

## THE IMPACT OF THE COVID-19 PANDEMIC ON THE CONSUMPTION OF BEE PRODUCTS IN IZMIR PROVINCE, TURKIYE

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### Abstract

*The main objective of this study is to examine the consumption preferences, trends, and purchasing behaviors of consumers residing in Izmir Province towards bee products before and after COVID-19. The main material of the study consists of online surveys conducted in March-April 2023 with consumers living in the seven districts of Izmir province with the highest population. The survey form comprises of three sections: consumption and purchasing behaviors of bee products, attitudes towards bee products, and questions on demographic characteristics of consumers. Since the first days when coronavirus cases began to emerge in our country, natural products that support the immune system such as bee products have been met with intense interest. The sustainability of bees and bee products in agriculture is always among the important issues. However, during the pandemic period, people's attention has been more focused on this issue. The value of honey and bee products, the miraculous food of nature, has been better understood, and this has been reflected in sales. If natural and economic conditions are favourable, this rise in the sector will continue.*

**Key words:** apilarnil, royal jelly, honey, perga, propolis, consumers' purchasing behaviour, Izmir province

### INTRODUCTION

Nutrition and health are among the basic needs of people to sustain their lives. A quality nutrition brings healthy living conditions as well as mental and physical development. The concepts of nutrition and health are complementary to each other. Diseases caused by food consumption and the fact that some of the food production falls below quality and safety standards have caused consumers to be more sensitive to food consumption [1]. Historical findings have revealed that honey has been used as a remedy for skin infections, stomach ulcers, eye-ear diseases, and accelerating wound repair after surgical procedures. Additionally, when the substances contained in honey are examined, it has numerous benefits such as antimicrobial, anti-parasite, antioxidant, reducing the symptoms of diseases in the upper respiratory system, prebiotic, painkiller, wound healing, and fertility enhancer [11]. When bee products are mentioned, many products come to mind. The most important and popular bee products are honey,

pollen, and beeswax. Apart from these, there are more bee products produced by the honeybee itself.

According to 2022 data, the total number of beehives in the world is 92.26 million, and Asia ranks first in the intercontinental ranking with 43.05 million hives and 835.64 thousand tons of honey production [9]. In 2020, approximately 1.8 million tons of honey were produced in the world. In 2020, China, which has a 25.9% share in world honey production, ranked first with 458 thousand tons of honey production, Turkey, with a 5.9% share in honey production, ranked second with 104 thousand tons, and Iran, with a share of 4.5%, ranked third with 80 thousand tons of honey production [19]. In terms of foreign trade, the world export, which was 684 thousand tons in 2017, increased by 5.5% in 2020 and reached 722 thousand tons. In 2020, as in world honey production, China ranked first in the amount of exports, while Turkey, which ranked second in the amount of production, ranked 22nd. In Turkey, honey foreign trade is carried out in two types: strained and honeycomb honey. In 2021, 77.1% of honey

exports were in the form of strained honey. Although honey exports increased by 66% in 2021 compared to the previous year and reached 9.98 thousand tons, since most of the honey produced was consumed domestically, a low rate of 10.4% of total honey production was exported in 2021 [19].

Coronaviruses are large, enveloped RNA viruses that cause different respiratory diseases in humans, including upper respiratory tract infections and severe pneumonia. In the past, seven types of coronaviruses infecting humans have been identified and three outbreaks caused by them have been reported. The first was acute and severe respiratory failure syndrome (SARS-CoV), which started in China in 2002, the second was Middle East respiratory syndrome (MERS-CoV), which emerged in Saudi Arabia in 2012. The third is a disease first seen in Wuhan, China in December 2019 and named COVID-19. As the cases in China increased day by day, resulting in deaths and affecting the whole world, the virus moved from the epidemic stage to the pandemic stage. It was declared a pandemic by the World Health Organization with an international call on January 30 [6].

COVID-19 affects the lower respiratory tract and hematologic system, causing symptoms such as fever, cough, and shortness of breath. Until November 28, 2021, 261.51 million COVID-19 cases were reported in the world while global deaths reached 5.22 million. In Turkey, the first case was seen in March 2020. Until November 28, 2021, there were 76 thousand deaths and 8.72 million COVID-19 cases [3].

