

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 7; July 2025; Page No. 301-307

Received: 05-04-2025
Accepted: 07-05-2025

Indexed Journal
Peer Reviewed Journal

Extent of adoption of fruit drop management practices of Mandarin

¹Thunga Nikhitha, ²Dr. RT Katole, ²Dr. PP Bhople, ³Dr. AA Bhopale, ⁴Dr. NR Koshti and ⁵Dr. RS Wankhade

¹M.Sc. Student, Department of Agricultural Extension Education, Post Graduate Institute, Dr. PDKV, Akola, Maharashtra, India

² Professor (CAS), Department of Agricultural Extension Education, Post Graduate Institute, Dr. PDKV, Akola, Maharashtra, India

³Field Officer (APC), Department of Agricultural Extension Education, Post Graduate Institute, Dr. PDKV, Akola, Maharashtra, India

⁴HOD, Department of Agricultural Extension Education, Post Graduate Institute, Dr. PDKV, Akola, Maharashtra, India

⁵Assistant Professor of Horticulture (ARS), Department of Agricultural Extension Education, Post Graduate Institute, Dr. PDKV, Akola, Maharashtra, India

DOI: <https://www.doi.org/10.33545/26180723.2025.v8.i7e.2145>

Corresponding Author: Thunga Nikhitha

Abstract

Mandarin cultivation plays a vital role in the livelihoods of fruit growers in India, especially in Maharashtra. Despite the availability of scientifically recommended fruit drop management practices, a significant adoption gap persists among growers, leading to productivity loss. This study aims to assess the adoption gap, identify the underlying constraints. The present investigation entitled, "Extent of Adoption of fruit drop management practices of Mandarin" was undertaken in two talukas of Amravati district in Maharashtra namely Achalpur and Chandur Bazar. An exploratory research design was used with 120 respondents from 12 villages and analysed by frequency and percentage. The data was collected through face-face interview with the respondents. The results revealed that the majority of respondents (52.50%) were middle-aged, and 49.17% had completed higher secondary education. Most farmers were semi-medium (40.83%), with 45.00 per cent earning between ₹4,00,001 and ₹8,00,000 annually. A large proportion of respondents (90.84%) reported medium yields ranging from 16 to 30 tons/ha, and 65.84 per cent had 8–20 years of experience in Mandarin cultivation. The main source of irrigation was tubewells (53.34%). Regarding behavioural traits, most farmers showed medium levels of social participation (71.67%), innovativeness (69.16%), risk orientation (64.17%). The study revealed that most Mandarin growers possessed high knowledge of key fruit drop management practices, particularly in pest identification (99.16%), disease control using Bordeaux mixture or Copper Oxychloride (98.33%), soil selection (98.33%), and pruning (98.33%). Moderate knowledge levels were observed for practices like mulching, fertigation, and seasonal spray applications. However, low awareness was recorded for avoiding intercropping with cotton and jowar (49.16%) and the use of Indo-Israel technology with 6×3 m spacing (28.34%), highlighting the need for improved dissemination of advanced orchard management practices. The study revealed high complete adoption of basic practices such as avoiding intercropping (65%), proper NPK application (64.16%), and pruning (50–61.66%), while advanced practices like Indo-Israel technology (5.83%) and hormonal sprays (0.83–3.5%) showed low adoption. Partial adoption was notable for drip irrigation (54.17%), fertigation (52.5%), and growth regulator use (61.67%). The key constraints responsible for this gap included adverse climatic conditions (68.33%), high cost and limited availability of inputs (65.83%), labour-related challenges (64.16%), improper use or lack of awareness of PGRs (63.33%), and limited awareness of PDKV's SOPs (51.60%).

Keywords: Knowledge, adoption, constraints, fruit drop, extent

Introduction

India is the second-largest producer of fruits and vegetables globally, with citrus fruits particularly Mandarin (*Citrus reticulata*) occupying a prominent position. Mandarin accounts for approximately 40% of the total citrus area in the country, with 446.31 thousand hectares under cultivation and a production of 6170.46 thousand metric tons in 2023–24 (Ministry of Agriculture & Farmers' Welfare). Maharashtra, especially the Vidarbha region, is a key contributor, with 135 thousand hectares producing 1335.29 thousand metric tons, representing 22% of India's total Mandarin output. The Nagpuri Mandarin, cultivated

predominantly in Nagpur and Amravati districts, is known for its superior quality and high market demand due to its rich nutritional value and suitability for fresh consumption and processed products. Despite technological advancements and recommended production practices by research institutions, Mandarin growers continue to face significant losses due to fruit drop, primarily due to a substantial gap between the high yields achieved at research farms and the lower yields in farmers' fields. This disparity is largely caused by the non-adoption or poor adoption of recommended technologies by growers, which stems from factors such as inadequate dissemination and

implementation of useful information, lack of awareness about the latest practices, and challenges faced by farmers in applying these technologies effectively on their own farms.

