RESEARCH PAPER | Asian Journal of Bio Science, Volume **8** | Issue 2 | October, 2013 | 175-179
Received : 01.04.2013; **Revised :** 08.07.2013; **Accepted :** 15.08.2013

Effect of organic mulches on runner production of strawberry (*Fragaria* x *ananassa* Duch.)

ANGREJ ALI[1] AND G.S. GAUR[2]

[1]Faculty of Agriculture, Sher-e-Kashmir University of Agriculture and Technology (K), Wadura, SOPORE (J&K) INDIA
[2]Department of Horticulture, Chandra Shekhar Azad University of Agriculture and Technology, KANPUR (U.P.) INDIA
Email : anghort@gmail.com

The runner production of strawberry cv. Sweet Charlie was evaluated under various organic mulches *viz.*, dry grass, saw dust, sugarcane trash and paddy, while plants without mulch served as control. The mulches of about 6 cm thickness were applied around plant basin one week after transplanting. Results revealed that all the organic mulches significantly increased runner production of strawberry. Maximum number of runner per plant, runner platelets per runner and runner plantlets per plant was recorded with paddy straw followed sugarcane trash. The per cent increase in number of runner plantlets over control with paddy straw, sugarcane trash, saw dust and dry grass mulch was 33.33 per cent, 27.78 per cent, 18.00 per cent and 14.00 per cent, respectively. Organic mulches also increased the length of the runner stolon, number of leaves and leaf area of runner plantlets.

Key words : Mulch, Organic, Runner, Strawberry

How to cite this paper : Ali, Angrej and Gaur, G.S. (2013). Effect of organic mulches on runner production of strawberry. *Asian J. Bio. Sci.*, **8** (2) : 175-179.

INTRODUCTION

Strawberry (*Fragaria* X *ananassa* Duch.) is an attractive soft fruit, very much liked for its taste and flavor, has high demand for fresh market and as raw material in processing industries. The strawberry is a fruit of temperate regions of the world, but it is also commercially cultivated in tropical and subtropical conditions in many countries. In India, it is commercially cultivated in the states Jammu & Kashmir, Himanchal Pradesh, Uttarakhand. Its cultivation has been extended to subtropical regions of India, although, a considerable variation exist among different strawberry cultivars regarding their adaptability to a particular set of agro-climatic conditions (Sharma and Yamadagni, 2000). Strawberry fruits are highly perishable and thus have limitations in long distance transport in conventional systems of fruit growing countries like in India. Increasing domestic market for fresh fruit has stimulated interest to strawberry production in subtropical regions of India (like Punjab, Haryana, Delhi, Uttar Pradesh) in past few decades.

Strawberry plants are commercially grown from the plantlets which are proliferated at the runner nodes of plants. The growth of runner is a result of cell division and elongation in the internodes (Nishizawa and Hori, 1993). The environmental condition is recognized as one of the major factors effecting runner production in strawberry. The runners proliferate when the day length 12 h or longer with the temperature of above 10°C, and the runner production very effective under the 15 h day-length photoperiod when the temperature not less than 22.7°C (Darrow, 1966). It was also found that the number and length of strawberry runner were not only dependent on the photoperiod but also on the variety factor and the interaction of the two factors (Pipattanawong *et al*., 1996).

The influence of the use of management techniques for the strawberry crop was intensively studied in different regions of the world. Among these practices, soil mulching, irrigation, and protected cultivation are worth mentioning. Mulching, the process of covering soil surface around plant basin, is an old age practice to create favourable environment for plant (Jacks *et al*., 1955). Performance of mulches is greatly associated with edapho-climatic factors, cultivation conditions, and cultivar. Mulching play important role in soil moisture conservation, regulation soil temperature and

reducing weed growth (Gupta and Acharya, 1993; Shukla, 1996; Rao and Pathak, 1998). Borthakur and Bhattacharya (1992) observed that the continuous use of organic mulches also helpful in improving beneficial soil microbial flora, organic matter content and better soil aeration. Beneficial effects of mulching have also been reported in subtropical fruits like ber (Byun *et al*., 1989), custard apple (Kulkarni *et al*., 1993), banana (Gurung and Chattopadhyay, 1994), pine apple (Hajarika and Das, 1999). Keeping in view the above facts, present investigation was, therefore, conducted to study the effect of various mulches on runner production of strawberry cv. Sweet Charlie in subtropical conditions of Central India.

