International Journal of Environment and Climate Change

Volume 13, Issue 11, Page 29-33, 2023; Article no.IJECC.104103
ISSN: 2581-8627
(Past name: British Journal of Environment & Climate Change, Past ISSN: 2231–4784)

Response of Nutrients and Mulches on Qualitative Attributes of Strawberry (*Fragaria × ananassa* Duch.) cv. Chandler

Charu Shekhawat [a*], Sanjay Kumar [a], Shatrunjay Yadav [a], Pooja Meena [a], Usha Shukla [a], Deeksha Gautam [b] and Surbhi Prithiani [c]

[a] Department of Horticulture, School of Agricultural Sciences and Technology, Babasaheb Bhimrao Ambedkar (A Central University) Vidya Vhar, Rae Bareli Road, Lucknow 226025, U.P., India.
[b] Department of Fruit Science and Horticulture Technology, Odisha University of Agriculture and Technology, Bhubaneswar-751003, Odisha, India.
[c] Department of Horticulture, R.C.A., MPUAT, Udaipur, Rajasthan, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI:10.9734/IJECC/2023/v13i113140

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/104103

Original Research Article

Received: 10/06/2023
Accepted: 16/08/2023
Published: 04/10/2023

ABSTRACT

To assess the significance of mulching and nutrients on the performances of Strawberry (*Fragaria x ananassa*) with respect to the qualitative character's during 2019–20, a field experiment was carried out at the Horticulture Research Farm-1 of the Department of Horticulture, School of Agricultural Sciences and Technology, Babasaheb Bhimrao Ambedkar University (A Central University), Vidya-Vihar, Rae Bareli Road, Lucknow. The experiment was laid out in RBD having three replications. The result revealed significantly highest Tss (11.28)^{0}Brix, Total Sugar (8.89%), Reducing Sugar

**Corresponding author: E-mail: Charushekhawat95@gmail.com;*

(6.85%), Non Reducing Sugar (2.39%), Acidity (0.63%) and Ascorbic Acid (41.90 mg/100g) in treatment T_9 (Black polythene FYM 100%) followed by the treatment T_{10} (Black polythene vermi-compost 100%). Treatment T1 (the control), on the other hand, performed poorly in terms of all qualitative character's. In light of the results, it can be said that using black polythene with FYM 100%in strawberry increases all qualitative attributing characters, while black polythene with vermin-compost 100% produced the second-best results.

Keywords: Strawberry; nutrients; mulches; growth and yield.

1. INTRODUCTION

"The strawberry is one of the most major fruit crops grown in horticulture today. *Fragaria X ananassa* Duch., the current cultivated octaploid Strawberry, was developed in France. It is a member of the Rosaceae family. One of the more widely accepted soft fruits, it is also one of the most delectable and healthy options. The temperate world is where this crop is primarily cultivated. It can, however, be cultivated in a subtropical climate and even in a tropical climate at a high altitude. Strawberries may grow in a variety of soil types, from dense clays to fine sand and gravel. However, sandy loam soil with a pH of 5.5 to 6.5 is ideal for growing strawberries" Anonn [1]. "The strawberry fruit has 0.5% total sugar and 0.90% to 1.85% acidity, with mailic acid and citric acid being the two most noticeable acids. According to research 100 g of fresh strawberries include 0.7 g of protein, 0.5 g of fat, 8.4 g of carbohydrate, 0.03 mg of thiamine, 0.07 mg of riboflavin, 0.60 mg of niacin, 59.0 mg of vitamin C, 21.0 mg of calcium, 21.0 mg of phosphorous, 1.0 g of iron, 164 mg of potassium, and 1.0 mg of sodium. According to research, each kilogram of fresh fruit contains 10 to 70 grams of catechin, 10 mg of epicatechin, 10 mg of caffeic acid, 10 to 15 mg of P-coumaric acid, 10 to 35 mg of 4-hydroxybenzoic acid, 5 mg of protecatechuic acid, and 10 to 40 mg of gallic acid. The primary volatile chemicals responsible for the flavor of fruits are ethyl esters. The primary esters found in ripe fruits are ethyl butanoate and ethyl hexanoate, whereas the most prevalent free amino acids are asparagine, glutamine, and alanine" Perez et al. [2]. Strawberry leaves, green and ripe achenes and leaf tissue all contain ellagic acid, a plant phenol that has antimutagenic and anticancer properties. According to Couture et al. [3], ripe fruit has somewhat more lipid, more oleic acid, and less linoleic acid than unripe fruit. The strawberry fruit is a whole fruit that is 98% edible. The two American diploid species, Fragaria chiloensis and F. virginiana, are regarded as the parents of the cultivated strawberry *Fragaria x ananassa*, which was first domesticated in France. Worldwide, the *F. ananassa* strawberry is farmed, yet its ancestors are indigenous to the New World. While F. virginiana is found in Canada and the United States of America, *F. chiloensis* is found in Chile and along the coast from California to the Aleutian island. The only places where *F. ananassa* naturally exists are along the coasts of California, Oregon, and Washington Sologalov [4]. The diploid F. vasca is the naturally occurring species with the greatest geographic distribution; it can be found in North and South America, Europe, Asia, and Hawai'i Heike, [5]. The modern-day strawberry was first domesticated between 1714 and 1759 in Europe.