Objectives

1. To study the profile of Mandarin growers
2. To study the knowledge and adoption of fruit drop management practices of Mandarin.
3. To identify the constraints faced by the Mandarin growers

Methodology

An exploratory design of social research was used for present study. The exploratory design was selected in order to check the knowledge of different fruit drop management practices and the adoption by the Mandarin growers. This study was carried out in two talukas namely Achalpur and Chandur Bazar of Amravati district were purposively selected for study which are having maximum affected area of fruit drop with Mandarin plantation. 12 villages were selected having area under Mandarin from the two talukas and each village, ten farmers were selected randomly who cultivated the Mandarin crop from last five years. Thus, total 120 Mandarin growers were selected for the present study from the 12 villages. The data was collected in face-face situations through use of systematically prepared interview schedule by personally contacting the selected farmers. Prior to conducting the actual data collection, the interview schedule was pretested, checked. The data was compiled and evaluated using a suitable statistical tool.

Results and Discussion

1. Profile of Mandarin growers

The profile of the Mandarin growers was studied and the findings are shown in table 1 and interpreted as below. From

table 1 it is observed that, in case of age, a majority (52.50%) of the respondents were from the middle age group (36–50 years), indicating experience in farming and decision-making ability. Most of the respondents (49.17%) had higher secondary education, followed by 22.50% with secondary education, showing that while basic education was common, advanced agricultural training was limited. Regarding land holding, a majority (40.83%) of the farmers were in the semi medium land holding category (2.01 – 4.00 ha), followed by small land holders (37.50%). Only a few had large land holdings. In terms of annual income, 45.00% of the respondents belonged to the medium-income group (Rs. 4,00,001 to Rs. 8,00,001), whereas 40.83% were from the low-income group (Up to Rs. 4,00,000). Concerning the area under Mandarin orchard, about 46.66% had orchards up to 2.00 hectare, indicating that most were small-scale orchardists. Regarding the yield from the mandarin, majority of the respondents (90.84%) had medium yield (5 – 33 ton/ha), 5.00% of them had high yield (above 33 ton/ha). In case of experience in Mandarin cultivation, 65.8% had 8 to 20 years of experience, showing familiarity with the crop but not necessarily with modern practices. Most of the respondents (53.34%) used borewells as their primary source of irrigation, while 40.00% of the respondents used wells as their source of irrigation. In terms of source of information, a majority of respondents (56.67%) depended on Agricultural assistant and gram sevak for formal source of information and 91.66% of them depended on progressive farmer and friends for informal sources and more than half of the respondents (66.67%) depended on whatsapp group as mass media source of information. Regarding knowledge level, the majority of respondents had medium knowledge (about 62.50%) regarding fruit drop management practices, indicating partial awareness but lacking depth.

Table 1: Distribution of respondents according to their profile characteristics

Sr. No.	Category	Respondents (N=120)	
		Frequency	Percentage
1.	Age (years)		
i.	Young (Up to 35)	28	23.34
ii.	Middle (36-50)	63	52.50
iii.	Old (Above 50)	29	24.16
	Total	120	100.00
2.	Education		
i.	Illiterate (No schooling)	03	2.50
ii.	Primary School (Up to 4 th standard)	05	4.16
iii.	Middle School (5 th -7 th standard)	08	6.67
iv.	Secondary School (8 th -10 th standard)	27	22.50
v.	Higher Secondary school (11 th -12 th standard)	59	49.17
vi.	College (Above 12 th standard)	18	15.00
	Total	120	100.00
3.	Land Holding (ha)		
i.	Marginal Farmers (Up to 1.00)	12	10.00
ii.	Small Farmers (1.01-2.00)	45	37.50
iii.	Semi Medium Farmers (2.01-4.00)	49	40.83
iv.	Medium Farmers (4.01-10.00)	10	8.34
v.	Large Farmers (Above 10.00)	4	3.33
	Total	120	100.00

