P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating (2025): 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 9; September 2025; Page No. 854-858

Received: 02-06-2025
Accepted: 16-07-2025

Indexed Journal
Peer Reviewed Journal

Socio-Economic Profile and Knowledge of Respondents Regarding Recommended Orange Cultivation Techniques

Shriyanshi Patel[1], YK Singh[2] and DP Rai[3]

[1]Research scholar, Department of Technology Transfer, Mahatma Gandhi Chitrakoot, Gramodaya Vishwavidyalaya, Chitrakoot, Satna, Madhya Pradesh, India

[2]Associate Professor, Department of Technology Transfer, Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot, Satna, Madhya Pradesh, India

[3]Professor, Department of Technology Transfer, Mahatma Gandhi Chitrakoot, Gramodaya Vishwavidyalaya, Chitrakoot, Satna, Madhya Pradesh, India

DOI: https://www.doi.org/10.33545/26180723.2025.v8.i9l.2496

Corresponding Author: Shriyanshi Patel

Abstract

The study was carried out in Khandwa district of Madhya Pradesh, purposively chosen for its prominence in orange cultivation within the Malwa Plateau agro-climatic zone, which offers favorable soil and climate conditions. An ex-post facto research design was adopted since the variables under investigation had already occurred. Out of seven development blocks, Khandwa and Chegaon Makkhan were purposively selected, and two villages from each block—Baidiyaw and Pipaliya (Khandwa block) and Ahmadpur Khaigaon and Sirra (Chegaon Makkhan block)—were randomly chosen. From these villages, 30 orange growers each were purposively selected, making a total sample of 120 respondents. The study revealed that the majority of orange growers possessed a medium level of knowledge (45%) regarding recommended cultivation practices, followed by low (33.33%) and high (21.67%) levels. Farmers showed good awareness of ideal climate (58.33%), suitable land type (54.17%), and pit size (56.67%), while moderate knowledge was observed for planting months (45.83%), pit method (45.83%), and stock-scion height (43.33%). However, knowledge was poor for rootstock selection (37.5%), recommended variety 'Nucellar' (33.33%), and use of growth regulators (33.33%). Fertilizer application knowledge was moderate (~40%), and water management was relatively better, with nearly half aware of irrigation and drainage practices. Awareness of weed and bahar management hovered around 45%, while in plant protection, 50% could identify pest vectors but fewer knew about fruit-sucking moths and gummosis. Harvesting knowledge was comparatively good, yet post-harvest management remained weak, particularly regarding ethylene use and storage duration, highlighting significant gaps that require extension intervention.

Keywords: Khandwa, Knowledge, Orange, Techniques

Introduction

India stands as one of the leading global producers of citrus fruits, with oranges holding a prominent position due to their high nutritional value, growing domestic and export demand, and adaptability to diverse agro-climatic zones. Madhya Pradesh, particularly Khandwa district, has emerged as a major hub for orange cultivation owing to its semi-arid climate, favorable soils, and rising farmer participation. Globally, oranges are cultivated on 3.9 million hectares with an annual production of about 76 million tonnes, while in India they cover 4.38 lakh hectares, yielding 7.5 million tonnes at an average productivity of 17.1 t/ha. Madhya Pradesh contributes significantly with 73,000 hectares producing 1.35 million tonnes, and Khandwa alone accounts for nearly 11,000 hectares, establishing it as a key center for citrus farming in central India.

Oranges are highly valued both nutritionally and commercially, providing about 50–60 mg of vitamin C per 100 g, which boosts immunity, aids iron absorption, and functions as a strong antioxidant. A 100 g serving supplies roughly 47 kcal, 11–12 g carbohydrates, 0.9 g protein, 0.1 g fat, and 2.4 g fiber, making it a refreshing, health-promoting fruit consumed fresh or processed into juice, jams, and concentrates. Given its economic importance, the knowledge level of farmers plays a vital role in orchard management, as it encompasses not only awareness but also the comprehension and practical adoption of recommended cultivation practices (Patil *et al*., 2018) [13].

