

## PACKAGING PREFERENCES AND PERISHABLE FOOD CHOICE: THE CASE OF MANGOES IN INDIA

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### **Abstract**

*Purpose* – The study aims to explore (1) how the likelihood of choosing mangoes in different types of packaging varies according to the socio-demographic profile of respondents, and (2) which factors related to mango purchasing habits and consumer behaviour are associated with the likelihood of selecting specific packaging types.

*Methodology* – A survey-based approach was employed to explore the relationship between sociodemographic characteristics and consumer behaviour on one side, and packaging preferences on the other. Respondents answered questions about their shopping habits and packaging choices related to mangoes. To identify significant differences and associations, the collected data were analysed using non-parametric statistical methods, including the Mann-Whitney U test, Kruskal-Wallis H test, and Spearman's rank correlation.

*Findings* – The results show that packaging preferences vary significantly by household size, accommodation type, and gender. Additionally, specific consumer behaviours—such as inspecting mangoes for mould or damage, washing them before consumption, storing them in packaging, and discarding damaged fruit—strongly influence the likelihood of selecting particular packaging types.

*Contribution* – This study enhances the understanding of consumer decision-making regarding sustainable packaging for perishable goods. It offers practical insights for businesses and policymakers aiming to reduce packaging-related waste by aligning product offerings with consumer preferences. Furthermore, the applied research framework is adaptable to other perishable food products, broadening the scope of future sustainable packaging studies. This study represents an exploratory analysis based on a cross-sectional survey, which limits the ability to infer causal relationships.

**Keywords** sustainable packaging, consumer preferences, perishable food, purchasing behaviour, mango

### **INTRODUCTION**

Mangoes (*Mangifera indica* L.), one of the most popular fruits, are appreciated worldwide for their rich flavour, attractive colour, and nutritional content (Arauz 2000). With over 1000 varieties cultivated worldwide and India being one of the leading producers, mangoes represent cultural significance and considerable economic value in global trade (Ali et al. 2022). However, due to their climacteric and highly perishable nature, mangoes pose specific challenges regarding storage, handling, and transportation (Vega-Alvarez et al. 2020; Shah et al. 2021). Packaging is a critical factor in mitigating

postharvest losses, especially during long-distance transport and storage under varying climatic conditions (Mitra 2016; Malik et al. 2017; Vilvert et al. 2023).

Effective packaging plays a dual role in protecting mangoes from mechanical damage and microbial spoilage, while also influencing consumer perceptions and purchasing decisions. As noted by Chonhenchob and Singh (2003), the right choice of packaging can significantly reduce bruising and fruit loss throughout the supply chain. Beyond preservation, packaging serves as a communication tool that conveys product information, sustainability values, and convenience features that can influence purchasing behaviour, especially in urban markets with evolving consumer expectations (Marsh and Bugusu 2007; Steenis et al. 2018).

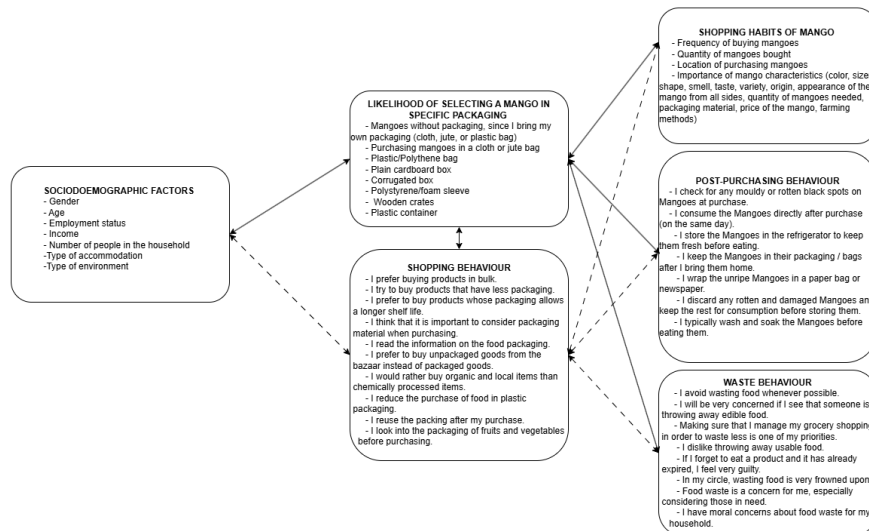
Consumer decisions regarding packaging are not only shaped by product attributes but also by broader psychological and social factors. According to the Theory of Planned Behavior (Ajzen, 1985), consumer choices are influenced by attitudes, subjective norms, and perceived behavioral control. This framework has been widely applied to explain environmentally conscious purchasing, including packaging-related decisions, and provides a valuable lens for interpreting consumer preferences in this study.