2. MATERIALS AND METHODS

During the academic year 2019–20, the experiment was carried out at Horticulture Research Farm I of the Department of Horticulture, School of Agricultural Sciences and Technology, Babasaheb Bhimrao Ambedkar University, Lucknow, India. It is located at 26056' North latitude and 80055' East longitude in the Central U.P. subtropical region. The Horticulture Research Farm is located 10 km south-east of the Lucknow Railway Station at Vidya-Vihar, close to South City in Lucknow. The average annual rainfall in this area is 650–750 mm, which is spread out over a period of more than 100 days with a peak in July–August. The temperature typically ranges from 3.50C to 450C. The coldest month is January, while May and June have the highest temperatures. The relative humidity (RH) varies throughout the year from 50 to 77%. A subtropical climate with hot, dry summers and freezing winter best describes Lucknow. The experimental farm's soil was salinized, with a pH under 8.3, an electrical conductivity over 4.0, and a sodium exchangeable percentage under 15.0 [6].

2.1 Experimental Material

In the month of October 2019, strawberry runners of the Chandler variety were transported from Kashmir (J&K)'s Central Institute of Temperate Horticulture. Before transplantation in well-prepared beds in open field condition

plots that were distributed randomly in three replications, the runners were kept in the shade for two days to harden. For the duration of the experiment, the runners were maintained according to customary cultural norms.

2.2 Planting System and Crop Management

A space measuring 18 m by 7.80 m was divided into 42 plots, each measuring 1.8 m by 1.2 m, and set up in three replications of 14 plots. The experiment was set up in R. B. D. with 14 treatments and a 45 cm between rows and 30 cm between plants spacing. An initial dose of N.P.K. fertilizer was used to prepare the field. Each bed had sixteen plants that were uniformly transplanted and watered. Between two beds, channels with water were filled. The soil surface in the bed was covered with black polythene (200 gauge) two days after transplanting, and the plots were covered with white polythene (200 gauge).

2.3 ObservationRecorded

Qualitative characters such as at room temperature, a digital hand refractometer (ATAGO Pocket 3810, PAL-1) was used to estimate the total soluble solids. By titrating the fruit pulp extract with 0.1N NaOH and using the phenolphthalein indicator, the titrable acidity was determined. The method outlined by Panse and Sukhatme (1989) was used to evaluate the acidity, Ascorbic acid, total sugar, reducing sugar, and non-reducing sugar content in fruit samples.

2.4 Statistical Analysis

According to the guidelines published by Gomez and Gomez (1984), the analysis of variance (ANOVA) for the randomised block design (RBD) was carried out using the OPSTAT (http://14.139.232.166/opstat) application. 'F' values were compared, and the critical difference (CD) was calculated at a 5% level of significance using Fisher and Yates' table.

3. RESULTSANDDISCUSSION

Farm yard manure also improves growth and yield, possibly as a result of the modification in the soil environment, namely, moderating soil temperature during early Growth of the crop which coincides with hot dry month that preserves soil moisture also contributed to increase the production of the more vegetative Growth and yield. Higher fruit quality is related to weed-free environment, higher moisture conservation, and maximum nutrient uptake under black polythene mulch treatment.

Using an Erma Hand Refractometer, the Total Soluble Solids (T.S.S.) content of strawberry fruits was measured. Table 2 shows the total soluble solid for several treatment combinations, which ranged from 7.5% to 11.28 brix. In comparison to control plants, the impacts of FYM, NPK, vermicompost, and mulched with black and white polythene dramatically boosted the total soluble solids contents of fruits. The treatment nine fruits treated with black polythene and FYM 100% had the highest total soluble solids (11.28), which was followed by the treatment ten fruits (10.18) treated with black polythene and vermicompost 100%. These findings are consistent with those made in strawberries by Patil et al. in 2004 [7].

Table 1. The details of treatments used in the experiments are given below

T_1	White Polythene
T_2	White Polythene + FYM 100%
T_3	White Polythene + vermi-compost 100%
T_4	White Polythene + NPK 100%
T_5	White polythene FYM 50%+ Vermi-compost 50%
T_6	White Polythene FYM 50% + NPK 50%
T_7	White polythene Vermi-compost 50% + NPK 50%
T_8	Black Polythene
T_9	Black polythene + FYM 100%
T1o	Black Polythene + Vermi-compost 100%
T_{11}	Black polythene +NPK 100%
T_{12}	Black Polythene FYM 50%+ Vermi-compost 50%
T_{13}	Black Polythene FYM 50%+ Vermi-compost 50%
T14	Black Polythene Vermi-compost 50%+ NPK 50%

Table 2. Response of different nutrients and mulches on qualitative attributes of strawberry