4.		Annual Income		
	i.	Up to Rs. 4,00,000	49	40.83
	ii.	Rs. 4,00,001 to 8,00,000	54	45.00
	iii.	Above Rs. 8,00,000	17	14.17
		Total	120	100.00
5.		Area under Orchard (ha)		
	i.	Up to 2.00 ha	56	46.66
	ii.	2.1ha – 4.00 ha	48	40.00
	iii.	Above 4.00 ha	16	13.34
		Total	120	100.00
6.		Yield (ton/ha)		
	i.	Low (Up to 15 ton/ha)	5	4.16
	ii.	Medium (16 – 30 ton/ha)	109	90.84
	iii.	High (Above 30 ton/ha)	6	5.00
		Total	120	100.00
7.		Experience in Mandarin Cultivation (years)		
	i.	Up to 7 years	26	21.66
	ii.	8 – 20 years	79	65.84
	iii.	Above 20 years	15	12.50
8.		Source of Irrigation		
	i.	River	03	2.50
	ii.	Well	48	40.00
	iii.	Tubewell	64	53.34
	iv.	Canal	05	4.16
		Total	120	100.00
10.		Source of Information		
	i.	Low (Up to 14)	23	19.16
	ii.	Medium (15 – 26)	78	65.00
	iii.	High (Above 26)	19	15.84
		Total	120	100.00
11.		Social Participation		
	i.	Low (Up to 5.9)	25	20.83
	ii.	Medium (6 – 11.4)	86	71.67
	iii.	High (Above 11.4)	9	7.50
		Total	120	100.00
12.		Innovativeness		
	i.	Low (Up to 10.6)	18	15.00
	ii.	Medium (10.7 – 14.4)	83	69.16
	iii.	High (Above 14.5)	19	15.84
		Total	120	100.00
13.		Risk Orientation		
	i.	Low (Up to 11)	25	20.83
	ii.	Medium (11.1- 15.4)	77	64.17
	iii.	High (Above 15.4)	18	15.00
		Total	120	100.00

2. Knowledge and Adoption of fruit drop management practices of Mandarin

• Knowledge of fruit drop management practices of Mandarin

Knowledge is operationally defined as the amount of understanding information processed by the Mandarin growers regarding the fruit drop management practices.

Table 2: Distribution of respondents according to their knowledge about different fruit drop management practices of Mandarin

Sr. No.	Fruit drop management practices in Mandarin	Knowledge (N=120)			
		Yes		No	
		Freq.	%	Freq.	%
A.	Selection of Soil				
1.	Well drained, medium depth, clay per cent should be below 60%, calcium carbonate per cent should be below 10%	118	98.33	2	1.67
2.	Soil testing done before planting	101	84.16	19	15.84
3.	Soil and leaf testing once in every three years.	71	59.16	49	40.87
B.	Land preparation & intercultural operation				
1.	Deep ploughing should be avoided.	92	76.66	28	23.34
2.	Intercropping like cotton and jowar should be avoided.	59	49.16	61	50.84
3.	Use of slasher or brush cutter implement to control weed.	114	95.00	6	5.00
C.	Indo-Israel technology for Mandarin				
1.	Use of Indo-Israel technology with recommended spacing (i.e. 6x3m.)	34	28.34	86	71.66
D.	Water Management for Bahar				
1.	Use of drip irrigation which improves soil properties and increases water holding capacity.	112	93.34	8	6.66
2.	Use of grass or polythene mulching (100 Micron) to avoid transpiration losses.	68	56.67	52	43.33
3.	Avoid overwatering and underwatering which causes stress for plants that leads to fruit drop.	111	92.50	9	7.50
E.	Drainage Management				
1.	Open drainage channels after each 2 rows of plant along the slope should be prepared to remove excess water from the orchard.	102	85.00	18	15.00
F.	Pruning				
1.	Pruning of dried branches along with 5cm healthy portion of branches	118	98.33	2	1.67
2.	Light pruning once in two years highly recommended for planting at 6x3m. spacing in intensive planting system.	116	96.66	4	3.34
G.	Nutrient Management				
1.	Proper and timely application of fertilizers (i.e. 900:300:300 NPK in five split doses) according to schedule.	116	96.66	4	3.34
2.	Application of recommended dose of liquid fertilizers/ micronutrient through drip irrigation (fertigation).	116	96.66	4	3.34
3.	Use of micronutrient and growth regulator as per recommendation.	110	91.66	10	8.34
4.	Use of bio-fertilizers (Trichoderma, Mycorrhiza) compulsory once in year for improving the soil health and increasing beneficial fungal activity in the soil.	114	95.00	6	5.00
5.	To control fruit drop in Ambia Bahar (due to continuous raining), Spray (in August month) N-ATCA 10ppm + Brasinoloid 4ppm + Folic acid 50ppm at interval of 15 days in August month.	67	55.83	53	44.17
6.	If fruit drop occurs in Mrig Bahar, spray application of Zinc Sulphate 0.5% + Ferrous Sulphate 0.55 and Boron 0.1%.	69	57.50	51	42.50
H.	Pest and Disease Management				
1.	Identification of major pest and to control them follow systematic destruction of larval host plants to reduce pest population. (Citrus psylla, Fruit sucking moth and White fly etc.)	119	99.16	1	0.84
2.	Identification of major diseases and to control them spray Bordeaux mixture (1:1:100) or Copper Oxychloride 50WP (3g/litre of water). (Phytophthora, Brown rot, Gummosis, Kolshi etc.)	118	98.33	2	1.67

