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### Effect of Plastic Mulch on Growth, Yield and Economics of Tomato (*Lycopersicon esculentum* Mill) under Nimar Plains Conditions of Madhya Pradesh

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**Abstract:** A field experiment was conducted as On Farm Trial at farmers' fields in Kharagone (M.P.) during winter season of the year 2015, 2016 and 2017 with view to assess the effect of plastic mulch on growth, yield and economics of Tomato. The treatment T<sub>2</sub> (Silver on black polythene ) recorded significantly maximum plant height (133.86 cm) number of branches per plant (6.46), average fruit weight (102.84g), number of fruits per plant (39.35), yield per plant ( 4.07 kg) and yield per hectare, (841.53q/ha). The maximum net return per hectare (Rs 315555) and cost benefit ratio (2.87) were recorded under treatment T<sub>2</sub>. However the minimum net return and cost benefit ratio were recorded in control (T<sub>1</sub>).

**Keywords:** Plastic Mulch, Tomato, Growth, Yield, Economics

#### INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill) is one of the most popular and widely grown vegetable in India. It covers 7.78% of total area grown under vegetable crops and 11.62 % of total vegetable production (National Horticulture Board). Tomatoes play a vital role in Indian diet by virtue of its nutrients, delicious taste and various modes of consumption and uses.

Various factors affect the quality and yield of tomatoes, among which are inadequate use of available moisture and nutrients. However water management plays an important role for better quality and production. Use of mulches is one of the alternatives to retain moisture in soil. A mulch is something, organic or inorganic, that spread on the soil to prevent erosion, retain moisture, prevent weeds from sprouting and keep the root of plants

cool. Soil mulching not only reduces the soil evaporation and weed growth but also improves the aerial environment around the plants which facilitate plant growth and increase yield. Use of mulches for early crop offers great scope through conserving moisture and improving soil temperature (Hooda et al., 1999). Tomatoes grown with plastic mulches produce fruits earlier and more fruits throughout the season. It keeps soil warmer in winter and cooler in summer. Therefore the present investigation was conducted to study the effect of plastic mulching on growth, yield and economics of tomato.

## MATERIALS AND METHODS

The field experiment was conducted as On Farm Trial for three consecutive years i.e. 2015, 2016 and 2017 during winter season on seven farmers' field in Khargone (M.P.). The Khargone district comes under Nimar Plains Zone of Madhya Pradesh which is situated Latitude 21.833525 (DMS Lat 21° 50' 0.6900" N) and longitude 75.614990 (DMS Long 75° 36' 53.9640" E). The maximum temperature ranges from 43 to 46°C during summer season and minimum temperature fluctuates between 6 to 10°C during winter season. The average annual rainfall of the region is 835 mm. The treatments comprised T<sub>1</sub> Farmers practice (without mulch) and T<sub>2</sub> (30 micron Silver on black plastic mulch) replicated at seven farmers field. The 28 days old seedlings of tomato hybrid TO 1057 were transplanted on raised beds with 1.20 m spacing between row to row and 0.40 m plant to plant spacing. The farm yard manure (25t/ha) was applied in the bed at the time of preparation of raised bed. The recommended dose of fertilizers was applied. The 75% of recommended dose of P applied as superphosphate as basal application and water soluble fertilizers were given through drip twice in a week as per recommendation of TNAU, Tamil Nadu. The raised beds were covered with silver on black polythene sheet (mulch) in treatment T<sub>2</sub> and Treatment T<sub>1</sub> remained without mulch. The data on plant growth, yield and cost of cultivation, gross

return, net return and cost benefit ratio were estimated as per paired "t" test of significance.

## RESULTS AND DISCUSSION

### Growth attributes

The perusal of result indicated that (Table1) the maximum plant height (133.86 cm) was observed in treatment T<sub>2</sub> and minimum plant height (102.86 cm) in treatment T<sub>1</sub>. The same findings were observed by Jan *et al.* (2002), Singh *et al.* (2005), Aruna *et al.* (2007) and Singh and Kumar (2007). As regards to number of branches, maximum number of branches per plant (6.46) were observed in treatment T<sub>2</sub> and minimum no of branches. (4.42) in treatment T<sub>1</sub> Singh *et al.* (2005, 2006) also obtained the same results.

### Yield and yield attributes

The data presented in table 1 revealed that maximum weight of fruit (102.84 g) was recorded in treatment T<sub>2</sub> where as minimum weight and fruit (85.64 g) was observed in T<sub>1</sub> (without mulch). Hooda *et al.* (1999) and Aruna *et al.* (2007). The maximum yield/ha (841.53q/ha) was observed in treatment T<sub>2</sub> whereas minimum yield (582.34q ha) was recorded in treatment T<sub>1</sub>. The difference in tomato yield in the present study appears to be related to the differences in far-red/red (FR/R) ratios received by the plants. In previous investigations, modifications in plant growth patterns by very subtle changes in FR/R ratios have been documented in the field (Bradburne et al., 1989). Nevertheless, the change in FR/R ratio is not the only factor determining photosynthetic partitioning and yield. Higher soil temperature, efficient water utilization, fertilizers and reduction in the competition with weeds are other reasons which may help in increasing the yield (Clarkson, 1960). In previous studies number of workers recorded the similar results *viz.*, Hooda *et al.* (1999), Hanna (2000), Jan *et al.* (2002), Singh *et al.* (2005), Singh *et al.* (2006), Singh and Kumar (2006) Rashid *et al.* (2009) have also obtained the same results.

**Table 1**  
Effect of plastic mulch on growth and yield of tomato (Average data of 3 years)

Treatment	Plant height (cm)	No. of main branches	Number of fruits per plant	Fruit weight (g)	Fruit yield per plant (Kg)	Fruit yield (q ha <sup>-1</sup> )
T <sub>1</sub> : FP: Without mulch	102.86	4.42	32.78	85.64	2.79	582.34
T <sub>2</sub> : RP: Silver on black polythene	133.86	6.46	39.35	102.84	4.07	841.53
<b>The value of <i>t</i></b>	20.721558	8.864502	3.511970	5.994405	14.476218	31.192501
<b>The two-tailed P value</b>	0.00001	0.000115	0.012641	0.000969	0.00001	0.00001

The result is significant at  $p \leq 0.05$

Significant at 5% level of significance

**Table 2**  
Effect of plastic mulch on economics of tomato (Average data of 3 years)

Treatments	Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	Cost: benefit ratio
T <sub>1</sub> : FP: Without mulch	137279	276297	139018	2.01
T <sub>2</sub> : RP: Silver on black polythene	168954	484509	315555	2.87
The value of <i>t</i>	18.941192	97.206208	96.329218	15.562150
The two-tailed P value	0.00001	0.00001	0.00001	0.00001

The result is significant at  $p \leq 0.05$

Significant at 5% level of significance

### Economics

The economics of cultivation presented in table 2 showed that among the treatments, application of 30 micron silver on black plastic mulch (T<sub>2</sub>) resulted in higher gross returns of Rs 484509 ha<sup>-1</sup> net returns Rs 315555 ha<sup>-1</sup> and cost: benefit ratio (2.87) as compared to without mulch (T<sub>1</sub>).

### CONCLUSION

These studies have demonstrated the benefits of silver on black plastic mulching on growth, yield and economics of Tomato. Mulching (silver on black plastic mulch) resulted in 44.50 % increase in fruit yield as compared to T<sub>1</sub> (without mulch).

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