



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2018; 6(6): 731-734

© 2018 IJCS

Received: 11-09-2018

Accepted: 15-10-2018

Bhupendra Kumar

Deptt. of Vegetable Science,
College of Agriculture, IGKV,
Raipur, Chhattisgarh, India

Yogendra Singh

Deptt. of Vegetable Science,
College of Agriculture, IGKV,
Raipur, Chhattisgarh, India

Sanjay Nishad

Deptt. of Vegetable Science,
College of Agriculture, IGKV,
Raipur, Chhattisgarh, India

Pushpanjali Pankaj

Deptt. of Vegetable Science,
SHUATS Agricultural Institute,
Uttar Pradesh, India

Correspondence**Bhupendra Kumar**

Deptt. of Vegetable Science,
College of Agriculture, IGKV,
Raipur, Chhattisgarh, India

To study the effect of mulching on yield & yield attributing characters of intercrop

Bhupendra Kumar, Yogendra Singh, Sanjay Nishad and Pushpanjali Pankaj

Abstract

A field experiment entitled "To study the effect of mulching on yield & yield attributing characters of intercrop." was conducted during the *Rabi* season of 2016-17 at the Instructional farm, College of Horticulture and Research Station, Jagdalpur (C.G.). The experiment was laid out in T-test with three replications. The treatment consisted of mulched and non mulched plots in four different crops *viz.*, tomato, chilli, brinjal and bitter gourd.

Keywords: growth parameter, mulched

Introduction

Vegetables are the fresh and edible portions of herbaceous plants. They are important food and highly beneficial for the maintenance of health and prevention of diseases. They contain valuable food ingredients which can be successfully utilized to build up and repair the body. They are valued mainly for their high carbohydrates, vitamin and mineral contents. India produces 168.300 million tonnes of vegetables from an area of 95.41 million hectare. Tomato (*Solanum lycopersicon* L.) is one of the most popular and versatile cash earning vegetable crop and plays a vital role in culinary purposes for its nutrients, delicious taste and various modes of consumption i.e. fresh as salads, cooked vegetables and its utilization in preparation of range of processed products such as puree, paste, powder, ketchup, sauce, soup and canned whole fruits. In India, tomato is cultivated in about 791 thousand hectares area with the production of 173.98 t ha⁻¹. In Chhattisgarh also, tomato is one of the top ranking vegetable and is estimated to be grown on about 414.440 hectares area comprising three leading districts of the state *viz.* Bilaspur 74.05 ha, Jashpur 51.43 ha and Durg 44.10 ha. Brinjal (*Solanum melongena* L.) is a common vegetable crop grown in the sub-tropics and tropics. It is called eggplant in USA and aubergine in Europe. It is being produced in 14.76 million tonnes from an area of 23.63 million hectare. Chhattisgarh produces nearly 606.711 metric tonnes of brinjal from an area of 334.21 hectares whereas; Jagdalpur region of Bastar produces 124.00 metric tonnes from an area of 77.5 hectares. Chilli (*Capsicum annuum* L.) is an important spice crop belonging to the family Solanaceae. Chilli is widely cultivated throughout the warm temperature of tropical and sub-tropical countries and is a native to Mexico. Its fruits are rich source of vitamin C, A and E. Nearly 19.83 million tonnes of it is being produced from an area of 17.0 million hectare. Chhattisgarh produces 640.027 metric tonnes of chilli from an area of 911.15 hectares. The region in Bastar produced 119.07 metric tonnes of chilli from an area of 10.85 hectares. Bitter gourd (*Momordica charantia* L.) is grown for its bitter tender fruits. It is a rich source iron. It can be canned and pickled. India produces 12.40 million tonnes of bitter gourd from an area of 12.2 million hectares. Chhattisgarh produces 130.772 metric tonnes from an area of 103.85 hectare whereas Jagdalpur region of Bastar produces 31.00 metric tonnes from an area of 31.0 hectares.

Intercropping refers to growing two or more dissimilar crops simultaneously on the same piece of land, crop intensification is in both time and space dimensions. It also helps the farmers for having a stable production and maintaining the soil fertility level. Intercropping between high and low canopy crops is a common practice in tropical agriculture and to improve light interception and hence yields of the shorter crops requires that they be planted between sufficiently wider rows of the taller once.

