



Challenge Faced by Horticulturists in Orange Cultivation with Special Reference to Madhya Pradesh, India

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Authors' contributions

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

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ABSTRACT

The study was conducted in Madhya Pradesh to examine the factors limiting citrus production and challenges faced by orange growers in the Agar Malwa and Pandhurna districts. A total of 183 respondents were selected using a proportional stratified sampling approach. The findings revealed several critical challenges affecting citrus farmers, with pest and disease outbreaks being the most

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significant constraint, impacting yield and fruit quality (mean score 4.26). Second major challenge was inadequate subsidies (mean score 4.19), followed by climate change effects, including temperature fluctuations, frosts, and irregular rainfall (mean scores 3.96 and 3.89, respectively). Other concerns included the high cost and unavailability of disease-free rootstock, a shortage of trained labor, market fluctuations, and post-harvest losses. These issues highlight the need for targeted policy, extension and research interventions to enhance pest and disease management, improve access to disease-free rootstock. Additionally, there is a need for market stabilization mechanisms and strategies to mitigate the impacts of climate change on citrus farming.

Keywords: Production; cultivation practices; challenges; orange.

1. INTRODUCTION

Orange is one of the most important fruits in the horticulture industry providing both financial and nutritional benefits to farmers (Otieno, 2020). Orange is one of the top citrus fruits being grown in most of the countries after banana and apple. The most important commercial citrus species are mandarin, sweet orange and acid lime. Orange has great economic importance due to its wide range of uses and benefits. This fruit is rich in vitamins like C, A, B and phosphorus. Orange can be grown both in tropical and sub-tropical climate conditions up to 1,500 meters. However dry climate with a soil temperature around 25 degrees Celsius could be optimum for plant root growth. The orange crop is very sensitive to frost conditions and highly humid conditions causing to spread of many diseases. With regard to harvesting the crop yield starts from 4" to 5" years depending on the cultivator. The economic life of an orange tree is 20 to 25 years (Baruah & Sangriang, 2016). Due to the problem of citrus decline, recently the average yield of oranges in India is gradually going to be low (9.3 Mt/ha) as compared to other countries like the USA (32.6 Mt/ha), Brazil (24.7 Mt/ha) and China (13.7 Mt/ha) (NHB 2012-2013, FAOSTAT 2013) (National Horticulture Board, 2013).

The main citrus fruits in Madhya Pradesh are mandarin orange (Santra), kinnow, and sweet orange. The area under mandarin orange, sweet orange and kinnow in Madhya Pradesh is 1,29,631 ha with a production of 21,85,684 metric tonnes. The average productivity is estimated to be 16.89 metric tonnes/ha. The area under citrus (Orange, Sweet Orange, Kinnow) in Agar Malwa is estimated to be 37,940 ha. The production of mandarin, sweet orange and lime in Agar Malwa is 6,82,920 metric tonnes and productivity is estimated to be 18 metric tonnes/ha. and Pandhurna occupied a 22013 ha. area with a production of 4,90,000 metric tonnes, productivity is estimated to be 20 metric

tonnes/ha. (District Horticulture Department, 2022-23).

Orange growers are facing problems in several areas of orange cultivation viz., selection of soil, layout of garden, training and pruning of plants and recommended package of practices are not followed as per the advice of the extension workers. At present, no sufficient investigations are available in regarding all these challenges areas Efforts are, therefore, required to investigate these problematic areas faced by orange growers. As a result, the present study is undertaken with an objective to know the Challenges in Orange Cultivation: An Analysis of the Challenges Facing Orange Cultivation in Madhya Pradesh.

1.1 Objective

To assess the challenges of orange cultivation in Agar Malwa and Pandhurna Districts.

2. METHODOLOGY

The investigation was carried out in the Pandhurna and Agar-Malwa districts of Madhya Pradesh, as these districts have the maximum area dedicated to orange cultivation and also these two districts comes under one district one product in orange. Pandhurna and Agar Malwa district comprises of two and four blocks respectively, out of which two blocks from each district were selected. Thus from Pandhurna district Sausar and Pandhurna blocks and from Agar Malwa district Susner and Nalkheda blocks were selected because of higher orange production. From each selected block five villages were selected based on the maximum number of orange growers. Thus, a total of 20 villages was selected from 4 blocks. we have followed Taro Yemne's proportional stratified sampling approach used to identify the number of farmers from each village for the questionnaire survey. So total 183 farmers were selected. A

sequential exploratory mixed-method research design was adopted to gain a comprehensive understanding of the research problem. The interview schedule functioned as the study's primary tool. It was determined to collect information through personal interviews in order to obtain authentic comprehensive responses. The collected data from the respondents were scored, tabulated and analyzed to calculate the Weightage score and mean score to interpret findings and draw conclusions.

3. RESULTS AND DISCUSSION

The result of present study as well as relevant discussion have been summarized under the following Challenges and Future Prospects in Orange Cultivation: An Analysis of the Challenges Facing Orange Cultivation in Madhya Pradesh from Table 1 shows that all the orange growers faced challenges like Irregular fruit bearing, Post-Harvest Losses, High cost of rootstock, Non-availability of disease-free rootstock, Inadequate subsidy, Fluctuation in market price and demand, Seasonal glut in the market, Non-availability of diagnostic and advisory services at field, Pest and diseases affect yield and quality, Irregular rainfall, Unavailability of Trained labour, Climate change (temperature fluctuation, frosts and droughts) , respectively.

