Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 9 [1] December 2019 : 166-169

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD
Global Impact Factor 0.876
Universal Impact Factor 0.9804
NAAS Rating 4.95

ORIGINAL ARTICLE **OPEN ACCESS**

Evaluation of different strawberry (*Fragaria* x *ananassa* Duch.) Cultivars for Yield attributing parameters and Benefit: cost ratio under net tunnel

***H. K. Panigrahi, G. L. Sharma, Sangeeta and Rakesh Patel**
Department of Fruit Science, College of Agriculture,
Indira Gandhi Krishi Vishwavidyalaya, Krishak Nagar, Raipur-492012 (C.G.)
*Corresponding author's e-mail: sanjuchandu1995@gmail.com,hphemantpanigrahi@gmail.com

ABSTRACT
Strawberry (Fragaria x ananassa Duch.) is one of the most important soft fruit belongs to the family Rosaceae.It is mainly a temperate region fruit crop but also can be grown in tropical and sub-tropical climatic region due to availability of day neutral and thermo-insensitive varieties. A research trial was conducted at Research Farm of Centre of Excellence on Protected Cultivation and Precision Farming under net tunnel, College of Agriculture, IGKV, Raipur (C.G.) to evaluate different strawberry cultivars for yield attributing parameters and B: C ratio of strawberry cultivation under net tunnel condition in the plain region of Chhattisgarh. The experiment was conducted with twelve strawberry cultivars replicated three times in Randomized Completely Block Design. Result revealed that regarding yield and yield attributing parameters. Nabila recorded maximum yield i.e. Flowers/plant, fruits/plant, yield (kg/plant), yield (q/ha) and B:C ratio, while the minimum was recorded in cv. Gili.
KEY WORDS: *Strawberry, evaluation, yield parameters, benefit: cost ratio etc.*

Received 21.09.2019 Revised 23.10.2019 Accepted 28.11.2019

INTRODUCTION

The cultivated strawberry (*Fragaria* x*ananassa* Duch.) is a natural hybrid derived from the North American species, *Fragaria chiloensis* and *Fragaria verginiana* in France. It belongs to the family Rosaceae. It is octaploid in nature. Botanically, strawberry fruit is an aggregate fruit called *etario of achenes* and the edible part is succulent thalamus. It is mainly propagated by vegetative propagation *i.e.* through runners but now a day tissue culture is being popular for its multiplication. It is being grown in temperate regions worldwide for delicious fruits having 98% edible portion and rich source of vitamin C, Iron and other active compounds [11].

It is one of the most important soft fruit having a distinct tantalizing aroma [16]. It is highly nutritious with abundant source of vitamins A, B, C and niacin, minerals like phosphorus, potassium, calcium and iron [8]. Strawberry has vast scope in processing industries and kitchen gardens. It is utilized for the production of purees, juice concentrate, jams, preserves and rose red wine. Medicinally, strawberries have been known for its anti-viral properties against polio, these may block the formation of nitosamines, which can cause cancer, furthermore these contain relatively high quantities of ellagic acid, which has a wide range of biological activities [15].

In India, it is being cultivated in Himachal Pradesh, Uttrakhand, Maharashtra, West Bengal, Delhi, Punjab, Haryana Rajasthan and Nilggiri hills [4] In our country the total area of strawberry is 1000 ha with production of 5000 MT [1]. In Chhattisgarh strawberry cultivation is not popular due to lack of knowledge. It is grown in Ambikapur and Surajpur district in very small areas with production of 12.50MT and12.00MT respectively under open field condition.

There are reports on higher &early production when market prices are high, higher quality fruit, better insect-pest, disease and weed control with reduced use of chemicals, decreased labour costs and more efficient water usage under plasticulture/greenhouse [5, 13, 6]. However, strawberries grown using the plasticulture system, must be intensively managed [5]. With a plasticulture system, there is considerably

less margin for error with regard to soil treatment, timing, pest management, frost and freeze strategies and marketing [14]. In Japan and Korea, about 90% of the total strawberry production is obtained from protected structures [17]. Similarly, in Netherlands and Belgium, the strawberry is extensively cultivated under greenhouses or tunnels [9]. Management technology of strawberry under greenhouse conditions, like cultivar selection, seedling preparation, growing system, population density and integrated pest management, has been developed in central Florida to attain marketable yields of 350 to 450 g per plant (7 to 9 kg/m^2) with population densities of 20 plants/m^2 [12]. Garwood [6] concluded that although plasticulture systems were expensive to implement but the increased productivity and reduced labour costs allowed for higher returns.

