



Tunisian consumer preferences for local forest honey attributes: A market segmentation analysis

Samir Ben-Ali¹ and Ibtissem Taghouti^{2,3}

¹ University of Carthage, Mograne Agricultural High School, Dept. of Agricultural Economics. Zaghouan 1121, Tunisia. ² University of Carthage, INRGREF, Laboratory of Management and Valorization of Forest Resources. Rue Hédi El Karray El Menzah IV, 1004 Tunis BP 10 Ariana 2080, Tunisia.

³ Center for Agro-Food Economics and Development (CREDA-UPC-IRTA). Parc mediterrani de la tecnologia. Edifici ESAB, carrer esteve terradas 8. Castelldefels 08860, Spain.

Both authors contributed equally to this work.

Abstract

Aim of study: This study focuses on the segmentation of local forest honey market based on consumer preferences for its origin and other sensory attributes.

Area of study: Tunisia

Material and methods: The empirical analysis relies on a face-to-face questionnaire survey of 200 respondents, conducted in 2019 among Tunisian consumers. A cluster analysis was used to identify the market segments and multinomial logit analysis was used to determine segment membership characteristics.

Main results: Three distinct market segments were identified. The first segment of consumers (44% of the sample) prefer eucalyptus and multiflora honey from the Northwest origin; the second segment (39%) is composed of consumers that tend to buy honey mainly produced in the eastern region of the country; in the third (17%), consumers prefer thyme-rosemary honey.

Research highlights: Consumer preferences for local forest honey mainly depend on its geographical origin, flower type, flavor and color. Findings suggest that gender, income, and grocery shopping task are the main determinants of the importance of these attributes.

Additional key words: honey attributes; forests; cluster analysis; multinomial logit; Tunisia

Abbreviations used: MNL (Multinomial Logit); SFSC (Short Food Supply Chain); TND (Tunisian Dinar); WTP (Willingness To Pay)

Authors' contributions: Both authors contributed equally in all stages of the work, including the study conception and design, data collection and analysis, the paper drafting and the revision of the intellectual content.

Citation: Ben-Ali, S; Taghouti, I (2022). Tunisian consumer preferences for local forest honey attributes: A market segmentation analysis. Spanish Journal of Agricultural Research, Volume 20, Issue 1, e0101. <https://doi.org/10.5424/sjar/2022201-18411>

Received: 20 May 2021. **Accepted:** 21 Feb 2022.

Copyright © 2022 CSIC. This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License.

Funding: The authors received no specific funding for this work.

Competing interests: The authors have declared that no competing interests exist.

Correspondence should be addressed to Ibtissem Taghouti: ibtissem.taghouti@gmail.com

Introduction

Tunisia is endowed with large natural forests and various suitable areas to honey production. Nevertheless, detailed information on honey production systems in forest areas and on Tunisian consumption preferences are still lacking. On the other hand, beekeeping activities have received substantial attention by the Tunisian decision-makers, since this sector contributes to local population livelihood in rural areas and forests. Currently, there are more than 12,000 beekeepers concentrated mainly in the western regions (AVFA, 2016). However, the majority of Tunisian beekeepers are non-professional “amateurs” with a limited number of 10 hives. With more than

265,000 hives, the average production is about 2,000 tons of honey per year (AVFA, 2016).

Despite the prominent position of honey production in Tunisia, beekeepers have not yet learned to understand the consumers' preferences and needs. Forest honey is still an overlooked product by consumers for its nutritional benefits and its various functions (Aparna & Rajalakshmi, 1999; Al-Quassemi & Robinson, 2003; Bogdanov *et al.*, 2008; Joshi, 2008; Ismaiel *et al.*, 2014). The average Tunisian consumption does not exceed 0.2 kg per year (INS, 2020), which is below the European average (0.7 kg per year). Then, food origin and consumption pattern are related to the development of the short food supply chain (SFSC), which is considered an important problem to the

development of agri-food systems (Guptill & Wilkins, 2002).

The SFSC is an effective alternative strategy as it has become very popular in marketing the Tunisian forest honey: Selling is based on a direct relationship between the seller allowing to share information about the product attributes such as the origin, floral type and taste. Moreover, they sell off-farm their forest honey in the neighboring markets, fairs and, sometimes, in cooperative shops, specialized outlets and shops owned by farmers.

Mtimet *et al.* (2020) identified honey among the main organic products in Tunisia that need further attention to enhance its availability and accessibility through the integration in mainstream sales channels which can reduce the gap between the purchase intention and actual purchase.

The organized market channel, where forest honey is commercialized through supermarkets, specialized outlets and market stands for local products, still represents a small share of the market (*e.g.*, only 37 specialized stands). This could be attributed to consumers' habits to buy forest honey directly from the producers based on relational networks and following friends' recommendations. To our knowledge, the purchase intention of Tunisian consumers is very influenced by the affirmation of the quality of previous consumers.

