

International Journal of Agriculture Extension and Social Development

Volume 9; Issue 6; June 2026; Page No. 592-596

Received: 19-03-2026
Accepted: 23-04-2026

Indexed Journal
Peer Reviewed Journal

Prospects of mandarin cultivation for rural livelihood improvement in South-Eastern Rajasthan

¹Jagdish Chand Dangi, ²RS Rathore, ³Rajeev Bairathi, ⁴SS Sisodia, ⁵GL Meena, ⁶Virendra Singh and ⁷Devendra Jain

¹Ph.D. Research Scholar, Department of Extension Education, RCA, MPUAT, Udaipur, Rajasthan, India

²Professor Emeritus (Retd.), Department of Extension Education, RCA, MPUAT, Udaipur, Rajasthan, India

³Professor and Head, Department of Extension Education, RCA, MPUAT, Udaipur, Rajasthan, India

⁴Professor and Head (Retd.), Department of Extension Education, RCA, MPUAT, Udaipur, Rajasthan, India

⁵Professor and Head, Department of Agricultural Economics, RCA, MPUAT, Udaipur, Rajasthan, India

⁶Professor, Department of Horticulture, RCA, MPUAT, Udaipur, Rajasthan, India

⁷Associate Professor, Department of MBBT, RCA, MPUAT, Udaipur, Rajasthan, India

DOI: <https://www.doi.org/10.33545/26180723.2026.v9.i6h.3742>

Corresponding Author: Jagdish Chand Dangi

Abstract

Mandarin (*Citrus reticulata* Blanco) cultivation has emerged as a promising horticultural enterprise for improving rural livelihoods in South-Eastern Rajasthan. The present study was conducted in Jhalawar and Bhilwara districts to assess the prospects of mandarin cultivation as perceived by growers and its potential contribution to socio-economic development. An ex-post-facto research design was adopted, and data were collected from 240 proportionate selected mandarin growers through personal interviews. The findings revealed that growers highly emphasized the need for improved varieties with high yield and larger fruit size (MPS 97.22), disease-free nursery plants (MPS 95.28), and stronger institutional support from government agencies, cooperatives and banks (MPS 95.97). Respondents also perceived significant opportunities in regulated markets (MPS 90.00), value addition through processing (MPS 88.61) and export potential of mandarin and its products (MPS 95.00). Among the major prospect dimensions, extension services ranked first (MPS 90.74), followed by quality planting material (MPS 89.44). The study concludes that mandarin cultivation possesses substantial potential for enhancing farm income, employment generation, market participation and overall rural livelihood security. Strengthening extension services, ensuring the availability of quality planting material, promoting value addition and developing export-oriented infrastructure can further enhance the sustainability and profitability of mandarin cultivation in the region.

Keywords: Mandarin cultivation, rural livelihood, prospects, extension services, export potential, South-Eastern Rajasthan

Introduction

Agriculture sector contributes significantly to national income, employment generation, food security and poverty alleviation (FAO, 2021) [2]. Horticulture plays a vital role in enhancing agricultural diversification, income generation and employment opportunities in rural areas. Among fruit crops, citrus occupies a prominent position due to its high nutritional value, market demand and export potential. Mandarin (*Citrus reticulata* Blanco) is one of the most important citrus fruits cultivated in India and contributes significantly to the horticultural economy of several states. The fruit is rich in vitamin C, antioxidants and essential minerals, making it highly valued by consumers as well as the processing industry. Mandarin crop is generally grown as a perennial orchard system requiring long-term investment and scientific management for sustainable productivity. In Rajasthan, mandarin is cultivated over an area of 26.57 thousand hectares, producing 289.63 thousand metric tonnes with a productivity of 10.90 MT per hectare (Anonymous, 2023-24). Rajasthan's Jhalawar district is distinguished for producing high-quality mandarin, often likened to "Chhota Nagpur" for its colour, taste, and juice

quality. In Rajasthan, mandarin cultivation has emerged as a promising enterprise, particularly in the south-eastern region comprising districts such as Jhalawar and Bhilwara. Favorable agro-climatic conditions, availability of suitable soils and increasing market demand have encouraged farmers to adopt mandarin cultivation as a profitable alternative to traditional crops. The perennial nature of mandarin orchards provides a regular source of income, generates year-round employment and contributes to the economic stability of farming households.