The work on varietal evaluation was not done earlier in Chhattisgarh plain region under protected conditions, therefore, the present study was conducted to evaluate strawberry cultivars under ordinary tunnel type polyhouse condition for yield parameters and benefit: cost ratio.

MATERIAL AND METHODS

The field trial was carried out during the year 2017-18 at Research Farm of Centre of Excellence on Protected Cultivation and Precision farming under net tunnel condition, College of Agriculture, IGKV, Raipur (C.G.). The soil of experimental field was clay-loam having pH 7.7. The experiment was laid out in Randomized Completely Block Design (RCBD) with 3 replications. The experiment was conducted with twelve strawberry cultivars *viz.*Hadar, Tamir, Sweet Charlie, Winter-dawn, Yashmin, E1-1333, Line-359, Nabila, Camarosa, Gili, Sabrina and Shani. Healthy Tissue cultured plants were procured from KFBio-Plants Private Limited Pune (Maharashtra).The vigorous, healthy, diseases & pest free and well rooted saplings of all 12 varieties of Strawberry were planted in field at 30cm x 30cm distance with fertigation of recommended dose of fertilizers. All the experimental plants were uniformly maintained and same cultural practices were provided *i.e.* fertilization, irrigation and plant protection measures during whole period of investigation. Irrigation and fertilizers have been provided to the plants through the drip system of irrigation.

Under yield and yield attributing parameters, the observations *i.e.* number of flowers per plant, number of fruits per plant, yield (kg) per plant, yield (q) per ha and B: C ratio were recorded.

RESULTS AND DISCUSSION

The results of trial pertaining to various aspects of yield and yield attributing parameters and benefit: cost ratio is summarized as follows:

Number of flowers per plant

The result revealed regarding the number of flowers per plant that the varieties differed significantly in respect of their flower numbers. The cv. Nabila recorded maximum flowers per plant (36.23) which was at par with cv. Camarosa (35.57). The cv. Gili recorded minimum flowers per plant (28.84). Neetu and Sharma [10] also reported that the maximum number of flowers produced per plant was observed in Nabila (27.42).The increment in the number of flowers per plant may be due to more light intensity in the region. Increased number of flowers per plant was observed in all the treatments over the reports of researchers [7] of Bangladesh.

Number of fruits per plant

The data presented regarding number of fruits per plant showed significant differences for number of fruits harvested per plant. The cv. Nabila recorded maximum fruits per plant (33.87) which was at par with cv. Camarosa (32.87). The cv. Gili recorded minimum fruits per plant (25.38). Neetu and Sharma (2018) also reported that cv. Nabila recorded maximum number (24.71) of fruits per plant which wasat par with Cv. Camarosa (23.10). These results are in accordance with findings obtained by Baumann *et al.,* [2] and Belakhud *et al.,* [3].

Yield (kg/plant)

The result revealed that the cv. Nabila recorded maximum yield per plant (0.82 kg) followed by Camarosa and Sabrina having same yield (0.61 kg) per plant. The cv. Gili recorded minimum yieldper plant (0.43 kg). Neetu and Sharma [10] also reported that cv. Nabila recorded maximum yield per plant. These results are in accordance with findings obtained by Baumann *et al.,* [2] and Belakhud *et al.,* [3].

Yield (q/ha)

The data presented regarding the yield (q/ha) showed significant differences among all the varieties. The cv. Nabila recorded maximum yield (306.43) q/ha followed by Camarosa with yield 298.50 q/ha. Sabrina was at par with Camarosa having yield 289.47 q/ha. The cv. Gili recorded minimum yield (160.32) q/ha. These results are in accordance with findings obtained by Neetu and Sharma [10] in Chhattisgarh condition.