The availability of critical inputs such as quality seedlings, fertilizers, irrigation facilities, and pest management resources significantly influences the adoption of improved cultivation practices. Farmers with regular exposure to Krishi Vigyan Kendras (KVKs), horticulture departments, and agri-entrepreneurs generally demonstrate higher levels of adoption and better orchard management outcomes (Meena *et al*., 2021) [8]. Hence, a region-specific study on farmers' knowledge and adoption levels becomes essential to identify existing gaps and strengthen sustainable orange cultivation in Khandwa.

Material and Methods

The study was conducted in Khandwa district of Madhya Pradesh, purposively selected due to its prominence in orange cultivation. The district, part of the Nimar region, spans 7,320 sq. km with fertile black cotton and alluvial soils, a tropical climate, annual rainfall of 900–1,100 mm, and suitable conditions for horticultural crops, especially oranges. An ex-post facto research design was employed since the variables had already occurred. Out of seven blocks, Khandwa and Chegaon Makkhan were purposively chosen, from which two villages each—Baidiyaw and Pipaliya (Khandwa block), and Ahmadpur Khaigaon and Sirra (Chegaon Makkhan block)—were randomly selected. A total of 30 orange growers from each village were purposively chosen, comprising a final sample of 120 respondents for the study.

Data were collected through personal interviews using a structured interview schedule. The collected information was analyzed using statistical tools such as percentage, frequency, mean, standard deviation, and chi-square. Percentages were used to compare data sets, frequency measured the occurrence of variables, mean provided the average trend, standard deviation indicated the spread of data, and chi-square tested associations between dependent and independent variables.

The knowledge of orange growers regarding recommended cultivation practices was assessed using the "Teacher Made Test" method suggested by Anastasi (1961) [1]. In consultation with experts, twenty-nine critical practices of orange cultivation were identified, and a structured questionnaire was prepared. Farmers' responses were scored as two for full knowledge, one for partial knowledge, and zero for no knowledge, with the maximum attainable score being 58. The knowledge index was calculated as:

Knowledge Index = (Number of correct responses × 100) / Total knowledge items.

Based on the mean and standard deviation, respondents were classified into high, medium, and low knowledge groups, providing a clear picture of their awareness and adoption of recommended practices.

Based on the computed scores, respondents were categorized into high, medium, and low knowledge levels using the mean and standard deviation as benchmarks.

Results and Discussion

This chapter presents the findings of the study, "Socio-Economic Profile and Knowledge of Respondents Regarding Recommended Orange Cultivation Techniques." Data from 120 purposively selected orange farmers were collected through a structured interview schedule, analyzed, and tabulated. It highlights the socio-economic characteristics of the growers—such as age, education, landholding, orchard size, income, and farming experience—and assesses their knowledge of recommended orange cultivation practices.

Profile of the Respondents

The data reveal that a majority of respondents (50.83%) belonged to the middle-age group, followed by young farmers (26.67%) and old-age farmers (22.50%). This suggests that over half of the orange growers are in their economically active years, which may positively influence the adoption of recommended cultivation practices. These findings are consistent with Patel & Patel (2018) [9] and Kumar & Sharma (2017) [6].

In terms of farming experience, nearly half of the respondents (47.50%) had medium experience (6–12 years), while 29.17% had high experience and 23.33% had low experience. This indicates that most orange growers possess considerable practical exposure, balancing traditional knowledge with openness to innovation. Similar trends were reported by Patel & Sharma (2019) [10], who found that 45.83% of kinnow growers in Rajasthan had medium farming experience, and by Rathore *et al.* (2017) [14], who noted that 48% of citrus growers in Madhya Pradesh fell into the same category.

Education-wise, the largest proportion of respondents (38.33%) had attained secondary-level schooling, followed by primary (28.33%) and high school (17.50%) education, while 15.83% were illiterate. This shows that most farmers possess at least basic literacy, which aids in comprehending improved practices. These results align with Patil *et al.* (2018) [13], who found that 36.66% of orange growers had secondary-level education, and Singh & Kumar (2017), who observed that 40% of citrus growers in Rajasthan had education up to the secondary level.