RESEARCH METHODOLOGY

The pot culture experiment was conducted during 2002-03 at the Department of Horticulture, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, U.P. (India). The organic mulch treatments adopted were dry grass, saw dust, sugarcane trash and paddy straw. Plants without mulch (un-mulched) served as control. The experiment was conducted in Complete Randomized Design with four replications. Earthen pots having 10 kg capacity filled with soil:FYM mixture (1:1 V/V) were used for growing of strawberry cv. Sweet Charlie. Transplanting in pots was carried out during first week of December (one plantlet per pot) and then the plants were kept in open field condition. Each treatment consisted of five pots (*i.e.* plants) in each replication. The mulch materials were applied around the plant basin in the pots one week after transplanting of the plantlets. Thickness of mulch was kept uniform for all mulching treatments (about 6 cm). Other cultural operations (irrigation nutrition, weed control plant protection etc.) were similar for all the treatments. The fruits borne on plants were harvested upto last week of March and thereafter all the plants were kept in intermittent shade for rest of the crop period. Total number of runner per plant, number of runner plantlets per runner, runner plantlets per plant and number of leaves per plantlet were counted at cessation of plant growth. The leaf area of runner plantlets was measured from all fully expanded leaves. The data generated from the present investigation were subjected to statistical analysis and treatment means were separated and compared using least significant differences (LSD) at P=0.05 as per the procedures described by Panse and Sukhatme (1967).

RESEARCH FINDINGS AND ANALYSIS

The strawberry plants started flowering from third week of January and the fruits harvested till last week of March. Data recorded on various parameter of runner production of strawberry revealed that the application of mulches increased runner production and growth of runner plantlets (Fig. 1 and Fig. 2).

Number of runner per plant :

Mulching treatment increased number of runner per plant (Fig. 1A). All the organic mulches under study had significant effect on number of runner production. Maximum number of runner per plant (2.50) was recorded with paddy straw mulch which was significantly superior over control (2.00), dry gasses (2.20) and saw dust (2.40) but statistically at par with sugarcane trash mulch (2.40). Number of runner per plant produced under saw dust mulch showed non-significant difference with dry grass.

Number of runner plantlets per runner :

The number of runner plantlets per runner produced under mulching treatments was significantly higher compared with control (Fig. 1B). Plants mulched with paddy straw or sugarcane mulch produced maximum runner plantlets per runner (2.40) but difference was non-significant with those of dry gasses (2.36) and saw dust (2.33). Plants without mulch produced 2.25 runner plantlets per runner.

Number of runner plantlets per plant :

Number of runner plantlets per plant as affected by organic mulches is presented in (Fig. 1C). The number runner plantlets per plant increased due to mulching treatment and all the organic mulches were significant over un-mulched control. Maximum number of runner plantlets per plant was recorded with paddy straw (6.00), however, the effect of paddy straw mulch was at par with sugarcane trash (5.75). Dry gasses and saw dust mulch produced 5.13 and 5.31 runner plantlets per plant, respectively. The minimum number of runner plantlets per plant (4.50) was recorded with control.

Length of runner :

The length of runner (stolon) was significantly affected by mulching treatments (Fig. 2D). All the organic mulches significantly increased the length of runner over control and longest runner (90.64 cm) was measured in the plants mulched with paddy straw, however, it was statistically at par with runner length under sugarcane trash mulch (89.45 cm). Non-significant difference was also observed between saw dust and dry grass mulches with respect to length of runner (83.89 cm and 80.60 cm, respectively). The length of the runner under control treatment was. 73.83 cm.

Number of leaves per runner plantlet :

The number of leaves per runner plantlet increased due to mulching treatment (Fig. 2A). The leaf count was significantly higher in the mulched plants compared with control, however, non-significant difference was observed within the organic mulches. Number of leaves per runner

