

RESEARCH PAPER

**Growth and yield response of strawberry cultivars under northern transitional tract of Karnataka**

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**Abstract :** A research trial was carried out in the experimental field at Hi-Tech Horticulture Unit, Main Agricultural Research Station, University of Agricultural Sciences, Dharwad during *rabi* season of 2021-22 to evaluate the performance of strawberry cultivars for the Northern transitional tract of Karnataka. The results revealed that cultivar Winter Dawn produced higher vegetative growth with higher plant height, number of leaves, plant spread, leaf area, number of crowns and runners per plant while the minimum was in cultivar Sweet Ann. Early flowering and fruiting was observed by Florida Beauty and Winter Dawn respectively whereas Pircinque was too late in flowering. Maximum number of flowers and fruits per plant was recorded in cultivar Winter Dawn and Brilliance, respectively. Larger and higher fruit weight having maximum duration of harvesting was observed in Winter Dawn while highest number of pickings was obtained in Brilliance. Highest fruit yield per plant was recorded in Winter Dawn which was on par with Brilliance.

**Key words:** Growth, Response, Strawberry, Yield

**Introduction**

The modern cultivated strawberry (*Fragaria × ananassa* Duch.) is one of the world's most popular and appealing soft fruit known for its delicious and refreshing quality. It is a hybrid obtained by two wild strawberries *i.e.*, *Fragaria virginiana* (Meadow strawberry) and *Fragaria chiloensis* belongs to the Rosaceae family. All cultivated varieties are octaploid (2n=56) in nature. Botanically it is an aggregate fruit which is highly perishable. It is a short day herbaceous plant, behaves as perennial in temperate condition and as annual in sub-tropical climate. It has shallow root system with a short stem known as crown. The edible portion is modified receptacle and achenes (true seeds) which is a non-climatic and propagated through runners (Coombey, 1976). Fruits turn full red stage within 28-30 days after anthesis, having the maximum fruit weight and size which is rich in vitamin C (60 IU/100 g of edible portion) and ellagic acid (Maheshgowda, 2016). The world production of strawberries is 8.9 million tonnes, led by China (38%), United States and Egypt as other significant producers (Anon. 2020). According to latest statistical report by Anon. 2021 Haryana ranks first in the production (4.26 t/1000 m<sup>2</sup>) followed by Maharashtra and Jammu and Kashmir. The evaluation of strawberry cultivars for a specific region is essential for improving the production and productivity as it is gaining importance due to the availability of day neutral cultivars, yet due to the crop's thermo sensitive nature, these cultivars need be evaluated for adaptability in new locations before being recommended for commercial production.

**Material and methods**

The present investigation was carried out at Hi-Tech Horticulture Unit, Main Agricultural Research Station, UAS, Dharwad, during *rabi* 2021-22. The experimental area located in Northern Transitional Zone (Zone VIII) of Karnataka state, situated at 15° 26' North latitude, 75° 07' East longitude and at an altitude of 678 meter above the mean sea level. Seven cultivars

(Brilliance, Winter Dawn, Sensation, Florida Beauty, Pircinque, Eliana and Sweet Ann) of strawberry were evaluated by adopting completely randomized block design with four replications with a plot size of 5 x 1 m with a spacing of 30 x 30 cm. Five plants from each treatment were randomly tagged and observations were recorded on vegetative growth parameters such as plant height (cm), number of trifoliolate leaves per plant, plant spread (cm), leaf area (cm<sup>2</sup>), number of crowns and runners plant<sup>-1</sup>, days to 50 per cent flowering and number of flowers plant<sup>-1</sup> while yield attributes such as days taken for first harvest, number of fruits plant<sup>-1</sup>, fruit weight (g), fruit length (cm), fruit diameter (cm) and yield per plant (g). The data were analyzed statistically with excel programming sheet and presented in Table 1 and 2.