Treatments	TSS	Acidity	Ascorbic Acid	Reducing sugar	Non-reducing sugar	Total sugars
T1	7.5	0.31	27.06	5.00	1.14	6.14
T2	8.8	0.57	30.13	4.15	1.16	5.31
T3	8.65	0.55	31.73	3.42	1.14	4.56
T4	8.3	0.57	30.60	2.25	1.27	3.52
T5	8.45	0.50	32.36	3.2	1.15	4.49
T6	8.42	0.41	33.93	4.38	1.36	5.74
T7	8.49	0.39	30.16	3.56	1.36	4.96
T8	7.7	0.38	29.50	5.15	1.20	6.35
T9	11.28	0.63	41.9	6.85	2.39	8.89
T10	10.18	0.58	40.2	6.78	1.76	8.54
T11	9.2	0.547	36.72	5.9	1.8	7.30
T12	9.69	0.383	35.50	5.1	1.5	6.60
T13	9.45	0.52	34.23	4.5	1.26	5.76
T14	9.6	0.53	32.53	2.2	1.05	3.25
C.D.	1.06	0.04	3.92	0.53	0.22	0.68
S.E(m)	0.36	0.01	1.34	0.18	0.07	0.23
S.E(d)	0.51	0.02	1.90	0.25	0.11	0.33

Controlled treatment one had the lowest level of acidity (0.31%), while treatments nine and ten had the highest levels (0.63% and 0.58, respectively). According to Sharma et al. [8], mulching and planting timing had a significant impact on strawberry fruits' greater TSS (9.41%), acidity (1.17%), and ascorbic acid content (46.4 mg/100 g pulp).

The highest values for ascorbic acid clearly demonstrated that treatment T-9 (41.90 mg/100g) came in second to treatment T10 (40.20 mg/100g). The therapy T1 (control) was determined to have the lowest value (27.06 mg/100g). According to Umar et al. [9], plants given 25 percent nitrogen through FYM + 75 percent nitrogen from urea coupled with Azotobacter produced fresh strawberry fruits with the greatest TSS (6.810Brix), total sugars (4.73%), and ascorbic acid (73.71 mg per 100g) contents.

The highest levels of total sugar, reducing sugar, and non-reducing sugar were found in treatment T9 (8.89%), followed by T10 (8.54%), (6.78%), and (1.76%), respectively. However, the lowest levels of non-reducing, reducing, and total sugar were measured at 1.15, 5%, and 6.15 percent, respectively.

The treatment that was mulched with 100% FYM and black polythene had the highest estimated number of quality characters overall, followed by treatment 10 mulch of 100% black polythene and 100% vermicompost. In addition, Akash et al. [10] discovered that the administration of 50% N tree-1 through FYM + 50% N tree-1 inorganic fertilizer to fresh fruit of the guava cultivar Sardar resulted in the greatest TSS (12.920Brix) and total sugars (8.56%).

4. CONCLUSION

It is safe to say that T9 (Black polythene + FYM 100%) considerably increases the qualitative qualities, i.e. Total soluble solid (Tss), Acidity, Ascorbic acid, Total sugar, Reducing sugar, and Non reducing sugar, from the experiment with nutrients and mulches on strawberry cv. Chandler. To get better-quality strawberry fruits in Lucknow during the winter, it might be advised to strawberry growers.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Annonymous. Wealth of India, CSIR, New Delhi, India. 1956;4:57-60.
2. Perez AG, Sanz C, Olias JM. Partial purification and some properties of alcohol acyltransferase from strawberry fruits. Journal of Agricultural and Food Chemistry. 1993;41(9):1462-1466.
3. Couture R, Willemot C, Avezard C, Castaigne F, Gosselin A. Improved

extraction of lipids from strawberry. Phytochemistry. 1988;27(7):2033-2036.
4. Sologalov PV, Sedykh TV. The effect of mulching and temporary plastic covering on productivity of strawberry cultivars and forms. Ovoshevadstva I Plodovodstvo Urala. 1987:138-140.
5. Heike S, George AP, Rasmussen T, Ludders P. Effect of Plastic soil mulches on fruit growth and development of low chilling Peach cv. Florid Prince (*Prunus persica* L. Bastsch) in sub- tropical regions. J Hort Sci. 1997;72(2):187-193.
6. Singh V, Kumar S, Yadav S, Kumar L, Shukla U, Darshan D. Effect of nutrients and mulches on qualitative aspects of Strawberry (*Fragaria* × *ananassa* Duch.) cv. Chandler. The Pharma Innovation Journal. 2022;11(2):18-21.
7. Patil MB, Mohammed RG, Ghadge PM. Effect of organic and inorganic fertilizers on growth, yield and quality of tomato. Journal of Maharashtra Agricultural Universities. 2004;29(2):124-127.
8. Singh R, Sharma RR, Goyal RK. Interactive effects of planting time and mulching on 'Chandler' strawberry. Sci. Hort. 2007;111:344-351.
9. Umar I, Wali VK, et al. Effect of Subabul (*Leuceana leucocephala*), Urea and biofertilizer application on groeth, yield of strawberry cv. Chandler. Applied Biological Res. 2010;(12):50-54.
10. Akash S, et al. Effect of integrated nutrient management strategies on nutrient status, yield and quality of guava. Indian J. Horti. 2013;70(3):333-339.

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The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/104103