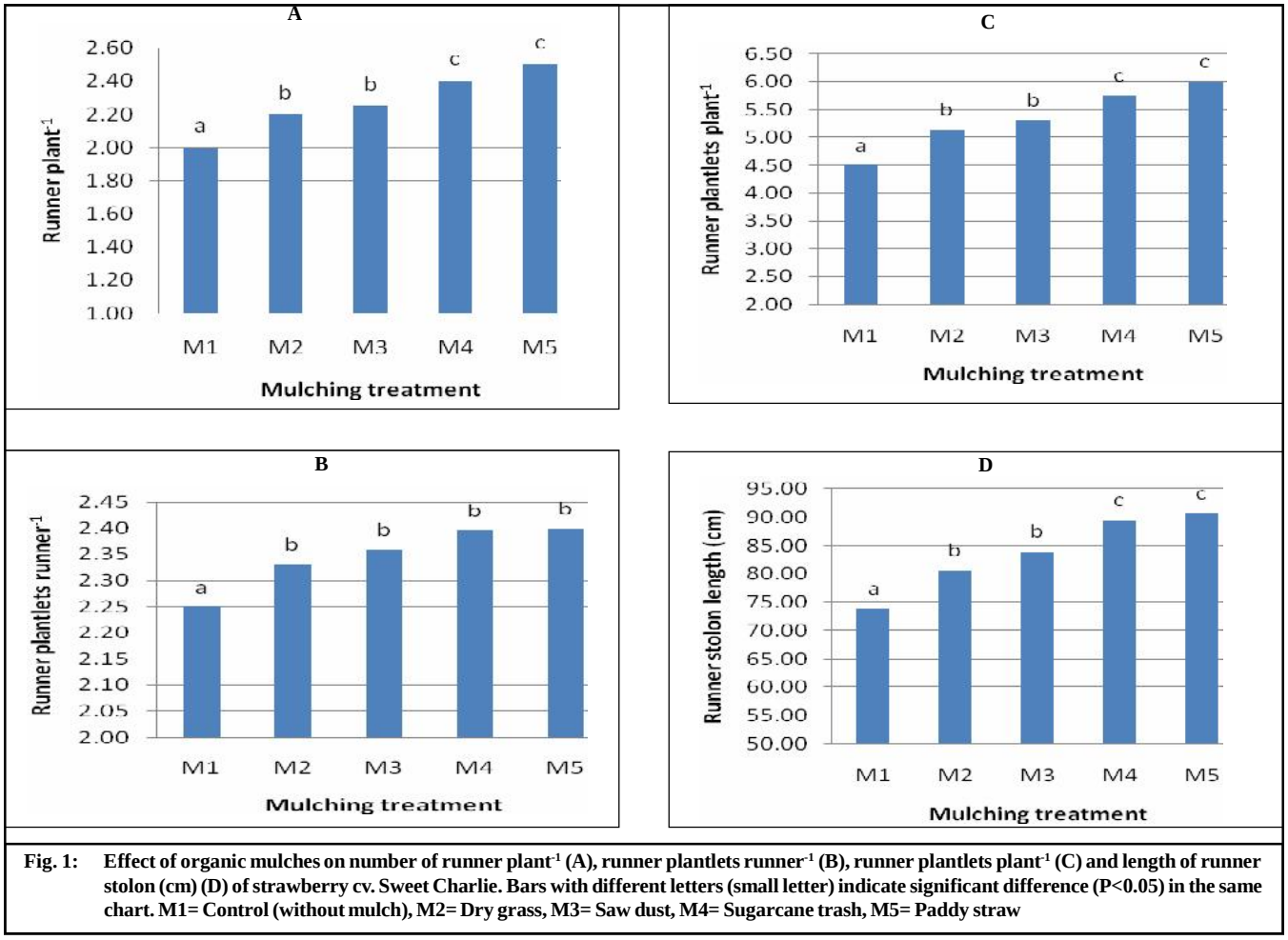

Fig. 1: **Effect of organic mulches on number of runner plant^{-1} (A), runner plantlets runner^{-1} (B), runner plantlets plant^{-1} (C) and length of runner stolon (cm) (D) of strawberry cv. Sweet Charlie. Bars with different letters (small letter) indicate significant difference (P<0.05) in the same chart. M1= Control (without mulch), M2= Dry grass, M3= Saw dust, M4= Sugarcane trash, M5= Paddy straw**

