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Varietal screening of strawberry (*Fragaria x ananassa* Duch.) cultivars under shade net condition for fruit quality and yield in Rajnandgaon district of Chhattisgarh plain, India

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Abstract

To determine the performance and qualitative character of various strawberry cultivars in the Rajnandgaon district of the Chhattisgarh plain, an experiment was carried out at the Horticulture Farm, Pt. K. L. S. College of Horticulture Rajnandgaon, IGKV, Raipur (C.G.). The experiment was carried out using a Randomized Block Design (RBD) with six treatments and three repetitions. T₁ (Nabila), T₂ (Camarosa), T₃ (Flavia), T₄ (Flaminia), T₅ (Rania), and T₆ (Capri) were the six treatments. The findings showed that Flaminia, Camarosa, and Nabila generated the maximum fruit yields, with treatments T₁ Nabila in 34.95 t/ha. Nabila, Rania, and Flavia had greater levels of T.S.S., total sugar, and reducing sugar, respectively, trends. Camarosa and flavia had the highest ascorbic acid and acidity concentrations.

Keywords: Strawberry, yield, quality, Nabila, Camarosa, Capri

Introduction

The current cultivated strawberry (*Fragaria x ananassa* Duch.) is a cross between the octoploid species *Fragaria chelonensis* Duch and *Fragaria virginiana* Duch, which are both primarily dioecious. It is mostly a short-lived perennial herbaceous plant that thrives in temperate climates. As the crop is ready for harvest within six months of planting, it is one of the few crops that offers rapid and extremely high yields per unit of capital investment area (Bakshi *et al.*, 2014) ^[1]. Linalool and non-anal are the two primary ingredients in strawberry oil (Khanizdeh and Belanger, 1997) ^[4]. Ellagic acid, a naturally occurring plant phenol, has been discovered to prevent tumor disorders in strawberries (Danial *et al.*, 1989) ^[14]. This fruit's regular eating also manages asthma (Mangal, 1998) ^[6]. According to Singh and Sharma (1970; Mitra, 1991) ^[7], the fruit's red color is mostly caused by an anthocyanin called 3-monoglycoside pelargonidine and traces of cyanidin. It is eaten for its flavor rather than for its nutritional content. Strawberries are processed into a variety of value-added goods in addition to desserts, including canned strawberries, jam, jelly, ice cream, frozen strawberries, wine, and other soft beverages. Fresh, ripe strawberries are an abundant source of vitamins and minerals, and they are particularly high in vitamin A (17 IU) and vitamin C (84.7 mg/100 g). Although strawberries are grown all over the world, the United States is the greatest producer, generating approximately 1.3 million tons in 2010 and making up 30% of all strawberries produced globally (Morgan, 2012) ^[9]. The crop strawberry is less well-known in Chhattisgarh. According to the ADH office in Balrampur (2016), it was grown only in the districts of Ambikapur and Surajpur, where it produced 12.50 MT and 12.00 MT, respectively. Strawberry is a new crop in Chhattisgarh for farmers or producers, and its growing practices are quite specialized for its marketing, including picking the right variety, when to plant corridors, what nutrients are needed, and how to use management techniques. weeds, illnesses, pests, and water. To enable farmers to cultivate crops profitably, cultivation methods must be standardized depending on the climate zone of Chhattisgarh. The crop strawberry is less well-known in Chhattisgarh. According to the ADH office in Balrampur (2016), it was grown only in the districts of Ambikapur and Surajpur, where it produced 12.50 MT and 12.00 MT, respectively. Strawberry is a new crop in Chhattisgarh for farmers or producers, and its growing practices are quite specialized for its marketing, including picking the right variety, when to plant corridors, what nutrients are needed, and how to use management techniques.

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Materials and Methods

From October 2018 to March 2019, the experiment was carried out at the Horticulture Research Farm of the Pt. Kishori Lal Shukla College of Horticulture and Research Station in Rajnandgaon (C.G.). Geographically, it lies between latitudes 17°14'N and 24°45'N and between longitudes 79°30'E and 84°15'E. Rajnandgaon is located on the Shivnath river's bank between the coordinates 21°06'N and 81°02'E, 307 meters above mean sea level.

Nabila (T₁), Camarosa (T₂), Flavia (T₃), Flaminia (T₄), Rania (T₅), and Capri (T₆) were the six strawberry cultivars used in the experiment as planting material. Three duplicates of each strawberry sapling from the six different strawberry kinds were planted in a randomized block pattern. On October 26, 2018, experimental plant material was planted. For enhanced crop growth, suggested fertilizers and another set of cultural techniques were employed. For the experiment, 540 plants that were robust, healthy, devoid of illnesses, insect-pest, and well-rooted propagation material were chosen. All plants have been cared for using the same cultural techniques, such as irrigation and fertigation. Following the random selection of five competitive plants from each plot, the observations listed below were made. On the basis of five plants for each cultivar in each observation, the mean value was computed. Each plot's five fruits were chosen for quality inspection. Vernier calipers were used to measure the fruit's length and diameter, and an electronic balance was used to determine the fruit's weight. The number of plants per hectare, which was determined based on the survival percentage of the plants for that specific plot, was multiplied by the fruit output per plant of each plot. Total soluble solids were measured in each replication's juice made from a random selection of fruits from all species.

Research findings and discussion

The following titles describe the findings of the testing of several quality and yield performance parameters:

Fruit weight (g)

According to Table 1, the heavier fruits were harvested from the Nabila treatment (26.95), which was statistically comparable to Flaminia (23.71), Camarosa (22.19), and Rania (19.28), while Capri (14.66) produced the lighter fruits. According to Morgan (2006) [10], the amount of achenes generated, which is determined by pollination and fertilization during flowering, determines the final size and shape of the berry.