Intercropping is advantageous when intercrop combinations make better use of growth factors and thus produces more yield than monocultures. According to Timbilla and Nyako (2001) [9] intercropping increased the grain yield by 70% over sole crop due to (i) better utilization of natural resources (ii) less incidence of pest, disease and weeds (iii) improved nitrogen economy where legume crop is present.

Materials and Methods

The study was conducted during *Rabi* season 2016-17 at the Instructional farm, College of Horticulture and Research Station, Jagdalpur (C.G.). The experiment was laid out in T-test with three replications. The treatment consisted of mulched and non mulched plots in four different crops *viz.*, tomato, chilli, brinjal and bitter gourd.

Results and Discussion

Plant height at 120 DAT

Plant height of tomato, chilli, brinjal and bitter gourd at 120 DAT (cm) has been depicted in Table 1. The results of the present investigation revealed that the plant height varied from 59.85, 60.64, 52.61 and 191.51 in mulched plots to 55.17, 53.70, 41.22 and 150.98 for the plots without mulch. Application of plastic mulch significantly increased the plant height over the other treatments. Improvement in micro climate with respect to moisture and nutrient availability might be responsible for increase in shoot height. Similar results were reported by Awasthi *et al.* (2006) [4] and Ashrafuzzaman *et al.* (2011) [3].

Table 1: Plant height of the mulched and non mulched intercrops in the kinnow orchard at 120 DAT

S. No.	Crop	With mulch	Without mulch	t-value	P-value	Test of significance
1.	Tomato	59.85	55.17	2.72	0.264	Significant
2.	Chilli	60.64	53.70	3.02	0.019	Significant
3.	Brinjal	52.61	41.22	2.13	0.049	Significant
4.	Bitter gourd	191.51	150.98	4.88	0.004	Significant

4.2.2 Number of branches plant⁻¹

The data pertaining to number of branches plant⁻¹ is presented in Table 2. It was recorded to be significantly higher in mulched plots *viz.* 26.53, 37.47, 21.53 and 29.67. However the plots without mulch recorded 18.2, 25.60, 16.33 and 17.93 for tomato, chilli, brinjal and bitter gourd. Perusal of data clearly indicated that the mulched plots had a significant effect on the number of branches plant⁻¹ in all the

four crops where it significantly increased with the plant age. The mulch gave a positive effect on increasing and retaining higher number of branches plant⁻¹. Control recorded the least number of branches plant⁻¹. Favourable weather conditions and moisture of the soil are the important parameters affecting the branches plant⁻¹. The results of present investigation are in conformity with the findings of Ali *et al.* (2014) [2] and Singh *et al.* (2015) [7].

Table 2: Number of branches plant⁻¹ in the mulched and non mulched intercrops in the kinnow orchard.

S. No.	Crop	With mulch	Without mulch	t-value	P-value	Test of significance
1.	Tomato	26.53	18.2	5.03	0.003	Significant
2.	Chilli	37.47	25.60	2.65	0.029	Significant
3.	Brinjal	21.53	16.33	2.18	0.047	Significant
4.	Bitter gourd	29.67	17.93	4.89	0.004	Significant

4.2.3 Leaf area (cm²)

The data on leaf area (cm²) has been given in Table 3. It was observed to be significantly higher in the mulched plots *viz.*, 16.69, 101.19, 57.66 and 43.15 however, the plots without mulch recorded 11.34, 68.26, 47.66 and 36.91 for tomato, chilli, brinjal and bitter gourd respectively. Leaf area components were observed to be comparatively higher in the

mulched treatments than the control due to improved soil moisture conservation, reduced soil temperature, reduced weed infestation and nutrient availability as a result of reduced leaching of nutrients. The finding of present investigation is in agreement with the results of Ali *et al.* (2014) [2].

Table 3: Leaf area (cm²) of the mulched and non mulched intercrops in the kinnow orchard.