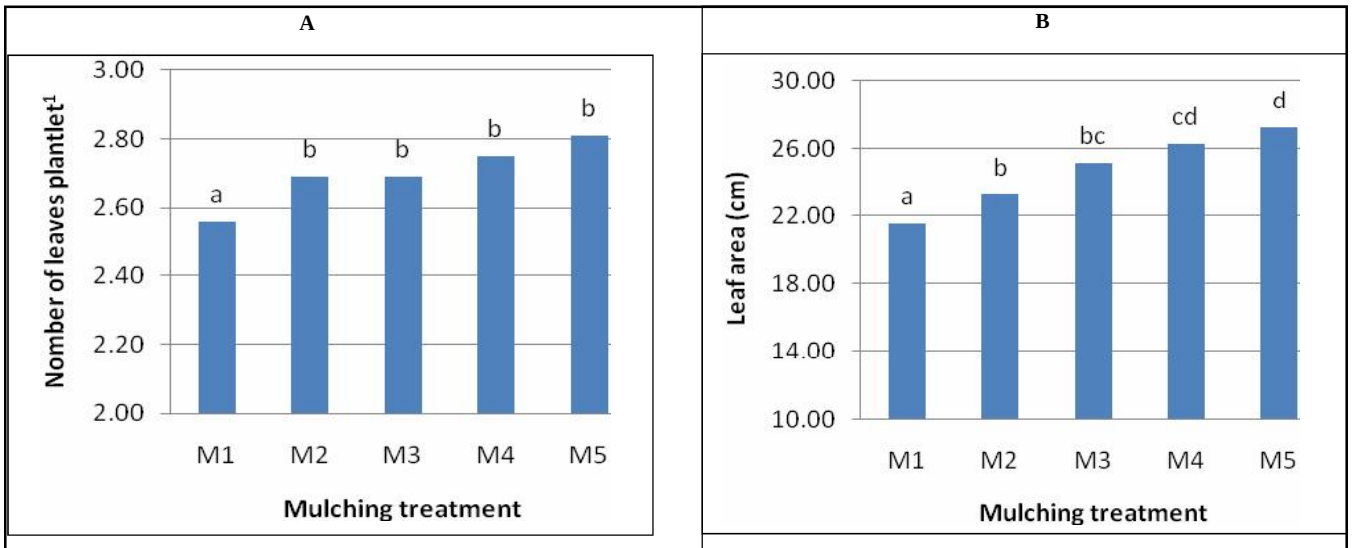

Fig. 2: **Effect of organic mulches on number of leaves (A) and leaf area (B) of strawberry runner plantlets cv. Sweet Charlie. Bars with different letters (small letter) indicate significant difference (P<0.05) in the same chart. M1= Control (without mulch), M2= Dry grass, M3= Saw dust, M4= Sugarcane trash, M5= Paddy straw**

plantlet under with paddy straw, sugarcane trash, saw dust and dry grass was 2.81, 2.75, 2.69 and 2.69, respectively. Plants without mulch produced 2.56 leaves per plantlet.

Leaf area :

Results indicated that effect of organic mulches on leaf area of runner plantlets was significant over control (Fig. 2B). Maximum leaf area (27.15 cm^2 per plantlet) was recorded with paddy straw mulch. The leaf area of platelets with sugarcane trash mulch was (26.24 cm^2) which was at par with paddy straw and saw dust mulches. There was also no significant difference between saw dust and dry grass (25.15 cm^2 and 23.26 cm^2, respectively). The leaf area under control plantlets was 21.55 cm^2.

Mulching increased soil moisture, organic matter contents leading to suitable environment for root penetration. Mulches have been reported to markedly influence the growth of several crops through modifying effect on hydrothermal regime and physiochemical properties of soil (Parfit and Stott, 1984; Dwivedi *et al.*, 2000; Hedua and Kumar, 2002). Mulching decreases bulk density of the surface soil (Ghuman and Sur, 2001). The soil organic matter increased due decomposition of applied mulch. Applications of crop residue mulches increase soil organic carbon contents (Havlin *et al*., 1990; Paustin *et al.*, 1997; Duiker and Lal, 1999; Saroa and Lal, 2003). Organic matter was significantly higher when more mulch was applied (Lal *et al.*, 1980). Acharya and Sharma (1994) observed that mulched treatments show significantly greater total uptake of nitrogen, phosphorus and potassium. Similar effects of mulching have also been reported in fruit crops like guava (Borthakur and Bhattacharya, 1992), custard apple (Mandal and Chattopadhyay, 1994), apple (Buban *et al*., 1996). Organic mulches under study resulted in better growth of strawberry vegetative growth in terms of increased runner production and better growth of runner plantlets. Maximum growth was observed with paddy straw followed by sugarcane trash, saw dust and dry grass as compared to control. The enhanced growth of runner of strawberry might be attributed to optimum soil moisture, spare weed population and availability of nutrients which might have formed increased number of runners and their better growth.

LITERATURE CITED

Acharya, C.L., Sharma, P.D. (1994). Tillage and mulch effects on soil physical environment, root growth, nutrient uptake and yield of maize and wheat on an Alfisol in north-west India. *Soil Tillage Res.*, **4**: 291–302.

Borthakur, P.K. and Bhattacharya, R.K. (1992). Effect of organic mulches on soil organic matter content and soil pH in guava plantation. *South Indian J.Hort.*, **40**: 352-354.

Buban, T., Helmeczi, B., Papp, J., Dorgo, E., Jakab, I., Kajati, I. and Merwin, I. (1996). IFP-compatible ground-cover management systems in a new-planted apple orchard. *Acta Hort*., **422**: 263-267.

Byun, J.K., Do, J.H. and Chang, K.H. (1989). The effect of black polyethylene and rice straw mulches on growth of young jujube (*Zizyphus jujube*) plants. *Hort. Sci*., **7**(1): 136-139.