Benefit: Cost ratio

The cv. Nabila recorded maximum benefit: cost ratio (4.63: 1) followed by cv. Camarosa and Sabrina having the benefit: cost ratio 3.52: 1 and 3.16: 1 respectively. The cv. Gili recorded minimum benefit: cost ratio (2.67: 1). These results are in accordance with findings obtained by Neetu and Sharma [10].

Table 1. Yield attributing parameters and benefit: cost ratio of different strawberry cultivars under net tunnel.

Treatments	Number of flowers/plant	Number of fruits/plant	Yield (kg/plant)	Yield (q/ha)	B: C ratio
Hadar	34.50^{c}	28.87^{cd}	0.60^{f}	286.75^{f}	2.87:1^{cd}
Sweet Charlie	29.57^{a}	28.54^{c}	0.57^{d}	246.76^{d}	2.82:1^{c}
E1-1333	32.13^{b}	30.87^{def}	0.53^{c}	240.09^{cd}	2.85:1^{cd}
Tamir	34.23^{c}	31.53^{cde}	0.52^{b}	271.86^{e}	2.12:1^{a}
Yashmin	32.57^{b}	28.53^{c}	0.52^{b}	238.99^{bcd}	2.83:1^{c}
Camarosa	35.57^{c}	32.87^{fg}	0.61^{g}	298.50^{g}	3.52:1^{e}
Gili	28.84^{a}	25.38^{a}	0.43^{a}	160.32^{a}	2.67:1^{b}
Shani	29.30^{a}	27.53^{bc}	0.59^{e}	229.74^{b}	2.68:1^{b}
Winter-dawn	32.53^{b}	28.52^{c}	0.52^{b}	232.33^{bc}	2.28:1^{a}
Line-359	31.17^{b}	25.53^{ab}	0.59^{e}	232.61^{bc}	2.45:1^{b}
Sabrina	34.87^{cd}	31.87^{efg}	0.61^{g}	289.47^{fg}	3.16:1^{d}
Nabila	36.23^{d}	33.87^{g}	0.82^{h}	306.43^{h}	4.63:1^{f}
SE(m)±	**0.49**	**0.71**	**0.003**	**3.41**	
C.D.	**1.47**	**2.10**	**0.008**	**10.07**	

The superscript letter indicates that the treatment means with same letters are at par at 5% level of significance, while the means with different letters are significantly different at 5% level of significance. These letters have been affixed based on CD- value comparison of treatment means.

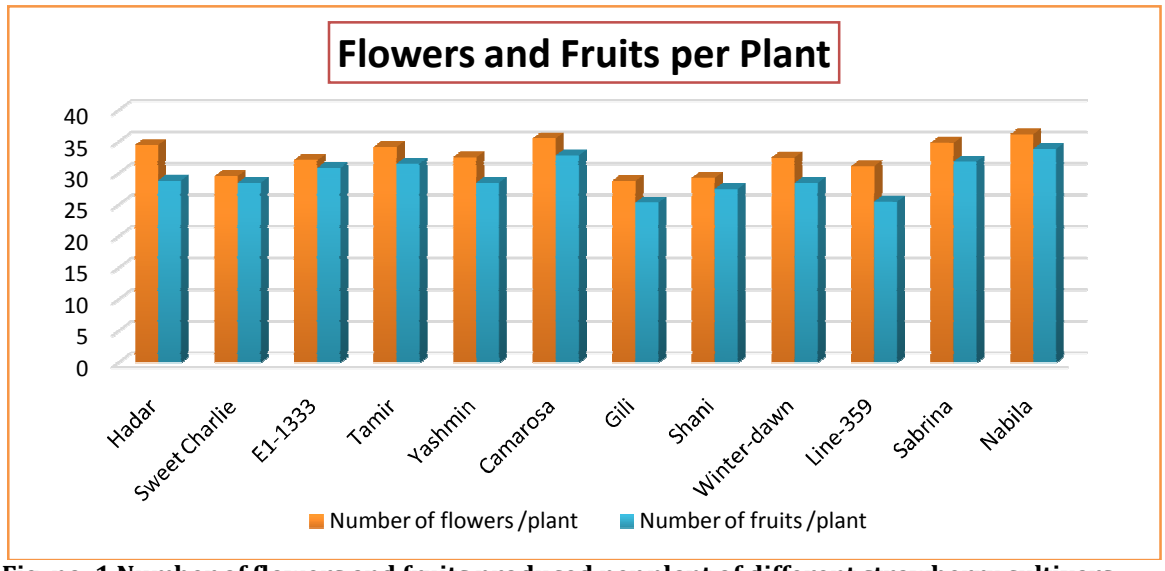

Fig. no. 1.Number of flowers and fruits produced per plant of different strawberry cultivars under net tunnel.