While previous studies have explored the technical and logistical role of mango packaging (Siddiq et al. 2011; Kamthai and Magaraphan 2019), limited attention has been paid to how consumer preferences intersect with packaging type, especially in economies like India, where sociodemographic diversity shapes market behaviour.

This study examines the relations between packaging preferences and consumer choice of mangoes in India, considering key behavioural and demographic factors that inform both business (packaging) innovation and policy strategies towards sustainable and acceptable packaging solutions. The study aims to answer the following research questions: (1) How does the likelihood of choosing mangoes in different types of packaging vary according to the sociodemographic profile of the respondents? (2) What factors of mango purchasing habits and characteristics are related to the likelihood of choosing mangoes in different types of packaging?

This study is guided by a conceptual framework that integrates behavioural dimensions such as shopping habits, post-purchase handling, and waste-related practices to understand better the interplay between sociodemographic factors, consumer behaviour, and packaging preferences. The conceptual framework presented in Figure 1 outlines the broader structure of the study, including all behavioural dimensions considered in the survey. While the whole model includes shopping behaviour, post-purchase handling, and waste-related practices, this paper focuses specifically on the relationships between sociodemographic factors and the likelihood of selecting specific mango packaging types, as influenced by mango shopping habits, post-purchase behaviour, and waste behaviour. Shopping behaviour is part of the broader research design but is not analysed in this paper.

Figure 1: Conceptual framework linking sociodemographic and behavioural factors to packaging preferences



Source: Authors' research

## 1. LITERATURE REVIEW

Packaging is multifaceted in the food supply chain, particularly for perishable goods such as mangoes. To provide a comprehensive foundation for this study, the literature review is structured into four thematic areas: (1) the functional and logistical role of packaging, (2) technical and sustainable packaging solutions, (3) consumer perceptions and behaviour, and (4) integrated packaging design and future directions. This structure allows us to synthesise insights from engineering, logistics, and consumer research, and to identify gaps relevant to our research questions.

### 1.1. Packaging functions and logistical role

Packaging is important in the food supply chain, especially for perishable products such as mangoes. It performs multiple functions: containment, protection, preservation, communication and convenience (Hellström and Saghir 2007). In this context, packaging significantly impacts logistics processes by enabling safe handling, reducing transport damage, and improving storage efficiency. Efficient packaging systems are essential in retail supply chains, where product damage, particularly bruising, directly reduces commercial value (Malik et al. 2017). In addition, packaging affects the operational costs and speed of retail logistics, especially when designed with unitisation and allocation in mind (Hellström and Saghir 2007). The need for synchronisation between packaging engineers and supply chain planners is well documented, emphasising that design decisions should reflect the realities of transportation and shelf-life requirements.

## **1.2. Technical and sustainable packaging solutions**

Mangoes are highly perishable due to their climacteric respiration behaviour, which accelerates ripening, softening, and decay (Arauz 2000). Proper packaging reduces moisture loss, limits bruising, and controls ethylene accumulation. Mango anthracnose and other postharvest diseases can cause significant economic losses if fruit is not adequately protected (Arauz 2000). Active and biodegradable packaging solutions are gaining traction as alternatives to traditional plastics. Kamthai and Magaraphan (2019) developed a PLA/CMCB film from bleached bagasse that extended the shelf life of mangoes up to 42 days under export conditions, reducing respiration and weight loss. These results demonstrate the potential of bio-based films not only for sustainability but also for functional quality preservation. Such materials also align with consumer trends towards multifunctional packaging - biodegradable yet performance-oriented.

Siddiq et al. (2011) tested different packaging and vibration treatments on fresh-cut apple slices. They found that while packaging type had a limited impact on sensory attributes, vibration simulation and proper handling were critical for quality preservation during transportation. This highlights a critical parallel for mango logistics: packaging alone is insufficient if distribution practices fail to mitigate handling exposure.

## **1.3. Consumer perceptions and behaviour**

Consumers perceive avoiding excessive packaging as crucial for reducing environmental impact. However, despite labelling, they often dispose of packaging materials, such as bio-based compostable packaging, incorrectly, indicating a need for more precise or more effective communication of information (Tobler et al. 2011; Taufik et al. 2020). Furthermore, packaging aesthetics and labelling (e.g., organic, sustainable) influence perceived quality more than objective factors such as freshness or production method (Ampuero and Vila 2006; Rokka and Uusitalo 2008).