Regarding the knowledge of fruit drop management practices of Mandarin, from the table 20 it was observed that maximum percentage of the respondents had knowledge about identification and control of major pests (99.16%) and disease management using Bordeaux mixture or Copper Oxychloride (98.33%), followed by knowledge on selection of well-drained, medium-depth soil (98.33%) and pruning of dried branches with healthy portion (98.33%). A large proportion of respondents also had knowledge regarding the use of slasher or brush cutter for weed control (95.00%), application of bio-fertilizers (95.00%), and drip irrigation system (93.34%), which are considered key practices for fruit drop management. Similarly, high knowledge levels were observed in light pruning once in two years and timely application of fertilizers and fertigation (each at 96.66%), followed by micronutrient and growth regulator application (91.66%) and open drainage channel creation (85.00%). About 84.16% of the respondents were aware of soil testing before planting, while 76.66% had knowledge of the need to avoid deep ploughing. Moderate knowledge was recorded for practices such as spray applications for fruit drop control

in Mrig Bahar (57.50%), Ambia Bahar (55.83%), mulching with grass or polythene to avoid transpiration loss (56.67%), and soil and leaf testing once in three years (59.16%). On the other hand, relatively low knowledge was found in the practice of avoiding intercropping with cotton and jowar (49.16%) and particularly in the use of Indo-Israel technology with recommended 6x3 m spacing (28.34%), indicating a significant gap in awareness regarding advanced and modern orchard management practices among the mandarin growers.

Table 3: Distribution of respondents according to their overall knowledge about different fruit drop management practices of Mandarin

Sr. No.	Knowledge	Respondents	
		Frequency	Percentage
1.	Low (Up to 86.50)	28	23.33
2.	Medium (86.50 – 96.50)	75	62.50
3.	High (Above 96.50)	17	14.17
Total		120	100.00

Mean = 91.51 S.D = 5.04

From table 21, it was observed that majority of respondents (62.50%) had medium level of knowledge followed by, 23.33 per cent of the respondents had low level of knowledge. High level of knowledge was observed in 14.17 per cent of the respondents.

• Adoption of fruit drop management practices of Mandarin

Adoption is defined as the degree to which the extent of actual use of recommended fruit drop management practices are followed by Mandarin growers.

Table 4: Distribution of respondents according to their practice wise adoption of recommended fruit drop management practices of Mandarin