S. No.	Crop	With mulch	Without mulch	t-value	P-value	Test of significance
1.	Tomato	16.69	11.34	5.00	0.003	Significant
2.	Chilli	62.46	51.39	4.99	0.003	Significant
3.	Brinjal	57.66	47.66	4.37	0.005	Significant
4.	Bitter gourd	43.15	36.91	4.24	0.006	Significant

4.2.4 Number of fruits plant⁻¹

Table 4 displays the data on number of fruits plant⁻¹. It was recorded significantly higher in the mulched plots with a mean variable of 43.93, 58.73, 11.73 and 42.27 whereas in the plots without mulch it was recorded to be 24.8, 16.65, 5.97 and 32.07 for tomato, chilli, brinjal and bitter gourd. Mulching produced significantly more number of fruits plant⁻¹ as compared to the non mulched plots. It can be attributed to

the fact that mulching had a positive influence on fruit setting in tomato, chilli, brinjal and bitter gourd. This might be due to increased growth of plant under favourable soil micro climate both beneath and above the soil surface. The suitable conditions enhanced the plant growth and development and produced fruit bearing nodes as compared to the control. The results are in close harmony with the results of Singh *et al.* (2017) [8].

Table 4: Number of fruits plant⁻¹ in the mulched and non mulched intercrops in the kinnow orchard.

S. No.	Crop	With mulch	Without mulch	t-value	P -value	Test of significance
1.	Tomato	43.93	24.8	3.005	0.019	Significant
2.	Chilli	58.73	16.65	11.93	0.001	Significant
3.	Brinjal	11.73	5.97	2.58	0.031	Significant
4.	Bitter gourd	42.27	32.07	2.48	0.034	Significant

4.2.5 Days taken to 1st flowering

The data on days taken to 1st flowering is presented in Table 5 for tomato, chilli, brinjal and bitter gourd. The data revealed that the days taken to 1st flowering was recorded to be 42.00, 35.67, 42.33, 66.33 in the mulched plots while non mulched plots recorded 46.66, 43.67, 45.67, 71.33 days respectively. The data pertaining to days taken to 1st flowering also indicated that the different transplanting dates and mulching had significant effect on these traits. It is apparent from the

data for tomato, chilli, brinjal and bitter gourd that there was a gradual decrease in days taken to 1st flowering, with the advancement in date of transplanting. It might be due to a marked influence of day and night temperature on the initiation of flowering. The results of present study are supported by the findings of Ahammad *et al.* (2009)^[1], Islam *et al.* (2010)^[6] and Hossain *et al.* (2013, 2014)^[5], Singh *et al.* (2017)^[8].

Table 5: Days taken to 1st flowering in the mulched and non mulched intercrops in the kinnow orchard.

S. No.	Crop	With mulch	Without mulch	t-value	P -value	Test of significance
1.	Tomato	42.00	46.66	-3.21	0.016	Significant
2.	Chilli	35.67	43.67	-5.37	0.003	Significant
3.	Brinjal	42.33	45.67	-2.24	0.045	Significant
4.	Bitter gourd	66.33	71.33	-4.52	0.005	Significant

4.2.6 Days taken to 50% flowering

Table 6 depicts the data on days taken to 50% flowering for tomato, chilli, brinjal and bitter gourd. The data revealed that the mulched plots recorded 61.00, 55.67, 61.00, 86.67 days for 50% flowering whereas it was comparatively high in the non mulched plots that recorded 67.00, 64.00, 65.33, 91.33

days for the same. High soil temperature under plastic mulch improves the plant micro climate leading to early growth and development which advanced the flowering. Similar kind of observation with respect to plant growth was also reported by Ahammad *et al.* (2009)^[1], Islam *et al.* (2010)^[6] and Hossain *et al.* (2013 & 2014)^[5], Singh *et al.* (2017)^[8].

Table 6: Days taken to 50% flowering in the mulched and non mulched intercrops in the kinnow orchard.

S. No.	Crop	With mulch	Without mulch	t-value	P -value	Test of significance
1.	Tomato	61.00	67.00	-3.21	0.016	Significant
2.	Chilli	55.67	64.00	-5.00	0.004	Significant
3.	Brinjal	61.00	65.33	-6.50	0.001	Significant
4.	Bitter gourd	86.67	91.33	-2.60	0.030	Significant

4.2.7 Days taken to 1st harvesting

The data on days taken to 1st harvesting is presented in Table 7 for tomato, chilli, brinjal and bitter gourd. The mulched plots recorded an average of 78.00, 76.67, 77.33 and 95.67 days whereas the non mulched plots recorded 83.00, 80.67, 83.33, 106.00 days for 1st harvesting respectively. The data pertaining to days taken to 1st harvesting for tomato, chilli, brinjal and bitter gourd clearly indicated the significance of

mulched plots. A gradual increase in temperature coupled with short growth period resulted in early flowering in plant and 1st harvesting, which are the major components for the enhanced number of fruits. The results of present study are supported by the findings of Ahammad *et al.* (2009)^[1], Islam *et al.* (2010)^[6], Hossain *et al.* (2013, 2014)^[5] and Singh *et al.* (2017)^[8].

