Journal of Natural Sciences Research www.iiste.org
ISSN 2224-3186 (Paper) ISSN 2225-0921 (Online)
Vol.5, No.11, 2015

The Effect of Different Mulching Material on the Fruit Size and Yield of the Strawberry under the Agro-Climatic Condition of Mansehra

Adil Rehman Muhammad Shireen khan Zakaria Dr. Ahmad Abbas Malik Dr. Asghar ali Muhammad Shahid
Agricultural Research Station Baffa, Mansehra-Pakistan,PO # 21110, Mansehra, Pakistan
Email: adil_swati93@yahoo.com

Abstract
The effect of different mulching materials on the fruit size and yield of Strawberry under the agro-climatic conditions of Mansehra was studied at the Agricultural Research Station Baffa, Mansehra during the growing season 2014. The experiment was laid out in Randomized Complete Block design with three replications. There were 6 treatments including T_0 (control), T_1 (Newspaper mulch), T_2 (Black plastic mulch), T_3 (Wheat straw), T_4 (Pine needles mulch), and T_5 (Saw dust). The row length was kept 4 meter while the row spacing 45 cm. The plot size was 5.4 m^2. Results of the experiment showed that the maximum single fruit weight 13.66g was recorded for the saw dust mulch, maximum fruit diameter 3.83 cm was noted for saw dust mulch, followed by the 3.56 cm for the pine needle mulch, maximum number of fruit $plant^{-1}$ 24.60 was observed for the saw dust mulch, followed by the 19.80 for the pine needle mulch and the highest total yield 4.01 t ha^{-1} was recorded for the saw dust mulch , followed by 3.28 t ha^{-1} noted for the pine needle mulch. From the experiment it is concluded that strawberry crop mulched by straw dust gave maximum fruit size and yield under the agro-climatic conditions of Baffa, Mansehra, hence recommended for the said area for increase in the production of strawberry.

1. Introduction

Strawberry (*Frageria ananassa* Dutch) is an herbaceous perennial crop belonging to family Rosaceae. It is a small fruit crop of great nutritional and medicinal value (Maas *et al.,* 1991). Some species of strawberry are cultivated everywhere in the world i.e. *F. chiloensis* and *F. virginiana* (Moss, 1984) and shared extensively in comparison with other fruits in conjunction with grapes (Childers, 1980). Scientifically strawberry is said to be an aggregate fruit as it is derived from the receptacles rather than the plant ovary. The achenes (apparent seed) which occurs on the fruit surface is basically the ovaries of the flower with seed inside it (E-Flora, 2008).

Various berry fruits along with low growing Rubuspseudo-japonica and Japanese strawberry species were introduced in the middle of 10th and 18th centuries in the ancient world “ichibigo” in Japan (Oda and Nishimura, 2009). The Roman literature specified the strawberry fruit for its medicinal use. Because of its medicinal importance the French starts to bring the strawberry plants from forest to their gardens for cultivation in the era of 1300’s. In the era of 1364 – 1380 the France’s king Charles V cultivated about 1200 plants in his royal garden. The depressive disorders were thought to treat by using the unified strawberry plants (Wikipedia).

Strawberry is cultivated in about 73 countries of the world. United State is the largest producer as producing about 27% of the world’s total output, with an average of 1312.960 thousand metric t ha-1 (FAOSTAT, 2014). In Pakistan strawberry is cultivated on 78 hectares with 74 tonns annual production, with an average of 3.51 t ha-. The major growing areas of strawberries are Swat, Abbottabad, Mansehra, Haripur, Mardan, Peshawar, Charsadda, Gujrrat, Sialkot, Jhelum, Chakwal and Karachi (Dad, 2011).

At the end of 1500 three European species were cited; F. *vesca*, F. *moschata*, and F. *viridis*. From forest the garden strawberries were transplanted and then propagated asexually through runners (Anonymus, 2013). various types of mulches (floating sheet and black) and different growing methods i.e. conventional and organic methods in order to check its response on the growth and yield in strawberry cultivar Camarosa and Charlie. The conventional growing method with the combination of black plastic mulch in cultivar Camarosa exhibited good results in growth and production of strawberry, while the cultivar sweet Charlie showed best results in terms of phosphorus and potassium when treated with black plastic mulch and floating sheet along with organic planting media. Demirsoy *et al.* (2012)

Polyethylene and other mulching treatments (dry leaves of neem, paddy straw, dry grass, transparent polyethylene, green and red color polyethylene) in the trial to check its effect on the cultivation of strawberry. It was concluded that green polyethylene was effective on the growth of plant. On the other hand results regarding yield and flower components affected significantly by green polyethylene treatment. Sonkar *et al.* (2012)

Different type of mulches on the production and size of strawberry. Red effective mulch (SMR-red) and standard black low density polyethylene mulch (LDPE) was used. It was noticed that the color of the mulch did not show any significant reaction on the size of the profitable strawberry fruits. However, the black and red mulch had significant effects on the yield of the fruit. Locascio *et al.* (2005)

Objectives

1. To introduce new crop in the area.
2. To minimize the laborer cost on agronomic practices.
3. To improve the fruit size.