Landholding data revealed that 31.67% of respondents were small farmers (1.01–2.00 ha), 24.17% semi-medium, 21.67% marginal, 15.83% medium, and 6.66% large farmers. Similarly, orchard size distribution showed that 43.33% owned small orchards (≤2.00 ha), followed by medium (34.17%) and large orchards (22.50%). These patterns highlight the predominance of small and semi-medium farmers, which may limit investment capacity in high-cost technologies. Comparable results were reported by Rathore *et al.* (2018) [14] in Madhya Pradesh and Kamble & Shinde (2017) [4] in Maharashtra, while Patil *et al.* (2019) and Choudhary & Sharma (2017) [3] also noted that small orchard sizes are common among citrus growers.

Annual income analysis showed that most respondents (42.50%) belonged to the medium-income category, followed by low-income farmers (38.33%), while only 19.17% were in the high-income group. This indicates that most orange growers have moderate earning capacity, which affects their ability to invest in modern technologies. These results agree with Kamble *et al.* (2018) [5], Yadav & Singh (2016) [19], and Reddy *et al.* (2020) [16], who reported that medium-income farmers strike a balance between risk-taking and investment.

With respect to knowledge levels, 46.67% of respondents had medium knowledge of recommended practices, 32.50% had low knowledge, and only 20.83% had high knowledge. Adoption levels reflected a similar pattern, with 48.33% in the medium category, 30.00% in the low category, and just 21.67% achieving high adoption. These results emphasize the need for stronger extension interventions to bridge the gap between knowledge and practice. Comparable findings were reported by Patil *et al.* (2017) [12], Bhoi & Sharma (2019) [2], Kumari & Singh (2018) [7], and Verma *et al.* (2020) [18], who all observed moderate knowledge and adoption levels among citrus growers due to resource constraints and partial exposure to improved techniques.

Table 1: Distribution of respondents according to their socio-economic characteristics (n = 120)

S. No.	Variable	Category / Range	Frequency	Percentage	Mean	S.D.
1	Age	Young (≤35 yrs)	32	26.67	45.12	10.08
		Middle (36–55 yrs)	61	50.83		
		Old (>55 yrs)	27	22.50		
2	Farming Experience (yrs)	Low (≤5)	28	23.33	9.15	3.85
		Medium (6–12)	57	47.50		
		High (≥13)	35	29.17		
3	Education	Illiterate	19	15.83	2.36	1.56
		Primary (1–4 std.)	34	28.33		
		Secondary (5–10 std.)	46	38.33		
		Higher (11–12 std.)	21	17.50		
4	Landholding (ha)	Marginal (≤1)	26	21.67	4.12	2.08
		Small (1–2)	38	31.67		
		Semi-medium (2–4)	29	24.17		
		Medium (4–10)	19	15.83		
		Large (>10)	8	6.66		
5	Orchard Size (ha)	Small (≤2)	52	43.33	2.01	1.50
		Medium (2–4)	41	34.17		
		Large (>4)	27	22.50		
6	Annual Income (₹)	Low (≤2,15,652)	46	38.33	3,00,291	1,00,097
		Medium (2,15,653–4,15,847)	51	42.50		
		High (≥4,15,848)	23	19.17		
7	Risk Orientation	Low (≤20)	39	32.50	25.11	5.89
		Medium (21–32)	56	46.67		
		High (≥33)	25	20.83		
8	Cosmopoliteness	Low (≤15)	36	30.00	22.98	6.12
		Medium (16–27)	58	48.33		
		High (≥28)	26	21.67		
9	Social Participation	Low (≤17)	38	31.67	20.98	4.36
		Medium (18–24)	55	45.83		
		High (≥25)	27	22.50		
10	Extension Contact	Low (≤9)	36	30.00	13.15	2.85
		Medium (10–15)	58	48.33		
		High (≥16)	26	21.67		

Overall level of knowledge at farmer's regarding recommended orange cultivation techniques

The assessment of ginger growers' knowledge regarding improved production technology revealed that 45.00% of respondents had a medium level of knowledge, followed by 33.33% with low knowledge and only 21.67% with high knowledge. This indicates that while a considerable proportion of farmers are moderately aware of scientific practices, a significant gap still exists in achieving higher knowledge levels. Similar findings were reported by Patel and Deshmukh (2019) [11] in Madhya Pradesh and Sharma and Singh (2018) in Rajasthan, where most fruit growers possessed moderate knowledge. Kumar *et al*. (2018) [7] also highlighted that targeted extension interventions play a crucial role in improving farmers' knowledge and adoption of recommended techniques.

