha <sup>-1</sup>	99.13	10.85	3.58	3.96	5.08	122.95	112.88	0.36	11.15	1.59
T <sub>4</sub> - Organic mulch @ 12 t ha <sup>-1</sup>	104.70	12.53	4.15	4.75	5.13	127.74	115.37	0.40	10.53	1.68
T <sub>5</sub> - Black on silver polythene (double coated 30µ)	110.72	13.54	4.44	7.08	6.18	154.94	144.41	0.52	9.28	2.24
T <sub>6</sub> - Black on white polythene (double coated 30µ)	130.21	14.77	5.17	9.04	8.84	189.28	177.85	0.64	5.53	3.11
T <sub>7</sub> - Black polythene (30µ)	119.12	14.24	4.74	8.16	8.26	175.35	165.57	0.50	4.56	2.67
SE(d) ±	1.05	0.35	0.03	0.05	0.17	2.35	1.69	0.01	0.18	-
CD (5 per cent)	2.29	0.78	0.07	0.11	0.38	5.12	3.69	0.02	0.40	-
CV (per cent)	1.26	3.75	1.15	1.11	3.64	2.15	1.68	3.89	1.44	-

followed by black polythene (119.12 cm) and Black on silver polythene (110.72 cm). The increased plant height in mulched plants was possibly due to better availability of soil moisture and optimum soil temperature provided by the mulches (Shinde *et al.*, 1999).

The highest fruit length was ranged from 6.85 cm (control) to 14.77 cm (black on white polythene mulch). The highest fruit girth was recorded in black on white polythene mulch (14.77 cm) followed by black polythene mulch (4.74 cm) and black on silver polythene mulch (4.44 cm). Among all mulching treatments, the highest fruit weight was recorded in treatment black on white mulch (9.04 g) followed by black polythene mulch (8.16 g) and black on silver polythene mulch (7.08 g). The highest fruit length, girth and individual fruit weight under black on white mulch was due to congenial soil moisture results in higher uptake of nutrition for better growth of fruit and reduction of evaporation losses in soil moisture caused by plastic mulches covered the soil surface in row of chilli. The above results were in consonance with the findings of Sharma and Narendra (2004) in tomato and Ashrafuzzaman *et al.* (2011) in chilli. They found that plastic mulches had tremendous effects on the growth and yield of chilli and black plastic showed superior performance among the plastic mulches. The results of present study revealed that mulches significantly influenced growth and yield of chilli compared to control.

Black on white polythene mulch registered the highest green fruit yield plot<sup>-1</sup> (8.84 kg), green fruit yield ha<sup>-1</sup> (189.28 q) and ripe fruit yield ha<sup>-1</sup> (177.85 q) while, the lowest value for fruit characters was registered in control. The increment in yield of mulched plot was probably associated with the conservation of moisture and improved micro-climate both beneath and above the soil surface and great weed control, especially in black on white, black and

black on silver plastic mulch recorded more number of leaves as a result of more branches due to the extra length (more number of internodes) in the main stem could have positively influenced the yield. The lowest yield was also obtained in control plots due to severe competition of weeds with chilli plants. Chilli mulched with black polythene (30µ) recorded the lowest weed density (4.56 sq. m<sup>-1</sup>) followed by double coated (30µ) black with white polythene (5.53 sq. m<sup>-1</sup>). The suppression of weeds under black on white polythene mulch may boost up the plant performance led to better nutrient up take by the plants (Shinde *et al.*, 1999; Ashrafuzzaman *et al.*, 2011). Further, black on white polythene mulch registered the high capsaicin content (0.64 per cent) with high benefit :cost ratio (3.11).

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