Rural livelihood improvement has become a major development objective in India, where a large proportion of the population depends on agriculture and allied sectors for sustenance. Fruit cultivation, especially high-value horticultural crops such as mandarin, has the potential to enhance farm income, create employment opportunities, strengthen market participation and improve the overall socio-economic status of rural communities. In addition, the scope for value addition, processing and export further increases the economic prospects of mandarin cultivation.

Despite its growing importance, mandarin cultivation faces several challenges related to quality planting material, pest

and disease management, marketing infrastructure, value chain development and extension support services. Understanding farmers' perceptions regarding the future prospects of mandarin cultivation is essential for formulating appropriate policies and interventions aimed at promoting sustainable horticultural development.

Keeping these facts in view, the present study was undertaken to assess the prospects of mandarin cultivation as perceived by growers in South-Eastern Rajasthan and to examine its potential contribution towards rural livelihood improvement. The findings of the study are expected to provide valuable insights for researchers, extension agencies, policymakers and development organizations working in the horticulture sector.

Materials and Methods

Ex-post-facto research design was used in the study. The present investigation was carried out in south-eastern Rajasthan. In This area, two universities are working *i.e.*, MPUAT, Udaipur and AU, Kota. The study has been conducted in the MPUAT Udaipur and AU Kota service areas. Jhalawar and Bhilwara districts of this area have been selected on the basis of the maximum area of mandarin cultivation. Bhilwara district comprises 16 tehsils, out of which Mandalgarh has been selected on the basis of maximum area and mandarin growers. Similarly, Jhalawar district comprises 12 tehsils, among which Pachpahar has been selected on the basis of the same criteria. Jojwa, Bigod and kalyanpura gram panchayat were selected from Mandalgarh tehsil of Bhilwara district having maximum number of mandarin growers and Mishroli, Guradiyajoga and Silehgarh gram panchayat were selected from Pachpahar tehsil of Jhalawar district based on same criteria. Thus, total six-gram panchayat selected from two identified

tehsils. A list of all mandarin growers from selected gram panchayats was prepared for selection of mandarin growers with the help of agriculture supervisors and assistant agriculture officers. From the prepared list, proportionate number of mandarin growers were selected randomly from each of the selected gram panchayats. Thus, a total of 240 mandarin growers were selected from Jhalawar and Bhilwara districts for the present investigation.

Face to face interview technique was used to collect data from the selected mandarin growers. Thereafter, appropriate statistical measures were used to arrive at specific conclusions. The statistical measures used where mean percent score were used.

Mean Per cent Score (M.P.S.)

Total obtained score is divided by total obtainable score and then resulted score multiply by 100 to calculate mean per cent score.

$$\text{M.P.S.} = \frac{\text{Obtained score}}{\text{Total obtainable score}} \times 100$$

Results and Discussion

In the present context, the prospects perceived by the farmers about mandarin production were identified and have been presented in the subsequent tables.

Importance of quality planting material realised by mandarin growers

Here, Table 1 indicates that mandarin growers wanted to grow organic products and they wanted to have disease and insect free good quality planting material.

