Original Research Article

Varietal Evaluation of Scented Field Roses under Coimbatore Agro Climatic Conditions

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ABSTRACT

A field experiment to evaluate the performance of ten scented field roses in terms of growth and floral parameters under open field condition was carried out at Botanical Garden, Department of Floriculture and Landscape Architecture, Tamil Nadu Agricultural University Coimbatore during the year 2022. Since there is a major lacuna in variety of scented field roses for cultivation in farmer's field, the present study was undertaken to assess suitable variety for commercial cultivation under Coimbatore condition. The field experiment was carried out using Randomized Block Design (RBD) with ten treatments (Arka Sukanya, Arka Parimala, Bourbon rose type 1, Bourbon Rose type 2, Pusa Alpana, Rose Sherbet, Scent Pink, Damask rose type 1, Damask rose type 2, Andhra Red) and three replications. Results indicate a significance difference between the varieties for growth, flowering and yield characters. Experimental data revealed that the maximum plant height (68.92 cm), maximum number of shoots per plant (8.21), maximum leaves per plant (410.50), stem girth (6.28 cm), Highest chlorophyll content (58.1), Least number days for flower bud initiation (31.05), Diameter of fully opened flower (5.89 cm) and fresh flower weight (3.59 g)was seen in Bourbon rose type 1. Bourbon rose type 2 recorded maximum number of flowers per plant (41.12) and Andhra red rose recorded maximum number of petals per flower (94.89) among the evaluated varieties.

Keywords:Scented field roses;Evaluation; vegetativeparameter; floral parameters.

1. INTRODUCTION

Rose is one of the oldest flowers under cultivation and most popular of all garden flowers throughout the world a universally known as "Queen of Flowers". Rose occupies first position in international flower trade Gajraj *et al.,* (20 The word Rose is derived from the word Eros which comes from Greek god for love. It represents love, compani sincerity, romance, grace and spirituality (Hummer and Jenick, 2009) [2]. The genus *Rosa* has been derived from word Rhedon which denotes its fragrant flowers. It constitutes 120 species and more than 30,000 cultivars that are distributed in the temperate and subtropical parts of the northern and southern hemispheres.Only few species of are scented viz., *Rosa damascena*., *R. gallica*, *R.centifolia*, *R. moschata*, *R. bourboniana*, *R. chinensis* etc. The fra can range from subtle and sweet to rich and intense depending on the varietal character of the flower. Apart from aesthetically pleasing, roses have various medicinal properties. Rose essential oil, which is derived from scented r frequently used in aromatherapy which is believed to promote relaxation, reduce stress, and uplift moods. In tra market places, rose flowers without the stalk and loose flower petals are used for making garlands and to make o in temples. As commercial cultivation of roses is gaining importance day by day, there is need for identification yielding scented rose cultivars. Therefore, the present study was undertaken to evaluate the scented field rose var open field conditions to assist the farmers in increasing the productivity and consumers in receiving higher quality fl

Comment [U1]: Clarity: While the abstract touches on the main results, it could be more explicit in stating the findings for each parameter. For example, rather than just mentioning that Bourbon rose type 1 had the "maximum" value for several parameters, it could specify the exact values.

Statistical Significance: It would be beneficial to mention if the differences between the varieties were statistically significant, which would add scientific weight to the findings.

Scope: The abstract could briefly mention the potential implications or applications of the findings, particularly for farmers or the floral industry.

Sample Size: It might be helpful to include the total number of plants or samples used for each variety to give readers a better understanding of the experimental setup.

Comment [U2]: Citations: In the introduction, citations are used to support certain statements, but the specific findings or contributions from the cited papers are not mentioned. It would be helpful to provide a brief summary of the relevant points from Gajraj et al. (2022) [1] and Hummer and Jenick (2009) [2] to establish their relevance to the current study.

Objective: While it is clear that the objective of the study is to evaluate scented field rose varieties in open field conditions, it could be explicitly stated at the end of the introduction.

Background: The introduction could benefit from providing a more comprehensive background on the significance of scented field roses in horticulture, flower trade, and their importance in the context of Coimbatore or the region where the study was conducted.

