

## Influence of planting time and mulching material on growth and fruit yield of strawberry cv. Chandler

Ravi Kher\*, Jahangeer A. Baba and Parshant Bakshi

Division of Fruit Science, Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu, Main Campus Chatha, Jammu 180 009

### ABSTRACT

An experiment was conducted for standardization of planting time and mulching material in strawberry cv. Chandler with the aim to maximise growth and yield under sub-tropical conditions. The experiment was laid out in a randomized block design (Factorial) with five levels of planting time starting from 25<sup>th</sup> September at weekly interval upto 25<sup>th</sup> October, 2007 and three levels of mulching. Plant height (20.16 cm), plant spread (28.13 cm), leaf area (64.19 cm<sup>2</sup>), average fruit weight (14.32 g), fruit yield (286.02 g/plant) and runners per plant (3.65) were significantly higher in 9<sup>th</sup> October planting than plants planted on other dates. Similarly, plant height (20.86 cm), plant spread (30.00 cm), leaf area (64.76 cm<sup>2</sup>), fruit weight (14.69 g) and fruit yield (295.78 g/plant) were significantly higher in plants mulched with black polyethylene than those either mulched with transparent polyethylene or paddy straw. The interaction effect of planting time and mulching material was found significant only in case of number of crowns per plant (0.37), fruit yield (27.33) and number of runners per plant (0.15). Thus, the study indicated that 9<sup>th</sup> October planting coupled with black polyethylene mulching is most favourable for successful cultivation of strawberry under sub-tropical conditions of Jammu.

**Key words:** Strawberry, planting time, mulching, growth, fruit yield.

### INTRODUCTION

Strawberry (*Fragaria x ananassa* Duch.) is known as one of the most delicious and refreshing soft fruit. Delicacy of flavour and richness in vitamins and minerals, makes strawberry a favoured food in the diet of millions of people around the globe (Bhat *et al.*, 2). In India, it is mainly grown in Maharashtra, Punjab, Haryana, Delhi, hills of Himachal Pradesh, J&K and Uttarakhand (Rana and Chandel, 9). Among the various cultivation practices adopted, mulching (Jacks *et al.*, 8) is the process of curing the soil surface around plant basin to create the most favourable conditions for growth and development of plant in strawberry cultivation. Mulching plays an important role in soil moisture conservation, improving soil structure, regulation of soil temperature, reducing weed growth (Rao and Pathak, 10; Reddy and Khan, 11), minimizing winter and frost injury and avoiding berries contact with soil, thereby reducing the number of dirty and rot infected fruits. In view of the above fact, mulching seems to be an ideal solution to improve the strawberry productivity under sub-tropical conditions. Although, planting can be done at any time from July to following April (Childers *et al.*, 3). For successful strawberry cultivation, planting time plays an important role. In India, strawberry is usually planted in second fortnight of October with traditional methods, which restrict the fruit availability for a very short period of one and a

half month (Singh *et al.*, 14). However, strawberry can be planted at different times of the year depending on variety, location and climate (Galleta and Bringham, 4; Sharma and Sharma, 12). Both planting time and mulching have been recognized to influence fruit production as well as quality of strawberry. Therefore, an investigation was conducted to study the effect of planting time and mulching material on growth and fruit yield of strawberry cv. Chandler.

### MATERIALS AND METHODS

The present investigation was carried out at the Research Farm of Fruit Science, Faculty of Agriculture, Sher-e-Kashmir University of Agricultural Sciences and Technology, Udheywalla, Jammu during 2007-08. The soil of the experimental field was sandy loam in texture having pH 7.07; organic carbon 0.51%; available nitrogen 215.50, phosphorous 13.44 and potassium 135.0 kg ha<sup>-1</sup>. The experiment was laid out in a randomized block design (Factorial). There were 15 treatment combinations with five planting dates (T<sub>1</sub> = 25<sup>th</sup> September, T<sub>2</sub> = 2<sup>nd</sup> October, T<sub>3</sub> = 9<sup>th</sup> October, T<sub>4</sub> = 17<sup>th</sup> October and T<sub>5</sub> = 25<sup>th</sup> October) and three types of mulching (M<sub>1</sub> = transparent polyethylene, M<sub>2</sub> = black polyethylene and M<sub>3</sub> = paddy straw), replicated thrice in 45 well ploughed and raised beds of 1.5 m x 2.0 m size with a planting distance of 45 cm x 30 cm. There were 20 number of plants per bed. Other cultural practices adopted were similar for all treatments. Observations were recorded on increase in vegetative growth of plant