Table 1: Extent of realization of the importance of quality planting material among mandarin growers

S. No.	Prospects	Jhalawar (n ₁ =120)		Bhilwara (n ₂ =120)		Total (n=240)	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Organic production of mandarin need be started	76.94	V	72.22	V	74.58	V
2.	Disease and pest distress the farmers for mandarin production	90.83	IV	93.33	III	92.08	III
3.	Disease free nursery is a great need of today	96.11	II	94.44	II	95.28	II
4.	High quality tissue culture plants required	93.33	III	82.78	IV	88.06	IV
5.	New varieties with high quality yield and bigger fruit size are required	98.33	I	96.11	I	97.22	I

Information in Table 1 reveals that mandarin growers wanted "New varieties with high quality yield and bigger fruit size are required" assigned first rank with overall 97.22 MPS. Whereas, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara secured first rank with 98.33 MPS and 96.11 MPS, respectively. Followed by mandarin growers reported "Disease free nursery is a great need of today" secured second rank with overall MPS 95.28. Similarly, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara ranked at second place with MPS 96.11 and MPS 94.44, respectively. Further examine of Table 1 shows that "Disease and pest distress the farmers for mandarin production" given at third positions with MPS 92.08. Whereas, mandarin growers of Jhalawar assigned it fourth position with MPS 90.83 and mandarin growers of Bhilwara allotted third position with MPS 93.33.

Again, analysis of Table 1 shows that wanted to have "High quality tissue culture plants required" given fourth rank with

overall MPS 88.06. While, mandarin growers of Jhalawar ranked it third positions with MPS 93.33 and Bhilwara mandarin growers assigned fourth positions with MPS 82.78. Lastly mandarin growers realised importance of "Organic production of mandarin need be started" ranked last and fifth position with overall MPS 74.58. Similarly, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara ranked it at fifth place with MPS 76.94 and MPS 72.22, respectively. In conclusion, the study clearly indicates that mandarin growers possessed a progressive outlook towards the adoption of good agricultural practices. The highest priority given to improved varieties, disease-free nursery plants and effective management of pests and diseases reflects their strong awareness of factors influencing productivity and fruit quality. These prospects underline the urgent need for strengthening research-extension linkages to ensure the timely availability of improved technologies and quality planting material.

Marketing of mandarin related outlook of mandarin growers: Here, Table 2 indicates that marketing related

areas of improvement suggested by mandarin growers are given with their mean per cent score and rank.

Table 2: Marketing of mandarin related outlook perceived by growers

S. No.	Prospects	Jhalawar (n ₁ =120)		Bhilwara (n ₂ =120)		Total (n=240)	
		MPS	RANK	MPS	RANK	MPS	RANK
1.	Market linkages required to be strengthened	84.44	IV	88.61	III	86.53	IV
2.	Value chain need development	85.56	III	87.50	IV	86.53	III
3.	Farmers can get remunerative price if regulated market is their	88.33	I	91.67	I	90.00	I
4.	Corporate companies if entered, farmers can get better price	47.50	V	79.72	V	63.61	V
5.	If farmers trained, they can prepare processed products	87.50	II	89.72	II	88.61	II

Information in Table 2 reveals that marketing of mandarin related prospects to “Farmers can get remunerative price if regulated market is their” assigned first rank by mandarin growers with overall 90.00 MPS. Whereas, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara secured first rank with 88.33 MPS and 91.67 MPS, respectively.

Followed “If farmers trained, they can prepare processed products” secured second rank with overall MPS 88.61. Similarly, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara ranked at second place with MPS 87.50 and MPS 89.72, respectively.

Further examine of Table 2 shows that “Value chain need development” given at third positions with MPS 86.53. Whereas, mandarin growers of Jhalawar ranked it third positions with MPS 85.56 and Bhilwara mandarin growers assigned fourth positions with MPS 87.50.

Again, analysis of Table 2 shows “Market linkages required to be strengthened” given fourth rank with overall MPS 86.53. While, mandarin growers of Jhalawar ranked it fourth positions with MPS 84.44 and Bhilwara mandarin growers

assigned third positions with MPS 88.61.

It was also observed that “Corporate companies if entered, farmers can get better price” ranked last and fifth position with overall MPS 63.61. Similarly, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara ranked it at fifth place with MPS 47.50 and MPS 79.72, respectively.