Research Gap: Mentioning the research gap or specific need for evaluating scented field rose varieties would strengthen the rationale for undertaking this study.

Scope: Clearly define the scope of the study and its potential implications for farmers and consumers.

2. MATERIAL AND METHODS

An experiment entitled “Varietal evaluation of scented field roses under Coimbatore agroclimatic conditions” was carried out at Botanical Garden, Department of Floriculture and Landscape Architecture, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore, India during the year 2022. The experiment was laid out in Randomized Block Design (RBD) with three replications and five plants per replication. The varieties that were subjected to evaluation are V_1 -Arka Sukanya, V_2 - Arka Parimala, V_3 - Bourbon rose type 1, V_4 - Bourbon Rose type 2, V_5 - Pusa Alpana, V_6 - Rose Sherbet, V_7 - Scent Pink, V_8 - Damask rose type 1, V_9 - Damask rose type 2, V_{10} - Andhra Red were planted at spacing of 1m x 1m. Five plants from each replication were selected and used for recording observations. Observations in respect of vegetative growth (Table.1) viz.,,plant height (cm), Number of shoots per plant, Number of leaves per plant, Stem girth (cm), Chlorophyll content (SPAD values) were recorded at 120 days after pruning and flowering parameters (Table.2) viz.,,Days to flower bud initiation (days), Diameter of fully opened flower (cm), No of petals per flower, Number of flowers per plant and weight of fresh flower (g) were also recorded. Collected data was subjected to statistical analysis by using AGRES software and Microsoft spreadsheet.

3. RESULTS AND DISCUSSION

3.1 Vegetative parameters

Plant height varied significantly among the varieties at 120 days after pruning (Table 1). The maximum plant height was observed in the variety Bourbon rose type 1 (68.92 cm) closely followed by Bourbon rose type 2 (67.40 cm). Minimum plant height was recorded in the variety Pusa Alpana (33.3 cm) (Table1). Differences in plant height is dependent on the varietal character of the plants and it varies from one variety to the other (Kanamadi and Patil, 1993 [3] and Behera *et al.* 2002[4]). More number of leaves may have contributed to the increased photosynthesis rate resulting in increased plant height. Comparable differences in plant height in rose were also recorded by Mohanty *et al.,* (2011) [5], Ramzan *et al.,* (2014) [6], Amita *et al.,* (2021) [7], Muthulakshmi*et al.,* (2022) [8].

Number of shoots per plant was highest in var Bourbon rose type 1 (8.21) and was significantly superior compared to other varieties. Minimum number of shoots per plant was observed in Pusa Alpana (3.20) (Table 1). Due to the influence of genetic makeup of the different varieties, variation in shoots may be observed. Similar observations were recorded in rose by Tabassum *et al.,* (2002) [9], Ramzan *et al.,* (2014) [6], Muthulakshmi*et al.,* (2022) [8].

Among the evaluated scented field roses, highest number of leaves per plant was observed in the var Bourbon rose type 1 (410.50) followed by Bourbon rose type 2 (326.48) and Andhra red (279.20), whereas minimum number of leaves per plant was observed in the var Pusa Alpana (60.08)(Table 1). This might be due to the inherent genetic factors, higher sprouting of auxiliary buds, endogenous production of cytokinin, auxin and gibberllins. The current findings are consistent with that of Wasnik *et al*., (2015) [10] Ashwini *et al.,* (2021) [11], Abd-Elrahim and Osman (2017) [12] Muthulakshmi*et al.,* (2022) [8].

Maximum stem girth was recorded in the variety Bourbon rose type 1 (6.28), followed closely by Bourbon rose type 2 (5.99) and Andhra Red (5.82). Minimum stem girth was recorded in the variety Arka Sukanya (1.91) (Table 1). Variations in stem girth is often due to varietal character of the plant. The results are in close agreement with the findings of Soujanya *et al.,* (2018) [13], Muthulakshmi*et al.,* (2022) [8].