The origin of the product is a very important criterion in food choice (Thøgersen *et al.*, 2017). Indeed, the product proximity from the production to consumption place is an important indicator for the consumer preference (Feldmann & Hamm, 2015; Ridley *et al.*, 2015). Specifically, a product elaborated in specific geographical areas can judged as an indicator of quality (Van der Lans *et al.*, 2001). Moreover, consumers prefer local products for social reasons such as belonging, community, tradition and loyalty (Brown, 2002; Baber & Frongillo, 2003). Resano & Sanjuán (2018) indicated that the origin of product has an important impact on hedonic evaluation and the certification of local products is a powerful marketing tool to reassure urban consumers' and ensure rural sustainability. In addition, the polyphenolic compounds of honey are recognized as the major constituents and responsible for the health-promoting properties of this product (Luchese *et al.*, 2017). Furthermore, Mitchell & Olson (1981) asserted that product attribute beliefs had a major mediating effect on brand attitudes (*e.g.*, geographic origin, type of flower, flavor and texture). Understanding the key determinants of honey consumers' attitudes would be for great interest due to their large associations with both intentions and behaviors.

Various non-economic factors could explain why forest honey is commercialized through local food channels instead of conventional marketing channels: trust, social interaction and accountability (Oñederra-Aramendi *et al.*, 2018). In addition to the deterrent effect of the price that

is significantly above the capacity of average income households, ignorance about its labeling as a local product and the lack of adequate communication policies prevent the development of a climate of trust between producers and consumers. Tunisian consumers tend to buy honey of good quality and are unwilling to consume neither imported honey nor that they ignore its origin. Despite the relevance of forest honey in supporting the livelihoods of local forest dependent communities and in Tunisian habits, there is no study that examined consumers' perception and demand for forest honey in this country. By doing so, our work contributes to the scarce literature on consumer behavior towards forest honey.

This paper attempts to segment the Tunisian forest honey local market according to consumer preferences, which are mainly guided by their appreciation of its geographic origin and its sensory attributes. This segmentation may allow sellers to target consumer segments according to their preferences and to adapt their offers and marketing strategies according to the specific features of targeted consumers.

Material and methods

Honey purchasing behavior: Consumer intentions and product characteristics

Various factors influence consumers' purchasing behavior and consumption preferences. Almlí *et al.* (2011) indicated that each successfully marketable product should have a positive image and its attributes respond to all consumers' expectations. It's obvious that consumer's decision-making about food products depends on two factors: 1) intrinsic attributes which are associated to the products themselves (flavor, color, smell, food safety, and shelf life); 2) extrinsic attributes which result in part from marketing mix strategy (price, brand, origin, packaging, size, and design). Indeed, as mentioned in Grolleau & Caswell (2006), consumers' perception of quality is influenced by the product's intrinsic attributes as well as the extrinsic indicators and cues provided by the seller of the product.

Furthermore, the relative importance of these attributes on the buying decision is completely dependent upon the industry and product type itself. In the case of forest honey, Yeow *et al.* (2013) pointed out that medical conditions, the product quality, brand reputation and price could affect the consumer's purchasing behavior of honey in Asia. Other studies analyzed demand, consumption and expenditure patterns in Saudi Arabia (Ismail *et al.*, 2014; Zulail *et al.*, 2014). The authors found that medicinal and nutritional values of honey are the main motivation to consume honey. Moreover, Murphy *et al.* (2000) identified honey with thick texture as the ideal product for Irish consumers. In addition, consumers prefer liquid

and transparent honey while crystallized product is not attractive. This reflects the lack of knowledge about quality standards and physical proprieties of honey (Kabbani *et al.*, 2011).

Murphy *et al.* (2000) revealed another important attribute that states that consumers are less price sensitive to buy honey; they indicated that color, texture, origin, price and packaging are the main quality criteria that differentiate the honey products at market place. Wu *et al.* (2015) analyzed the behavior of American consumers toward local honey, using the experimental auction and concentrating on the local attribute. They suggested three important attributes as the geographic location of production, the packaging and product information. In the same context, Cosmina *et al.* (2016) analysed the behavior of Italian consumers' preference using the choice experiment methodology. They suggested the origin, the price, the organic production, the landscape, and the level of crystallization as the main driving factors to purchase natural honey in Italy. In the case of Argentinian honey, Kallas *et al.* (2019) analysed the consumers' opinions towards the development of the SFSC and explained how the purchase behavior of local honey products is determined by specific quality cues and the global sensory acceptance.