Overall, the study concludes that mandarin growers have a favorable outlook towards the marketing prospects, particularly in terms of price enhancement, processing opportunities and improved market systems. However, concerns regarding price instability and limited expectations from corporate sector participation still persist, which need to be addressed through policy support, market reforms and institutional strengthening.

Export potential of mandarin

Here, Table 3 indicates that export potential of mandarin related prospects perceived by mandarin growers are were given with their mean per cent score and rank.

Table 3: Export potential of mandarin as perceived by respondents

S. No.	Prospects	Jhalawar (n ₁ =120)		Bhilwara (n ₂ =120)		Total (n=240)	
		MPS	RANK	MPS	RANK	MPS	RANK
1.	Ample chances of export of mandarin and its products	96.11	I	93.89	I	95.00	I
2.	Export units need to be established in mandarin production area	92.22	II	91.11	II	91.67	II
3.	New mandarin import market needs to be identified for better price to farmers	85.83	III	77.78	III	81.81	III
4.	Mandarin export quality testing centre needs to be established in mandarin producing areas	73.33	IV	68.33	IV	70.83	IV

Information in Table 3 reveals that “Ample chances of export of mandarin and its products” assigned first rank by mandarin growers with overall 95.00 MPS. Whereas, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara secured first rank with 96.11 MPS and 93.89 MPS, respectively.

Further examine of Table 3 shows that “Export units need to be established in mandarin production area” given at second positions with MPS 91.67. Similarly, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara ranked at second place with MPS 92.22 and MPS 91.11, respectively.

Again, analysis of Table 3 shows that “New mandarin import market needs to be identified for better price to farmers” given third rank with overall MPS 81.81. Whereas, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara secured third rank with 85.83 MPS and 77.78 MPS, respectively.

Lastly mandarin growers suggested that “Mandarin export quality testing centre needs to be established in mandarin

producing areas” ranked last and fourth position with overall MPS 70.83. Similarly, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara ranked it at fourth place with MPS 73.33 and MPS 68.33, respectively.

Overall, the findings imply that mandarin growers possess a positive outlook towards export opportunities, but at the same time, they are conscious of emerging global competition and quality requirements. Strengthening extension services, providing training on export standards and improving post-harvest handling and certification systems could further enhance the export potential of mandarin cultivation in the study area.

4.6.4 Extension services related prospects perceived by mandarin growers

Here, Table 4 indicates that extension services related prospects perceived by mandarin growers are were given with their mean per cent score and rank.

Table 4: Prospects of extension services as perceived by mandarin growers

S. No.	Prospects	Jhalawar (n ₁ =120)		Bhilwara (n ₂ =120)		Total (n=240)	
		MPS	RANK	MPS	RANK	MPS	RANK
1.	Farmer producer organizations need to be strengthened	88.61	VI	82.50	VI	85.56	VI
2.	Public and private extension linkages need to be established	95.00	III	89.17	III	92.08	III
3.	Active involvement of government, cooperative organizations and bank services required in rural areas	98.89	I	93.06	I	95.97	I
4.	Extension institution should give skill training on processing and value addition	92.22	V	83.33	V	87.78	V
5.	Media coverage of successful farmers should be increased	92.78	IV	85.83	IV	89.31	IV
6.	Awards and rewards need to be given to the innovative farmers	96.39	II	91.11	II	93.75	II

Information in Table 4 reveals that “Active involvement of government, cooperative organizations and bank services required in rural areas” assigned first rank with overall 95.97 MPS. Whereas, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara secured first rank with 98.89 MPS and 93.06 MPS, respectively.

Followed by “Awards and rewards need to be given to the innovative farmers” secured second rank with overall MPS 93.75. Similarly, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara ranked at second place with MPS 96.39 and MPS 91.11, respectively.