Martinho et al. (2015) and Steenis et al. (2018) note that sustainable packaging must provide both environmental and symbolic value to succeed commercially. However, unpacking habits at home, such as removing fruit from packaging or puncturing for ventilation, can shorten product life (Plumb et al. 2013). Matar et al. (2020) highlight the relevance of consumer behaviour in food loss reduction: packaging condition post-purchase, storage temperature, and duration before consumption are significant predictors of waste. Thus, beyond technical performance, packaging must align with domestic storage practices and hygiene behaviour (e.g., washing fruit, discarding damaged pieces) to be effective.

## **1.4. Integrated packaging design and future directions**

Modern packaging must meet three parallel demands: logistical efficiency, environmental responsibility, and consumer appeal. Marsh and Bugusu (2007) stress that packaging can extend shelf life, reduce waste, and be a powerful communication medium

when designed holistically. In the case of mangoes, this means combining robust cushioning and moisture control (Malik et al. 2017) with biodegradable materials that appeal to eco-conscious consumers (Kamthai and Magaraphan 2018). However, as Hellström and Saghir (2007) emphasise, packaging development often occurs in isolation from logistics and marketing, leading to inefficiencies. Future solutions require cross-disciplinary coordination and consumer-centred design principles that reflect environmental objectives and demographic realities.

While the reviewed literature provides valuable insights into the technical, logistical, and behavioural aspects of food packaging, few studies have examined how these dimensions interact in the context of perishable fruits in emerging markets. In particular, the intersection of sociodemographic characteristics and packaging preferences remains underexplored. This study addresses this gap by empirically investigating how consumer behaviour and demographic factors influence packaging choices for mangoes in India. In this context, both sustainability and affordability are critical concerns.

## **2. METHODOLOGY**

### **2.1. Questionnaire and measures**

The questionnaire was primarily based on Guillard et al. (2018), while some questions about waste behaviour were adapted from Chirilli, Molino and Torri (2022). The questionnaire comprises six sections, with the demographic part as the sixth. The first question was eliminatory, as only consumers who purchased mangoes in 2024 were part of the target population. The first section focused on mango consumer behaviour. It included four closed-ended questions about the frequency and quantity of mangoes purchased, the place of purchase, and 12 items describing consumer mango choices, such as mango colour, price, smell, etc. Respondents were asked to express the importance of each factor using a five-point Likert scale (1 - Not at all important, 5 - Extremely important). The second section consisted of one question, which examined the post-purchase handling of mangoes. Respondents were presented with eight statements describing different post-purchase handling practices and asked to express their level of agreement using a five-point Likert scale (1- Never, 5 - Always). The third section consisted of one question focused on consumer awareness of food waste. Like in the second section, participants rated their agreement with eight statements related to waste management practices using a five-point Likert scale (1 - Strongly disagree, 5 - Strongly agree). The fourth section examined general purchasing behaviour. Ten statements addressed behaviours such as purchasing unpackaged goods, reading product information, reusing packaging, etc. Respondents were asked to evaluate their agreement with listed behaviours using a five-point Likert scale (1 - Strongly disagree, 5 - Strongly agree). The question in the fifth section examined consumer preferences regarding the likelihood of choosing different packaging options for mangoes. Eight images depicting mangoes in various types of packaging were presented to respondents (Table 1). This approach was proposed by Nørsgaard Olesen and Giacalone (2018), who identified the

absence of actual product images as a limitation in their study on packaging and consumer quality perception of carrots. Respondents rated the likelihood of purchasing each of the given packaging on a five-point scale ranging from 1 (Very unlikely) to 5 (Very likely). Additionally, two open-ended questions were included to capture consumer associations with mango packaging and perceptions of the advantages and disadvantages of currently available packaging solutions. Lindh et al. (2016) highlight that such questions allow respondents greater freedom of expression, leading to more nuanced and insightful data.

The results were validated using IBM SPSS Statistics version 29. The selection of statistical tests was based on the nature of the data and the research objectives. The Mann-Whitney U test was used to compare two independent groups, the Kruskal-Wallis H test allowed comparison between multiple groups, while Spearman’s rho identified correlations between variables.