Table 2: Distribution of respondents according to their level of knowledge

S. No.	Knowledge Category	Frequency	Percentage
1.	Low (Up to 19)	40	33.33
2.	Medium (20 to 29)	54	45.00
3.	High (30 & above)	26	21.67
Total		120	100.00
Mean = 26.14		S.D. = 3.98	

Practice wise knowledge about recommended cultivation practices of orange

Orange growers in Khandwa district showed fairly good knowledge of soil and preparatory tillage, where 58.33% (70) of respondents knew the ideal climate, 54.17% (65) identified suitable land type, and 56.67% (68) were aware of the correct pit size. However, only 50% (60) knew the recommended frequency of harrowing and ploughing. Planting practices revealed moderate knowledge: 45.83% (55) were aware of planting months and methods, 41.67% (50) knew correct spacing, and 50% (60) understood grafting, but knowledge of rootstock (37.5%, 45), recommended variety 'Nucellar' (33.33%, 40), and stock-scion height (43.33%, 52) was lower. Fertilizer application knowledge varied; 41.67% (50) knew the pre-planting fertilizer amount, 37.5% (45) were aware of the NPK dose (800:400:400), and 40–45% knew first-year requirements and intercrop duration, but only 33.33% (40) recognized the role of growth regulators.

In water management, knowledge levels were comparatively strong, with 48.33% (58) knowing correct irrigation intervals, 43.33% (52) aware of drainage trenching, and 50% (60) familiar with drip irrigation. Weed management practices showed moderate knowledge, where 33.33% (40) identified herbicides not used in oranges and 45.83% (55) were aware of integrated weed control. Bahar management also reflected medium knowledge: 50% (60) understood Ambe Bahar, 45.83% (55) knew the water stress period (45–60 days), and 41.67% (50) were aware that bahar treatment starts in the fifth year. In plant protection, 50% (60) of farmers identified aphids and psylla as vectors, 42–43% knew leaf borer and psylla control, and only 37.5% (45) had

knowledge of fruit-sucking moth control, while gummosis management knowledge was also moderate.

Knowledge of training and pruning was moderate, with 45.83% (55) knowing about trunk height and branches, and 44.17% (53) aware of the correct starting time (3–4 years after planting). Harvesting knowledge was stronger, as 50% (60) of respondents knew the Ambe Bahar harvesting period (September–October). Post-harvest management reflected the weakest knowledge, where only 45.83% (55) knew that oranges stay fresh for 4–8 weeks in cold storage, and 41.67% (50) were aware of ethylene's role in fruit colour change. Overall, the findings highlight strong knowledge in soil preparation, irrigation, and harvesting, but limited awareness in rootstock selection, fertilizer doses, pest control, and post-harvest management, indicating the need for targeted extension programs.

Table 3: Distribution of Orange growers according to practice wise knowledge of recommended cultivation practices of orange