The maximum chlorophyll content (SPAD value) was recorded in the variety Bourbon rose type 1 (58.10) followed by Bourbon rose type 2 (55.40) and scent pink (54.29). However minimum value was recorded in variety Pusa Alpana (37.56) (Table 1, Fig.1). Leaves are the functioning units for photosynthesis particularly the chlorophyll content of leaf influences the growth of the plant. The leaf chlorophyll content is a genetic character that differs according to varieties. Variation in chlorophyll content was also observed previously in orchids by Anita *et al.* (2000) [14] and Prabhu *et al.,* (2018) [15] in chrysanthemum and in rose by Soujanya *et al.,* (2018) [13].

3.2Floral parameters

Earliest bud initiation was seen in the variety Bourbon Rose type 1 (31.05) followed by Andhra red (32.15) andScent Pink (32.98) whereas Pusa Alpana took the longest time for bud initiation (49.70) (Table 2). If a plant has adequate carbohydrates in it since its vegetative growth, it has a tendency to enter the reproductive phase early. Initiation of flower buds is also influenced by environmental conditions. These observations are in agreement with Kute *et al.,* (2022) [16] and Patil *et al*., (2022) [17].

Among the different varieties assessed, maximum diameter of fully opened flower was recorded in the variety Bourbon rose type 1 (5.89) followed by Bourbon rose type 2 (5.69) and minimum diameter of fully opened flower was recorded in

Comment [U3]: Experimental Site Description: Adding a brief description of the Botanical Garden, Department of Floriculture and Landscape Architecture, and the Horticultural College and Research Institute would provide context and location-specific information for readers.

Plant Selection: The section mentions that five plants per replication were used for recording observations, but it doesn't specify how the plants were selected. Clarifying the criteria for plant selection or randomization process would enhance the experimental design description.

Data Collection and Instruments: While the vegetative and floral parameters are listed in Tables 1 and 2, respectively, the section could provide additional details on how each parameter was measured and the instruments or methods used for data collection. For instance, how was chlorophyll content (SPAD values) measured?

Statistical Analysis: The software used for statistical analysis is mentioned as "AGRES," but it would be better to provide more information about this software or its full name, as readers may not be familiar with it. Additionally, mentioning the specific statistical tests used for the analysis would further enhance the section.

Data Handling: It would be useful to briefly mention how the collected data was handled before statistical analysis, such as data validation and transformation procedures.

Replicates and Experimental Design: The number of total replicates and the justification for choosing a Randomized Block Design could be mentioned. ...

Comment [U4]: Discussion Integration: While the section provides the results, it would be even more effective to integrate the discussion with each result as it is presented. For example, after reporting the highest and lowest values for plant height, discuss why certain varieties showed specific growth patterns and how these findings align with previous studies. This will help readers understand the significance of the results.

Interpretation: The section could benefit from further interpretation of the results. For instance, discuss why the variety Bourbon rose type 1 exhibited the maximum plant height, highest number of shoots, and the maximum number of leaves per plant. Relate these observations to the characteristics of the variety or any potential advantages it may have for commercial cultivation.

Comparisons and Consistency: While the section references previous studies (e.g., Wasnik et al., 2015, Amita et al., 2021, etc.), it could make more direct comparisons between the current findings and those from other research. Point out the consistency or discrepancies with previous studies, and discuss any potential reasons for these differences.

Significance and Application: Discuss the practical significance of the results and how they may impact rose cultivation, especially in the Coimbatore region. Address the potential benefits of cultivating certain varieties based on their performance in different parameters.

Graphical Representation: Utilize figures and graphs to visually represent the data and trends, which can help readers grasp the results more easily.

the variety Pusa Alpana (3.92) (Table 2). The variation can be attributed to genetic makeup of the variety and impact of biotic and abiotic factors as well. These outcomes are in accordance with Wasnik *et al.,* (2015) [10], Ashwini *et al.,* (2021) [11] and Muthulakshmi*et al.,* (2022) [8].

Number of flowers per plant was measured in the collected varieties and the highest number of flowers was observed in Bourbon rose type (41.12) by Bourbon rose type 1 (39.84) whereas least number of flowers per plant was observed in Pusa Alpana (12.38) (Table 2, Fig. 2). Maximum number of flowers per plant might be attributed to more number of leaves per plant and chlorophyll content which would result in production and accumulation of more photosynthesis resulting in the production of more number of flowers with bigger size. The observed results are in agreement with previous reports of Mohanty *et al.,* (2011) [18], Singh *et al.,* (2013) [19], Ramzan *et al.,* (2014), Wasnik *et al.,* (2015) [10], Soujanya *et al.,* (2018) [13] and Amita *et al.,* (2021) [7], Muthulakshmi*et al.* (2022) [8].