Table 1: **Types of packaging**

Mangoes without packaging 	Purchasing mangoes in a Cloth or Jute bag 	Wooden crates 	Polystyrene/foam sleeve 
Plain cardboard box 	Corrugated box 	Purchasing mangoes in a Plastic/Polythene bag 	Plastic container 

Source: Authors’ research

## 2.2. Data collection and sample characteristics

The target population of the study consisted of mango consumers in India. The sample was collected through a snowball sampling method, where a link to an online questionnaire was initially sent to potential respondents via WhatsApp and Instagram, with a request to forward it to others. The survey was created using the 1KA Arnes platform and was available online from July 7, 2024, to October 4, 2024. A total of 435 individuals attempted to participate, with 169 entering the introduction and first question. Of these, 114 participants started with the questionnaire, reflecting a 26.2% response rate. Fourteen (14) participants were eliminated based on the eliminatory question. The rest of the 100 respondents fully completed the survey. The chosen data collection method—an online survey distributed via social media—was selected for its efficiency in reaching a large and diverse sample of mango consumers across different regions of India, allowing quick and cost-effective data collection and minimising geographical constraints. However, this method also presents limitations, such as potential self-selection bias, as participation was restricted to individuals with internet access and

social media engagement. Therefore, this study serves as an initial exploratory analysis to gain insights into mango consumers' profiles, providing a foundation for future large-scale research.

Demographic characteristics of the participants are presented in Table 2. The sample is predominantly female. Employment is the most common status among participants, while around 30% consist of students, unemployed individuals, retirees, and those with other unspecified statuses. A reference point for income was provided based on data from Statista (2024), which estimates India's average per capita income for 2024 at approximately 184,000 rupees (€2,061.42 per year). Around half of the respondents reported incomes close to this national average, while less than 20% fell below this threshold, and every third respondent reported incomes above it. Regarding living arrangements, most reside in apartments or flats, followed by those living in houses, with a small fraction reporting other types of accommodation. Most respondents reside in urban areas, while 12% live in suburban and rural environments.

Table 2: **Sample description**

<b>Gender</b>	<b>%</b>	<b>Type of accommodation</b>	<b>%</b>
Female	61	Apartment/Flats	58
Male	39	House	40
<b>Employment status</b>		<b>Type of environment</b>	
Employed	70	Urban	88
Unemployed	6	Suburban	8
Student	11	Rural	4
Retired	6	<b>Income</b>	
Other	6	Below the national average	17
No answer	1	Around the national average	51
Other	2	Above the national average	32

Source: Authors' research

### 3. RESULTS

#### 3.1. Descriptive statistics results

Table 3 summarises mango purchasing patterns by frequency, quantity, and preferred purchase points. 72% of respondents reported buying mangoes at least once per week. The quantities varied, some opting for smaller amounts below 500 g, while 70% purchased around 1 kg or more. Local shops and nearby vegetable sellers were the most common purchase points. Specialised fruit and vegetable markets, general bazaars, and supermarkets were frequently selected, while 11% of respondents preferred buying directly from producers or door-to-door vendors.

Table 3: Mango purchase frequency and source

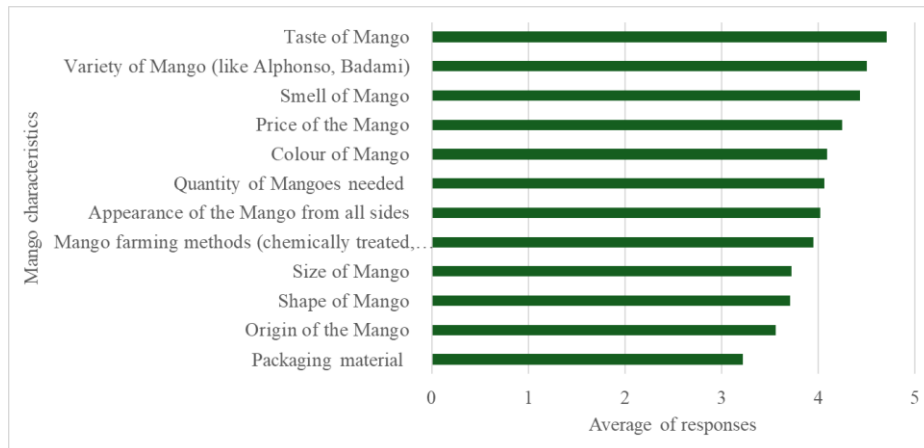
	%		%
<b>Frequency of buying mangoes</b>		<b>Places of purchasing mangoes</b>	
More than once per week	35	At the local shop, a nearby vegetable seller	51
Once per week	37		
Two or three times per month	19	In a specialised fruit and vegetable bazaar or mandí	18
Once per month or less	9		
<b>Quantity of mangoes bought</b>		In the bazaar	10
Less than 500 g	5	In the supermarket or shopping center	7
Around 500 g	11	Directly from the producer or farmer	6
Between 500 g and 1 kg	14	From the door-to-door vegetable vendor	5
Around 1 kg	30		
More than 1 kg	40	Other	3