Sr. No.	Fruit drop management practices in Mandarin	Adoption (N=120)		
		CA	PA	NA
		Freq. (%)	Freq. (%)	Freq. (%)
A.	Selection of Soil			
1.	Well drained, medium depth, clay per cent should be below 60%, calcium carbonate per cent should be below 10%.	74 (61.66)	00 (00.00)	46 (38.33)
2.	Whether soil testing done before planting?	63 (52.50)	34 (28.34)	23 (19.16)
3.	Soil and leaf testing once in every three years.	36 (30.00)	29 (24.16)	55 (45.84)
B.	Land preparation & intercultural operation			
1.	Deep ploughing should be avoided.	69 (57.50)	37 (30.83)	14 (11.67)
2.	Intercropping like cotton and jowar should be avoided	78 (65.00)	31 (25.83)	11 (9.17)
3.	Use of slasher or brush cutter implement to control weed.	74 (61.66)	37 (30.83)	9 (7.50)
C.	Indo-Israel technology for Mandarin plantation			
1.	Use of Indo-Israel technology with recommended spacing (i.e. 6x3m.)	7 (5.83)	24 (20.00)	89 (74.17)
D.	Water Management for Bahar			
1.	Use of drip irrigation which improves soil properties and increases water holding capacity.	23 (19.17)	65 (54.17)	32 (26.66)
2.	Use of grass or polythene mulching (100 Micron) to avoid transpiration losses.	51 (42.50)	25 (20.83)	44 (36.67)
3.	Avoid overwatering and underwatering which causes stress for plants that leads to fruit drop.	45 (37.50)	74 (61.66)	1 (0.84)
E.	Drainage Management			
1.	Open drainage channels after each 2 rows of plant along the slope should be prepared to remove excess water from the orchard.	30 (25.00)	33 (27.50)	27 (22.50)
F.	Pruning			
1.	Pruning of dried branches along with 5cm healthy portion of branches.	63 (52.50)	55 (45.84)	2 (1.66)
2.	Light pruning once in two years highly recommended for planting at 6x3m. spacing in intensive planting system.	60 (50.00)	58 (48.34)	2 (1.66)
G.	Nutrient Management			
1.	Proper and timely application of fertilizers (i.e. 900:300:300 NPK in five split doses) according to schedule.	77 (64.16)	39 (32.50)	4 (3.34)
2.	Application of recommended dose of liquid fertilizers/ micronutrient through drip irrigation (fertigation).	29 (24.16)	63 (52.50)	28 (23.34)
3.	Use of micronutrient and growth regulator as per recommendation.	29 (24.16)	74 (61.67)	17 (14.17)
4.	Use of bio-fertilizers (Trichoderma, Mycorrhiza) compulsory once in year for improving the soil health and increasing beneficial fungal activity in the soil.	49 (40.83)	56 (46.67)	15 (12.50)
5.	To control fruit drop in Ambia Bahar (due to continuous raining). Spray (in August month) N-ATCA 10ppm + Brasinoloid 4ppm + Folic acid 50ppm at interval of 15 days in August month.	3 (3.50)	32 (26.67)	85 (70.83)
6.	If fruit drop occurs in Mrig Bahar, spray application of Zinc Sulphate 0.5% + Ferrous Sulphate 0.5% and Boron 0.1%.	1 (0.83)	36 (30.00)	83 (69.17)
H.	Pest and Disease Management			
1.	Identification of major pest and to control them follow systematic destruction of larval host plants to reduce pest population. (Citrus psylla, Fruit sucking moth Bark eating caterpillar and White fly etc.)	36 (30.00)	65 (54.16)	19 (15.84)
2.	Identification of major diseases and to control them spray Bordeaux mixture (1:1:100) or Copper Oxychloride 50WP (3g/litre of water). Phytophthora, Brown rot, Gummosis, Kolshi etc.)	32 (26.67)	59 (49.17)	29 (24.16)

CA = Complete Adoption, PA = Partial Adoption, NA = No Adoption, Freq. = Frequency, % = Percentage

Regarding the adoption of fruit drop management practices of Mandarin, from the table 4 it is found that in terms of complete adoption, practices like avoiding intercropping (65%), using slashers or brush cutters (61.66%), and proper NPK fertilizer application (64.16%) showed high levels of adherence among respondents. Pruning practices were also widely adopted, with over 50% of farmers regularly pruning dried branches and conducting light pruning in intensive systems. Similarly, soil selection based on texture and calcium carbonate content (61.66%), and avoiding deep ploughing (57.5%) were well adopted. However, complete adoption was very low for advanced practices like Indo-Israel technology with 6x3m spacing (5.83%), fertigation (24.16%), micronutrient and growth regulator use (24.16%), and hormonal sprays for fruit drop control in Ambia and Mrig Bahar (3.5% and 0.83% respectively). When it comes to partial adoption, it was more prominent in practices that involve more investment or technical knowledge. For instance, partial adoption was high for drip irrigation (54.17%), fertigation (52.5%), and growth regulator application (61.67%). Even practices like soil and leaf testing (24.16%), drainage management (27.5%), and pest

and disease control (54.16% and 49.17%, respectively) were adopted partially by a large number of respondents.

Table 5: Distribution of respondents according to overall Adoption of fruit drop management practices of Mandarin

Sr. No.	Adoption Level	Frequency(N)	Percentage (%)
1.	Low (< 18.6)	19	15.83
2.	Medium (18.7 to 30.8)	80	66.67
3.	High (> 30.8)	21	17.50
	Total	120	100.00

Mean = 24.67 S.D. = 6.09

From the table 5, it is revealed that majority of respondents (66.67%) had medium adoption, followed by 17.50 per cent of the respondents had high adoption and low adoption is observed in 15.83 per cent of the respondents.