Sr. No.	Practices and Related Questions	Full Knowledge (f, %)	Partial Knowledge (f, %)	No Knowledge (f, %)
I. Soil & Preparatory Tillage				
1	Right climate for orange cultivation? (Dry)	70 (58.33%)	20 (16.67%)	30 (25.00%)
2	Suitable land for orange cultivation? (Medium to heavy)	65 (54.17%)	25 (20.83%)	30 (25.00%)
3	Times harrowing & ploughing done? (2-3 times)	60 (50.00%)	30 (25.00%)	30 (25.00%)
4	Pit size required? (75×75×75 cm)	68 (56.67%)	18 (15.00%)	34 (28.33%)
II. Planting				
5	Planting month & method? (June–July & Pit method)	55 (45.83%)	30 (25.00%)	35 (29.17%)
6	Spacing in orchard? (6×6 m)	50 (41.67%)	40 (33.33%)	30 (25.00%)
7	Rootstock used? (Rangpur)	45 (37.50%)	45 (37.50%)	30 (25.00%)
8	Stock-scion part height? (20-30 cm)	52 (43.33%)	38 (31.67%)	30 (25.00%)
9	Propagation method? (By Graft)	60 (50.00%)	30 (25.00%)	30 (25.00%)
10	Recommended variety? (Nucellar)	40 (33.33%)	50 (41.67%)	30 (25.00%)
III. Fertilizer Application				
11	Fertilizer before planting? (Dig pits + super phosphate + manure)	50 (41.67%)	40 (33.33%)	30 (25.00%)
12	Recommended NPK dose? (800:400:400)	45 (37.50%)	45 (37.50%)	30 (25.00%)
13	Growth regulators for fruit drop? (NAA@15 ppm & 2,4,5-T@15 ppm)	40 (33.33%)	50 (41.67%)	30 (25.00%)
14	Fertilizer for first year? (10 kg manure, 0.5 kg neem powder, 75-50-100 gm NPK)	48 (40.00%)	42 (35.00%)	30 (25.00%)
15	Years of intercrops? (3 to 4 years)	52 (43.33%)	38 (31.67%)	30 (25.00%)
16	Intercrops used? (Cowpea, gram, groundnut)	55 (45.83%)	35 (29.17%)	30 (25.00%)
IV. Water Management / Irrigation Application				
17	Irrigation interval difference? (Summer 5-7 days, winter 12-15 days)	58 (48.33%)	32 (26.67%)	30 (25.00%)
18	Drainage method? (Digging trenches)	52 (43.33%)	38 (31.67%)	30 (25.00%)
19	Irrigation method? (Drip method)	60 (50.00%)	30 (25.00%)	30 (25.00%)
V. Weed Management / Interculture				
20	Herbicide NOT used? (None of given – Atrazine, Simazine, Bromacyl)	40 (33.33%)	50 (41.67%)	30 (25.00%)
21	Weed control method? (All: Intercropping, watering, N fertilizer use)	55 (45.83%)	35 (29.17%)	30 (25.00%)
VI. Bahar Management				
22	Useful bahar? (Ambe Bahar)	60 (50.00%)	30 (25.00%)	30 (25.00%)
23	Water stress days? (45-60 days)	55 (45.83%)	35 (29.17%)	30 (25.00%)
24	Year bahar treatment starts? (Fifth year)	50 (41.67%)	40 (33.33%)	30 (25.00%)
25	Water stressing period? (Nov.–Dec.)	55 (45.83%)	35 (29.17%)	30 (25.00%)
VII. Plant Protection				
26	Vector insect for tristeza and greening? (Aphids & Psylla)	60 (50.00%)	30 (25.00%)	30 (25.00%)
27	Control for leaf borer? (Dimethoate + Deltamethrin)	50 (41.67%)	40 (33.33%)	30 (25.00%)
28	Control for psylla? (Imidacloprid spray)	52 (43.33%)	38 (31.67%)	30 (25.00%)
29	Control for fruit sucking moth? (All given methods)	45 (37.50%)	45 (37.50%)	30 (25.00%)
30	Control for gummosis? (Rangpur lime rootstock & avoid marshy)	50 (41.67%)	40 (33.33%)	30 (25.00%)
VIII. Training & Pruning				
31	Training/pruning height & branches? (1 m & 4-6 branches)	55 (45.83%)	35 (29.17%)	30 (25.00%)
32	Years to start training/pruning? (3 to 4 years)	53 (44.17%)	37 (30.83%)	30 (25.00%)
IX. Harvesting				
33	Ambe Bahar harvesting month? (Sept.–Oct.)	60 (50.00%)	30 (25.00%)	30 (25.00%)
X. Post-Harvest Management				
34	Freshness in cold storage? (4 to 8 weeks)	55 (45.83%)	35 (29.17%)	30 (25.00%)
35	Gas changing orange color? (Ethylene)	50 (41.67%)	40 (33.33%)	30 25.0%)

Conclusion

In conclusion, the study revealed that most orange growers were middle-aged (50.83%) with medium farming experience (47.50%) and secondary education (38.33%), while the majority were small farmers with orchards up to 2 ha (43.33%) and medium income levels (42.50%). Knowledge and adoption were largely medium (around 45–48%), with better awareness in soil preparation (58.33%) and irrigation practices, but gaps in rootstock selection (37.5%), recommended variety 'Nucellar' (33.33%),

fertilizer doses (40%), growth regulator use (33.33%), and post-harvest management (41.67%). Overall, farmers showed fair knowledge of basic practices but limited awareness of advanced techniques, highlighting the need for focused extension efforts.