Source: Authors' research

Figure 2 presents respondents' evaluation of various mango characteristics influencing their selection. Taste was identified as the most important factor ( $M = 4.71$ ,  $SD = 0.78$ ), with 83% of respondents considering it as important (rated at least 4). Following taste, variety (e.g., Alphonso, Badami) also played a key role in selection ( $M = 4.5$ ,  $SD = 0.91$ ), with 86% of respondents rating it at least 4. Similarly, smell was highly valued ( $M = 4.43$ ,  $SD = 0.94$ ), as 63% of respondents assigned it the highest rating, and only 4% considered it of low importance. In terms of visual appearance, colour ( $M = 4.09$ ,  $SD = 1.01$ ) was more relevant than size ( $M = 3.72$ ,  $SD = 1.11$ ) or shape ( $M = 3.71$ ,  $SD = 1.21$ ), with over 70% of respondents rating colour at least 4. Among non-sensory attributes, price was a crucial consideration ( $M = 4.25$ ,  $SD = 0.94$ ), with almost half of the respondents rating it as 5.

Other factors, such as farming methods ( $M = 3.95$ ,  $SD = 1.3$ ) and origin of mango ( $M = 3.56$ ,  $SD = 1.37$ ), showed greater variability in importance, with 20% of respondents rating them as unimportant (2 or less). The least important factor was packaging material ( $M = 3.22$ ,  $SD = 1.41$ ), where responses were highly polarised - 27% rated it as very important and 16% considered it the least important attribute.

Figure 2: Importance of mangos' characteristics for purchasing



Source: Authors' research

Figure 3 presents consumer behaviour, particularly regarding packaging considerations and product selection. The preference for organic and local products over chemically processed items ( $M = 4.41$ ,  $SD = 1.11$ ) was the highest-rated behaviour, with 81% rating this factor important (at least 4) and only 5% as unimportant. Similarly, a reduction in food purchases in plastic packaging ( $M = 4.38$ ,  $SD = 1.01$ ) was also a key concern, as 77% of respondents rated it as important (4 or higher), and only 7% rated it as 2 or lower.

Another significant consideration was reading the information on food packaging ( $M = 4.22$ ,  $SD = 1.02$ ), with 74% of respondents rating this behaviour with 5 or 4, and only 6% rating it 2 or lower. Additionally, evaluating the importance of packaging material when purchasing ( $M = 4.01$ ,  $SD = 1.07$ ) was relevant for many consumers, as 69% rated it as important (4 or 5), while only 10% assigned it with 2 or lower. When considering packaging-related attributes, choosing packaging that allows for longer shelf life ( $M = 3.89$ ,  $SD = 1.25$ ) was valued, with 66% of respondents rating it as 5 or 4. In contrast, actively reusing packaging after purchase ( $M = 3.8$ ,  $SD = 1.44$ ) was slightly less prevalent, as 63% assigned it as important (5, 4), while 18% rated it as unimportant (2 or less). Examining fruit and vegetables in the packaging before purchasing ( $M = 3.9$ ,  $SD = 1.3$ ) was also a moderately relevant behaviour, with 65% of respondents rating it as 4 or higher, while 15% rated it as 2 or lower. A preference for unpackaged goods from bazaars instead of packaged goods ( $M = 3.44$ ,  $SD = 1.46$ ) received mixed responses, with 53% rating it as 5 or 4, yet 27% rating it as 2 or lower, suggesting varying attitudes.

The two listed behaviours received relatively lower importance. Buying products with less packaging ( $M = 3.61$ ,  $SD = 1.29$ ) was moderately valued, while buying products in bulk ( $M = 3.17$ ,  $SD = 1.37$ ) was the least preferred behaviour, with only 25% of respondents assigning it the highest rating, while 28% rated it as 1 or 2, suggesting that bulk purchasing is not a widespread preference.

Figure 3: Consumer behaviour characteristics of respondents



Source: Authors' research

Figure 3 suggests respondents' likelihood of purchasing mangoes in different types of packaging, assuming that the quantity and price remain the same across all options. The results reveal a clear preference for eco-friendly and reusable packaging, while plastic-based options are the least favoured. Mangoes without packaging, brought home in respondents' reusable bags, were the most preferred ( $M = 4.23$ ,  $SD = 1.19$ ), with 77% rating this option as 4 or higher. Similarly, purchasing mangoes in a cloth or jute bag received nearly identical support ( $M = 4.23$ ,  $SD = 1.14$ ), with 72% rating it as 5 or 4. Only 4% rated these two options as 1 or 2, highlighting a preference for sustainable packaging solutions.

