Growth Performance and Instability in Area and Production of Cut Rose: A Survey

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Rose is an elegant and beautiful flower which holds significant value in the global market due to its high market value and export potential, so this study focuses on the annual growth rate and instability of cut rose from 2013 to 2023. This study was carried out based on secondary data collected from APEDA and India stat.There has been a consistent increase in the annual growth rate of both the cut rose area and production and no peculiar instability observed.The recognition of cut rose's potential across multiple industries, profitable returns, advancements in technology, improved transportation facilities, and the introduction of new varieties through genetic engineering have substantially contributed to the rise in area, production and export value.Moreover, there is

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relatively less focus on export of cut rose. This study helps to understand the annual growth rate pattern of cut roses during the decade and also suggest ways to increase the area, production and export value of cut roses.

1. INTRODUCTION

Rose is designated as "Queen of Flowers"as they have captivated human hearts with their beauty and elegance. Rose is one of the leading cut flowers in floriculture markets across the globe. There are countless rose varieties from hybrid teas to shrub roses, ideal for every occasions. Beyond their aesthetic appeal they behold numerous health benefits. Some of the common rose varieties in India are Arka ivory, Arka Swadesh, Arka Pride, Goldstrike, Noblesse, Revival, Taj Mahal, Corvette, Emma, Anika, Acapella, Abishek, Bora Bora and various others. Priya *et al.*, [1] and Soujanya *et al.*, [2]. The major rose producing countries of the world are India, China, Ecuador, Colombia, Kenya, Mexico, Italy, Thailand, Japan, Netherlands, Germany, Taiwan China, Israel, Poland, Spain, Turkey, Morocco. India accounts for over 45 per cent of the global area dedicated to cut rose cultivation. In India, Karnataka is the major producer of rose accounting to 1,71,880 tonnes annually followed by West Bengal (65,920 tonnes), Gujarat (38,760tonnes),Tamil Nadu (33,890 tonnes), Madhya Pradesh(28350 tonnes),Chhattisgarh (26,730 tonnes), Orissa(24,230 tonnes), Assam (8,340 tonnes), Telangana(4,650 tonnes) and a total of 4,72,850 tonnes as per 2021-22 census (APEDA 2022). A significant growth inthe area and production of cut roses can be observed by comparing the data of 2013-14 to 2021-22. In 2013-14 the area dedicated to cut roses were 3,087 ha, while in 2021-22 it increased to 40,550 ha. Similarly, the production of cut rose also raised from 166.47MT in 2013-14 to 240.67MT in 2022-23. (India stat, 2023).

The Hs code for export of cut rose is 06024000.During the year 2020-21, 2021-22 and 2022-23, there has been a noticeable increase in export value of cut roses with quantities reaching 17.05MT,22.92MT and 125.68MTrespectively. The export value of cut roses in India also witnessed a substantial rise ranging from US$ 97.03 to 143.42 and 323.06 US$. Trade barriers for cut rose exports includes sanitary and phytosanitary regulations, trade related tariffs and packaging standards [3,4]. Other complex regulatory compliance's include specific regulations like pest control measures, pesticide residual limits and documentation procedures. It is imperative to uphold high quality standards to export cut roses, including maintaining of vase life and freshness. To address these challenges, this study focuses on the growth performance of the cut rose

2. REVIEW OF LITERATURE

Iftikhar *et al.* [5] examined the current status and potential future growth of cut rose flower production and post-harvest management in Punjab, Pakistan. Despite of being the leading flower crop in the area, its performance in markets were poor due to lack of technology and intervention. Active interests taken by government and public sectors can aid to increased yield using advanced methodologies. Their study stands as a model for various other countries for improving rose production.

Ninama *et al.* [6] reviewed that floriculture is thriving in Asian countries, especially India providing self-employment opportunities to small farmers. Increasing demand and income makes floriculture integral in domestic and international markets. They state that along with skilled manpower and suitable economic reforms, floriculture has seen a significant increase in production, area and export since 2001.

According to Rahul *et al.* [7] adoption pattern and marketing channels for cut rose flower growers. The study was carried out in Anekal district in the urban outskirts of Karnataka in 2020-2021. The extent of recommended production technologies adopted by growers were analysed for finding out marketing channels for the farmers. After interviewing 60 farmers, the results revealed that majority adopted recommended production practices. Further it was revealed that channel 1was reliable for rose growers followed by channels 2 and 3.