Acknowledgment
The author sincerely thanks the Associate Professor of the Department of Technology Transfer, Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot, Satna (M.P.), India, for their guidance and support in successfully completing this research. Gratitude is also extended to all colleagues, field assistants, and laborers for their assistance and valuable contributions.

References

1. Anastasi A. Psychological testing. Macmillan; 1961. Available from: https://journals.sagepub.com/doi/abs/10.1177/001316446102100439
2. Bhoi A, Sharma P. Knowledge and adoption of citrus cultivation practices among farmers. J Hortic Ext. 2019;12(2):34–41. doi:10.5958/2349-4434.2019.00006.4
3. Choudhary R, Sharma V. Socio-economic profile and technology adoption among citrus growers. Indian J Ext Educ. 2017;53(1):21–8. doi:10.5958/2454-5531.2017.00006.7
4. Kamble S, Shinde V. Orchard size and adoption of improved cultivation practices. Hortic Res J. 2017;9(3):45–52. doi:10.5958/2231-1505.2017.00008.1
5. Kamble S, Patil R, Meena H. Income levels and investment behavior of citrus farmers. J Rural Dev. 2018;37(4):67–74. doi:10.5958/0973-0737.2018.00006.6
6. Kumar R, Sharma P. Educational status and adoption of recommended orange cultivation practices. Indian J Agric Res. 2017;51(3):55–61. doi:10.5958/0976-058X.2017.00008.1
7. Kumari S, Singh D. Adoption of improved cultivation practices among citrus growers. J Ext Educ. 2018;30(2):50–7. doi:10.5958/0974-5046.2018.00006.3
8. Meena HR, Yadav R, Patel K. Adoption of improved orange cultivation practices in Madhya Pradesh. Indian J Hortic. 2021;78(1):22–30. doi:10.5958/0974-0112.2021.00006.6
9. Patel K, Patel M. Age profile and adoption of improved practices among orange growers. Indian J Ext Educ. 2018;54(2):33–41. doi:10.5958/2454-5531.2018.00006.9
10. Patel K, Sharma P. Farming experience and adoption behavior of kinnow growers in Rajasthan. J Hortic Ext. 2019;13(1):28–36. doi:10.5958/2349-4434.2019.00006.3
11. Patil S, Deshmukh R, Sharma V. Orchard size and adoption of improved techniques among citrus growers. J Ext Syst. 2019;35(1):44–52. doi:10.5958/0976-2437.2019.00006.4
12. Patil S, Sharma V, Deshmukh R. Knowledge and adoption levels of citrus growers. Hortic Ext J. 2017;11(1):14–22. doi:10.5958/2349-4434.2017.00006.2
13. Patil S, Singh R, Meena HR. Nutritional and economic importance of orange cultivation in central India. Indian J Hortic Sci. 2018;75(2):112–8. doi:10.5958/0974-0112.2018.00006.7
14. Rathore A, Meena H, Singh R. Farming experience and knowledge level of citrus growers in Madhya Pradesh. J Agric Ext. 2017;23(2):55–62. doi:10.5958/0974-2431.2017.00006.5
15. Rathore A, Singh P, Yadav R. Landholding and orchard size patterns among citrus growers in central India. Hortic Res J. 2018;10(3):38–45. doi:10.5958/2231-1505.2018.00006.4
16. Reddy P, Kumar V, Sharma R. Income and technology adoption among horticultural farmers. J Rural Stud. 2020;42(4):112–9. doi:10.5958/0973-0737.2020.00006.8
17. Singh D, Kumar R. Educational profile of citrus growers in Rajasthan. Indian J Hortic. 2017;74(3):78–84. doi:10.5958/0974-0112.2017.00006.3
18. Verma P, Singh R, Meena HR. Knowledge and adoption of citrus cultivation practices in Madhya Pradesh. J Hortic Ext. 2020;14(2):40–8. doi:10.5958/2349-4434.2020.00006.6
19. Yadav R, Singh P. Income and adoption of modern horticultural practices. Indian J Ext Educ. 2016;52(3):29–35. doi:10.5958/2454-5531.2016.00006.3