Among structured packaging options (Figure 4), plain cardboard boxes were more favoured ( $M = 4.01$ ,  $SD = 1.17$ ), with 69% rating them as 5 or 4. This was followed by the corrugated box ( $M = 3.61$ ,  $SD = 1.40$ ), which received a 5 or 4 from 54% of respondents but also showed greater variation in opinions, as 21% rated it as 2 or lower. Wooden crates ( $M = 3.46$ ,  $SD = 1.50$ ) showed a split response, with 51% of respondents rating it as important (5 or 4) but a notable proportion (26%) rating it as 2 or 1. In contrast, plastic-based packaging received the lowest ratings. Polystyrene/foam sleeves ( $M = 2.63$ ,  $SD = 1.53$ ) were rated as 1 or 2 by 46% of respondents, while only 31% found them highly acceptable (rating of 5 or 4). Plastic or polythene bags were less favoured ( $M = 1.87$ ,  $SD = 1.18$ ), with most (70%) rating them as 1 or 2 and only 5% as 4 or more. The least favoured option was plastic containers ( $M = 1.43$ ,  $SD = 0.93$ ), with 86% of respondents rejecting them (rating of 1 or 2) and only 3% considering them a desirable choice (5 or 4).

Figure 4: Willingness to purchase mango in different packaging



Source: Authors' research

### 3.2. Mango packaging choices and sociodemographic characteristics

The results (Table 4) reveal several statistically significant differences and correlations between respondents' sociodemographic characteristics and the likelihood of different packaging choices. According to gender, statistically significant differences in the likelihood of choosing mango in a corrugated box were examined ( $U = 888.5$ ). Statistically significant differences were also examined according to the respondents' accommodation type regarding the likelihood of choosing wooden crates ( $H = 0.012$ ). A weak but statistically significant positive correlation was observed between household size and the likelihood of choosing wooden crates ( $\rho = 0.306$ ).

A weak positive statistical correlation was also found between household size and the likelihood of purchasing mangoes in a cloth or jute bag ( $\rho = 0.314$ ), suggesting that larger households are more inclined toward this eco-friendly option. Similarly, household size was statistically significantly but weakly positively correlated with the choice of cardboard boxes ( $\rho = 0.249$ ), suggesting a slight tendency among respondents from larger households to prefer this packaging type. Statistically significant differences ( $H = 14,779$ ) were also found between consumer groups with different purchasing frequency regarding the likelihood of choosing mangoes without packaging.

Table 4: Sociodemographic characteristics and mango packaging choices

		Mann-Whitney U test	Kruskal-Wallis H test	Spearman's Rho
<b>Mangoes without packaging, since I bring my own packaging</b>	Frequency of purchasing mango		14,779*	
<b>Mangoes in a cloth/jute bag</b>	Number of people in the household			0.314*
<b>Wooden crates</b>	Type of accommodation		0.012*	
	Number of people in household			0.306*
<b>Corrugated box</b>	Gender	888.500*		
<b>Cardboard box</b>	Number of people in household			0.249*

\*The significance level is 0.05

Source: Authors' research

### 3.3. Mango packaging choices and mango characteristics

Table 5 presents relations between the importance of specific mango characteristics and the likelihood of choosing specific packaging. The preference for mangoes without packaging (consumers bring their own bags) is positively correlated with the importance of mango size ( $\rho = 0.319$ ), shape ( $\rho = 0.281$ ), and appearance ( $\rho = 0.254$ ). In the case of wooden crates, the strongest correlations were observed with the importance of packaging material ( $\rho = 0.319$ ) and farming methods ( $\rho = 0.289$ ), followed by mango smell ( $\rho = 0.230$ ) and shape ( $\rho = 0.229$ ). Plastic/polythene bags showed a weak positive correlation with the importance of mango size ( $\rho = 0.220$ ) but a negative correlation with price sensitivity ( $\rho = -0.207$ ), suggesting that those concerned with price tend to avoid plastic packaging. Corrugated box preference was weakly positively correlated with the importance of farming methods ( $\rho = 0.221$ ) and mango shape ( $\rho = 0.218$ ). For plain cardboard boxes, low but positive correlations were found with mango smell ( $\rho = 0.236$ ), price ( $\rho = 0.269$ ), and farming methods ( $\rho = 0.327$ ). For cloth or jute bag preference, positive correlations were investigated with the importance of mango origin ( $\rho = 0.232$ ) and packaging material ( $\rho = 0.205$ ), while plastic containers showed a weak positive correlation with the importance of mango smell ( $\rho = 0.265$ ).