Govindasamy *et.al.* [8] studied about the growth performance and export of rose over the period 2011-2021. They have predicted the future potential of production and export for the subsequent years. They calculated CGR (Compound Growth Rate), CAGR (Compound

Annual Growth Rate), Standard deviation, simple linear trend equation for area and production and the results showed negative for the period. Govindasamy *et.al.* [8]

3. METHODOLOGY

The compound annual growth rate was employed to evaluatethe growth rate in area andproduction of cut rose in India.The formula utilized in this investigation closely corresponds with the one detailed by Muthulakshmi et al. [9] in their research paper.

$$Y_t = ab^t U_t \quad .... \quad (1)$$

A compilation of annual time series data from various sources like India Stat, APEDA and other related articles spanning from 2013 to 2022 was gathered during the course of this study and incorporated to Formula (1).

Y_t = Area of land cultivated for Cut Rose (thousand hectares) and Production (thousand tonnes)

    a= Intercept
    b= Regression coefficient
    t = Time period (2013-2022)
    U_t = Disturbance term

The logarithmic form of the recommended model was then utilized to determine the coefficient of the chosen study variables.

$$\ln Y_t = \ln a + t \ln b + \ln U_t \quad .... \quad (2)$$

The Ordinary Least Squares (OLS) approach was used to determine estimates for the regression analysis. Following this, by employing the provided formula, establish the calculated estimate (b) value for each variable utilized in calculating the compound annual growth rate (CAGR).

$$CAGR (r) = [Antilog (log b)-1] X 100 \quad .... \quad (3)$$

Where,

r = Compound growth rate in per cent
To find out the significance and standard error of growth rate, the t statistic was used

$$t = bi/Se (bi) \quad .... \quad (4)$$

Where,

    bi= Regression coefficient
    Se= Standard error of the regression coefficient

3.1 Instability Analysis

The investigation focused on examining the instability in the area and production of cut rose by utilizing two different metrics namely Coefficient of Variation and the Cuddy-Della Valle Index.

3.2 Coefficient of Variation

The coefficient of variation (C.V.), a basic measure of instability over estimates the level of instability in time series data characterized by long-term trends.

(C.V) = (Standard Deviation /Mean) * 100

3.3 Instability Index: Cuddy-Della Valle Index

For determining the instability of cut rose's area of land cultivatedand production.Cuddy-Della Valle Index is used to correct the long term trend in coefficient of variance. It is a more precise method of indicating agricultural production instability. A lower value of this index indicates reduced instability in the cultivation of cut rose and signifies an increased production and vice versa.

This is how the CV is determined by Cuddy-Della Valle Index:

Cuddy - Della Valle Instability Index (%) = $CV\sqrt{(1-R^2)}$

Where,

C.V. - Coefficient of Variation in per cent and R^2 - Coefficient of determination (R^2) which was derived from a temporal trend regression was altered to account for its degrees of freedom.

The ranges of CDVI are given as follows.
Low instability = 0 to 15
Medium instability = 15 to 30
High instability = 30 and above.

4. RESULTS AND DISCUSSION

The compound annual growth rate was analysed, and Fig. 1 illustrates the pattern in the area and production of cut roses from 2013 to 2023. By referring to Table 1, it is evident that both the area and production experienced a positive growth rate.

Table 1. Compound annual growth rate for cut rose

Particulars	CGAR (per cent) Period (2013-2023)
Area	4.14
Production	5.98

Source: Authors calculation based on data collected from India stat (2013-2023)
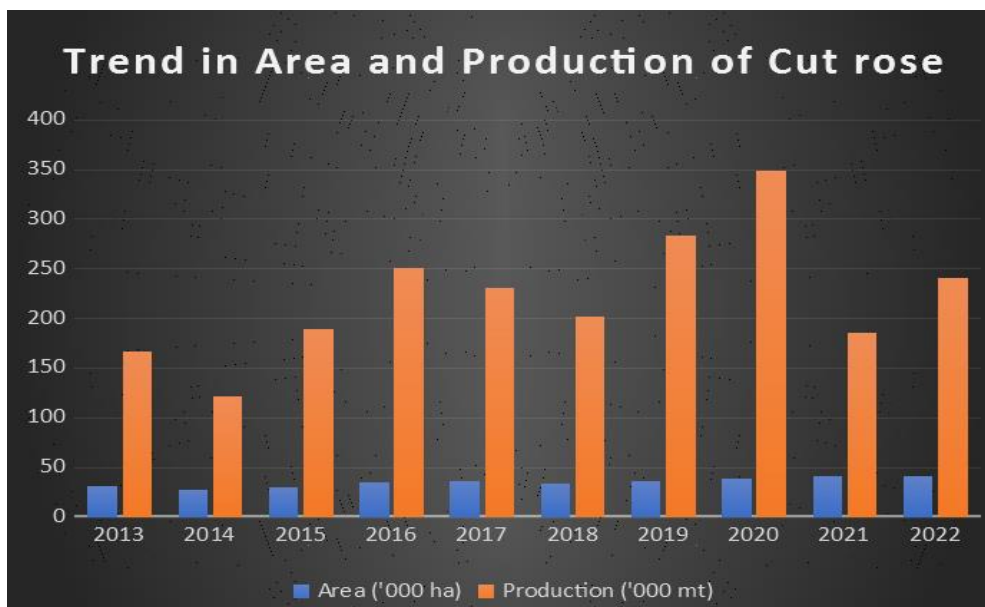
Fig. 1. Trend in the area and production of cut rose for the period 2013-2023

