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Performance of strawberry varieties in different planting dates under agro-climatic conditions of hill zone of Assam

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Abstract

A field trial was conducted at Assam agricultural University, Zonal Research Station, Diphu, with the objective to identify suitable variety and optimum time of planting for cultivation of strawberry in hill zone of Assam. Three varieties viz., Chandler, Festival and Sweet Charlie were tested in four dates of planting, such as 15th October, 15th November, 15th December and 15th January in the trial conducted in split plot design. Among the varieties tested, highest berry weight (14.89 g) and highest yield (186.8 g/plant) was obtained in variety Chandler. Highest number berry per plan (19.20) and longest harvest duration (65.0 days) was recorded in variety Sweet Charlie. The yield performance of Sweet Charlie (182.4 g/plant) was at par with that of Chandler. Thus, both varieties Chandler and Sweet Charlie were considered suitable for cultivation in the region. Among the planting dates, 15th November was found most suitable with highest nos. of berry per plant (29.15), highest yield (298.7 g/plant) better quality fruits with highest TSS and sugar content (7.06 °Brix 6.04% respectively).

Keywords: Strawberry, varieties, planting time, hill zone, Assam

Introduction

Strawberry (*Fragaria ananasa* Duch.) is one of the attractive high value fruit grown all over the world. It belongs to the family Rosaceae and is native of America. The fruit is popular for its pleasant aroma, attractive colour, nutrient compositions and pharmaceutical properties (Rahman *et al.*, 2015) ^[11]. Strawberry is consumed as raw fruit and also processed for preparing jams, jellies, squashes, ice creams, canned berry, wine and other soft drinks (Mitra, 2004; Joshi *et al.*, 2005) ^[10, 8]. Strawberry basically, is a fruit plant of temperate climate. However, in recent years, with the introduction of day neutral varieties, its cultivation is spreading to tropical and subtropical plains of India (Sharma and Sharma, 2004) ^[3]. In Assam also the crop is gaining popularity since past few years and some growers in the hill zone of the state comprising of Karbi Anglong and Dima Hasao districts have started commercial cultivation of the crop. But, the available information for successful cultivation of the strawberry in these localities is very scanty. Choice of cultivars is of paramount importance for successful strawberry cultivation (Asrey and Singh, 2004; Ahsan *et al.*, 2014) ^[2, 1]. Choosing an appropriate planting date is also one of the most important decision-making steps to achieve the desired quality and performance in strawberry and production. The effect of different planting dates on growth and fruit quality parameters has been demonstrated in various previous research works. Bhamini *et al.*, (2017) ^[3] reported significant effect of planting time planting time on growth and quality parameters of strawberry. Due to inadequate information on specific growing conditions and suitable cultivars, its commercial cultivation could not become popular in a state like Assam. Under these circumstances, an experiment has been conducted to evaluate the best cultivar and date of planting for hill zone of Assam conditions.

Materials and Methods

The present experiment was carried out at Zonal Research Station, Diphu, Assam Agricultural university (25^o44' N and 94^o10' S with 186 m above mean sea level) The soil of

the experimental plot was a sandy loam having pH of 5.06. The study was conducted with 03 (three) varieties of strawberry viz., Chandler (V-1), Festival (V-2) and Sweet Charlie (V-3) and 04 (four) planting dates viz. 15th October (S-1), 15th November (S-2), 15th December (S-3) and 15th January (S-4) under open field conditions. The experiment was laid out in split plot design with three replications, keeping the varieties in main plot and planting dates in sub plot. Tissue cultured planting materials with uniform and healthy crown and well developed root systems were planted in 15 cm raised beds with spacing of 30 cm x 45 cm. Each treatment contained three number of replication accommodating 12 (twelve) plants in each plot. Observations were recorded at proper time during the crop cycle. quality parameters were analyzed using standard procedure.

Results and Discussion

1. Growth and yield parameters

1.1 Effect of variety

The varieties differed significantly with respect to their growth, yield and its attributes in the present study (Table-1). Differences in growth and yield performance of strawberry varieties was recorded by various authors including Singh *et al.*, (2008) [14] and Das *et al.*, (2015) [5]. Plant spread and Number of runners per plant were recorded highest (27.44 cm and 8.64 respectively) in variety Sweet Charlie (V-3). Variety Sweet Charlie also produced highest (19.20) number of berry per plant followed by variety Chandler with 17.95 nos. while the berry weight was highest (14.89 g) in variety Chandler, closely followed by variety Festival with 14.68 g. Harvest duration was found longest (65.0 days) in variety Sweet Charlie followed by Chandler with 62.2 days. Highest yield per plant (186.8 g.) was recorded in variety Chandler which was mostly contributed by its highest berry weight and higher number of berry per

plant. Kumar and Ahad (2012) [9] also reported superiority of variety Chandler in terms of growth and yield for cultivation in South Kashmir.

1.2 Effect of planting time

Differences in planting time exposes the plants to variation in day and night temperature, day light intensity and photoperiod, which effect the floral induction, fruit size, quality and yield because 90-95% of plants dry weight is derived from photosynthesis (Biscoe and Gallagher, 1978). In the present study, significant differences were observed in various growth, yield attributing characters and yield due to the effect of planting time (Table. 2). Plant spread was found to be highest (25.44 cm) in 15th November planting (P-2) while it was lowest (20.19 cm) in 15th January planting (P-4). Highest number of runners per plant (7.35) was also recorded in P-2. Nos. of berry per plant was found to be highest (29.15) in 15th November planting (P-2) which declined sharply in 15th December and 15th January planting (P-3 and P-4). Berry weight was also found to be highest (15.10 g) in 15th November planting (P-2) and it differed significantly from other treatments. Lowest berry weight (8.30 g.) was recorded in mid January planting (P-4). Plants of 15th January planting (P-4) took least number of days (60.0) for first picking while it took highest number of days (78.0) in mid October planting (P-1). Longest harvest duration (72.0 days) was recorded in mid November planting (P-2) and it was lowest (52.8 days) in mid January planting (P-4). Higher number of berry per plant, higher berry weight and longer harvest duration attributed towards highest yield per plant (298.7 g.) in mid November planting (P-1) and it was lowest (35.7 g.) respectively in mid January planting (P-4). Differences in plant growth, yield and quality of strawberry in different time of planting was also reported by Tanuja and Rana (2024) [15].

Table 1: Effect of of variety on growth and yield parameters

Treatments	Plant spread (cm)	No of runners per plant	No. of berry per plant	Berry weight (g)	Yield per plant (g)	Days taken for first harvest	Harvest duration (days)
Chandler (V-1)	24.18	7.09	17.95	14.89	186.8	72.0	62.2
Festival (V-2)	23.08	6.00	16.00	14.68	169.0	68.0	60.0
Sweet Charlie (V-3)	27.44	8.64	19.20	11.42	182.4	78.0	65.0
CD at 0.05	2.44	1.20	2.78	2.22	6.09	5.88	4.32

Table 2: Effect of planting time on growth and yield parameters

Treatments	Plant spread (cm)	No of runners per plant	No. of berry per plant	Berry weight (g)	Yield per plant (g)	Days taken for first harvest	Harvest duration (days)
15 th Oct (P-1)	21.75	6.11	21.80	13.35	240.5	78.0	60.5
15 th Nov (P-2)	25.44	7.35	29.15	15.10	298.7	75.0	72.0
15 th Dec (P-3)	22.35	5.67	13.20	10.00	99.3	67.0	60.0
15 th Jan (P-4)	20.19	5.44	4.89	8.30	35.7	60.0	52.8
CD at 0.05	2.40	1.29	3.50	2.05	9.20	6.87	4.99

2. Quality parameters

2.1 Effect of variety

Results of the present experimentation showed considerable variation in quality parameters due to effect of variety. (Table 3). Highest value of TSS (7.92^oBrix) was recorded in variety Sweet Charlie (V-3) and the lowest (7.00) in variety Festival (V-2). Titrable acidity was highest in variety Festival (0.65%) and the lowest value in variety Sweet Charlie (0.60%). Ascorbic acid content was found highest (30.29 mg/100 g.) in variety Sweet Charlie followed by

Chandler with 28.24 mg/100 g. In the present experiment, significant variations were also observed in the percentage of total sugar, reducing and non reducing sugar. The highest value of total sugar (5.32%), reducing sugar (3.00%) and non reducing sugar (2.25%) were observed in variety Sweet Charlie (V-3). Variety Chandler (V-1) recorded 5.14, 2.85 and 2.14 percent of total sugar, reducing sugar and non reducing sugar respectively, which were at par with the respective values of variety Sweet Charlie. The variation in sugar content might be due to varied rate of hydrolysis of

starch into soluble sugars such as glucose, sucrose and fructose. The results are in line with experiment of Jami *et*

al., (2015) [7].

Table 3: Effect of variety on quality parameters

Treatments	TSS (^o Brix)	Titration acidity (%)	Ascorbic acid (mg/100 g)	Total sugar (%)	Reducing Sugar (%)	Non Reducing Sugar (%)
Chandler (V-1)	7.80	0.62	28.24	5.14	2.85	2.14
Festival (V-2)	7.00	0.65	25.24	4.45	2.35	2.00
Sweet Charlie (V-3)	7.92	0.60	30.29	5.32	3.00	2.25
CD at 0.05	0.88	0.03	2.72	0.32	0.41	0.24

2.2 Effect of planting time.

Quality parameters of strawberry differed significantly due to effect of planting time. TSS was found highest (7.06 ^oBrix) in 15th November planting (P-2) and decreased gradually in later planting dates. This might be due to exposure to more favourable environment in long day condition with more time for sugar and acid accumulation. The favourable temperature especially in night during fruit growth and ripening leads to higher TSS content (Sharma and Sharma, 2002) [12]. Ascorbic acid content of fruits also found to be highest (29.24 mg/100 g) in 15th November planting. The

mean values for total sugar, reducing sugar and non reducing sugar were significantly higher 15th November planting (6.04%, 3.09% and 2.63% respectively) while 15th January planting recorded lowest values for all three parameters. The variation in total sugar content might be due to exposure of plants to different length of sunlight, which is needed hydrolysis of starch into sugars. The results are in agreement with the findings of Singh *et al.*, (2008) [14]. Higher values for TSS, ascorbic acid and sugars in strawberry fruits of mid November planting was also reported by Gogoi *et al.*, (2023) [6] in Assam condition.

Table 4: Effect of planting time on quality parameters

Treatments	TSS (^o Brix)	Titration acidity (%)	Ascorbic acid (mg/100 g)	Total sugar (%)	Reducing Sugar (%)	Non Reducing Sugar (%)
15 th Oct (P-1)	6.93	0.61	22.89	5.19	2.77	2.25
15 th Nov (P-2)	7.06	0.56	29.24	6.04	3.09	2.63
15 th Dec (P-3)	6.95	0.61	29.10	5.93	2.93	2.59
15 th Jan (P-4)	6.73	0.59	24.93	4.60	2.26	2.12
CD at 0.05	0.64	0.03	2.12	0.37	0.22	0.39

Conclusion

In the present study, the highest number of berry per plant was recorded in variety Sweet Charlie followed by variety Chandler. Berry weight was highest in Variety Chandler. Yield performance was recorded highest in variety Chandler followed by Sweet Charlie and both were statistically at par. Quality aspects in terms of TSS and sugars were superior in variety Sweet Charlie. Considering these findings, variety Chandler and Sweet Charlie can be recommended for cultivation in hill zone of Assam. On the other hand, 15th November planting was found to be best for higher yield and quality and thus, mid November can be prescribed as optimum time of planting strawberry in the region.

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