\*Corresponding author's E-mail: kherraviudy@yahoo.co.in

(plant height, plant spread, number of leaves per plant, leaf area and number of runners per plant), fruit weight and fruit yield per plant. Leaf area was measured by leaf area meter (Systronics 211 model). The time of recording number of runners per plant was mid May. The data obtained was statistically analysed (Gomez and Gomez, 5).

## RESULTS AND DISCUSSION

Different plant growth parameters like plant height, plant spread, number of leaves per plant and leaf area of strawberry cv. Chandler were significantly affected by planting time and mulching treatments (Table 1). Plant height (20.16 cm), plant spread (28.13 cm), leaf area (64.19 cm<sup>2</sup>), average fruit weight (14.32 g) and fruit yield (286.02 g/plant) were significantly higher in 9<sup>th</sup> October planting than plants planted on other dates. However, different treatment combinations had varying influence on growth and fruit yield of strawberry (Table 2).

Treatment combination T<sub>3</sub>M<sub>2</sub> resulted in the highest leaf area and T<sub>1</sub>M<sub>3</sub> produced minimum value. Number of crowns per plant was significantly influenced by various treatment combinations. Maximum number of crowns per plant was recorded under T<sub>3</sub>M<sub>2</sub> and minimum under T<sub>1</sub>M<sub>3</sub>. Interaction effect of planting time and mulching material was found significant on fruit yield. Strawberry runners planted on 9<sup>th</sup> October and mulched with black polyethylene (T<sub>3</sub>M<sub>2</sub>) recorded the maximum yield of 343.38 g/plant and minimum fruit yield of 140 g/plant was harvested from T<sub>1</sub>M<sub>3</sub>. Significantly higher number of runners per plant (3.85) were obtained from plants planted on 9<sup>th</sup> October and mulched with black polyethylene (T<sub>3</sub>M<sub>2</sub>) and T<sub>5</sub>M<sub>3</sub> treatment combination yielded minimum of 2.95 runners per plant (Table 2; Fig. 1).

Favourable micro-climate might probably be responsible for better growth and development of plants during that period, since upto first week of October temperature is usually high under north Indian conditions, which is not conducive for growth

**Table 1.** Effect of planting time and mulching material on growth and yield of strawberry cv. Chandler.

Treatment	Plant height (cm)	Plant spread (cm)	No. of leaves per plant	Leaf area (cm <sup>2</sup> )	No. of crowns per plant	Fruit yield (g/plant)	No. of runners per plant
Planting time (T)							
25 <sup>th</sup> September (T <sub>1</sub> )	17.77	25.65	16.61	57.85	2.56	185.94	3.21
2 <sup>nd</sup> October (T <sub>2</sub> )	19.47	27.19	18.73	61.85	2.78	246.07	3.19
9 <sup>th</sup> October (T <sub>3</sub> )	20.16	28.13	19.44	64.19	2.65	286.02	3.65
17 <sup>th</sup> October (T <sub>4</sub> )	18.82	25.72	18.47	61.33	2.49	261.82	3.10
25 <sup>th</sup> October (T <sub>5</sub> )	18.07	24.21	17.44	59.43	2.64	221.68	3.01
CD (P = 0.05)	NS	NS	NS	2.43	NS	15.78	0.09
Type of mulching (M)							
Transparent polyethylene (M <sub>1</sub> )	18.52	25.83	18.03	60.32	2.39	246.53	3.27
Black polyethylene (M <sub>2</sub> )	20.82	30.00	19.26	64.76	2.96	295.78	3.21
Paddy straw (M <sub>3</sub> )	17.20	22.72	17.12	57.70	2.52	178.61	3.22
CD (P = 0.05)	1.10	1.68	NS	1.88	0.16	12.22	0.15