Table 2. Instability analysis for area and production of cut rose

Particulars	Area (per cent)	Production (per cent)
Mean	34.36	221.42
Standard Deviation	4.36	61.00
Coefficient of variation	12.69	27.54
Adjusted R square	0.79	0.23
CDVI	6.17	24.16

Source: Authors calculation based on the data collected from India stat (2013-2023)

Throughout the entire duration of study, spanning from 2013 to 2023, the compound annual growth rate of cut rose experienced a significant surge owing to its growing use in decoration, bouquets and worshipping. Additionally, the essential oil extracted from rose is widely used perfumes and cosmetics.As it is the most preferred cut flower in global market and is of high export value in global market [10].

From Fig. 1, it is evident that there has been no significant fluctuation in the area and production of cut rose during the past decade. The highest area is observed in the year 2022-2023, while the highest production levels were recorded in 2020-2021 followed by a minor decline.

Upon examining Table 2, it is evident that the coefficient of variation for area and production of

cut rose are 12.69 per cent and 27.54 per cent respectively for the years 2013 to 2023.This study clearly depicts that there is a steady growth rate in the area and production of cut roses without any instability or deviation. The reasons for absence of instability are season neutrality in rose production (Pooja *et al.,* 2022), increased demand of rose in both local and international markets, advancements in production technologies, efficiency in supply chain management and more.

5. CONCLUSION

Rose is an elegant and attractive flower that holds a prominent and immovable position in both global markets and the economic growth of the nation. This study focuses on the growth performance and instability of cut rose in India

from 2013-2023.The findings of this study indicate that ,the area and production of cut roses in India have experienced a steady and positive growth rate during the period.The instability analysis shows that there is minimal variation. Cut rose production and marketing play a significant role in contributing to the economy. However, there is still potential for growth and increased production. This can be achieved by implementing modern technologies in production aspect along with tackling the current challenges related to post-harvest handling, transportation infrastructure and logistics to meet global quality standards. By boosting collaboration with farmers and export stakeholders, the competitiveness of both cut rose production and export can be enhanced.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Priya Philip, Mini Sankar, U. Sreelatha JS. Minimol and TV. Anupama. Evaluation of cut rose varieties for commercial cultivation under humid tropics of Kerala. Journal of Tropical Agriculture. 2019;57(2): 180-185

2. Soujanya P, Balaji S, Kulkarni, Rajiv Kumar PM, Munikrishnappa M, Shivapriya M, Harshavardhan. Evaluation of rose (*Rosa hybrida* L.) varieties for growth, yield and quality under eastern dry zone of Karnataka. Journal of Pharmacognosy and Phytochemistry. 2018;7(5):165-168.

3. Bairwa KC, Sharma R, Kumar T. Economics of growth and instability: Fruit crops of India. Rajasthan Journal of Extension Education. 2012;20:128-32.

4. Muhammad A, D'Souza A, Amponsah W. Violence, instability, and trade: evidence from Kenya's cut flower sector. World Development. 2013;51:20-31.

5. Iftikhar Ahmad, John M. Dole M, Aslam Khan M. Qasim Tanveer Ahmad and AS. KhanPresent Status and Future Prospects of Cut Rose Production in Punjab, Pakistan. HortTechnology hortte. 2010;20 (6):1010-1015

6. Ninama AP, SA. Sipai KG, Khadayatha and PC. Patel. Floriculture in India: problems and prospect. Advances in Life Sciences. 2016;5(4):1150-1153

7. Rahul CR, Lakshminarayan MT, Ganapathy MS, Siddaya. Adoption pattern and marketing channels of rose cut flower growers. Journal of Krishi Vigyan. 2021; 10(1):1-5.

8. Govindasamy R, Das Dhanya Sai, Vardhini S. and Pooja. Trends in Production and Export of Rose in India. Shanlax International Journal of Management. 2023;10(3):88-92.

9. Muthulakshmi K, M Thilagavathi, KM Shivakumar, M R Duraisamy, M Kavino, Uma GM. Determination of growth and export performance of mango in India. Journal of Experimental Agriculture International. 2022;44(10):163-169.

10. Bhagat AA, Badgujar CD, Bhosale SS, Supe VS. An economic analysis for export of fresh cut rose flowers from India. J Pharmacogn Phytochem. 2019;8(2S):291-298.