Data collection

The present study was conducted in Carrefour-La Marsa within the area of the capital of Tunisia. Data collection was carried out from April to June 2019. The choice of this hypermarket is justified by the large number of visitants and the important number of specialized outlets selling honey and related products. Data were obtained from a face-to-face survey on a sample of honey consumers. Interviewees persons are mainly consumers who regularly purchase and consume forest honey at least one time in the last three months¹. A random sample of 200 respondents were interviewed on preferred honey attributes. These included honey origin, honey floral type, its flavor and color. Furthermore, they were asked to specify their purchases characteristics including frequency, quantities and price. All respondents were adults (> 18 years old) with equilibrated proportions of women and men (49% female and 51% male). All interviewed consumers were economically compensated with a honey sample (small bottle of 100 g).

The questionnaire included different sections. The first section was devoted to collect information about consumer knowledge of forest honey (purchasing places and frequency, outlets, ...) as well as his/her purchase habits.

The respondent was particularly asked to realize his/her willingness to pay (WTP) expressed in Tunisian Dinar² (TND) for honey and the responsible person of purchase. As for the second section, the questions were basically about the relation between the interviewee's preferences and the honey attributes. This includes their preference for the region of origin of the honey (North, Center and South with a distinction between East and West of each region). Additionally, consumers were asked to indicate their preferred flower type (thyme, rosemary, eucalyptus, jujube, acacia and multi floral). Other questions about the preferences of consumers included the sensory characteristics of the product such as the flavor (strong or sweet), the color (dark or light), and the appearance (crystallized or not). The last section includes descriptive and sociodemographic profile of the consumer. Table 1 summarizes the structure of the surveyed sample according to demographic and socio-economic criteria.

Methodology

Data were analyzed by two-step cluster analysis using the IBM SPSS Statistics software. Clusters were defined from the matrix of consumer preferences when buying honey. As the attributes describing the consumers' preferences of honey differ from one country to another, we have eliminated less appreciated honey attributes which can cause rejection of the product notwithstanding its quality criteria. These attributes concerned the imported origin and the crystallized appearance of honey. These characteristics are considered as revealing a poor-quality honey by Tunisian consumers. Indeed, as emphasized by Wu *et al.* (2015), consumers demonstrate greater demand for locally produced honey, especially when provided information about negative aspects of internationally produced honey that include adulteration. Furthermore, although crystallization is a natural aspect of honey, crystallized products make consumers doubt the quality of this product. Indeed, 100% of consumers surveyed expressed their rejection of products with a crystallized appearance at the time of purchase. Accordingly, the analysis of the preferences of these consumers relates to local products with a liquid appearance at the time of purchase.

These preferences are related to their perception of product attributes, which describe the local origin of honey, its floral type, flavor and color. Table 2 describes the four underlying honey attributes, which determine consumer preferences.

As mentioned by Ward (1963), the main aim of the cluster analysis is the classification of subjects and their

¹ A filter question was included in the beginning of the questionnaire to select only regular and connoisseur consumers of forest honey.

² One Tunisian Dinar is equivalent to 0.31 euros in 2022

Table 1. Sample characteristics

Variables	Definition	Percentage
Gender	Female	49
	Male	51
Marital status	Single	41
	In couples	59
Age	≤18	7
	21-35	45
	36-60	40
	>60	8
Region	North	69
	Center	29
	South	2
Home shopping	Consumer	25
	Other family member	75
Household income (TND/month)	<500	23
	500-1000	60
	1000-1500	15
	>1500	2

TND: Tunisian Dinar (1 TND ~ €0.31 in 2022)

inclusion in a certain number of clusters. When applying two-step cluster analysis, the choice of the appropriate number of clusters was based on a minimum of Akaike information criterion (AIC).

For the characterization of consumer segments, a multinomial logit (MNL) analysis was used to assess the criteria influencing consumers' belonging to each market segment. These criteria have been approached by demographic and socio-economic variables which seem to be relevant for defining consumer opinion on aspects of preferred honey.

In the MNL analysis, the cluster variable was treated as the dependent variable and the demographic and socio-economic characteristics as independent variables. If a demographic and socioeconomic characteristic show a significant difference between the clusters, the analysis makes it possible to derive the effect of this variable on the probability of a consumer's belonging to a segment. Indeed, the sign of the marginal effect coefficient indicates whether a change in the demographic or socioeconomic variable would increase or decrease the probability of membership in that cluster.

By considering the variable y_i which represents the membership cluster of consumer i , the model is written as:

$$\text{Multinomial Logit } y_i = \alpha + \beta_j X_{ij}$$

where α is the intercept parameter; β_j is the vector of slope parameter and X_{ij} is the explanatory demographic

and socioeconomic variables. These include gender (1 if female and 0 if male), age in years, family member involved in honey purchasing (1 if consumer and 0 if others), income level and WTP for forest honey (TND kg⁻¹). The estimate was conducted under STATA software.