Psychological, demographic, and social factors affecting consumer behaviour are all under the influence of culture. The culture of a country can have a direct impact on consumption awareness as well as the determination of the products produced in that country. In Europe, America and some Asian countries, there has been a significant level of social awareness about the production and consumption of bee products in the last 30 years. While apitherapy, which is the use of bee products for therapeutic purposes, is practiced almost everywhere in the world,

there are very few studies on the use of bee products such as pollen, royal jelly, propolis, and bee venom, the production amounts of which have just started to enter the statistics in our country. The fact that people have recently started to attach importance to their health and are in search of various natural products has led to the progress and improvement of beekeeping activities when considered with the concept of a healthy life. In this sense, it is important for human health to consume bee products in appropriate conditions and levels. In addition, it is also known that honey and other bee products have "antimicrobial, antibacterial, antiviral and antiparasitic" functions based on the "enzymes, vitamins and minerals" they contain [7].

The uncertainty caused by the COVID pandemic has led to changes in consumer behaviour. Consumer demand for food and hygiene products increased in the aftermath of the pandemic. Subsequently, literature on consumer behaviour during the COVID-19 period has emerged, primarily covering European countries [16]. It is anticipated that this research on bee products, which holds significance for Turkey, will make a substantial contribution to the literature. Additionally, it will serve as a valuable source of data for companies operating in this sector, aiding in decision-making on issues such as investment, product diversification, and development.

The main objective of this research is to examine the consumption preferences, tendencies, and purchasing behaviours of consumers residing in Izmir Province towards bee products before and after COVID-19.

## MATERIALS AND METHODS

The primary data for this study were gathered through online surveys conducted in March-April 2023 among residents of the seven most populous districts in Izmir. These selected districts represent 59.33% of Izmir's provincial population. The study also drew insights from prior research on the subject. Data collection involved the administration of a questionnaire designed specifically for this

study through a Google survey form. The questionnaire comprised three sections: consumer behaviors related to the consumption and purchase of bee products, attitudes towards bee products, and demographic characteristics of participants. The sample size for this study was determined using the proportional sample volume formula [12]. Focusing on the seven central districts of Izmir province.

$$n = \frac{Np(1-p)}{(N-1)\sigma_p^2 + p(1-p)} \dots\dots\dots(1)$$

where:

n= Sample volume

N= Total population of the central districts of Izmir province (2,647,337)

p= 0.5 was taken.

$\sigma^2_{px}$  = Variance of the ratio.

The p value was set to 0.50 to determine the maximum sample size. The number of surveys conducted in the districts was calculated based on the population density of these districts. With a 90% confidence interval and a 10% margin of error, the sample size was determined to be 178.

Five-point Likert scales were employed in the questions aimed at measuring the consumption and purchasing behaviours of consumers towards bee products. Arithmetic mean and percentage calculations were utilized in data analysis. Statistical tests were performed to assess whether there were differences in the consumption and purchasing behaviours of consumers towards bee products before and after the onset of COVID. Comparison analyses were conducted using with Wilcoxon related two-sample test. This test is employed to compare the perspectives of a specific nonparametric group on two related but distinct topics or practices [8].

## RESULTS AND DISCUSSIONS

### Socio - Demographic Characteristics of Consumers

In this section of the study, we present the demographic characteristics of the consumers who participated in the survey. The average

age of the respondents is 39. Of the survey participants, 39.3% were women, and 60.7% were men. On average, the surveyed consumers have 14 years of education, with 79.8% holding university degrees. Additionally, 87.1% of the interviewed consumers are currently employed (Table 1).