Darrow, G.M. (1966). The strawberry: History, breeding and physiology. Holt, Rinehart and Winston, NEW YORK (U.S.A.)

Duiker, S.W. and Lal, R. (1999). Crop residue and tillage effects on carbon sequestration in a Luvisol in central Ohio. *Soil Tillage Res.*, **52**: 73-81.

Dwivedi, S.K., Singh, B. and Elipoljor (2000). Effect of mulch on eshtablishment and growth of apple sapling in cold arid region conditions of Ladakh. *Prog. Hort.*, **32**(1): 79-80.

Ghuman, B.S. and Sur, H.S. (2001). Tillage and residue management effects on soil properties and yields of rainfed maize and wheat in a sub humid subtropical climate. *Soil Tillage Res.*, **58**: 1-10.

Gupta, R.S. and Acharya, C.L. (1993). Effect of mulching induced hydrothermal regime, root growth, water use efficiency and quality of strawberry. *J. Indian Soc. Soil Sci.*, **41**(1): 17-25.

Gurung, S. and Chattopadhyay, P.K. (1994). Influence of soil cover on production and quality of banana. *Ann. Agric. Res.*, **15**(2): 445-447.

Hajarika, B. and Das, P.K. (1999). Effect of black polyethylene and rice husk on chemical composition of pine apple. *J. Appl. Hort.*, **2**(2): 125-127.

Havlin, J.L., Kissel, D.E., Maddus, L.D., Claassen, M.M. and Long, J.H. (1990). Crop rotation and tillage effects on soil organic carbon and nitrogen. *Soil Sci. Soc. American J.*, **54**: 448-452.

Hedua, N.K. and Kumar, M. (2002). Effect of different mulches on yield, plant height, nitrogen uptake, weed growth, soil moisture and economics of tomato. *Prog. Hort.*, **34**(2): 208-210.

Jacks, G.V., Brind, W.D. and Smith, R. (1955). Mulching. Commonwealth Bureau of Soil Science. Technical Communication No. 49. Commonwealth Agricultural Bureau, UK.

Kulkarni, S.S., Desai, U.T., Masalkar, S.D. and Dosale, S.B. (1993). Effect of cultural and chemical treatment on yield and physiochemical characteristics of custard apple. *J. Maharashtra Agric. Univ.*, **21**(3): 474-475.

Lal, R., Vleeschauwer, D.D. and Nganje, R.M. (1980). Changes in properties of a newly cleared tropical Alfisols as affected by mulching. *Soil Sci. Soc. American. J.*, **44**: 827-833.

Mandal, A. and Chattopadhyay, P.K. (1994). Enfluence of mulching on soil moisture, temperature ad their effect on growth and yield of custard apple. *Adv. Plant Sci.*,**7**(2): 314-318.

Nishizawa, T. and Hori, Y. (1993). Elongation of strawberry runners in relation to length and number of cells. *Tohoku J. Agric. Res*., **43(3/4):** 87-93.

Panse, V.G. and Sukhatme, P.V. (1967). *Statistical methods for agricultural workers.* ICAR publication, NEW DELHI, INDIA.

Paustin, K., Collins, H.P. and Paul, E.A. (1997). Management controls of soil carbon. *In*: Paul, E., *et al*. (eds.), *SOM in temperate agroecosystems: Long term experiments in North America*, pp: 15-49. CRC Press Inc.

Perfit, R.I. and Stott, K.G. (1984). Effect of mulch cover and herbicides on the establishment, growth and nutrition of popular and willow cuttings. *Aspect Appl. Biol*., **5**: 305-310.

Pipattanawong, N., Fujishige, N., Yamane, K., Ijiro, Y. and Ogata, R. (1996). Effects of growth regulators and fertilizer on runner production, flowering, and growth in day-neutral strawberries. *Japan. J. Trop. Agric*., **40**(3): 101-105.

Rao, V.K. and Pathak, R.K. (1998). Effect of mulches on aonla (*Emblia officinalis* Gaertn.) orchard in sodic soil. *Indian J. Hort.*, **55**(1): 27-32.

Saroa, G.S. and Lal, R. (2003). Soil restorative effects of mulching on aggregation and carbon sequestration in a Miamian soil in Central Ohio. *Land Degradation Develop.*, **14**: 481-493.

Sharma, R.M. and Yamadagni, R. (2000). *Modern strawberry cultivation.* Kalyani Publishers, NEW DELHI (INDIA).

Shukla, A.K. (1996). Efficiency of drip irrigation and mulching on young plantation of aonla+ber cropping model in sodic soil. M.Sc.(Ag.) Thesis, Narendra Deva University of Agriculture and Technology, Faizabad, U.P. (INDIA).