Results

The results of the clustering method conducted on the individual preferences of honey attributes indicated that the origin and type of flowers were the main determinant factors that identify consumer clusters. Since this study concerns only local honeys, this attribute describes the regional origin of this product. This origin reflects the properties of the honey preferred by the consumer. The NW region with its humid and sub-humid climate is characterized by its dense forests with diverse plant cover. It is, therefore, a suitable space for the availability of pollen of various origins. The other regions whose climate varies from semi-arid to dry are known by specific ground covers that can go from eucalyptus and thyme-rosemary in areas of the North East to jujube in the Southern regions. Thus, the region of origin of honey is considered by the consumer as revealing of its sensory features.

The type of flowers also appears as a determining attribute in the choice of the consumer ahead of other sensory criteria, namely the color and the flavor. The importance of the type of flowers is linked to the consumers' perception of this product.

Table 2. Segmentation of consumer preference for forest honey: Segment A (NW honey consumers, 43.8%); Segment B (Eastern honey regions consumers, 38.9%); Segment C (thyme-rosemary honey consumers, 17.3%)

Attribute	Segment A (%)	Segment B (%)	Segment C (%)
Honey origin			
North West	100.0	0.0	20.0
North East	0.0	42.9	32.0
Center West	0.0	0.0	40.0
Center East	0.0	57.1	0.0
South West	0.0	0.0	4.0
South East	0.0	0.0	4.0
Floral type			
Thyme-rosemary	0.0	53.6	100.0
Eucalyptus	33.3	12.5	0.0
Multifloral	66.7	0.0	0.0
Other floral	0.0	33.9	0.0
Flavor			
Sweet	42.9	67.9	0.0
Strong	57.1	32.1	100.0
Color			
Clear	42.9	60.7	0.0
Dark	57.1	39.3	100.0

In addition, cluster analysis results allowed the identification of three homogeneous clusters defining the market segments. Table 2 provides a description of the three segments with respect to the importance assigned to the factors of honey preference.

The three segments obviously showed differences in consumer preferences for these factors. Segment A (43.8% of the total sample) is composed entirely of consumers that prefer to buy only NW honey. Regarding the floral type, consumers of this group prefer multifloral and eucalyptus honey, which are the most available product in this region. The composition of this segment according to the flavor and color attributes of the honey did not show significant differences from that of the overall sample. This result indicates that this geographic region is considered by this category of consumers as the most important criterion in the selection of the product.

Segment B (38.9%) includes 'Eastern regions' honey consumers. Their various floral type preferences indicate that they are interested in all type of honey that could be found in these regions. Compared with other segments, these consumers have more preference for sweet flavor and clear honey. Segment C (17.3%) describes 'thyme-rosemary' honey consumers. They tend to buy honey characterized by strong flavor and dark color. The main origin of their purchases are Northern and Central Western regions of the country.

Further details on the composition of the honey consumer' segments by demographic and socio-economic characteristics are presented in Table 3. Comparing the composition of each group with that of the overall sample makes it possible to identify the particularities of each segment. The first finding is the strong similarity of the composition of segment A with that of the overall sample. For this reason, segment A can constitute a reference group. Any differences in the composition of the other two groups from this group may indicate a potential impact of certain demographic or socioeconomic factors on consumer preferences.

The most significant differences can be observed for segment C. The predominance of men in this group and the relatively higher income level may explain the preference of thyme-rosemary honey. Indeed, this result indicates that thyme-rosemary honey, which is known by a strong flavor and a dark color, is more preferred by men. The relatively higher price of this honey makes it more accessible to categories having more WTP.

The composition of group B shows a higher female share compared to other groups. This may explain the greater preference for sweet flavor honey for consumers in this group. Another special feature concerns the responsible for shopping in the household. The share of consumers who realize their shopping tasks is the lowest among the three groups. These findings allow us to conclude that

Table 3. Demographic and socio-economic characteristics of honey consumer segments

Factor (%)	Segment A	Segment B	Segment C	Overall sample
Gender				
Male	49.2	46.4	68.0	48.6
Female	50.8	53.6	32.0	51.4
Age				
≤ 20	3.2	8.9	12.0	6.9
21-35	44.4	57.1	36.0	45.1
36-60	41.3	50.0	48.0	39.6
> 60	11.1	7.1	4.0	8.3
Region of origin				
North	92.1	51.8	72.0	72.9
Center	6.3	44.6	12.0	22.2
South	1.6	3.6	16.0	4.9
Income (TND)				
≤ 500	22.2	23.2	24	22.9
501-1000	60.3	69.6	36	59.7
1001-1500	12.7	7.1	40	15.3
> 1500	4.8	0.0	0.0	2.1
Home shopping				
Consumer	27.0	21.4	28.0	25
Other family member	73.0	78.6	72.0	75

TND: Tunisian Dinar (1 TND ~ €0.31 in 2022)

change in demographic and socioeconomic variables is likely to be relevant in defining the preference towards honey aspects.