Table 1. Socio-demographic characteristics of the surveyed consumers

Variables	Categories	Number of People	%
Age (Average age: 39)	18-25	19	10.7
	26-35	38	21.3
	36-45	73	41.0
	46-55	35	19.7
	56-65	11	6.2
	65 and above	2	1.1
Gender	Woman	70	39.3
	Male	108	60.7
Education Status (Average duration of education: 14 years)	12	21	11.8
	14	8	4.5
	16	142	79.8
	>16	7	3.9
Employment Status	Employee	155	87.1
	Not working	13	7.1
	Retired	10	5.6
Total Monthly Income (Average Income: 887.73 USD*/month)	<443.86 \$ / month	4	2.2
	443.86-835.51 \$/month	23	12.9
	835.51-1,253.26 \$/month	56	31.5
	>1,253.26 \$/month	95	53.4
Occupational groups of consumers	Tradesmen	23	12.9
	Officer	109	61.2
	Private sector	30	16.9
	Student	8	4.5
	Retired	5	2.8
	Not working	3	1.7
Number of individuals living in the household (person)	One	32	18.0
	Two	26	14.6
	Three	56	31.5
	Four	51	28.7
	Five	12	6.7
	Six	1	0.6
Number of children living in the household	I have no children	75	42.1
	A child	60	33.7
	Two children	36	20.2
	Three children	6	3.4
	Five children	1	0.5
Distribution of people responsible for shopping in the household	Mother/ Woman	68	38.2
	Father/Male	77	43.3
	Child	1	0.5
	Other	32	18.0
Ownership status of consumers' residence	Own house	88	49.4
	Kira	90	50.6
Household ownership of automobiles	There is	122	68.5
	No	56	31.5
Total household food expenditure (USD*/month)	<104.44	8	4.5
	104.44-208.88	40	22.5
	208.88-313.32	48	27.0
	313.32-417.75	36	20.2
	417.75-522.19	33	18.5
>522.19	13	7.3	

Source: Own calculation.

\*1 USD equals to 19.15 TRY in March 2023.

Regarding income, 53.4% of the surveyed consumers reported an average monthly income of \$1,253, with an overall average income of approximately \$888. Occupationally, 61.2% were civil servants, 16.9% worked in the private sector, 12.9% were artisans, 4.5% were students and 2.8% were retired.

Approximately 31.5% of the surveyed consumers reported having three members in their households. Furthermore, it was found that 42.1% of the consumers were childless. Gender distribution among the participants revealed that 43.3% identified as Father/Male, and 38.2% as Mother/Female.

In terms of housing, 50.6% of the consumers identified as tenants, while 49.4% stated that they owned the house they lived in. Vehicle ownership was reported by 68.5% of the respondents, while 31.5% did not have a car belonging to the household.

Concerning monthly budget allocation, 27% of the consumers allocated a monthly budget of \$208.88-\$313.32 USD for food expenditures, and 7.3% allocated a budget of \$522.19 and above (Table 1).

### Consumers' Behaviour towards the Consumption and Purchase of Bee Products

Table 2 presents the reasons for consumption among surveyed consumers both before and after the onset of COVID-19.

Table 2. Reasons for consumption of bee products by surveyed consumers

Reasons for consumption	Pre COVID-19		Post COVID-19	
	Number	%	Number	%
Immunization	91	51.1	141	79.2
High antioxidant content	82	46.1	123	69.1
Recommended by experts	70	39.3	120	67.4
High nutritional value	116	65.2	109	61.2
No additives	99	55.6	95	53.4
Being delicious	138	77.5	70	39.3
Habit	115	64.6	58	32.6
Can be stored for a long time	117	65.7	54	30.3
Loved by family members	119	66.9	48	27.0
Satisfying / satiating	113	63.5	45	25.3

Source: Own calculation.

\*Since consumers gave more than one reason, the total percentage exceeds 100.

The percentage of consumers citing "Immunization" as a reason for consumption increased significantly from 51.1% to 79.2% after the pandemic. Similarly, the proportion of consumers acknowledging "High antioxidant content" as a motivating factor rose from 46.1% to 69.1%; and the rate of consumers who agreed with the statement "Recommended by experts" increased from 39.3% to 67.4%. Conversely, it was observed that reasons such as "Does not contain additives", "Tasty", "Habit", "Can be stored for a long time", "Loved by family members" and "Satisfying/filling" witnessed a decreased in prevalence after the COVID-19 period (Table 2).

Table 3 outlines the buying preferences of consumers for bee products. It was discerned that surveyed consumers predominantly opt to purchase bee products from supermarkets, with a frequency of 2-3 times a month, earning a score of 5.54. Following supermarkets in popularity are producers, cooperative sales stores, internet platforms and organic sales stores. Notably, wholesalers were identified as the least frequented option for purchasing bee products (Table 3).

Table 3. The purchasing frequency of bee products by surveyed consumers from specific points of sale

Points of sale	Purchase frequency
Supermarket	5.54
Manufacturer	5.46
Cooperative sales outlets	5.43
Online	5.34
Stores selling organic products	5.30
Grocery Store	4.78
Market	4.57
Wholesaler	4.18

Source: Own calculation.