3. Constraints faced by the Mandarin growers

The present study identified the key constraints responsible for the adoption gap in fruit drop management practices of Mandarin. The constraints are the circumstances or causes which prohibit and restraint the Mandarin growers.

Table 6: Distribution of the respondents according to the constraints faced about adoption gap in fruit drop management practices of Mandarin.

Sr. No.	Constraints	Frequency (N=120)	Percentage (%)
1.	Limited availability, high cost of inputs (e.g., fertilizers, drip, biofertilizers, PGRs)	79	65.83
2.	Farmers not destroying infected/dropped fruits due to high labour charges	77	64.16
3.	Lack of knowledge or improper use of Plant Growth Regulators (PGRs)	76	63.33
4.	Adverse climatic conditions (unseasonal rain, drought, etc.)	82	68.33
5.	Lack of awareness of PDKV University SOPs (Standard Operating Procedures)	62	51.60
6.	Low profitability due to price instability	72	60.00
7.	Difficult to undertake intercultural operations and high cost of opening drainage channels	74	61.67
8.	Unavailability of skilled labour during peak season	55	45.83
9.	No proper linkage to markets	68	56.67
10.	Delayed diagnosis of diseases leading to fruit drop	48	40.00

Regarding the constraints faced by the Mandarin growers, it was observed from table 6 that, the most frequently reported constraint was adverse climatic conditions, such as unseasonal rains, drought, and extreme temperatures, affecting 68.33% of the respondents. These unpredictable conditions disrupt critical crop stages like flowering and fruit setting, leading to poor adoption of weather-sensitive practices. A significant portion of respondents (65.83%) cited the limited availability and high cost of inputs—including fertilizers, drip irrigation systems, biofertilizers, and plant growth regulators (PGRs) as a major constraint. Labour-related issues, especially the reluctance to destroy infected or dropped fruits due to high labour charges, were noted by 64.16% of respondents, while lack of knowledge or improper use of PGRs affected 63.33%. Economic factors also played a key role. Price instability leading to low profitability was reported by 60.00% of respondents, discouraging investment in scientific practices. Poor drainage infrastructure and difficulty in intercultural operations, due to high costs or land constraints, were highlighted by 61.67%. Information and institutional gaps were evident, with 51.60% of farmers lacking awareness of PDKV University's recommended Standard Operating Procedures (SOPs). Additionally, market constraints such as lack of proper linkages were reported by 56.67% of the

sample, limiting the incentive to adopt high-input management strategies. Other constraints included the unavailability of skilled labour during peak periods (45.83%) and delayed diagnosis of diseases, which was cited by 40.00% of farmers as a reason for ineffective pest and disease control.

Conclusion

The study found that a majority of Mandarin growers (52.50%) belonged to the middle-age group and had higher secondary education (49.17%). Most held semi-medium (40.83%) or small (37.50%) landholdings with medium income levels (45.00%). About 62.50% of the respondents had medium knowledge, and complete adoption was highest for practices like avoiding intercropping (65.00%), use of brush cutters (61.66%), and proper NPK application (64.16%). However, advanced practices such as Indo-Israel technology (5.83%) and hormonal sprays for fruit drop control in Ambia (3.50%) and Mrig Bahar (0.83%) showed poor adoption. Key constraints included adverse climatic conditions (68.33%), high input costs (65.83%), labour issues (64.16%), and lack of knowledge on PGRs (63.33%). Addressing these with effective extension services and support systems can significantly bridge the adoption gap in fruit drop management.

References

1. Ingole VS. Knowledge and adoption of recommended technologies by mandarin growers [M.Sc. thesis]. Akola: Dr. PDKV; 2020. Unpublished.
2. Dilip CP. Adoption of improved technology by orange growers [M.Sc. thesis]. Akola: Dr. PDKV; 2021. Unpublished.
3. Wadhankar BP. Impact of Indo–Israel technology on mandarin growers [M.Sc. thesis]. Akola: Dr. PDKV; 2020.
4. Preeti RD. Reasons behind the fruit drop in oranges and removal of orchards. *Pharma Innov J.* 2023;12(5):387–90.
5. Kadu KS. Knowledge and adoption of improved technologies by orange growers [M.Sc. thesis]. Akola (MS): Krishinagar; 2016. Unpublished.