The profile of a consumer who is likely to be one of the three honey consumer segments was determined within the framework of the MNL model. For this model, the independent variables were economic and sociodemographic characteristics of the respondents, whereas the dependent variable was the three consumer segments. The MNL model results describe the potential effects of demographic and socioeconomic criteria on consumer preferences (Table 4). In the MNL model, we treated the cluster level as categorical variable under the assumption that the levels of clusters have no natural ordering and we selected segment A as the referent group. Therefore, the coefficients estimates are relative to the baseline group and will be interpreted as the expected change of the Logit of segments B and C relative to this reference cluster.

Table 4 reports estimates of the MNL model. Results show that WTP, age, gender and home shopping are significant and all variables have expected signs. However, the effect of income is not statistically significant for both segments. Empirical findings show that the positive impact of 'willingness' is significant at 95% level of confidence for cluster B and C, indicating that a higher consumer's WTP would increase the probability of being in cluster B and C. Female consumers are more likely

to belong to the group B than group C. Furthermore, our findings suggest that an increase in the consumers' age in segment C would increase the likelihood to buy honey produced from thyme-rosemary plants with strong flavor and dark color compared to cluster A.

Shopping variable has a negative effect on the likelihood to be part of groups B and C rather than group A. Indeed, the purchasing criteria allows a distinction between customers who actually consume honey and those who only buy the product. When buying honey, customers who do not consume honey may be more concerned about its availability and proximity service than its origin and type. Honey that satisfies the criteria of consumers in groups B and C is more likely to be accessible. It is worth noting that honey meeting the criteria for group A finds its origin only in the NW zone. Thus, purchasing this type of product would require a special selection effort. A non-consumer will pay less importance to this selection.

Discussion

To the best of our knowledge, there is no research study that has focused on forest honey demand and consumers' behavior in Tunisia. Moreover, the present study is relevant for honey producer who need further information to understand the Tunisian consumer pre-

Table 4. Coefficient values of the multinomial logit model (*p* values in parenthesis)

Variables	Segment B	Segment C
Income	-0.072 (0.823)	0.122 (0.666)
Willingness to pay	0.035 (0.044)**	0.042 (0.015)**
Age	0.386 (0.190)	0.624 (0.034)**
Gender	0.850 (0.049)**	-0.579 (0.131)
Home shopping	-0.293 (0.586)	-1.117 (0.022)**
Constant	-2.934 (0.010)***	-3.055 (0.006)***

*** Significant at 1%; ** significant at 5%.

ferences and to adapt their production and marketing strategies to improve their market share and ensure a sustainable development of their activity. In this context, we carried out a market study to analyze consumers' criteria that could influence their decision-making processes for buying honey. The analysis can contribute to reduce uncertainty about forest honey quality and price in order to establish a sustainable supply based on consumers' perceptions. To do this, a two-step cluster analysis was used to determine the honey's attributes of each cluster of consumers. Moreover, a MNL model was used to understand influencing and decision factors in honey forest demand that define consumer segments.

Our results have shown that it is possible to achieve a reliable segmentation of Tunisian honey consumers. In fact, it suffices to rely on their preferences in terms of a few properties easy to be appreciated by the consumer, namely origin, flower type, flavor and color. Indeed, following Siegmund *et al.* (2018), honeys' botanical and geographical origin can majorly influence the quality attributes including flavor, odor, texture, and color of honey and as such significantly determines consumer acceptance. According to Kurtagić *et al.* (2016), these properties are related to the origins of nectar with are strongly associated to the geographical and botanical aspects and the climatic conditions prevailing in each region.

Furthermore, honey is not only considered as a food which can be used as natural alternative to refined sugar but also as healthy food (Testa *et al.*, 2019). Furthermore, honey was traditionally applied in natural healing and folk medicine (Siegmund *et al.*, 2018). Similar perceptions of honey were observed by Tunisian consumers. Indeed, 99.5% and of the surveyed consumers believed in the beneficial effect of honey on their health. In addition, 66.5% of the consumers recognized the therapeutic properties of honey.

Several studies have shown that phenolic compounds which are bioactive substances in honey depend mainly on the floral type. Among them, Escriche *et al.* (2014) and Sadowska *et al.* (2019) assessed that the antioxidant potential of honey varies greatly depending on the floral

source, possibly due to the differences in enzyme activity and the content of plant secondary metabolites.