**Results and discussion**

The findings of the trial of different growth and yield parameters are presented under the following heads

**Growth parameters**

**Plant height**

The data presented in Table 1 shows that significant difference in plant height, which recorded maximum in Winter Dawn (24.31 cm) followed by Brilliance (21.63 cm) and minimum plant height was recorded in Sweet Ann (15.66 cm). The increase in plant height in Winter Dawn may be due to increased length and erect growth of leaf which is upright controlled by genetic factor of the cultivars which differs from one another. Variation in height was also noted by Neetu and Sharma (2020) in Chattisgarh which supports the present observation.

**Number of trifoliolate leaves plant<sup>-1</sup>**

The maximum number of trifoliolate leaves per plant was observed in Winter Dawn (31.62) which was significantly differed from other cultivars and minimum (13.36) in Sweet Ann

Table 1. Performance of strawberry cultivars for growth parameters

Cultivars	Plant height (cm)	Number of leaves per plant	Plant spread (cm)	Leaf area (cm)	Number of runners plant <sup>-1</sup>	Number of crowns plant <sup>-1</sup>	Days to 50 per cent flowering	Number of flowers plant <sup>-1</sup>
Brilliance	21.63	23.39	34.65	115.22	3.13	5.01	41.64	25.81
Winter Dawn	24.31	31.62	37.60	146.43	2.82	5.92	40.99	28.24
Sensation	21.16	21.19	31.40	102.03	10.07	4.78	45.45	23.98
Florida Beauty	15.83	20.41	30.68	96.73	6.11	4.21	46.83	22.64
Pircinque	16.47	19.88	29.59	102.39	4.52	3.85	47.58	20.03
Eliana	16.92	17.73	30.32	96.35	4.19	3.43	53.84	21.12
Sweet Ann	15.66	13.36	26.54	94.39	5.74	3.01	56.98	20.34
Mean	18.85	21.08	31.54	107.64	5.22	4.31	47.61	23.16
S. Em. ±	1.69	1.52	1.52	4.57	0.34	0.19	1.74	1.25
C.D. @ 5%	5.02	4.52	4.52	13.58	1.03	0.57	5.18	3.73

(Table 1). This may be due to increase in length of epidermal and parenchyma cells, higher rate of cell division and cell elongation in sub apical meristem of shoots, which acts differently to light, temperature, photoperiod. Similar variation in number of trifoliate leaves among the cultivars have been reported previously by Ankita and Chandel (2014), Uddin *et al.* (2016).

#### Plant spread

Significant difference was recorded among the cultivars with respect to plant spread Table 1. The maximum plant spread was recorded in cultivar Winter Dawn (34.65 cm) which was on par with Brilliance whereas Sweet Ann recorded minimum plant spread (26.54 cm). It may be due to maximum length and weeping growth of leaf petioles which lean outwards resulting in maximum plant spread. The obtained result is in conformity with the findings Maheshgowda (2016).

#### Leaf area

The leaf area differed significantly among the cultivars Table 1. Winter Dawn had maximum leaf area (146.43 cm<sup>2</sup>) and minimum leaf area was found in Sweet Ann (94.39 cm<sup>2</sup>). Increase in leaf length and breadth might be contributed to increased leaf area along with genetic factor and acclimatization of cultivar to particular region. These results are in line with the findings of Hossan *et al.* (2013).

#### Number of runners per plant and number of crowns per plant

Significantly the maximum number of runners per plant (10.07) was recorded in Sensation and minimum (2.82) was recorded in Winter Dawn Table 1. The maximum number of crowns (5.92) was recorded in Winter Dawn followed by Brilliance (5.01) and least number of crowns (3.01) in Sweet Ann. This may be due to variation in allocation of photosynthates from source to sink which is controlled by genetic factor of cultivars and environmental conditions. These results are in conformity with the findings of Uddin *et al.* (2016) and Neetu and Sharma (2020).