Table 5: **Packaging choices and the importance of mango characteristics**

<b>Mangoes without packaging, since I bring my own packaging</b>		<b>Cloth or jute bag</b>	
Size of the mango	0.319**	Origin of the mango	0.232*
Shape of the mango	0.281**	Packaging material	0.205*
Appearance of the mango	0.254*	<b>Plain cardboard box</b>	
<b>Wooden crates</b>		Smell of the mango	0.236*
Shape of the mango	0.229*	Price of the mango	0.269**
Smell of the mango	0.230*	Mango farming methods	0.327**
Packaging material	0.319**	<b>Plastic container</b>	
Mango farming methods	0.289**	Smell of the mango	0.265**
<b>Plastic/ Polythene bag</b>		<b>Corrugated box</b>	
Size of the mango	0.220*	Shape of the mango	0.218*
Price of the mango	-0.207*	Mango farming methods	0.221*

\*\* The significance level is 0.01  
 \*The significance level is 0.05

Source: Authors' research

### 3.4. Mango packaging choice and consumer behaviour

Table 6 presents statistically significant correlations between consumer behaviour characteristics and packaging preferences. The likelihood of choosing mangoes without packaging was weakly but positively correlated with consideration of packaging material when shopping ( $\rho = 0.321$ ), suggesting some alignment with sustainable behaviour. A negligible positive correlation was observed for wooden crates with the tendency to read food packaging information ( $\rho = 0.228$ ). In contrast, preferences for plastic/polythene bags showed several weak to negligible negative correlations. Consumers who consider packaging material important ( $\rho = -0.292$ ), read packaging information ( $\rho = -0.322$ ), prefer organic/local products ( $\rho = -0.220$ ), and aim to reduce food bought in plastic packaging ( $\rho = -0.322$ ) were all less likely to choose this option.

Corrugated box preference was weakly positively associated with both the importance of packaging material ( $\rho = 0.308$ ) and the effort to reduce plastic packaging use ( $\rho = 0.274$ ), suggesting a somewhat environmentally conscious consumer profile. The likelihood of choosing plain cardboard boxes was positively but weakly associated with bulk buying preferences ( $\rho = 0.203$ ), reading packaging information ( $\rho = 0.246$ ), selecting organic/local over processed products ( $\rho = 0.261$ ), and avoiding plastic packaging ( $\rho = 0.321$ ), reflecting a broader sustainable consumption orientation.

Plastic containers were negatively correlated with sustainable attitudes: preferring less packaging ( $\rho = -0.299$ ), valuing packaging material ( $\rho = -0.228$ ), and choosing

organic/local products ( $\rho = -0.276$ ), suggesting that more sustainability-oriented consumers avoid this option. Finally, cloth or jute bag preference was positively but negligibly correlated with efforts to reduce packaging ( $\rho = 0.208$ ). In contrast, polystyrene/foam sleeve preference showed a negligible positive correlation with prioritising longer shelf life ( $\rho = 0.233$ ).

Table 6: Mango packaging choice and consumer behaviour

	Correlation Coefficient		Correlation Coefficient
<b>Mangoes without packaging, since I bring my own packaging</b>		<b>Plain cardboard box</b>	
I think that it is important to consider packaging material when purchasing	0.321**	I prefer buying products in bulk	0.203*
<b>Wooden crates</b>		I read the information on the food packaging	0.246*
I read the information on the food packaging	0.228*	I would rather buy organic and local items than chemically processed items	0.261*
<b>Plastic/ Polythene bag</b>		I reduce the purchase of food in plastic packaging	0.321**
I think that it is important to consider packaging material when purchasing	-0.292**	<b>Corrugated box</b>	
I read the information on the food packaging	-0.322**	I think that it is important to consider packaging material when purchasing	0.308**
I would rather buy organic and local items than chemically processed items	-0.220*	I reduce the purchase of food in plastic packaging	0.274**
I reduce the purchase of food in plastic packaging	-0.322**	<b>Cloth or jute bag</b>	
<b>Plastic container</b>		I try to buy products that have less packaging	0.208*
I try to buy products that have less packaging	-0.299**	<b>Polystyrene/foam sleeve</b>	
I think that it is important to consider packaging material when purchasing	-0.228*	I prefer to buy products whose packaging allows a longer shelf life	0.233*
I would rather buy organic and local items than chemically processed items	-0.276**		

\*\* The significance level is 0.01

\*The significance level is 0.05

Source: Authors' research

#### 4. DISCUSSION

The results of this study reflect a consumer shift toward more sustainable mango packaging options, with a consistent preference for solutions that minimise environmental impact.

Based on the presented results, packaging that allows consumers to avoid plastic, such as bringing their reusable bags or choosing cloth/jute bags, received the highest ratings. These findings are consistent with broader trends in consumer behaviour that show growing ecological awareness and support for low-waste shopping practices.