Three segments of consumers were identified. The first segment is composed of consumers that prefer honey produced in the NW region of the country. Honey preferences of this group were mainly driven by the origin of product. This product category can be attributed to the extension of forest area in this region allowing to predominate the beekeeping sector in Tunisia (80% of the total number of beehives are located in this region). Several studies stated that honey origin is the most important factor in buying decision. Among them, Cosmina *et al.* (2016) found a strong positive preference of Italian consumers for locally produced honey. Roman *et al.* (2013) stated that 88.3% of Polish consumers choose honey produced domestically. A similar result was found by Pocol & Bolboacă (2013) for Romanian consumers who prefer to buy honey from local producer.

The second segment tend to buy honey from eastern origin characterized by sweet flavor. The third segment describes consumers preferring honey based on thyme-rosemary plants. In addition, compared to consumers of the first group, members of the other two groups give more importance on the flavor of honey and its floral type rather than its origin.

The estimation of the MNL model allows to identify the profiles of consumers belonging to each segment. Indeed, results indicate that female consumers are more likely to belong to the segment preferring to buy honey from eastern origin characterized by sweet flavor while elder consumers are more likely to be classified in the segments describing more preference for thyme-rosemary honey. Furthermore, it is worth noting that consumers belonging to the segment B and C have higher WTP than those of the first group do. Adequately product policy promoting attractive packaging and appropriate label information would target these two groups of consumers.

This finding may have important implications for marketing strategy in Tunisian honey sector. According to Dibb & Simken (1991), after identification of market segments, marketers must make decisions about how many and which customer groups to target. They may choose to

concentrate on a single segment with one product, offer one product to a number of segments or target each segment with a different product. They mentioned that the targeting strategy must be translated into a tangible mix of product, price, promotion and distribution. These variables would describe the product position relative to the competition.

Accordingly, targeting consumer segments according to their preferences would make it possible to adapt extrinsic attributes in line with the characteristics of these categories. In particular, the honey origin and its flower type should be clearly mentioned on the packaging. It is important to note that the packaging information must truly reflect the attributes of the product in order to raise consumers' loyalty. Regarding pricing policy, the results indicate that consumers belonging to the A segment are the least willing to pay. Therefore, their preferred product, NW honey, should be competitively priced. The high productive potential of this region should allow beekeepers to have easier access to large-scale distribution channels. Price-promotional policies could then be planned to attract consumers and enhance their loyalty.

Furthermore, communication campaigns would support evidence of the preferred aspects of the product. Consistently, women could be targeted by sweet flavored honey, mainly produced in eastern regions. Consumers preferring thyme-rosemary honey, with higher WTP could be attracted by a product with appropriate label information emphasizing the therapeutic properties of this honey.

Although our empirical findings can be very useful to determine marketing strategies adapted to the profile of honey consumers, the implementation of such strategies requires the extension of distribution channels. Indeed, the main constraint facing the establishment of an adequate marketing strategy based on a market segmentation, targeting and positioning choices is the narrowness of the organized honey market in Tunisia. Thus, honey is produced by small-scale beekeepers who sell their products directly to consumers. Consequently, they do not feel the need to improve extrinsic attributes of the product, such as the brand and the packaging. Beekeepers need to make more use of large-scale distribution channels and not be limited to over-the-counter channels. For these reasons, beekeepers should adopt collective strategies allowing them to act jointly. The creation of cooperatives specializing in the production and the distribution of honey would be appropriate for brand creation and communication strategy implementation. Several foreign experiences have shown the advantages of the creation of cooperatives for the honey sector. Indeed, Saner *et al.* (2007) suggested an increased role of cooperatives to improve marketing strategies for honey and other bee products in Turkey. In addition, Serra & Davidson (2021) found

that involvement in cooperatives has a positive effect on the production and marketing outcomes of women honey-producers in Ethiopia.

Knowledge about market segmentation and honey buyers' behavior is important for both beekeepers and marketing managers who try to optimize their production decision. Such study would help them define their offers and marketing strategies according to the specific features of each consumer group. Furthermore, it remains important for Tunisian beekeepers to further develop their distribution channels and not be limited to over-the-counter sales in order to be able to adequate their marketing strategies to consumers' preferences.

This study presents some limitations. Indeed, it focuses only on the Tunisian market for local honey which is dominated by over-the-counter sales. Consequently, extrinsic attributes of the product (*e.g.*, packaging, brand, imported origin) have not been directly investigated. As avenues for future research, we can suggest to extend consumers preferences analysis to include extrinsic attributes of the product. In addition, it will be interesting to study the link between consumer perceptions of honey (medical or nutritional benefits) and preferred attributes of this product.