2. Method and Materials

An experiment was conducted at Agricultural Research Station Baffa Mansehra to study "The effect of different mulching material on the fruit size and yield of the Strawberry under the agro-climatic condition of Mansehra" during the growing season 2014.

The strawberry Variety Chandlar was used in the experiment. The experimental design was RCBD with three replications. There were 6 treatments including T_0 (control), T_1 (Newspaper mulch), T_2 (Black plastic mulch), T_3 (Wheat straw), T_4 (Pine needles mulch), and T_5 (Saw dust). The row length was kept 4 meter while the row spacing 45 cm. The plot size was 5.4 m^2.

3. Result and Discussion:

The average data on the various growth and yield parameters were collected and then analyzed for mean values by statistical software Statistix 8.1. The results are as follow.

3.1 Single fruit weight

The mean data in Table-1regarding the single fruit weight showed that there is a significant effect observed on strawberry by the mulching materials. The mean data revealed that the maximum single fruit weight (13.667g) was recorded for the treatment T_5 (saw dust), closely followed by the (11.367 g) T_3 (wheat straw), whereas the minimum single fruit weight (8.633g) was recorded for the T_0 control treatment. The increase in the fruit weight for the saw dust mulch was might be due to the fact that the saw dust fully cover the soil which help the soil in retaining the moisture as well as reduces the leaching down of nutrients. Saw dust also provide sufficient organic matter to the soil which help in the root movement and more adsorption of nutrient occurs which further translocated to leaves for food production. Increase in food production in the leaves ultimately increase the fruit size and weight. Our results are in resemblance with those of Sonkar *et al.* (2012) who reported that the polyethylene treatment significantly increase the growth of plants which subsequently increase the fruit weight.

3.2 Fruit Diameter

The mean data in Table-1showed that the maximum fruit diameter (3.8333 cm) was noted for T_5 (saw dust), closely followed by the (3.56 cm) T_4 (Pine Needle), where as the minimum fruit diameter (2.62 cm) was recorded for the T_0 control treatment. The increase in the fruit diameter for the saw dust mulch was might be due to the fact that the saw dust helps to modifying the soil structure. Plant incorporation with sawdust increased soil organic matter by 50% in the first year. Plant shoot and whip growth rate in both years was increased by mulching compared to un mulched plots. Linda, 2006. Saw dust provide organic matter as well as macro and micro nutrient to soil. The easily availability of these nutrients to the plant roots help in the vigorous growth of plants as well as improve the fruit size. Our results are in line with those of Ijoyah, 2005 who reported that the increase in the soil organic matter increase the fruit volume in tomato.

3.3 Number of fruit plant^{-1}

The mean data in Table-1for the number of fruit per plant showed that the maximum number of fruits per plant (24.60) were recorded for T_5 (saw dust), closely followed (19.80) by the T_4 (pine needle), while the minimum number of fruits per plant (14.13) were recorded for the T_0 control treatment which is at par with (14.20) noted for T_2 (news paper). The more number of fruit per plant produced for saw dust mulch was due to the fact that the saw dust mulch cover the soil and result in less number of weeds. Moreover, the less weed competition and availability of more resources resulted in maximum number of fruit plant-^{1} Haroon *et al*., 2014. Another reason could be that Plots with incorporated sawdust had the greatest change from baseline readings of soil nutrient availability and organic matter (OM) content. Mg levels were higher in plots with incorporated sawdust. The Mn, Mg and B, soil content were higher in incorporated plots Linda, 2006. The avalibility of these nutrient, increase in organic matter, water and nutrient holding capacity improve the plant growth and number of flowers per plant which subsequently increase the number of fruit per plant. Our results are line with those of Haroon *et al*, 2014 who stated that the in cooperation of saw dust mulch to the strawberry increase the number of fruits per plant.

3.4 Total Yield t ha^{-1}

The mean data in Table-1 regarding the total yield showed that there is a significant effect observed on strawberry by the mulching materials. The mean data revealed that the maximum total yield (4.01 t ha^{-1}) was recorded for the T_5 (saw dust), closely followed by (3.28 kg) the T_4 (pine needle), while the minimum total yield

(2.53 t ha^{-1}) was recorded for the T_0 control treatment, closely followed by (2.65 kg) noted for the T_2 (black plastic). Our results are in line with those of Clark, 1991 who stated that Sawdust mulch improved growth of high bush blueberry cultivars. Also with the Haynes and Swift, 1986, suggested that the Use of peat moss as a pre-plant amendment with a sawdust mulch increased soil organic matter content, the availability of iron (Fe) and manganese (Mn) and increase plant growth, Spiers (1998) found that the use of pine bark mulch resulted in greater plant volume and improved yield in comparison to un mulched plants.