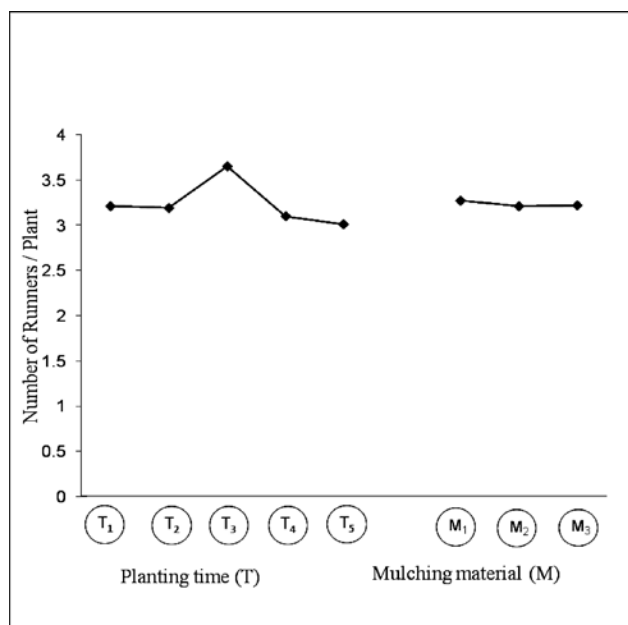
Maximum plant height of 22.24 cm was recorded under treatment combination comprising of 9<sup>th</sup> October planting and black polyethylene mulching (T<sub>3</sub>M<sub>2</sub>) and minimum plant height was recorded under paddy straw mulching for 25<sup>th</sup> October planting (T<sub>5</sub>M<sub>3</sub>). Interaction effect of planting time and mulching material was found non-significant on plant spread, however maximum plant spread was obtained in treatment combination T<sub>3</sub>M<sub>2</sub> and minimum in T<sub>5</sub>M<sub>3</sub>. Planting time and mulching material did not influence number of leaves significantly in strawberry. Maximum number of leaves per plant was obtained under T<sub>3</sub>M<sub>2</sub> and minimum under T<sub>1</sub>M<sub>3</sub>.

and development of strawberry (Singh and Asrey, 13; Sharma and Sharma, 12; Hassan *et al.*, 7).

Similarly, plant height, plant spread, leaf area, fruit weight and fruit yield were significantly higher in plants mulched with black polyethylene than those either mulched with transparent polyethylene or paddy straw (Table 1). This may be due to better soil hydrothermal regimes, better moisture conservation and suppression of weeds in the plants mulched with black polyethylene than other mulches (Badiyala and Aggarwal, 1; Gupta and Acharya, 6; Hassan *et al.*, 7; Tarara, 15; Singh and Asrey, 13).

**Table 2.** Interaction effect of time and mulching on growth and yield of strawberry cv. Chandler.

Treatment combination	Plant height (cm)	Plant spread (cm)	No. of leaves per plant	Leaf area (cm <sup>2</sup> )	No. of crowns per plant	Fruit yield (g/plant)	No. of runners per plant
T <sub>1</sub> M <sub>1</sub>	17.13	25.15	16.10	58.24	2.52	185.86	3.11
T <sub>1</sub> M <sub>2</sub>	19.85	28.41	18.33	61.22	2.89	231.76	3.18
T <sub>1</sub> M <sub>3</sub>	16.33	23.41	15.41	54.10	2.27	140.21	3.33
T <sub>2</sub> M <sub>1</sub>	19.39	26.37	18.97	60.68	2.79	253.38	3.20
T <sub>2</sub> M <sub>2</sub>	21.34	31.35	19.55	66.52	3.01	309.32	3.15
T <sub>2</sub> M <sub>3</sub>	17.68	23.86	17.67	58.36	2.53	175.51	3.22
T <sub>3</sub> M <sub>1</sub>	19.71	28.65	19.28	63.50	2.27	304.54	3.46
T <sub>3</sub> M <sub>2</sub>	22.24	31.84	20.25	68.58	3.07	343.38	3.85
T <sub>3</sub> M <sub>3</sub>	18.53	23.91	18.79	60.49	2.62	210.13	3.66
T <sub>4</sub> M <sub>1</sub>	18.55	25.91	18.44	59.98	2.09	258.92	3.50
T <sub>4</sub> M <sub>2</sub>	20.57	29.78	19.47	64.73	2.93	334.22	2.86
T <sub>4</sub> M <sub>3</sub>	17.33	21.46	17.50	59.29	2.47	192.31	2.96
T <sub>5</sub> M <sub>1</sub>	17.81	23.07	17.36	59.23	2.28	229.95	3.07
T <sub>5</sub> M <sub>2</sub>	20.29	28.63	18.70	62.77	2.93	260.21	3.00
T <sub>5</sub> M <sub>3</sub>	16.13	20.95	16.26	56.28	2.73	174.88	2.95
CD (P = 0.05)	NS	NS	NS	NS	0.37	27.33	0.15