Fruit length (cm)

The information (Table 1) revealed a sizable difference in fruit length between types. It turned out that Nabila had the fruit with the longest length (4.16 cm), though it was on par with Flaminia's (3.69 cm), while Capri's (2.96 cm) was the shortest. Fruit size variations may result from genotype genetic differences. The findings of Dwiwedi *et al.* (2004) [3] in the frigid climate of Ladakh support this fact.

Fruit diameter (cm)

The information in Table 1 demonstrated that there were

considerable differences across cultivars in the average diameter of the fruit. Nabila had the largest diameter (3.15), which was statistically comparable to Camarosa's (3.09), Rania's (2.80), and Capri's (2.75). The ability of the fruits to accumulate assimilates may be the cause of this variation in the diameter of the fruit.

T.S.S. (°Brix)

According to the findings (Table 1), Flavia had the lowest TSS, followed by Nabila (12.09%) and Rania (11.43%) in terms of high-quality fruit. During the growth and maturation of the strawberry, the soluble solids content was more influenced by environmental factors than by genetic inheritance (Shaw, 1990) [16].

Ascorbic acid (mg/100 g)

The ascorbic acid content of the Flaminia and Camarosa cultivars was statistically higher than that of the other cultivars, but the Rania and Capri cultivars had the lowest levels (Table 2). When compared to fruits collected and studied at higher elevations, the fruits at the lowest altitude on Earth had a lower quantity of ascorbic acid because the oxygen concentration there caused more ascorbic acid to be oxidized. In support of this claim, Klimczac (1988) [5] noted that strawberries cultivated at higher elevations (860 m) have more ascorbic acid.

Acidity (%)

According to the information in Table 1, Flaminia (0.80) and Camarosa (0.70) had the greatest acidity levels, while Nabila (0.58) had the lowest. The difference between day and night temperatures, which is extremely little, may account for a strawberry's lesser acidity, whilst colder nights and warmer days can help to summarize an increase in acidity as noted by Wani *et al.*, (2007) [17].

Total Sugars (%)

Nabila (7.13), who had a significant response in the percentage of total sugar and was statistically comparable to Rania (6.93) and Flavia (6.47), had the highest response. The results of Belakhud *et al.*, (2015) [2], who found that the Fenmenal cultivar had the lowest percentage of total sugar and the Belrubi cultivar had the highest, were closely related to the lowest content, which was measured in Flaminia (4.93).

Reducing Sugars (%)

According to the statistics in Table 1, Nabila's therapy resulted in the highest percentage (6.26) of sugar decrease, which was statistically comparable to Rania's (6.12), Flavia's (5.85), Camarosa's (5.81), and Capri's (5.75). In the treatment with Flaminia, lowering sugars made up a much smaller percentage (4.51) of the total sugars. Due to the high temperature (which increased breathing) and the geographic location of the trial site (placed at a lower altitude), the sugar decrease content in all treatments was lower. Again, the earlier discovery is supported by Klimczac (1988) [5], who noted that strawberries grown at higher altitudes had a larger sugar content.

B:C ratio

All cultivars had significantly different B: C ratios, with Nabila (2.43) having the highest value, followed by Camarosa and Flavia, and Capri (1.10) having the lowest value (Table

1). This contrasts with the findings of Das *et al.*, (2015), who found that the Festival of cultivars had the highest B: C ratio (2.92) and the lowest B: C ratio (2.43) under the conditions of Bihar. Because the climate and photoperiod were used more effectively, the cost-benefit ratio would appear to be higher. According to the findings, the Nabila variety had the highest yield and best-sized fruits out of the six varieties. Maximum TSS, total sugar, and reducing sugar percentages were recorded in Nabila. At the same time, Nabila displayed the

lowest acidity percentage among the treatments. Camarosa had the highest ascorbic acid concentration, while Rania had the lowest. Among the treatments, Nabila produced the highest yield of marketable fruits and has a better B:C ratio (2.43), making it the most economically viable option. All cultivars had significantly varying B: C ratios, with Nabila (2.43) having the highest, followed by Camarosa and Flavia, and the lowest B: C ratio being found in Flavia.

Table 1: This table show on different treatment of Fruit weight and Ascorbic acid characters

Treatment	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	T.S.S. (°Brix)	Ascorbic acid (mg/100 g)
T ₁	26.95	4.28	3.15	12.09	77.35
T ₂	22.91	3.47	3.09	10.09	80.68
T ₃	17.00	3.62	2.51	11.01	71.38
T ₄	23.71	3.69	2.78	9.82	83.23
T ₅	19.28	3.16	2.80	11.43	69.01
T ₆	14.66	2.96	2.75	10.08	61.68
S.Em±	1.02	0.14	0.14	0.14	1.94
CD at 5%	3.12	0.44	0.43	1.25	5.89

Table 2: This table show on different treatment on Acidity and B:C ratio characters

Treatment	Acidity (%)	Total Sugars (%)	Reducing Sugars (%)	Yield Per hectare (tone)	B:C ratio
T ₁	0.57	7.13	6.26	34.94	2.43
T ₂	0.70	6.11	5.81	27.49	2.05
T ₃	0.62	6.47	5.85	19.33	1.83
T ₄	0.8	4.93	4.51	24.28	1.68
T ₅	0.62	6.90	6.12	14.61	1.59
T ₆	0.64	6.24	5.72	13.79	1.10
S.Em±	0.03	0.15	0.22	3.48	0.16
CD at 5%	0.11	0.46	0.68	10.57	0.50

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