Orange growers face a range of challenges that significantly impact their productivity and the sustainability of their orchards. These challenges include both technical and economic factors, as

well as institutional constraints, each contributing to the difficulties experienced by farmers. One of the most pressing issues is irregular fruit bearing, which can be caused by various factors such as plant hormones, excessive pruning, and a lack of nutrients like nitrogen and potassium in the leaves. Additionally, irregular rainfall and high temperatures during flowering periods further exacerbate the problem. These factors collectively contribute to uneven fruit production, which is a critical issue for orange growers (Jangid et al., 2023, Dalal et al., 2018, Gedam & Singh, 2012).

Post-harvest losses also represent a significant challenge, as oranges are highly perishable. The absence of cold storage facilities is a major contributing factor to these losses. With inadequate infrastructure for proper handling and storage, oranges often spoil before they can be sold, leading to significant economic losses for farmers. The high cost of rootstock is another major issue, as many farmers are financially burdened by the expense of purchasing quality rootstock. Unable to afford the higher-cost options, farmers may resort to cheaper alternatives, which can result in inferior rootstock that affects the long-term productivity of their orchards (Choudhary & Bangarwa, 2013). Moreover, the non-availability of disease-free rootstock is a critical problem, as the quality of planting material has a direct impact on the productivity of the orchard over the next 20-25 years. Poor quality rootstock not only affects yield but also the overall adoption and success of orange cultivation in the region (Biswas & Jamir, 2015).

Table 1. Challenges faced by orange growers with their rank

S. No.	Challenges faced by orange growers	Weightage Score	Mean	Rank
1.	Irregular fruit bearing	521	2.84	XI
2.	Post-Harvest Losses	339	1.85	XII
3.	High cost of rootstock	683	3.73	VIII
4.	Non-availability of disease-free rootstock	686	3.74	VII
5.	Inadequate subsidy	768	4.19	II
6.	Fluctuation in market price and demand	667	3.64	IX
7.	Seasonal glut in the market	706	3.85	V
8.	Non-availability of diagnostic and advisory services at field	541	2.95	X
9.	Pest and diseases affect yield and quality	781	4.26	I
10.	Irregular rainfall	712	3.89	IV
11.	Unavailability of Trained labour	702	3.83	VI
12.	Climate change (temperature fluctuation, frosts and droughts)	725	3.96	III

In terms of economic challenges, inadequate subsidy access is a key issue. Farmers struggle to obtain official credit due to bureaucratic procedures, which forces them to rely on informal credit sources that often lead to a cycle of debt. Without adequate financial support, farmers are unable to invest in essential agricultural inputs, which limits their capacity to improve production. Additionally, fluctuations in market prices and the seasonal glut in the market create further instability. During peak production times, when the market is flooded with oranges, farmers are forced to sell their produce at low prices, which negatively affects their profitability. The lack of cold storage and processing facilities exacerbates this issue, as farmers have limited options to manage excess supply.

Non-availability of diagnostic and advisory services is another challenge that impacts farmers' ability to address technical issues such as pest control and disease management. The absence of expert advice and training leads to a lack of knowledge about improved cultivation practices, which further reduces the potential for successful crop management (Choudhary & Bangarwa, 2013). In addition, irregular rainfall and climate change pose significant risks to orange production. Variability in rainfall patterns, along with rising temperatures, frosts, and droughts, have a detrimental effect on crop yields, especially for crops like oranges that are sensitive to climatic fluctuations (Ghada et al., 2019, Khan & Khan, 2021).

Finally, unavailability of trained labor adds to the challenges faced by orange growers. The demand for labor is high throughout the year, especially during harvest, but many workers migrate to urban areas in search of better opportunities. This labor shortage, coupled with high wages, increases production costs and makes it difficult for farmers to manage their orchards effectively (Chikkalaki & Krishnamurthy, 2023). These constraints highlight the complex and multifaceted challenges faced by orange growers, requiring a comprehensive approach to address technical, economic, and institutional issues that hinder their success.

The challenge warrants attention to combat to bring about improvement in orange cultivation and orange growers' livelihoods. The challenges encountered by the orange growers in adoption of recommended package of practices of orange can be summarized as Irregular fruit-bearing,

Post-Harvest Losses, High cost of rootstock, Non-availability of disease-free rootstock, Inadequate subsidy, Fluctuation in market price and demand, Seasonal glut in the market, Non-availability of diagnostic and advisory services at field, Pest and diseases affect yield and quality, Irregular rainfall, Unavailability of Trained labour, Climate change (temperature fluctuation, frosts and droughts) , respectively. So, the government should address the challenges of better technical support and credit facilities for wider adoption of this fruit crop (Hore & Barua, 2004).

4. CONCLUSION

To address the challenges faced by orange growers, several strategies can be implemented across technical, economic and institutional areas. Improving fruit bearing consistency can be achieved through better nutrient management, optimized pruning practices. Reducing post-harvest losses requires investment in cold storage and effective post-harvest management. The high cost and unavailability of disease-free rootstock can be tackled by offering subsidies and loans, while promoting research in cost-effective, disease-resistant varieties. Enhancing access to credit and simplifying financial procedures can help farmers overcome inadequate subsidies. Establishing cooperative marketing agencies and improving transport infrastructure would help stabilize prices and reduce seasonal glut. Strengthening extension services through ICT-based platforms and training programs can address the lack of diagnostic and advisory services. Adaptation to climate change can be supported by encouraging climate-smart practices and promoting weather insurance for crops. Labor shortages can be mitigated through mechanization and training programmes.

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 the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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