



RESEARCH ARTICLE

Dragon fruit in the Indian fruit market: A consumer-centric study in Coimbatore city

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Received: 27 June 2025; Accepted: 08 August 2025; Available online: Version 1.0: 04 November 2025

Cite this article: Anirudhan S, Deepa N, Divya K, Suganya S, Senthil NS. Dragon fruit in the Indian fruit market: A consumer-centric study in Coimbatore city. Plant Science Today. 2025;12(sp4):01–06. <https://doi.org/10.14719/pst.10328>

Abstract

This study was conducted to investigate consumer preference toward dragon fruit in Coimbatore city, India. The primary objective of the study was to identify and analyse the consumer preferences, factors influencing the purchase behaviour and constraints faced by consumers when purchasing the dragon fruit. With the help of primary data collected from 120 consumers through structured questionnaires and analysed with descriptive statistics, factor analysis and Garrett ranking, this study identifies three main components impacting consumer behaviour: consumer exploration which signifies the importance of digital influence and recommendations, consumer satisfaction mostly consist of taste experience and health benefits and finally the last component is market affordability which emphasizes the significance of price and availability. The results shows that the majority of the consumer for dragon fruit is middle-aged (26-45 years old), well-educated and average income consumers. In this study, 77 % of respondents reported buying dragon fruits on occasionally or on very rare events. The biggest constraints for purchasing the fruit were price, which is followed by availability of fruit in the market. Most consumers like free samples to get to know the fruit indicating that large consumers are yet to try the fruit and then followed by discounts and offers as an effective strategy selected by the respondents. This research provides valuable insights for the stakeholders across the dragon fruit value chain to design marketing strategies, optimize pricing and enhance market penetration for this exotic fruit in Coimbatore city.

Keywords: awareness; consumer behaviour; exotic fruit; fresh produce; healthy food products

Introduction

Dragon fruit (*Hylocereus* spp.), with its attractive pink or yellow exterior and peppered white or red flesh has transformed from just novelty fruit into a global superfood phenomenon. It is originated in Central America but now this exotic fruit has got attention from consumers across the globe with its striking appearance and sweet flavour. Beyond its beauty and taste, dragon fruit has gained significant attention from nutritionist and researchers for its nutritional composition and potential health benefits (1). Urban consumers typically value attributes like freshness, colour and sweetness during purchase (2). Dragon fruit comprise of many nutritional beneficiaries such as vitamin C, B1, B2 and B3 as well as vital minerals such as calcium, phosphorus, magnesium and iron, dietary fibre and antioxidants like betalains. The seeds are great source of healthy essential fatty acids including linoleic and linolenic acids (3). People generally perceive exotic fruits such as dragon fruit, kiwi and berries as highly expensive. People with food neophobia are reluctant to try new food produce (4). Hence it has been difficult for exotic fruits to compete with the traditional fruits in the market. However, consumers are more open to trying new foods in processed forms such as cookies, jam, jujube and beverages (5), this facilitates market entry for exotic fruits. The studies have shown that nutritional education has a positive impact on the growth of exotic

fruits (6). Food blogs and chefs are increasing the market demand for exotic fruit by innovating new ideas and recipes (7). From the intrusion of social media, people's knowledge on exotic food product and willing to try something new have increased over the years (8). The recent market research shows that exotic fruits have penetrated in second-tier Indian cities and discovered that dragon fruit awareness increased by over the years (9), with continuous growth in both the wholesale and retail sectors. Exotic fruits such as dragon fruit emerged as a promising exotic fruit crop with huge growth potential in Tamil Nadu, with Coimbatore becoming a significant hub for both production and consumption. As dragon fruit cultivation expands in South India, understanding the regional market dynamics and consumer becomes crucial for stakeholders across the value chain, from farmers to retailers and food processors. These studies regarding the financial assessment of dragon fruit have shown better results in Tamil Nadu. But high-cost installation materials and labours cost are the major concerns in the production (10). Dragon fruit, though widely recognized for its unique appearance and nutritional benefits, is still considered a niche product in the Indian fruit market. Coimbatore, as an emerging hub for exotic fruit consumption in Tamil Nadu, offers an ideal setting to study its market potential. Despite favourable climatic conditions and government support for cultivation, challenges such as high price, limited availability and low familiarity among consumers

restrict regular consumption. Previous studies indicate that urban, educated and health-conscious consumers are more likely to experiment with exotic fruits, yet their purchase frequency remains low due to affordability and accessibility issues. By investigating the interplay of digital influence, taste experience and price-availability dynamics, this study seeks to provide empirical insights for marketers, producers and policymakers to bridge the gap between consumer interest and actual purchase behaviour, ultimately fostering sustained market growth for dragon fruit in the region.