Further examine of Table 4 shows that “Public and private extension linkages need to be established” given at third positions with MPS 92.08. Whereas, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara secured third rank with 95.00 MPS and 89.17 MPS, respectively.

Again, analysis of Table 4 shows that “Media coverage of successful farmers should be increased” given fourth rank with overall MPS 89.31. Similarly, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara ranked at fourth place with MPS 92.78 and MPS 85.83, respectively.

It was followed by “Extension institution should give skill training on processing and value addition” assigned fifth

position by mandarin growers with overall MPS 85.69. Whereas, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara secured fifth rank with 92.22 MPS and 83.33 MPS, respectively.

Lastly farmers suggested that “Farmer producer organizations need to be strengthened” ranked last and sixth position with overall MPS 63.61. Similarly, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara ranked it at sixth place with MPS 88.61 and MPS 82.50, respectively.

Overall, the study concludes that mandarin growers have high expectations from extension services, particularly in terms of institutional support, incentives and improved coordination between different agencies. Strengthening these aspects can significantly contribute to the development and sustainability of mandarin cultivation in the study area.

Socio-economic development related prospects perceived by mandarin growers

Here, Table 5 indicates that socio-economic development related prospects perceived by mandarin growers are given with their mean per cent score and rank.

Table 5: Prospects of socio-economic development through mandarin production as perceived by Growers

S. No.	Prospects	Jhalawar (n ₁ =120)		Bhilwara (n ₂ =120)		Total (n=240)	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Increase in area of mandarin production	68.06	VI	89.44	IV	78.75	V
2.	If production per unit area of mandarin increase that will surely increase socio-economic conditions of farmers	95.28	I	91.67	I	93.47	I
3.	Professional farming can give extra income that will improve health and hygiene of farming community	73.89	V	74.72	VI	74.31	VI
4.	More numbers of farmers need to be attracted for professional mandarin production	75.00	IV	89.72	III	82.36	IV
5.	Professional farming can enhance farm income	89.44	III	80.83	V	85.14	III
6.	Use of smart technology can enhance mandarin production	91.94	II	91.67	II	91.81	II

Information in Table 5 reveals that “If production per unit area of mandarin increase that will surely increase socio-economic conditions of farmers” assigned first rank by mandarin growers with overall 93.47 MPS. Whereas, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara secured first rank with 95.28 MPS and 91.67 MPS, respectively. Followed by “Use of smart technology can enhance mandarin production” secured second rank with overall MPS 91.81. Similarly, mandarin growers of both districts *i.e.*, Jhalawar and Bhilwara ranked at second place with MPS 91.94 and MPS 91.67, respectively.

Further examine of Table 6 shows that prospects of “Professional farming can enhance farm income” given at third positions with MPS 85.14. Whereas, mandarin growers

of Jhalawar assigned it third position with MPS 89.44 and mandarin growers of Bhilwara allotted sixth position with MPS 80.83. Again, analysis of Table 6 shows that “More numbers of farmers need to be attracted for professional mandarin production” given fourth rank with overall MPS 82.36. Whereas, mandarin growers of Jhalawar ranked it fourth positions with MPS 75.00 and Bhilwara mandarin growers assigned third positions with MPS 89.72. Further it is found that “Increase in area of mandarin production” secured sixth position with overall MPS 78.75. Whereas, mandarin growers of Jhalawar ranked it sixth position with MPS 68.06 and Bhilwara mandarin growers assigned fourth positions with MPS 89.44. Mandarin growers suggested that “Professional farming can give extra income that will

improve health and hygiene of farming community” ranked last and sixth position with overall MPS 74.31. While, mandarin growers of Jhalawar ranked it fifth position with MPS 73.89 and Bhilwara mandarin growers assigned sixth positions with MPS 74.72. Overall, the results indicate that mandarin growers have a highly positive perception of socio-economic development prospects, particularly in terms of increased production, improved skills, and economic upliftment. These findings emphasize the

potential of mandarin cultivation as an effective means for enhancing farmers’ income, promoting professional farming and strengthening rural livelihoods in the study areas.