Significantly maximum weight of fresh flower was recorded in the variety Bourbon rose type 1 (3.59) followed by Bourbon rose type 2 (3.41) and minimum weight of fresh flower was recorded in the variety Pusa Alpana (1.54) (Table 2). Variation in flower weight among the cultivars is a varietal character and depends upon the genetic makeup of the plant. These results are in favor with previous findings of Wasnik *et al.,* (2015) [10] and Amita *et al.,* (2021) [7].

More number of petals per flower was observed in the variety Andhra red (94.89) followed by Bourbon rose type 2 (89.03) and lowest number of petals per flower was observed in Arka Sukanya (28.5) (Table 2). The genetic makeup of the variety affects the diversity in the number of petals. Similar findings were also observed by Wasnik *et al.*, (2015) [10], Shahrin*et al.,* (2015) [20], and Muthulakshmi*et al.,* (2022) [8].

Table 1. Mean performance of the scented field roses for vegetative parameters

Varieties	Plant height (cm)	Number of shoots per plant	Number of leaves per plant	Stem girth (cm)	Chlorophyll content (SPAD values)
Arka Sukanya	51.46	4.45	115.7	4.11	43.71
Arka Parimala	54.29	4.89	141.81	5.67	46.80
Bourbon Rose type 1	68.92	8.21	410.5	6.28	58.10
Bourbon Rose type 2	67.40	7.42	326.48	5.99	55.40
Pusa Alpana	33.30	3.20	60.08	1.91	37.56
Rose Sherbet	59.79	4.20	121.8	3.77	48.80
Scent Pink	63.40	5.93	249.06	2.86	54.29
Damask rose type 1	41.73	4.12	86.52	2.91	42.70
Damask rose type 2	49.94	4.40	101.2	3.94	45.60
Andhra Red	61.70	6.98	279.2	5.82	51.40
Mean	55.19	4.53	187.38	55.19	48.4360
S.Ed	0.98	1.26	4.72	0.98	0.83
CD (5%)	2.07	2.66	9.93	2.07	1.75