#### Days to 50 per cent flowering

The data presented in Table 1 shows that the minimum days of 40.99 was taken by Winter Dawn for 50 per cent flowering which was on par with Brilliance (41.64 days). Variability in flowering period of different cultivars may also be due to

variation in genetic factor and their chilling requirement as suggested by Joolka and Badiyala (1983) and these observations are in line with findings of Oliveira and Scivittaro (2011).

#### Number of flowers per plant

Significantly higher number of flower plant<sup>-1</sup> (28.24) was recorded in Winter Dawn and the minimum number of flowers plant<sup>-1</sup> (20.03) was observed in Pircinque Table 1. This variation might be due to light intensity and environmental factors of the region and also depends on the number of days taken for flower emergence. The same results were previously obtained by Maheshgowda. (2016).

#### Yield parameters

##### Days to first harvest

Significantly early harvesting was observed in Winter Dawn (63.85) which was on par with Brilliance (65.34) and Sensation (68.87), later (82.45) in cultivar Sweet Ann to harvest Table 2. Similar results were also obtained by Islam *et al.* (2012) and Aslam (2017). This earliness in harvest in the cultivars may be due to the number of days taken for flower emergence and agro-climatic condition (differences in temperature and light intensity).

##### Number of fruits per plant

The maximum number of fruits per plant was recorded in Winter Dawn (23.78) which was statistically on par with Brilliance (22.00) while, minimum numbers of fruits per plant (16.45) was obtained in Sweet Ann Table 2. The accumulation of higher starch, carbohydrates and photosynthates which leads to setting of higher number of flowers per plant and thereby increases in fruit set percentage leads to increase in number of fruits per plant. The findings are in line with the results of Pradeepkumar *et al.* (2002) and Neetu and Sharma (2020).

##### Fruit weight, length and diameter

Significantly higher fruit weight (26.00 g), length (4.77 cm) and diameter (3.38 cm) were recorded in Winter Dawn while minimum fruit weight and diameter (13.81 g and 2.01 cm, respectively) in Sweet Ann and minimum fruit length was recorded in Eliana (3.42 cm) and the data is presented in Table 2. The variation might be due to varietal character and the findings

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Table 2. Performance of strawberry for yield and yield attributes

Cultivars	Days to first harvest	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Number of fruits per plant	Yield per plant (g)
Brilliance	65.34	25.61	4.17	3.33	22.00	563.42
Winter Dawn	63.85	26.00	4.77	3.38	23.78	618.28
Sensation	68.87	22.43	3.78	3.31	19.35	434.02
Florida Beauty	79.67	21.25	3.48	3.30	19.34	410.97
Pircinque	69.62	16.23	3.50	2.65	18.62	325.08
Eliana	80.07	17.74	3.42	2.45	17.22	374.66
Sweet Ann	82.45	13.81	3.56	2.01	16.45	227.17
Mean	72.83	20.43	3.81	2.91	19.53	421.94
S.Em. ±	2.67	1.87	0.13	0.11	0.97	21.57
C.D. @ 5%	7.95	5.70	0.40	0.35	2.95	64.08

are supported with the results of Janik and Eggerts (1968) who reported that fruit size in strawberry depends on interaction between blossom position, number of developed achene and competition of plant vigour.

### Yield per plant

Among the different cultivars, highest yield per plant was recorded in Winter Dawn (618.28 g) which was on par with Brilliance (563.28 g) whereas, lowest yield was recorded in Sweet Ann (227.17 g) Table 2. This may be due to increased vegetative growth and early emergence of flowers which enables higher fruit set and fruit weight due to formation of more metabolites by

large leaves and high rate of photosynthesis. The findings is in line with the results of Hossan *et al.* (2013) and Ahsan *et al.* (2014). Various components like yield per plant, number of crowns, number of leaves per plant, plant size, number of inflorescence, number of fruits per plant, fruit set and total number of achenes per berry are related with the yield per unit area Mitra (1991).

### Conclusion

As per the data cultivars Winter Dawn and Brilliance performed superior in terms of growth, yield and quality attributes. Hence, both the cultivars are suitable for cultivation under northern transitional tract of Karnataka.

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