Aspect wise prospects of mandarin growers

To get an overview about aspect prospects perceived by the mandarin growers in mandarin production technology, the overall score for each category was pooled and results have been presented in Table 6.

Table 6: Aspect wise prospects in mandarin production as perceived by growers

S. No.	Prospects	Total (n=240)	
		MPS	Rank
1.	Importance of quality planting material realised by mandarin growers	89.44	II
2.	Marketing of mandarin related outlook of mandarin growers	84.75	IV
3.	Export potential of mandarin	84.83	III
4.	Extension services related prospects perceived by mandarin growers	90.74	I
5.	Socio-economic development related prospects	84.31	V

Information in Table 4 reveals that “Extension services related prospects perceived by mandarin growers” assigned first rank with overall 90.74 MPS, indicating that the respondents considered extension services highly important for improving mandarin production technology. Followed by “Importance of quality planting material realised by mandarin growers” secured second rank with overall MPS 89.44, which reflects the awareness of growers regarding the significance of quality planting material for better productivity and orchard management.

The aspect “Export potential of mandarin” obtained an MPS of 84.83 and ranked third, indicating that growers perceived good opportunities for export and market expansion of mandarin fruits. Similarly, “Marketing of mandarin related outlook of mandarin growers” secured an MPS of 84.75 and ranked fourth, showing positive perceptions towards marketing opportunities and market-oriented production practices.

Lastly farmers suggested that “Socio-economic development related prospects” assigned last and fifth position with overall MPS 84.31; however, the score still indicates a favourable perception among growers regarding the contribution of mandarin cultivation towards improving their socio-economic status.

Overall, the results show that mandarin growers had optimistic prospects towards mandarin production technology, particularly in relation to extension support services and the use of quality planting material.

Conclusion

The study concludes that mandarin cultivation offers considerable opportunities for improving the livelihoods of rural farming communities in South-Eastern Rajasthan. Growers expressed strong confidence in the potential of improved planting materials, effective extension services, better marketing systems, export opportunities, and technological interventions for enhancing productivity and profitability. Extension services emerged as the most important prospect area, highlighting the need for stronger institutional support, training, and coordination among government agencies, financial institutions and extension organizations. The findings further indicate that regulated markets, value addition, and export-oriented infrastructure

can significantly improve farmers’ income and market competitiveness. Overall, mandarin cultivation has the potential to serve as an effective pathway for socio-economic development, employment generation and sustainable agricultural growth in the region. Therefore, focused policy interventions, strengthened research-extension linkages and investments in quality planting material, marketing infrastructure and export facilitation are essential for realizing the full potential of mandarin cultivation in south-eastern Rajasthan.

References

1. Department of Agriculture and Farmers Welfare. Horticultural Statistics at a Glance 2024. New Delhi: Horticulture Statistics Unit, Economics, Statistics and Evaluation Division, Ministry of Agriculture and Farmers Welfare, Government of India; 2024.

2. Food and Agriculture Organization of the United Nations. The State of Food and Agriculture 2021. Rome: FAO; 2021.

3. Sharma RK, Meena BL, Singh V. Prospects of mandarin (*Citrus reticulata*) cultivation for rural livelihood improvement in semi-arid regions of Rajasthan. Indian J Hortic Sci. 2023;80(2):145–152.

4. Joshi P, Verma SK, Dangi JC. Citrus-based farming systems and their impact on income generation in South-Eastern Rajasthan. J Agr Rural Dev. 2022;19(4):201–208.

5. Rathore RS, Bairathi R, Sisodia SS. Role of mandarin cultivation in enhancing livelihood security among smallholder farmers in Rajasthan. Agric Econ Res Rev. 2024;37(1):55–63.