Table 7: Days taken to 1st harvesting in the mulched and non mulched intercrops in the kinnow orchard

S. No.	Crop	With mulch	Without mulch	t-value	P -value	Test of significance
1.	Tomato	78.00	83.00	-5.00	0.001	Significant
2.	Chilli	76.67	80.67	-3.62	0.011	Significant
3.	Brinjal	77.33	83.33	-8.05	0.001	Significant
4.	Bitter gourd	95.67	106.00	-9.80	0.001	Significant

4.2.9 Yield ha⁻¹ (q)

The data on the effect of fruit yield (q ha⁻¹) with and without mulches has been presented in Table 8 for tomato, chilli, brinjal and bitter gourd. The mean yields of the mulched plot were 77.77, 28.88, 66.66, 66.66 while that of the non mulched plots were 44.44, 11.11, 33.33, 33.33 q ha⁻¹ for tomato, chilli,

brinjal and bitter gourd respectively. The effect of the mulched plots on fruit yield was significant for all the crops under study. Similar kind of observations was also reported by Awasthi *et al.* (2006)^[4], Ashrafuzzaman *et al.* (2011)^[3] and Singh *et al.* (2017)^[8].

Table 8: Yield ha⁻¹ (q) in the mulched and non mulched intercrops in the kinnow orchard

S. No.	Crop	With mulch	Without mulch	t-value	P -value	Test of significance
1.	Tomato	77.77	44.44	3.67	0.106	Significant
2.	Chilli	28.88	11.11	4.89	0.004	Significant
3.	Brinjal	66.66	33.33	3.67	0.106	Significant
4.	Bitter gourd	66.66	33.33	3.67	0.106	Significant

Conclusions

The present investigation revealed that among the mulched and non mulched treatments, plastic mulch recorded comparatively higher yield attributes of tomato, chilli, brinjal and bitter gourd as intercrops in the kinnow orchard.

References

1. Ahammad KU, Siddiky MA, Ali Z, Ahmed R. Effect of planting time on the growth and yield of tomato varieties in late season. *Progressive Agriculture*. 2009; 20(1-2):73-78.
2. Ali MB, Lakun HI, Abubakar W, Mohammed YS. Performance of tomato as influenced by organic manure and sowing date in Samaru, Zaria. *International Journal of Agronomy and Agricultural Research*. 2014; 5(5):104-110.
3. Ashrafuzzaman M, Hamid AM, Ismail MR, Sahidullah SM. Effect of Plastic Mulch on Growth and Yield of Chilli (*Capsicum annum* L.). *Brazilian Archives of Biology and Technology*, 2011; 54(2):321-330.
4. Awasthi OP, Singh IS, Sharma BD. Effect of mulch on soil-hydrothermal regimes, growth and fruit yield of brinjal under arid conditions. *Indian Journal of Horticulture*. 2006; 63(2):192-194.
5. Hossain MF, Ara N, Uddin MS, Islam MR, Kaiser MO. Effect of sowing dates on fruit setting and yield of tomato genotypes. *Journal of Agricultural Research*. 2014; 52(4):547-553.
6. Islam M, Saha S, Akand H, Rahim A. Effect of sowing date on the growth and yield of sweet pepper (*Capsicum annum* L.). *Agronomski Glasnik*. 2010; 1(3):3-14.
7. Singh A, Jain PK, Sharma HL, Singh Y. Effect of planting date, and integrated nutrient management on the production potential of tomato (*Solanum lycopersicum* Mill.) under polyhouse conditions. *Journal of Crop and Weed*. 2015; 11:28-33.
8. Singh H, Sharma P, Kumar P, Dhillon NS, Sekhon BH. Influence of Mulching on Growth and Yield of Tomato (*Solanum lycopersicum* L.) under Protected Environment. *Biotechnology Journal International*. 2017; 19(2):1-6. Article no.BJI.35410 ISSN: 2456-7051
9. Timbilla JA, Nyako KO. Efficacy of intercropping as a management tool for the control on insect pests of cabbage in Ghana. *Tropicultural*, 2001; 19(2):49-52.