References

- Almli VL, Verbeke W, Vanhonacker F, Næs T, Hersleth M, 2011. General image and attribute perceptions of traditional food in six European countries. *Food Qual Prefer* 22(1): 129-138. <https://doi.org/10.1016/j.foodqual.2010.08.008>
- Al-Qassemi R, Robinson RK, 2003. Some special nutritional properties of honey- A brief review. *Nutr Food Sci* 33(6): 254-260. <https://doi.org/10.1108/00346650310507073>
- Aparna AR, Rajalakshmi D, 1999. Honey - its characteristics, sensory aspects, and applications. *Food Rev Int* 15(4): 455-471. <https://doi.org/10.1080/87559129909541199>
- AVFA, 2016. Importance du secteur apicole. Agricultural Extension & Training Agency, Tunisia. http://avfa.agrinet.tn/upload/supports_ar/importanceapicole.pdf
- Baber LM, Frongillo EA, 2003. Family and seller interactions in farmers' markets in upstate New York. *Am J Alternative Agr* 18(2): 87-94. <https://doi.org/10.1079/AJAA200239>
- Bogdanov S, Jurendic T, Sieber R, Gallmann P, 2008. Honey for nutrition and health: A review. *J Am Coll Nutr* 27(6): 677-689. <https://doi.org/10.1080/07315724.2008.10719745>
- Brown A, 2002. Farmers' market research 1940-2000: An inventory and review. *Am J Altern Agr* 17(4): 167-176. <https://doi.org/10.1079/AJAA2002167>

- Cosmina M, Gallenti G, Marangon F, Troiano S, 2016. Reprint of "Attitudes towards honey among Italian consumers: A choice experiment approach". *Appetite* 106: 110-116. <https://doi.org/10.1016/j.appet.2016.08.005>
- Dibb S, Simkin L, 1991. Targeting, segments and positioning. *Int J Retail Distrib* 19(3): 4-10. <https://doi.org/10.1108/09590559110143800>
- Escriche I, Kadar M, Juan-Borrás M, Domenech E, 2014. Suitability of antioxidant capacity, flavonoids and phenolic acids for floral authentication of honey. Impact of industrial thermal treatment. *Food Chem* 142: 135-143. <https://doi.org/10.1016/j.foodchem.2013.07.033>
- Feldmann C, Hamm H, 2015. Consumers' perceptions and preferences for local food: A review. *Food Qual Prefer* 40(A): 152-164. <https://doi.org/10.1016/j.foodqual.2014.09.014>
- Ghorbani M, Khajehroshanaee N, 2009. The study of qualitative factors influencing on honey consumers demand: Application of hedonic pricing model in Khorasan Razavi Province. *J Appl Sci* 9: 1597-1600. <https://doi.org/10.3923/jas.2009.1597.1600>
- Grolleau G, Caswell JA, 2006. Interaction between food attributes in markets: The case of environmental labeling. *J Agric Resour Econ* 31(3): 471-484. <https://doi.org/10.2139/ssrn.708483>
- Guptill A, Wilkins JL, 2002. Buying into the food system: Trends in food retailing in the US and implications for local foods. *Agric Hum Values* 19(1): 39-51. <https://doi.org/10.1023/A:1015024827047>
- INS, 2020. Enquête nationale sur le budget la consommation et le niveau de vie des ménages 2015. The National Institute of Statistics, Tunisia.
- Ismail S, Al-Kahtani S, Adgaba N, Al-Ghamdi AA, Zuilail A, 2014. Factors that affect consumption patterns and market demands for honey in the Kingdom of Saudi Arabia. *Food Sci Nutr* 5(17): 1725-1737. <https://doi.org/10.4236/fns.2014.517186>
- Joshi SR, 2008. Honey in Nepal: Approach, strategy and intervention for subsector promotion income distribution. German Tech Coop/Private Sector Promotion. Lalitpur, Nepal.
- Kabbani D, Sepulcre F, Wedekind J, 2011. Ultrasound-assisted liquefaction of rosemary honey: Influence on rheology and crystal content. *J Food Eng* 107(2): 173-178. <https://doi.org/10.1016/j.jfoodeng.2011.06.027>
- Kallas Z, Alba MF, Casellas K, Berges M, Degreef G, Gil JM, 2019. The development of short food supply chain for locally produced honey: Understanding consumers' opinions and willingness to pay in Argentina. *Br Food J* 123(5): 1664-1680. <https://doi.org/10.1108/BFJ-01-2019-0070>
- Kurtagić H, Memić M, Barudanović S, 2016. Determination of type of honey produced in the different climatic regions of Bosnia and Herzegovina. *Int J Environ Sci Technol* 13: 2721-2730. <https://doi.org/10.1007/s13762-016-1101-5>
- Luchese RH, Prudêncio ER, Guerra AF, 2017. Honey as a functional food. In: *Honey analysis*; Vagner A (ed.). IntechOpen, London. <https://doi.org/10.5772/67020>
- Mitchell AA, Olson, JC, 1981. Are product attribute beliefs the only mediator of advertising effects on brand attitude? *J Mark Res* 18(3): 318-332. <https://doi.org/10.1177/002224378101800306>
- Mtimet N, Souissi A, Mhamdi N, 2020. Tunisian consumers perception and behavior towards organic food products. *New Medit* 19(1): 4-18. <https://doi.org/10.30682/nm2001a>
- Murphy M, Cowan C, Henchion M, O'Reilly S, 2000. Irish consumer preferences for honey: a conjoint approach. *Br Food J* 102(8): 585-598. <https://doi.org/10.1108/00070700010348424>
- Oñederra-Aramendi A, Begiristain-Zubillaga M, Malagón-Zaldúa E, 2018. Who is feeding embeddedness in farmers' markets? A cluster study of farmers' markets in Gipuzkoa. *J Rural Stud* 61: 22-33. <https://doi.org/10.1016/j.jrurstud.2018.05.008>
- Pocol CB, Teselios CM, 2012. Socio-economic determinants of honey consumption in Romania. *J Food Agr Environ* 10: 18-21.
- Pocol CB, Bolboacă SD, 2013. Perceptions and trends related to the consumption of honey: A case study of North-West Romania. *Int J Consum Stud* 37(6): 642-649. <https://doi.org/10.1111/ijcs.12046>
- Resano H, Sanjuán AI, 2018. Exploring the role of mountain origin and autochthonous breed on urban consumers' acceptability. *Sustainability* 10(12): 4423. <https://doi.org/10.3390/su10124423>
- Ridley W, Shook S, Devadoss S, 2015. Evaluations of consumers' preference structure for locally-produced beef. *J Food Prod Mark* 21(4): 413-425. <https://doi.org/10.1080/10454446.2014.885871>
- Roman A, Popiela-Pleban E, Kozak M, Roman K, 2013. Factors influencing consumer behavior relating to the purchase of honey, Part 2. Product quality and packaging. *J Apic Sci* 57(2): 175-185. <https://doi.org/10.2478/jas-2013-0027>
- Sadowska M, Gogolewska H, Pawelec N, Sentkowska A, Krasnodębska-Ostręga O, 2019. Comparison of the contents of selected elements and pesticides in honey bees with regard to their habitat. *Environ Sci Pollut Res* 26: 371-380. <https://doi.org/10.1007/s11356-018-3612-8>
- Saner G, Yercan M, Engindeniz S, Karaturhan B, Cukur F, 2007. Alternative marketing strategies for honey and other bee products in Turkey. *J Agric Food Inf* 8(4): 65-74. <https://doi.org/10.1080/10496500802083690>
- Serra R, Davidson KA, 2021. Selling together: The benefits of cooperatives to women honey producers in Ethiopia. *J Agric Econ* 72(1): 202-223. <https://doi.org/10.1111/1477-9552.12399>