Materials and Methods

Selection of study area

Coimbatore is a major industrial and agricultural city in Tamil Nadu, India, with a large fruit trading community. Hence the research was conducted in major fruit trading areas of Coimbatore city namely Gandhipuram, Saravanapatti, Townhall and Ukkadam which were purposively selected for the study.

Collection of data

Primary data collection consisted of direct interviews with customers who visited these retail stores such as Kovai fruits, KMR fruits stall, departmental stores and local fruit shops aided by a professionally developed and detailed questionnaire. A total of 120 dragon fruit consumers were interviewed using a convenience sampling method. In the sampling, Researcher have selected the respondent who are buyers of the dragon fruits in the fruit market to obtain a reliable data for the analysis. The analytical technique was descriptive analysis, focusing on average and percentage calculations to investigate the consumers' demographic characteristics, such as age, gender, marital status and educational level, statistical analysis was to identify the major factors and constraints influencing the purchase of dragon fruit. In addition, secondary data was gathered from various published sources, including reports and journals.

Percentage analysis

Percentage analysis is one of the traditional economic instruments commonly used in interpretation of primary data. It is calculated as the proportion of responses to a specific question relative to the total number of respondents (11).

$$\text{Percentage \%} = \frac{\text{No. of samples taken}}{\text{total samples}} \times 100 \quad \text{Eqn. 1}$$

Factor analysis

Factor analysis is a powerful statistical technique used to uncover hidden patterns or relationships among a set of observed variables. Rather than analysing each variable in isolation, this method groups them into underlying factors based on how strongly they are correlated. These factors represent common themes that explains the correlation within the data and simplifying them to make us understand the patterns affecting the whole structure. The primary aim of factor analysis is to reduce the complexity of data by identifying a smaller number of unobserved variables known as factor that account for the patterns among the observed ones. By doing so, researchers can gain clearer insights into the underlying dimensions of a dataset (12). In this study, the factors examined to assess consumer influence towards dragon fruit include online reviews and advertisement, new age dietary lifestyle, curiosity and novelty, doctor's recommendation, health benefits, taste, previous experience with the fruit, price, availability and instore-discount and offers.

Garrett ranking

Garrett ranking is a statistical method used to analyse and rank preferences or opinions collected from respondents in a survey. It helps convert qualitative data (like rankings or preferences) into quantitative scores, allowing for a more objective comparison of different factors or items (13). It converts ranks given by respondents into percent positions, then into Garrett scores, which are averaged to determine the final ranking.

$$\text{Position percent} = \frac{R_{ij} - 0.5}{N_j} \times 100 \quad \text{Eqn. 2}$$

Where:

R_{ij} = Rank given for the i^{th} factor by the j^{th} individual

N_j = Total number of items ranked by the j^{th} individual

Results and Discussion

The demographic data indicates a slight predominance of male consumers compared to female consumers (Table 1). Age wise data shows that the largest consumer segment for the fruit is 36-45 years old with majority of 36 %, followed by 26-35 years with 28 %. Together these middle-aged adults are from 26-45 years old comprise 64 % of the market, indicating dragon fruit appeals most strongly to the working age consumers. Most of the consumers have a college education; among the respondents, 60.8 % are undergraduates and 27.5 % are postgraduates. This indicates that the level of education has a significant influence on the purchase behaviour. According to occupational data, most of the consumers are employees with 55 %, followed by businesspeople with 19.2 %, students with 13.3 % and home makers with 12.5 % out of respondents. People with the income of around 4.5 lakhs per year and with those earning over 6.5 lakhs are around 80 % suggests that the fruit appeals to the middle-aged, educated, employed consumers with higher-than-average incomes (14). This could indicate the fruit is positioned as a premium product or that its health benefits particularly resonate with health-conscious middle and upper-middle-class professionals.

Table 2 represents that majority of the consumers prefer to buy dragon fruit in supermarket, which implies that the consumers prefer convenience and assortment provided by the bigger retail stores. After supermarket, consumers prefer local markets for purchasing the fruit. This indicates that consumers often prefer traditional purchasing channels. When it comes to online purchases, they were significantly lower. This is evidenced by 88.33 % of purchases occurring through physical channels such as supermarkets and local markets. The low online penetration may indicate potential growth opportunities in e-commerce, because most of the consumers were high income and educated (15). This purchase pattern suggests marketing and distribution strategies should prioritize supermarket placement while maintaining presence in local markets, with online channels potentially serving as a supplementary rather than primary distribution method.