**Fig. 1.** Effect of planting time and mulching material on runner production in strawberry.

It is thus concluded that 9<sup>th</sup> October planting coupled with black polythene mulching was found to be most effective for successful cultivation of strawberry under Jammu sub-tropics.

## REFERENCES

1. Badiyala, S.D. and Aggarwal, G.C. 1981. Note on the effect of mulches on strawberry production. *Indian J. Agric. Res.* **51**: 832-34.
2. Bhat, A.K., Sharma, R.M., Singh, A.K. and Masoodi, F.A. 2005. Performance of some strawberry (*Fragaria x ananassa* Duch.) cultivars under Jammu conditions. *Prog. Hort.* **37**: 163-65.
3. Childers, N.F., Morris, J.R. and Sibbett, G.S. 1995. *Modern Fruit Science Orchard and Small Fruit Culture*. Horticulture Publication, Gainesville, Florida, USA, pp. 22.
4. Galletta, G.J. and Bringham, R.S. 1990. Strawberry management. In: *Small Fruit Crop Management*. Prentice Hall, Englewood Cliffs, New Jersey, pp. 83-156.
5. Gomez, A.K. and Gomez, A.A. 1996. *Statistical Procedures for Agricultural Research*. (2<sup>nd</sup> Edn.). John Willey and Sons Inc., New York.
6. Gupta, R. and Acharya, C.L. 1994. Use black polyethylene for higher strawberry fruit yields. *Indian Hort.* **39**: 6-7.
7. Hassan, G.H., Godara, A.K., Kumar, J. and Huchche, A.D. 2000. Effect of different mulches on yield and quality of 'Oso Grande' strawberry

- (*Fragaria x ananassa*). *Indian J. Agric. Sci.* **70**: 184-85.
8. Jacks, G.V., Brind, W.B. and Smith, R. 1955. Mulching. *Tech. Comm. British Soil Sci. Soc. Rothamsted*, pp. 49.
9. Rana, R.K. and Chandel, J.S. 2003. Effect of bio-fertilizers and nitrogen on growth, yield and fruit quality of strawberry. *Prog. Hort.* **35**: 25-30.
10. Rao, V.K. and Pathak, R.K. 1998. Effect of mulches on aonla (*Emblica officinalis*) orchard in sodic soil. *Indian J. Hort.* **55**: 27-32.
11. Reddy, Y.T.N. and Khan, M.M. 2000. Weed control in sapota orchards through use of soil covers. *Indian J. Weed Sci.* **32**: 103-4.
12. Sharma, R.R. and Sharma, V.P. 2004. Plant growth and albinism disorder in different strawberry cultivars under Delhi conditions. *Indian J. Hort.* **61**: 92-93.
13. Singh, R. and Asrey, R. 2005. Growth, earliness and fruit yield of micro-irrigated strawberry as affected by planting time and mulching in semi-arid regions. *Indian J. Hort.* **62**: 148-51.
14. Singh, R., Sharma, R.R. and Goyal, R.K. 2007. Interactive effects of planting time and mulching on 'Chandler' strawberry (*Fragaria x ananassa* Duch.). *Scientia Hort.* **111**: 344-51.
15. Tarara, J.M. 2000. Microclimate modification with plastic mulch. *Hort. Sci.* **35**: 169-80.
- 

Received: March, 2009; Revised: March, 2010;  
Accepted : July, 2010