- Siegmund B, Urdl K, Jurek A, Leitner E, 2018. More than honey: Investigation on volatiles from monovarietal honeys using new analytical and sensory approaches. *J Agric Food Chem* 66(10): 2432-2442. <https://doi.org/10.1021/acs.jafc.6b05009>
- Testa R, Asciuto A, Schifani G, Schimmenti E, Migliore G, 2019. Quality determinants and effect of therapeutic properties in honey consumption. An exploratory study on Italian consumers. *Agriculture* 9: 174. <https://doi.org/10.3390/agriculture9080174>
- Thøgersen J, Pedersen S, Paternoga M, Schwendel E, Aschemann-Witzel J, 2017. How important is country-of-origin for organic food consumers? A review of the literature and suggestions for future research. *Br Food J* 119(3): 542-557. <https://doi.org/10.1108/BFJ-09-2016-0406>
- Van der Lans IA, Van Ittersum K, De Cicco A, Loseby M, 2001. The role of the region of origin and EU certificates of origin in consumer evaluation of food products. *Eur Rev Agric Econ* 28(4): 451-477. <https://doi.org/10.1093/erae/28.4.451>
- Ward Jr JH, 1963. Hierarchical grouping to optimize an objective function. *J Am Stat Assoc* 58: 236-244. <https://doi.org/10.1080/01621459.1963.10500845>
- Wu S, Fooks JR, Messer KD, Delaney D, 2015. Consumer demand for local honey. *Appl Econ* 47(41): 4377-4394. <https://doi.org/10.1080/00036846.2015.1030564>
- Yeow SHC, Chin STS, Yeow JA, Tan KS, 2013. Consumer purchase intentions and honey related products. *JMRCS* 2013: 1-15. <https://doi.org/10.5171/2013.197440>
- Zulail A, Ismaiel S, Al Kahtani S, Al-Ghamdi AA, Adgaba N, 2014. Qualitative factors affecting the price and demand of honey in Saudi Arabia. *Aust J Basic Appl Sci* 8(10): 199-206.