\*1: 1 time per year or less 2: Once every 6 months 3: 1-2 times in 3 months 4: Once a month 5: 2-3 times a month 6: At least 1 time per week

According to the survey results, consumers effectively conveyed their expectations from companies producing and packaging bee products, with an average of 4.52 for the criterion of "quality". Following closely, is the expectation for products "not containing additives" with an average of 4.46. In contrast, the expectation for "different packaging designs" was rated at the lowest,

with an average of 2.84, among the factors considered in the survey (Table 4).

Table 4. Surveyed consumers' expectations from companies producing and packaging bee products.

Why?	Mean
Quality	4.52
No additives	4.46
Production under hygienic conditions	4.44
No foreign objects in the packages	4.33
Accessible Price	4.17
Increased product diversity	3.50
Different packaging designs	2.84

Source: Own calculation.

Note: 1:Ineffective 2:Less Effective 3:Moderately Effective 4:Highly Effective 5:Very Effective

To assess consumers' attitudes towards the consumption of bee products, a five-point Likert scale was employed. The results indicate a strong agreement with the statement "I pay attention to consume natural and organic bee products." with an average rating of 4.47. Following closely, the statement "I care about the conditions under which the producer obtains the product" secured the second position with a mean score of 4.39. Consumers also expressed agreement with the following statements, "Consumption of bee products is very important for my health.", "I care about the quality, appearance and class of bee products," and "The city where the product is produced is important for me." (Table 5).

Table 5. Attitudes of surveyed consumers towards consumption of bee products

Attitude	Mean
I take care to consume natural and organic bee products	4.47
I care about the conditions under which the producer obtains the product.	4.39
Consumption of bee products is very important for my health.	4.38
I care about the quality, appearance and class of bee products.	4.29
I care about the taste of bee products.	4.27
Eating bee products makes me happy.	4.15
The use of sugar in the production of bee products is important to me.	4.12
I always try to buy the best bee products at the best price.	4.11
I shop at places that sell bee products, where I get expert advice.	4.07
The city where the product is produced is important to me.	3.86
A product of a famous brand influences my purchase of bee products.	3.58
I prefer to buy bee products openly rather than in jars.	2.88

Source: Own calculation.

Note: 1:Strongly Disagree 2:Disagree 3:Undecided 4:Agree 5:Strongly Agree

### Analysis of Differences in Consumers' Consumption and Purchase Behaviours of Bee Products Before and After COVID-19

Table 6 provides insights into the factors considered by consumers when purchasing bee products before and after the pandemic. Before the pandemic, consumers emphasized the importance of "good quality" when buying bee products with an average of 4.50, and this emphasis increased to 4.54 after the pandemic. Additionally, the factor "not containing additives" received a mean of 4.40 before the pandemic, rising to 4.48 after the pandemic. Similarly, the importance attributed to the "production and expiration date" increased from a mean of 4.25 before the pandemic to 4.34 after pandemic. Consumers' attention to the organic nature of bee products scored a mean of 4.21 before the pandemic, increasing to 4.34 after the pandemic.

Table 6. Consumers' reasons for purchasing bee products before and after COVID-19

Reason	Pre COVID-19 Mean	Post COVID-19 Mean
Quality	4.50	4.54
No additives**	4.40	4.48
Production and expiration date**	4.25	4.34
Being organic**	4.21	4.34
Price***	4.3	4.19
Which region it comes from***	3.98	4.12
Advice from close friends*	3.83	3.92
Appearance	3.79	3.86
Packaged***	3.66	3.79
Discounted*	3.58	3.67
Brand*	3.46	3.55
To be promoted***	3.34	3.48
Packaging material*	3.19	3.26
Ads***	2.77	2.93

Source: Own calculation.

Note: 1:Ineffective 2:Less Effective 3:Moderately Effective 4:Highly Effective 5:Very Effective

According to Wilcoxon test, there is a difference at \*\*\* $p < 0.01$ , \*\* $p < 0.05$  and  $p < 0.1$  levels.

Comparatively, consumer consistently prioritize purchasing quality products, emphasizing factors such as absence of additives, production and expiration dates, and organic certification. Notably, the significance consumers place on advertisements when purchasing bee products was rated the lowest at 2.77 before the pandemic. However, this increased slightly to an average of 2.93 after the pandemic.