REFFERENCES

1. Anonymous (2016).Statistical database.*http//www.agricoop.nic.in.*
2. Baumann, T.E., Eaton G.W. and Spaner D. (1993) Yield Components of Day neutral and Short-day Strawberry Varieties on Raised Beds in British Columbia. *Hort. Science* 28(9):891-894.
3. Belakhud, B., Bahadur, V., Prasad, V. M. (2015). Performance of strawberry (*Fragaria* x *ananassa* Duch.) varieties for yield and biochemical parameters. *Pharma Inno. J.* 4(10):05-08.

4. Chadha, K. L., (2001). Strawberry. In Hand Book of Horticulture. DIPA, ICAR, New Delhi. Pp.324-328.
5. Dinar, M., (2003). Strawberry production in greenhouse. Proc. Intl. Congr. Greenhouse, Puerto Vallarta, Jalisco, Mexico. Netafim.
6. Garwood, T., 1998. An economic analysis of matted row, plasticulture and greenhouse production systems inNorth Carolina. MS Thesis, North Carolina State Univ., Raleigh.
7. Jamal, Uddin, A.F.M., Ahsan, M.K., Hussain, M.S., Mahmud, M.F. and Mehraj, H. (2016). Evaluation of Strawberry Germplasm at Sher-E-Bangla Agricultural University, Bangladesh. *World Applied Sciences Journal* 34 (1): 78-83
8. Karakara, B. K., Dwivedi, M.P.,(2002). Strawberry. In: Enhancement of Temperate Fruit Production in changing Climate, K.K. Jindal and D.R. Gautam (eds.). UHF, Solan, 198204.
9. Lieten, F., (1993). Methods and strategies of strawberry forcing in Central Europe: historical perspective and recent developments. *Acta horticulturae.* 348: 158-170.
10. Neetu and Sharma, S. P. (2018). Evaluation of Strawberry Cultivars for Growth and Yield Characteristics in Plain Region of Chattisgarh, India. *Int.J.Curr.Microbiol.App.Sci.* 7(02): 2835-2840.
11. Oszmianski, J. and Wojdylo, A. (2009). Comparative study of phenolic content and antioxidant activity of strawberry puree, clear, and cloudy juices. *European Food Res. Tech.* 228: 623-631.
12. Paranjpe, Ashwin, V. and Cantliffe, Anielj, D., (2003). Winter Strawberry Production in Greenhouses Using Soilless Substrates: An Alternative to Methyl Bromide Soil Fumigation. *Proc. Fla. State Hort. Soc.*116: 98-105.
13. Poling, E.B., (1993). Strawberry plasticulture in North Carolina: II. Preplant, planting and post plant considerations for growing Chandler strawberry on black plastic mulch. *Hort Technology* 3: 383-393.
14. Poling, Barclay, Gerard, Krewer and Smith, J. Powell, (2005). Southeast Regional Strawberry Plasticulture Production Guide. Pp 1-21.\
15. Rieger, M. (2006). Introduction to fruit crops. Food product press. An Imprint of the Haworth Press Inc. New York.
16. Sharma, R. M., Yamdagni, R. (2000). Modern strawberry cultivation. Ludhiana, India, Kalyani Pub. 37(1):163-165.
17. Takeda, Fumiomi, (1999). Out of season greenhouse strawberry production in soil less substrate. *Ad. Strawberry Res*. 18 :1-11.

CITATION OF THIS ARTICLE

H. K. Panigrahi, G. L. Sharma, Sangeeta and Rakesh Patel. Evaluation of different strawberry (*Fragaria* x *ananassa* Duch.) Cultivars for Yield attributing parameters and Benefit: cost ratio under net tunnel . Bull. Env. Pharmacol. Life Sci., Vol 9 [1] December 2019: 166-169