Most of the purchases done by the consumers are occasional implying that dragon fruit is considered as a curiosity or specialist product than a staple food (Table 3). Almost 77 % of consumers buy it occasionally. Very little portion of consumers display a loyalty towards the fruit. A low frequency pattern is consistent with dragon fruit's positioning as an exotic fruit or high-

Table 1. Demographic characteristics of the respondents

| Gender | Respondents | Percentage to total |
|------------------|-------------|---------------------|
| Male | 61 | 57.50 % |
| Female | | 42.50 % |
| Age | Respondents | Percentage to total |
| 18-25 | 16 | 13.00 % |
| 26-35 | 33 | 28.00 % |
| 36-45 | 43 | 36.00 % |
| Above 46 | 28 | 23.00 % |
| Education | Respondents | Percentage to total |
| Primary | 14 | 11.70 % |
| Under Graduate | 73 | 60.80 % |
| Post Graduate | 33 | 27.50 % |
| Occupation | Respondents | Percentage to total |
| Business Man | 23 | 19.20 % |
| Employee/Worker | 66 | 55.00 % |
| Home maker | 15 | 12.50 % |
| Student | 16 | 13.30 % |
| Household income | Respondents | Percentage to total |
| Below 1.5 lakhs | 2 | 1.600 % |
| 1.5- 2.5 lakhs | 5 | 4.160 % |
| 2.5- 4.5 lakhs | 17 | 14.16 % |
| 4.5 -6.5 lakhs | 33 | 27.50 % |
| Above 6.5 lakhs | 63 | 52.50 % |

Table 2. List of places where consumers purchase the fruit more frequently

| Place of purchase | Respondents | Percentage to total |
|-------------------|-------------|---------------------|
| Local market | 42 | 35.00 % |
| Supermarket | 64 | 53.33 % |
| Online | 14 | 11.66 % |

Table 3. Frequency of purchase for the dragon fruit made by the consumers

| Frequency of purchase | Respondents | Percentage to total |
|-----------------------|-------------|---------------------|
| Daily | 1 | 1.00 % |
| Weekly | 6 | 5.00 % |
| Monthly | 21 | 17.00 % |
| Occasionally | 53 | 44.00 % |
| Rarely | 39 | 33.00 % |

end product. It can be reduced by focusing on quality at the point of sales (16). This data indicates marketing strategies should focus on increasing purchase frequency among existing customers by providing more everyday usage ideas, recipes or promotional pricing to encourage more regular consumption (17).

According to Table 4, the most effective marketing promotion is free sample. This implies that the taste and texture of dragon fruit is still unknown to many individuals and will get them to buy the fruit (18). Consumers are attracted to discounts and offers indicating that they are moderately price sensitive which is consistent with dragon fruit's tendency to marketed as a high-end product. Offers like get one free or bundling are some of the effective marketing tactics in the fruits market but in exotic fruit market, price for fruits is slightly higher than traditional fruit hence price-based incentives better for encouraging the purchase. Health campaigns are the least preference for the consumers but still there is a sizable income responds well to a nutritional information. Value perception is understood by the fact the significance amount of consumers is influenced by price, hence the stakeholders should focus on cost concerns of the consumer.

Table 4. Consumers favourite marketing promotions

| Marketing promotions | Respondents | Percentage to total |
|----------------------|-------------|---------------------|
| Discounts | 33 | 27.55 % |
| Offers | 26 | 21.66 % |
| Free samples | 42 | 35.00 % |
| Health Campaign | 19 | 15.83 % |

Supermarkets and local markets are the important information sources suggesting that in-store advertising and point of sale exposure are essential touchpoints for raising consumer awareness and educating them (Table 5) (19). Even though the purchase rate from the internet is very low, but when it comes to advertising, social media plays a crucial role in spreading awareness displays significance of digital influence. Other marketing means such as word of mouth through friends and family, and traditional media such as radio and television have very little influence on the consumers. Since the retail environment has a strong influence, increases the importance of in-store presentation, signage and education to drive awareness and sales (20). Meanwhile, the significant impact of social media suggests visual platforms are effective for showcasing this visually distinctive fruit, despite consumers' preference for physical purchasing.