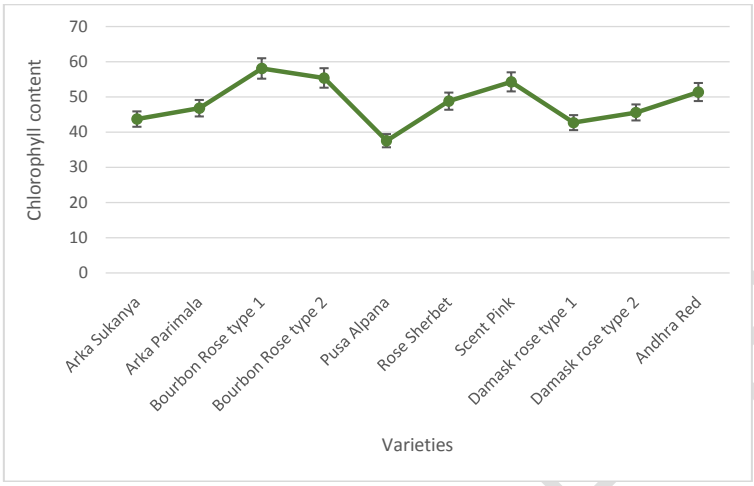

Fig.1. Chlorophyll content (SPAD values) of evaluated scented field roses

Table 2. Mean performance of the scented field roses for floral parameters

Varieties	Days to flower bud initiation (days)	Diameter of fully opened flower (cm)	No of petals per flower	No of flowers per plant	Fresh flower weight (g)
Arka Sukanya	43.73	5.12	28.50	19.51	2.32
Arka Parimala	42.32	5.52	35.70	21.71	2.86
Bourbon Rose type 1	31.05	5.89	88.71	39.84	3.59
Bourbon Rose type 2	37.29	5.69	89.03	41.12	3.41
Pusa Alpana	49.70	3.92	31.42	12.38	1.54
Rose Sherbet	38.00	4.87	44.20	28.16	2.43
Scent Pink	32.98	5.17	47.21	34.32	3.29
Damask rose type 1	47.80	4.59	52.17	13.67	1.97
Damask rose type 2	45.50	4.69	55.14	15.42	2.08
Andhra Red	32.15	4.93	94.89	32.71	3.11
Mean	40.05	3.97	25.88	25.88	2.66
S.Ed	0.67	0.08	7.13	7.13	0.04
CD (5%)	1.41	0.18	14.98	14.98	0.10

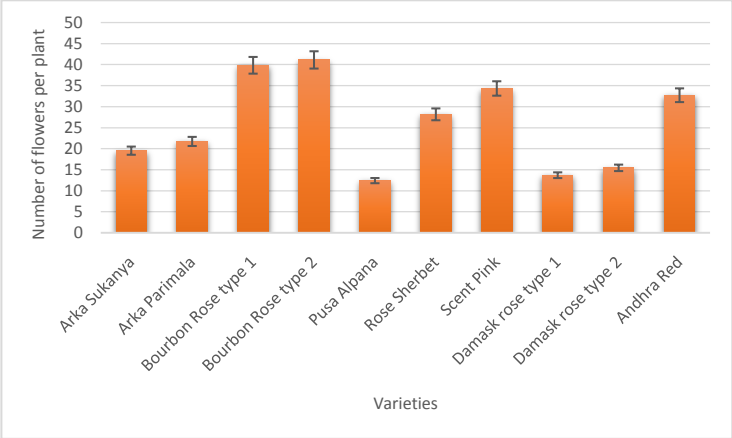

Fig.2. Number of flowers per plant for evaluated scented field roses

4. CONCLUSION

From the present experimental findings, it was observed that the variety Bourbon rose type 1 has outperformed all the other varieties in terms of vegetative and floral parameters in agroclimatic conditions of Coimbatore. It recorded maximum plant height, number of shoots per plant, number of leaves per plant, stem girth, highest chlorophyll content, diameter of fully opened flower, least number days for flower bud initiation, maximum fresh flower weight and estimated flower yield per plant. On the other hand, the variety Bourbon rose type 2 recorded maximum number of flowers per plant and Andhra red rose was reported to have maximum number of petals per flower. Bourbon rose type 1 and Bourbon rose type 2 exhibit vigorous growth and more yield however they require more maintenance. The varieties Arka Sukanya and Arka Parimala are performing well and they can be introduced to farmers for commercial cultivation in Coimbatore. Even though Damask rose type 1 and Damask rose type 2 exhibit less vigorous growth, they can be planted in high density plating which accommodates more number of plants which subsequently leads to more yield. Therefore these evaluated scented field rose varietiesare suitable for cultivation under Coimbatore agro climatic conditions and they can be recommended for commercial cultivation in farmer's field and may be further utilized in breeding programs for further selection.

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Comment [U5]: Quantitative Comparison: The conclusion could be strengthened by providing some quantitative comparisons of the different varieties. For example, mention the percentage increase or decrease in specific parameters for Bourbon rose type 1 compared to other varieties.

Practical Recommendations: Provide more specific and practical recommendations for farmers based on the findings. Suggest the best varieties for different purposes, such as commercial cultivation for yield, ornamental purposes, or high-density planting.

Potential Limitations: Briefly mention any limitations or challenges encountered during the study, which may help readers better understand the context of the findings.

Future Directions: Mention any potential future research directions or aspects that were not explored in this study. For example, discuss the potential for further breeding programs using the top-performing varieties to improve overall rose cultivation.

Significance of Research: Emphasize the significance of the research in addressing the need for identifying suitable scented rose varieties for Coimbatore conditions. Discuss how this study contributes to the existing knowledge and how it can impact the horticulture and floral industry.

Generalizability: Discuss the generalizability of the findings to other regions with similar agroclimatic conditions. Address whether the results are applicable beyond Coimbatore and how they might be relevant in different regions.

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