According to the Wilcoxon test results, there is a statistically significant increase in consumers' sensitivity to bee products not containing additives, production and expiration dates, being organic, price, region of origin, recommendations from close contacts, packaging, discounts, brand, promotions, packaging material, and advertisements after COVID-19 (Table 6).

As per the Turkish Food Codex Honey Communiqué (TGK), honey is defined as "the natural product of plant nectars, secretions of the living parts of plants or secretions of plant-sucking insects living on the living parts of plants, which the honeybee, after collecting them, modifies by combining them with specific substances, reduces the water content and matures by storing them in the honeycomb" [18]. Pollen, a microscopic unit with a diameter of 6 to 200 micrometres [13], along with nectar, constitutes essential components of honeybee nutrition. In developed countries, pollen bee products, rich in nutrients for human consumption, are available in various forms such as tablets, granules, liquids, and candies, thanks to the use of pollen traps at beehive entrances.

Perga, also known as bee bread, is a highly nutritious substance created by worker bees. They mix collected pollen with nectar and special enzymes, pack the mixture into honeycombs, and preserve it. Bee bread differs from pollen containing higher levels of vitamin K, reduced sugars, and digestive enzymes. Both bee pollen and bee bread are rich sources of polyunsaturated fatty acids essential for human nutrition [10].

Propolis, semi-solid at room temperature and varying in colour based on its source, is formed by the worker bees through biochemical modification of resinous substances and plant secretions [14]. Widely used in cosmetic, pharmaceutical, and apitherapy centres, propolis exhibits antibacterial properties and contains various chemical substances [17].

Beeswax, secreted by worker bees at 12-18 days of age from wax glands in their abdominal segments, is essential for constructing storage compartments in hives for honey and pollen for brood rearing [15].

Royal jelly, secreted by young worker bees after digesting flower powder and nectar, is a homogeneous substance with a runny and pasty consistency, containing carbohydrates, proteins and vitamins [15].

Bee venom is a pungent-smelling, bitter-tasting, yellowish substance formed in the venom bag of bees. It dries and crystallizes quickly in contact with liquid air and is injected through the stinger when the bee stings [4].

Apilarnil is the 3–7-day larval stage of drone larvae, occurring before the honeycomb eye closes. With a yellow-grey colour and an astringent taste, its complex composition is like royal jelly [20].

The survey results indicate a slight increase in the frequency of consumer purchases of pollen, perga (bee bread), propolis, beeswax, royal jelly, bee venom, and apilarnil. Notably, flower honey and pine honey, being relatively more affordable, witnessed a considerable increase. The average consumption of flower honey "at least once a week" rose from 4.40 before the pandemic to 4.79 after, while in pine honey, this average increased from 3.04 to 4.06 after the pandemic. Moreover, the average frequency of propolis "2-3 times a month" increased from 1.87 before the pandemic to 2.53 after, and in pollen the rate of those purchasing "2-3 times a month" rose from 1.95 before the pandemic to 2.55 after the pandemic (Table 7).

Table 7. Consumers' frequency of purchasing bee products before and after the pandemic

Products	Pre COVID-19 Mean	Post COVID-19 Mean
Honey (Flower)***	4.40	4.79
Honey (Pine)	3.04	4.06
Polen***	1.95	2.55
Propolis***	1.87	2.53
Beeswax**	1.45	1.83
Royal Jelly	1.49	1.77
Perga (Bee Bread)	1.37	1.58
Bee Venom	1.26	1.52
Apilarnil	1.29	1.51

Source: Own calculation.

Note: 1: 1 time per year or less 2: 1 time in 6 months 3: 1-2 times in 3 months 4: 1 time per month 5: 2-3 times per month 6: At least 1 time per week

According to Wilcoxon test, there is a difference at \*\*\*p<0.01, \*\*p<0.05 and p<0.1 levels.

The study results show a significant increase ( $p < 0.01$ ) in consumers purchasing flower honey, pine honey, pollen, propolis, beeswax, and royal jelly after the COVID-19 pandemic. This suggests that the shift in consumers priorities due to the pandemic has influenced their purchasing behaviour.

Table 8 illustrates the price range of bee products purchased by consumers both before and after the pandemic. Prior to the pandemic, consumers acquired flower honey at an average price of 1.49 and pine honey at an average price of 1.50. Following the pandemic, these averages increased to 2.55 for flower honey and 2.57 for pine honey.