Table 5. List of information sources about the fruit

| Information sources | Respondents | Percentage to total |
|------------------------------------|-------------|---------------------|
| Supermarket\local market | 48 | 40.00 % |
| Family\friends | 11 | 9.20 % |
| Television\radio | 2 | 1.70 % |
| Online blogs | 8 | 6.70 % |
| Health influencers | 5 | 4.20 % |
| Social media (Meta ads, Insta ads) | 28 | 23.30 % |
| Others | 18 | 15.00 % |

Kaiser-Meyer-Olker (KMO) measure of sampling adequacy is 0.817, which means that the sample has significant associations pattern and is ideal for factor analysis (Table 6) (21). A huge chi-square value of 555.741 at 66 degrees of freedom indicates a very significant result ($p = 0.000$) according to Bartlett's test of sphericity. These findings provide strong evidence that the factor analysis for the study is appropriate and significant variable may be obtained from the study. It makes it possible to understand consumer segment with great confidence.

Table 6. KMO and Barlett's test

| | | |
|--|---------|-------|
| Kaiser-Meyer-Olkin Measure of sampling adequacy. | | 0.817 |
| Approximate chi-square | 555.741 | |
| Bartlett's test of sphericity | Df | 66 |
| | Sig. | 0.000 |

Eigen values and its extracted sum of squared value are presented in Table 7. Kaiser's criterion has been used to extract significant factors from the data. From the data three major components have been identified using the eigen value (22). Kaiser's criterion has been used to extract the significant factors from the data. From the data three major components have been identified using the eigen value. These three components account for 61.92 % of the variance in the purchase behavior of the consumer. First component has an eigen value of 4.715 which accounts for major variance. Then component two and three are equally influencing the purchasing behavior of the consumer. This analysis confirms that the three elements are appropriate for the study.

Rotated component matrix is represented in Table 8. Rotation creates a factor structure that is easier to understand by maximizing high item loadings and minimizing low item loadings. These loadings are present in the rotated component matrix following the application of rotation (23). From the above rotated component matrix, all the factors can be categorised into three major components. Table 9 explains the below segmentation of the factors

Consumer exploration

Factors loading (between 0.620-0.805) signifies the influence of external information sources and novelty. The factor loadings for online reviews or advertisement (0.805), new age dietary lifestyle (0.769), novelty (0.627) and doctor's recommendation (0.620). This component implies that the consumers are willing to try something new and some need to start new diets so they resort to online reviews and advertisement or doctor's recommendation. Consumer perceptions are heavily influenced by what they hear from others (24). The high volume of online reviews suggests that digital

Table 8. Rotated component matrix

| Factors | Components | | |
|------------------------------------|------------|-------|-------|
| | 1 | 2 | 3 |
| Online reviews\advertisement | 0.805 | | |
| New age dietary lifestyle | 0.769 | | |
| Curiosity\novelty | 0.627 | | |
| Doctor's recommendation | 0.620 | | |
| Health benefits | | 0.581 | |
| Taste | | 0.851 | |
| Previous experience with the fruit | | 0.776 | |
| Price | | | 0.807 |
| Availability | | | 0.806 |
| Instore Discount and Offers | | | 0.654 |

Table 9. Segmentation of the factors

| Segments\components | Factors |
|-----------------------|-------------------------------------|
| Consumer exploration | Online reviews\advertisement |
| | New age dietary lifestyle |
| | Curiosity\novelty |
| | Doctor's recommendation |
| Consumer satisfaction | Health benefit |
| | Taste |
| | Previous experience with the fruits |
| | Price |
| Market affordability | Availability |
| | Instore discount and offers |

marketing has a significant influence in the market especially when it comes to exotic fruits such as dragon fruit.

Consumer satisfaction

This component implies the importance of consumer satisfaction for the growth of the dragon fruit. The factor loading for taste (0.851), previous experience with the fruit (0.776) and health benefits (0.581). Taste is the important factor in case of purchase of dragon fruit, showing that once consumers try dragon fruit, they are willing to buy more. Major cause for the repeat purchases are strongly driven by sensory experience (25). Health benefits, while important, have less influence on people than taste.

Market affordability

This component signifies the availability and financial aspects for the dragon fruit market. The factor loadings for price (0.807), availability (0.806) and instore discount and offers (0.654). Price and availability are about equally important, indicating that buyers care about both getting the fruit at a fair price and having easy access to it. Availability of the product gives convenience and drive repeated purchase (26).

Table 7. Eigen values and its extracted sum of squared value

| Components | Initial eigen values | | | Extraction sums of squared loading | | |
|------------|----------------------|---------------|--------------|------------------------------------|---------------|--------------|
| | Total | % of variance | Cumulative % | Total | % of variance | Cumulative % |
| 1 | 4.715 | 39.292 | 39.292 | 4.715 | 39.292 | 39.292 |
| 2 | 1.371 | 11.424 | 50.716 | 1.371 | 11.424 | 50.716 |
| 3 | 1.345 | 11.204 | 61.920 | 1.345 | 11.204 | 61.920 |
| 4 | 0.895 | 7.457 | 69.377 | - | - | - |
| 5 | 0.712 | 5.933 | 75.310 | - | - | - |
| 6 | 0.609 | 5.072 | 80.382 | - | - | - |
| 7 | 0.531 | 4.425 | 84.807 | - | - | - |
| 8 | 0.508 | 4.229 | 89.036 | - | - | - |
| 9 | 0.404 | 3.369 | 92.406 | - | - | - |
| 10 | 0.339 | 2.824 | 95.230 | - | - | - |

Constraints

Constraints are the limitations or restrictions that specify the parameters that a system, procedure or choice must work within are known as constraints. They are frequently crucial in identifying workable solutions to issues and can be technological, legal, economic, social, or physical in character (27). Six major constraints have been identified from the respondents in this research are price, availability, traditionalism, lack of knowledge, poor taste and health concerns or allergic reactions to dragon fruit.

The list of constraints affecting the consumer purchase is shown in Table 10. Price and availability, the two top-ranked limitations, are exactly in line with component 3 of component analysis. Although they are not the main factors influencing purchasing interest, this demonstrates that access and cost are main concern for the dragon fruit consumption and that is the reason why consumers are favouring free samples and instore discount for the purchase of dragon fruit. Traditionalism is the third most significant constraints in purchasing dragon fruit. Cultural preferences and a tendency to stick with familiar fruits create a psychological barrier. Dragon fruit is still considered exotic choice by many customers. This reluctance might be addressed by encouraging the use of dragon fruit in traditional recipes and incorporating it into regional culinary customs. Lack of knowledge and taste are moderate level of constraints faced by the consumer among those measured. But still a concern for the fruit's market, lack of knowledge on fruits nutritional value and the ways it can be consumed and how it could be incorporated into a meal affecting the growth of dragon fruit in exotic fruit market. The taste of dragon fruit is very different from the traditional fruits in the market. consumer prefer traditional fruit more and that is why dragon fruit are bought on occasion. Health concerns and allergic reaction is a very big problem for the fruit's market still most people don't have any health issue when consuming the fruit. Only few people have the allergy for the fruit hence it is the least constraint for purchasing the fruit by the consumers.

Table 10. List of constraints affecting the consumer purchase

| Constraints | Mean value | Rank |
|-------------------------|------------|------|
| Price | 67.23 | I |
| Availability | 54.51 | II |
| Traditionalism | 49.46 | III |
| Lack of knowledge | 46.14 | IV |
| Poor taste | 32.15 | V |
| Health concerns/allergy | 20.19 | VI |

Conclusion

This study confirms that dragon fruit in Coimbatore is positioned as a premium health-oriented product, predominantly attracting urban, educated consumers and sold mainly through supermarkets. Factor analysis revealed three key determinants of consumer behaviour: consumer exploration driven by online reviews and advertisements (loading 0.805); consumer satisfaction influenced by taste (loading 0.851); and market affordability shaped by price and availability constraints. Although purchase frequency is currently irregular, the strong influence of digital media marketing and in-store promotions presents clear opportunities for growth. Cost and availability remain the principal barriers, while free samples and promotional offers effectively stimulate trial purchases among consumers unfamiliar with the fruit's taste. To enhance market penetration, stakeholders

should prioritise consistent quality, strengthen supermarket visibility, leverage targeted social media campaigns and implement consumer education initiatives on nutritional benefits and culinary applications. With continued support from Tamil Nadu Agricultural University and coordinated efforts across the value chain, the dragon fruit sector in Coimbatore can transition from a low-frequency niche market to a high-demand, profitable segment.

Acknowledgements

Authors thank the Department of Agricultural and Rural Management, Tamil Nadu Agricultural University, Coimbatore for providing guidelines and support for writing the research article.

Authors' contributions

AS prepared the questionnaire to identify the pros and cons, carried out interrogations in the Coimbatore region and did the statistical analysis. DN, DK, SS and SNS provided necessary information for carrying out the study. All authors read and approved the final manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interests to declare.

Ethical issues: None

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