References

Anonymous. 2013. Strawberry Plant: The Nutritional Value of Strawberries http://strawberryplants.org/2010/05/strawberry-plant/ (Retrieved in 21.11.2013: 11:01 pm)

Childers, N. F. 1980. Forword. Strawberry cultivars to marketing. Horticulture publications. Islamabad. P. 288.

Clark, J. 1991. Rabbiteye and Southern Highbush Blueberry Response to Sawdust Mulch. Arkansas Farm Research. Jan.-Feb:3.

Dad, A. 2011. Strawberry Cultivation in Charsadda-Pakistan. Hafat Roza veterinary stresses in plants. J. Plant Nut. Soil Sci. 168; 521-530.

Demirsoy, L., H. Demirsoy and G. Balci. 2012. Different Growing conditions affect nutrient content, Fruit yield and growth in strawberry. Park. J. Bot. 44(1): 124-129.

E-Flora, B. C. 2008. Electronic Atlas of the plants of British Columbia. Copy right 2008 E-Flora, B. c. All rights reserved. http://linnet.geog.ubc.ca/. (10-1-2014).

F. A. O. 2010. United National Food and Agricultural Statistical Database. http://faostat.fao.org/site/339/default.aspx. Accessed 10 Nov 2013.

Haroon, M., M. Saeed., I. Ahmad., R. Khan., S. Bibi, S. U. Khattak and Hidayatullah. 2014. Weed Density and Strawberry Yield as Affected by Herbicides and Mulching Techniques. *Pak. J. Weed Sci. Res., 20(1): 67-75.*

Haynes, R., and R. Swift. 1986. Effect of Soil Amendments and Sawdust Mulching on Growth, Yield and Leaf Nutrient Content of Highbush Blueberry Plants. Scientia Hort. 29:229-238.

Ijoyah . M.O. 2005. Effects of different levels of decomposed poultry manure on yield of beetroot (*Beta vulgaris* L.) at Anse Boileau, Seychelles. Department of Crop Production, University of Agriculture, Makurdi, Benue State, Nigeria, p. 1-5.

Linda D. W. 2006. The Effect of Pre-plant Incorporation with Sawdust, Sawdust Mulch, and

Locascio, S. J., J.P. Gilreath, S. Olson, C. M. Hutchinson and C. A. Chase. 2005. Red and Black mulch color effects production of Florida strawberries. Hort. Sci. 40(10): 69-71.

Maas, J.L., S.Y. Wang and G.J. Galletta. 1991. Evaluation of strawberry cultivars for ellagic acid content. Hort. Sci., 26: 66-68.

Moss, J. L. 1984. Compendium of strawberry diseases. The American Phytopathological Society St. Paul, Minnesota, USA. 55121:1.

Nitrogen Fertilizer Rate on Soil Properties and Nitrogen Uptake and Growth of 'Elliott' Highbush Blueberry. M-phill thesis, Oregon State University.

Oda, Y and K. Nishimura. 2009. 'Ichibo' – Japanese name of strawberry- its origin and historical change of phonogram for strawberry in japan. Acta. Hort. 842; 611-618.

Sonkar, P., R. B. Ram and M. L. Meena. 2012. Effect of various mulch materials and spacing on Growth, yield and quality of Strawberry. Hort Flora Res. Spectrum. 1(4): 323-327.

Spiers, J. 1998. Establishment and Early Growth and Yield of 'Gulfcoast' Southern Highbush Blueberry. HortScience. 33(7):1138-1140.

Table 1: Data regarding single fruit weight (gm), diameter of fruit (cm), no of fruit/plant and total yield (gm)

S. No	Treatments	Single fruit weight(gm)	Fruit Diameter (cm)	No of fruit/plant	Yield(t/ha)
1	T_0(Control)	8.63 e	2.62 e	14.13 c	2.53 e
2	T_1 (Newspaper)	8.96 de	2.25 f	14.20 c	3.07 c
3	T_2 (Black plastic)	9.36 d	2.93 d	16.13 bc	2.65 de
4	T_3 (Wheat straw)	11.36 b	3.12 c	18.60 bc	2.76 d
5	T_4 (Pine needles)	10.43 c	3.56 b	19.80 ab	3.28 b
6	T_5 (Saw dust)	13.66 a	3.83 a	24.60 a	4.01 a
7	LSD at 0.05%	0.67	0.08	4.86	1.77

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

Academic conference: http://www.iiste.org/conference/upcoming-conferences-call-for-paper/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar