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Evaluation of Strawberry Cultivars for Central Midland Regions of Kerala

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Abstract

A research trial was carried out in the experimental field of Department of Fruit Science, College of Agriculture, Thrissur, Kerala during two seasons (2016-2018) to evaluate the performance of strawberry cultivars. One month old tissue culture plants of eight strawberry cultivars viz., Hadar, Sweet Charlie, Sabrina-1, Sabrina, Crystal, Winter Dawn, Gili and Barak were planted at 30 x 40 cm apart on the raised beds during last week of September. The design of experiment was randomized block design (RBD). The results of the study indicated that out of the cultivars tried, the strawberry cv. Sabrina-1 proved to be best in producing maximum plant height and plant spread while cv. Winter Dawn recorded maximum number of leaves, number of crowns, number of flowers, number of clusters and yield per plant. Variety Gili was the least among all these parameters. Hence the variety Winter Dawn can be recommended for cultivation in the Central midlands of Kerala.

***Key words*:** Strawberry, Winter dawn, Gili, Hadar, Sweet charlie, Sabrina-1, Sabrina

Strawberry (*Fragaria x ananassa* Duch.) is one of the most delicious, soft fruit of the world, having pleasant distinctive flavour and a tantalizing aroma [1]. Its unique appeal lies in its combination of a sweet yet tangy taste, which delivers a burst of flavor with every bite. The fruit's characteristic soft texture enhances its melt-in-the-mouth experience, making it a favorite in both fresh and processed forms. Strawberries are distinguished by their vibrant red color, which is complemented by a glossy surface and tiny, embedded seeds [2]. Beyond their visual allure, the fruit exudes a distinctive, pleasant aroma that is both tantalizing and instantly recognizable. This combination of flavor and fragrance has made strawberries a versatile ingredient in a wide range of culinary applications, from desserts and beverages to jams and sauces. Their sensory appeal, coupled with their nutritional benefits, including high levels of vitamin C, antioxidants, and dietary fiber, underscores their global popularity as a fruit that is both delicious and health-promoting [3].

Strawberries are native to North America and belongs to the family Rosaceae. It is a herbaceous, perennial plant and the fruit is an aggregate fruit (etaerio of achenes). It is among the few fruit crops which gives quick and very high returns per unit area on capital investment [4]. In India, it is commercially grown in Mahabaleshwar (Maharashtra), Haryana, Punjab, Uttar Pradesh, Arunachal Pradesh, Jammu and Kashmir, Uttarakhand and Himachal Pradesh. In Kerala, strawberry is mainly cultivated in Idukki and Wayanad districts. It is a highly nutritious fruit with rich source of vitamins mainly vitamin A, B, C and niacin, minerals like potassium, calcium, phosphorous and has high pectin content also. Health benefits of strawberry include properties like anticarcinogenic, antidiabetic, antiobestic, etc. [5], because of the presence of high amounts of antioxidants such as ellagic acid, anthocyanins such as pelargonidin, and rich source of fibre content. Earlier research studies shown that strawberry can be grown in Central midlands of Kerala. At present, farmers are growing several strawberry cultivars. Choice of cultivars suitable to different agro-climatic conditions of Kerala is of paramount importance for successful production of strawberry. Keeping this in view, a study was conducted to evaluate the performance of strawberry varieties for the farmers of Central midland regions of Kerala.

MATERIALS AND METHODS

The study was carried out in the open field of fruit orchard in Department of Fruit Science, College of Agriculture, Thrissur during 2016-2017 and 2017-2018. It is located at 10° 31’ N latitude and 76° 3’ E longitude, at an altitude of 22.25 m above mean sea level and enjoys the typical warm humid tropical climate of Kerala. The soil type is sandy loam. Minimum to maximum temperature ranges from 22.65 °C to 33.42 °C. The experiment was laid out in randomized block design (RBD) with eight varieties and three replications. One month old tissue culture plants of eight strawberry varieties viz. Hadar, Sweet Charlie, Sabrina-1, Sabrina, Crystal, Winter Dawn, Gili and Barak were planted on raised beds of size 1.6 x 2.1 m^2 with a spacing of 50 cm between beds. Twenty-four plants of a particular variety were planted in each bed during the last week of September and mulched with black polyethylene. Data were recorded for several vegetative attributes, floral attributes and yield. Ten randomly selected plants from each bed was used for documentation. Monthly

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observation of vegetative attributes from November to March were recorded. Flowering attributes and yield were also recorded. Statistical analysis of data was carried out by two factor analysis (pooled over seasons) [6].

RESULTS AND DISCUSSION

Vegetative attributes

Plant height

The results obtained on the vegetative growth of strawberry recorded significant differences among different strawberry cultivars. Sabrina-1 recorded maximum plant height during the entire stage of plant growth (23.77 cm) while Gili recorded minimum plant height (12.35 cm) during all stages of growth (Table 1). Similar trend was observed in strawberry cv. Winter Dawn which recorded 17.13 cm in Central midlands [7]. The increase in height might be due to low temperature (21.9 °C) and high relative humidity (68%) in the current cropping season compared to the earlier research which recorded temperature of 24.24 °C and relative humidity of 64.71% [7].

Number of leaves

During 1 MAP, Sabrina-1 recorded maximum number of leaves (5.51). From 2 MAP to 5 MAP, Winter Dawn recorded maximum number of leaves of 18.18, 38.72, 58.15 and 56.39 respectively (Table 1). Earlier similar trend was recorded in strawberry cv. Winter Dawn which recorded maximum number of leaves in Central midlands of Kerala (63.04) [8]. Variation with respect to number of leaves per plant could be attributed to the fact that different cultivars may react differently to photoperiod, light and temperature. So, there is a corresponding increase in the length of epidermal and parenchyma cells, higher rate of cell division and cell elongation in sub apical meristem of strawberry shoots which might led to the production of higher number of leaves per plant of strawberry. This is in accordance with the findings of Strik [9] in strawberry.

Table 1 Plant height and number of leaves of strawberry varieties

Varieties	Plant height (cm)					Number of leaves				
	1MAP	2MAP	3MAP	4MAP	5MAP	1MAP	2MAP	3MAP	4MAP	5MAP
Hadar	11.67	15.68	18.37	19.80	20.80	3.68	16.81	26.99	38.19	36.38
Sweet Charlie	12.61	15.14	16.97	18.06	19.02	4.04	13.79	21.20	29.43	27.90
Sabrina-1	13.04	17.47	20.46	22.65	23.77	5.51	17.10	34.02	49.93	48.48
Sabrina	9.83	11.83	12.85	14.42	15.77	3.67	7.40	17.24	28.18	27.23
Crystal	9.32	13.40	15.45	17.85	19.27	3.38	11.72	21.11	30.87	29.64
Winter Dawn	12.43	15.68	20.17	22.45	23.37	5.13	18.18	38.72	58.15	56.39
Gili	4.78	8.09	10.16	11.34	12.35	3.33	5.94	10.77	13.18	12.10
Barak	5.92	8.56	13.23	16.87	18.08	3.83	7.22	12.26	17.39	16.64
CD	1.17	1.08	0.69	0.59	0.50	0.54	1.35	1.8	2.29	2.24

Fig 1 Winter Dawn variety with maximum vegetative, floral and yield attributes

Plant spread

At 1 MAP and 2 MAP, Hadar recorded maximum plant spread of 12.69 cm and 18.79 cm respectively. At 3 MAP, 4 MAP and 5 MAP, Sabrina^{-1} recorded plant spread of 24.50 cm, 34.64 cm and 37.52 cm respectively (Fig 1). Gili recorded minimum plant spread (15.89 cm) during all stages of growth (Table 2). The favourable environmental conditions would influence the production of more plant height in cv. Sabrina-1 might have ultimately resulted in more plant spread also.

Number of crowns

There is no significant difference in the number of crowns during 1 MAP. At 2 MAP, Sabrina 1 and Winter Dawn recorded maximum number of crowns of 2.40. At 3 MAP and

4 MAP, Sabrina-1 recorded maximum number of crowns 3.03 and 3.31 respectively (Table 2). At 5 MAP, Winter Dawn recorded maximum number of crowns (3.88). The number of crowns was found some co-relation with production of leaves. The variation in number of crown might be due to the fact that varieties which produce maximum number of leaves might lead to the production of more number of crowns.

Table 2 Plant spread and number of crowns of strawberry varieties

Varieties	Plant spread					Number of crowns				
	1MAP	2MAP	3MAP	4MAP	5MAP	1MAP	2MAP	3MAP	4MAP	5MAP
Hadar	12.69	18.79	24.41	28.48	29.77	1	1.06	1.17	1.27	1.47
Sweet Charlie	5.85	10.47	14.98	19.12	20.36	1	1.00	1.00	1.00	1.00
Sabrina-1	9.66	17.76	24.50	34.64	37.52	1	2.40	3.03	3.31	3.41
Sabrina	5.52	10.40	15.57	18.50	20.31	1	1.13	1.13	1.17	1.20
Crystal	6.18	11.06	17.96	22.51	25.19	1	1.14	1.27	1.34	1.38
Winter Dawn	6.44	11.84	18.91	31.20	34.17	1	2.40	2.63	3.30	3.88
Gili	5.58	8.61	11.64	14.75	15.89	1	1.00	1.00	1.03	1.07
Barak	6.32	10.43	12.87	17.92	19.03	1	1.00	1.00	1.16	1.16
CD	1.46	1.46	1.56	2.17	2.68	NS	0.16	0.16	0.26	0.4

Table 3 Flowering and yield attributes of different strawberry cultivars

Varieties	Days to first flowering	Number of clusters	Number of flowers	Number of fruits	Yield per plant
Hadar	75.33	1.67	2.63	2.38	19.41
Sweet Charlie	93.00	0.00	1.27	0.90	5.93
Sabrina-1	90.83	3.17	4.63	3.57	36.29
Sabrina	101.17	0.17	1.55	0.90	2.59
Crystal	55.83	0.00	1.50	1.17	5.93
Winter Dawn	49.00	5.67	8.13	4.85	44.53
Gili	96.33	0.00	1.10	0.73	1.65
Barak	101.50	0.00	1.20	0.87	6.73
CD	1.02	0.48	0.37	0.26	4.09

Fig 2 Strawberry varieties

Flowering

Days to first flowering

Minimum number of days to first flowering was recorded by Winter Dawn (49.00 days). Maximum number of days to first flowering was recorded by Barak (101.50 days) (Table 3). The variation in the time of flowering among different strawberry cultivars may be probably due to the fact that different cultivars differ widely in their chilling requirement and plants of varieties which showed early flowering were capable of growing and producing early flowers without a prolonged chilling period [10-11]. Similar findings were also recorded with Aslam [12].

Number of flowers

Maximum number of flowers was recorded by Winter Dawn (8.13). Minimum number of flowers per plant was recorded by Gili (1.10) (Table 3). Maximum number of leaves (56.39) and number of crowns per plant (3.88) were observed with variety Winter Dawn in Central midlands, which might have influenced the production of maximum number of flowers per plant.

Number of clusters

Maximum number of clusters was recorded by Winter Dawn (5.67). Varieties Sweet Charlie, Crystal, Gili and Barak produced no clusters (Table 3). Winter Dawn recorded maximum number of flowers per plant. This may be the reason for having higher number of clusters per plant.

Number of fruits

Winter Dawn recorded maximum number of fruits (4.85) and the lowest number of fruits was recorded by Gili (0.73) (Table 3). The number of flowers per plant recorded maximum in case of variety Winter Dawn which may lead to the production of more number of fruits per plant (Fig 2). These findings were in accordance with the earlier reports of Beniwal *et al*. [13], Baumann *et al*. [14], Belakhud *et al*. [15].

Yield

Winter Dawn recorded the maximum yield per plant of 44.53 g per plant and the lowest yield per plant was recorded by Gili of 1.65 g (Table 3). he yield per plant among the strawberry cultivars in the table varies significantly, reflecting differences in productivity. The cultivar Winter Dawn demonstrates the highest yield per plant at 44.53 g, making it the most productive among the varieties tested. This is followed by Sabrina-1, with a yield of 36.29 g, indicating its strong potential as a high-yielding cultivar. On the other hand, cultivars such as Hadar and Sweet Charlie produce moderate yields of 19.41 g and 5.93 g, respectively [16]. Crystal also yields 5.93 g, showing similar productivity to Sweet Charlie. However, Sabrina and Gili exhibit the lowest yields, with 2.59 g and 1.65 g, respectively, suggesting limited productivity under the conditions of the study. Barak yields slightly better at 6.73 g, but it remains on the lower end of the spectrum. These results indicate significant variation in the yield potential of different strawberry cultivars, with Winter Dawn and Sabrina-1 being the most promising for higher productivity [17].

CONCLUSION

From the present study it was concluded that variety Winter Dawn showed better results than other cultivars for vegetative characters such as number of leaves and number of crowns. Winter Dawn also recorded maximum floral and yield attributes.

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LITERATURE CITED

1. Kher R, Baba JA, Bakshi P. 2010. Influence of planting time and mulching material on growth and fruit yield of strawberry *cv*. Chandler. *Indian Jr. Horticulture* 67: 441-444.
2. Abouelenein D, Acquaticci L, Alessandroni L, Borsetta G, Caprioli G, Mannozzi C, Marconi R, Piatti D, Santanatoglia A, Sagratini G. 2023. Volatile Profile of Strawberry Fruits and Influence of Different Drying Methods on Their Aroma and Flavor: A Review. *Molecules*. 2023; 28(15): 5810.
3. Giampieri F, Tulipani S, Alvarez-Suarez JM, Quiles JL, Mezzetti B, Battino M. 2012. The strawberry: Composition, nutritional quality, and impact on human health. *Nutrition* 28(1): 9-19.
4. Bakshi P, Bhat DJ, Wali VK, Sharma A, Iqbal M. 2014. Growth, yield and quality of strawberry (*Fragaria x ananassa* Duch.) cv. Chandler as influenced by various mulching materials. *African Journal of Agricultural research* 9: 701-706.
5. Wang SY, Jiao H. 2000. Scavenging capacity of berry crops on superoxide radicals, hydrogen peroxide, hydroxyl radicals, and singlet oxygen. *Journal of Agricultural and Food Chemistry* 48(11): 5677-5684.
6. Gomez KA, Gomez AA. 1984. *Statistical Procedures for Agricultural Research* (2nd Edition). John Wiley and Sons, New York. pp 680.
7. Kurian A. 2015. Performance of strawberry (*Fragaria x ananassa* Duch.) in different growing conditions. *M. Sc. Thesis*, Kerala Agricultural University, Thrissur, Kerala. pp 127.
8. Adnan MM, Rahim MA, Haque T, Hossain MM. 2017. Growth and yield performance of strawberry (*Fragaria* × *ananassa* Duch.) as influenced by variety and mulch materials. *Fundamental and Applied Agriculture* 2(1): 202-206.
9. Strik BC. 1988. The importance of growth during flower bud differentiation to maximizing yield in strawberry genotypes. *Fruits Varieties Journal* 42(2): 45-48.
10. Craig DL, Brown GL. 1977. Influence of digging date, chilling, cultivars and culture on greenhouse strawberry production in Nova Scotia. *Canadian Journal of Plant Science* 57: 571-576.
11. Nicoll MF, Galletta GJ. 1987. Variation in growth and flowering habits of June bearing and everbearing strawberries. *Journal of American Society of Horticultural Sciences* 122(5): 872-880.
12. Aslam M. 2017. Evaluation of promising strawberry (*Fragaria x ananassa* Duch.) varieties of Wayanad. *M. Sc. Thesis*, Kerala Agricultural University, Thrissur (India). pp 134.
13. Beniwal LS, Daulta BS, Bisla SS. 1989. Evaluation of different strawberry cultivars under Hisar conditions I- Growth, Flowering and Fruiting. *Haryana Journal of Horticulture Science* 18: 34-39.
14. Baumann TE, Eaton GW, Spaner D. 1993. Yield components of day neutral and short-day strawberry varieties on raised beds in British Columbia. *Horticultural Science* 28(9): 891-894.
15. Belakhud B, Bahadur V, Prasad VM. 2015. Performance of strawberry (*Fragaria x ananassa* Duch.) varieties for yield and biochemical parameters. *Pharmaceutical Innovation Journal* 4(10): 05-08.
16 Chandel JS, Badiyala SD. 1996. Performance of some strawberry cultivars in foot hills of Himachal Pradesh. *Annals of Agri. Research* 17(4): 375-378.
17. Rao V, Swamy GSK. 2017. Performance of strawberry (*Fragaria x ananassa* Duch.) genotypes for yield and quality parameters. *Int. Jr. Curr. Microbiol. App. Science* 6(9): 1904-1908.