The results consistently show that plastic-based packaging options—particularly plastic containers and polythene bags—are the least preferred among respondents. This aversion appears to stem from environmental concerns and the perceived mismatch between plastic and the natural character of fresh produce. As noted by Siddiq et al. (2011), packaging that fails to support or detracts from these visual cues, such as colour and appearance, may negatively impact consumer interest, regardless of the product's internal quality. Thus, packaging plays a dual role: it protects the product and shapes consumer perception of freshness and naturalness.

Correlation results suggest a tendency for consumers who value attributes like farming method, mango smell, shape, and packaging material to prefer sustainable packaging. These characteristics, although varying in the strength of association, reflect a holistic view of food quality, where packaging is not just a protective layer but part of the overall product experience.

Respondents' sociodemographic profiles also may contribute to packaging preferences. According to the presented results, larger households show some support for eco-friendly options such as wooden crates or jute bags, which may reflect their need for practicality combined with environmental values. Gender and accommodation type also showed limited influence, suggesting that personal living circumstances can affect perceptions of what constitutes appropriate packaging.

These findings can be interpreted through the Theory of Planned Behaviour (TPB). In the Indian context, this framework helps explain why urban consumers and larger households prefer eco-friendly packaging options. Their choices may reflect stronger environmental attitudes, social expectations around sustainability, and practical considerations such as higher consumption needs and limited storage space (Shanbhag et al., 2023).

Survey results resonate with Plumb et al. (2013) and Matar et al. (2020), indicating that many consumers remove packaging immediately after purchase, particularly for fresh produce. In the UK, up to 89% of consumers remove packaging from bananas, and similar patterns exist for other fruits and vegetables. Matar et al. further observed that 79% of strawberry consumers remove packaging upon purchase, and most consume the fruit within 1 to 3 days. These habits suggest that the protective role of packaging in the

home may be minimal, reinforcing the idea that consumers value packaging more during transport and sale than for storage.

This study also highlights how eco-friendly packaging choices are associated with sustainable purchasing habits, such as reading labels, avoiding plastic, and preferring local or organic options. These connections suggest that packaging preferences appear to be connected with broader values and behaviours, not just functional considerations. While several associations identified in this study are statistically significant, many reflect small effect sizes ( $\rho \approx 0.20\text{--}0.30$ ). These findings should therefore be interpreted as indicative of general tendencies rather than strong predictive relationships. The study's exploratory nature calls for cautious interpretation and highlights the need for further research with larger and more representative samples.

In summary, results highlight the potential relevance of consumer-aligned, environmentally conscious packaging strategies in the fresh produce sector. This suggests minimising plastic use and integrating packaging with transparency, quality, and sustainability values for marketers and producers. As packaging continues influencing purchasing decisions and perceptions of freshness, the transition toward eco-friendly, sensory-enhancing solutions may offer both environmental and competitive advantages in the fruit industry. Based on the observed preferences, we suggest that retailers and packaging designers prioritise eco-friendly solutions such as cloth/jute bags and cardboard boxes, which received the highest ratings among respondents. Plastic-based packaging, particularly containers and polythene bags, was consistently rejected and should be de-emphasised in product offerings. These insights can guide more sustainable packaging strategies that align with consumer expectations and environmental goals.

## CONCLUSION

This study investigated consumer preferences and behaviour concerning the packaging of mangoes. The findings illustrate that packaging remains an important element in consumer choices, not only as a functional means of protection and preservation, but also as a communication tool that can reflect product quality and sustainability. Among the different types of packaging, those perceived as more environmentally friendly were more likely to be chosen by respondents in a hypothetical purchase scenario. While statistically significant, the observed relationships are modest in strength and should be viewed as preliminary insights into consumer packaging preferences. However, the results also showed differences in the preferences of different sociodemographic groups, suggesting that packaging strategies should be adapted to different consumer segments.

While the findings offer valuable insights, their generalizability is limited due to sample size and sampling method. Finally, although including images was a strength, these cannot fully capture real-world packaging preferences, as choices made in real-world retail environments may differ due to context or sensory cues.

Future research could address these limitations by using larger, more diverse and representative samples and combining quantitative surveys with qualitative methods such as focus groups or in-store experiments. In addition, cross-cultural studies would be valuable in investigating how packaging preferences differ between different markets. As packaging evolves with the increasing pressure for sustainable solutions, further research is needed to investigate how consumers perceive and respond to emerging packaging materials and labelling. By understanding these dynamics, producers and marketers can design packaging that meets functional needs and supports informed and sustainable consumer choices.

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