In the case beeswax, consumers who bought it for an average of 2.03 before the pandemic found themselves purchasing it at an average of 2.78 after the pandemic. Similarly, the average price of pollen, which was 2.00 before the pandemic, rose to 2.95 after, while the average of bee venom, increased from 2.44 to 3.04. Apilarnil, previously priced at 2.51, saw an average increase to 3.09, and Perga (bee bread), which stood at 2.30 before the pandemic, experienced an average rise to 3.14.

Propolis climbed from an average of 2.22 to 3.23 before the pandemic, and royal jelly increased from 2.31 to 3.29 after the pandemic. Comparing all the products in the table before and after the pandemic, it becomes evident that purchase prices have increased significantly (Table 8;  $p < 0.01$ ).

Various sectors experienced demand shocks due to measures taken within the scope of COVID-19 and the prevailing uncertainty. Logistical challenges and reduced access to raw materials further contributed to negative supply shocks. The convergence of these demand shocks and supply constraints resulted in economic contractions, diminished production volumes in specific sectors, and price hikes in certain product categories. The surge in demand for medical supplies, pharmaceuticals, vitamins, cleaning tools; disinfectants, colognes, etc. as well as food and beverage products during the pandemic is a clear indication of this trend [2]. The increasing consumer demand for bee products during this period, coupled with

inflation, has contributed to notable price increases in bee products (Table 8).

Table 8. Price range of consumers' purchase of bee products before and after the pandemic

Products	Pre COVID-19 Mean	Post COVID-19
Royal Jelly***	2.31	3.29
Propolis***	2.22	3.23
Perga***	2.30	3.14
Apilarnil**	2.51	3.09
Bee Venom	2.44	3.09
Polen***	2.00	2.95
Wax***	2.03	2.78
Honey (Pine)	1.50	2.57
Honey (Flower)***	1.49	2.55

Source: Own calculation.

Note: 1: 90 TL and below 2: 91-150 TL 3: 151-250 TL 4: 251-400 TL 5: 401-750 TL 6: 751-1200 TL 7: 1201-2000 TL 8: 2000 TL and above

According to Wilcoxon test, there is a difference at \*\*\* $p < 0.01$ ,

\*\* $p < 0.05$  and  $p < 0.1$  levels.

## CONCLUSIONS

Honey is considered the most valuable food available to man [5]. When analysing the purchase prices of bee products, it was determined that consumers bought flower honey at an average price of 1.49 and pine honey at an average price of 1.50 before the pandemic. Upon comparing purchases of pollen, bee bread, propolis, beeswax, royal jelly, bee venom, and apilarnil by consumers before and after the pandemic, it was found that product prices had increased. Implementing occasional promotions on bee products with higher prices could prove effective in boosting consumer purchases and consumption.

Participants in the survey demonstrated that before the pandemic, the frequency of bee product purchases was at most once a month, with the least frequent purchase occurring once a year or even less. After the pandemic, there was a notable increase in the purchase frequency, with at least once a week being the most common. Flower honey and pine honey remained the most frequently purchased bee products before and after the pandemic. There was a noticeable surge in the purchase of propolis and pollen post-pandemic. Products like bee venom, perga, and apilarnil did not show a significant increase, likely due to their

higher prices. The affordability of flower honey and pine honey was identified as the reason behind their high purchase frequency. The least consumed bee products included perga, beeswax, apilarnil, and bee venom.

Survey participants who frequently purchased bee products at least once a week predominantly chose supermarkets as their preferred shopping destination, followed by producers, cooperative sales stores, internet retailers, organic product stores, grocery stores, and markets.

Consumers consistently prioritize quality and additive-free nature from companies producing and packaging bee products, both before and after the pandemic. The reason for consumers avoiding market purchases is the open selling environment. Online sales, however, are not influenced by diverse package designs. Brand names emphasizing quality and additive-free characteristics are considered more effective than package designs.

Consumers also give significant importance to expert opinions. It appears that as the income level rises, consumption of higher-priced bee products increases. Accessible pricing, with an average rate of 4.03 was identified as another crucial factor in consumers' preferences, likely attributed to decreased purchasing power due to the economic crisis. Offering bee products in smaller, more affordable packages could address this concern.

In the analysis of consumers' attitudes towards bee products consumption, the highest-rated statement is "I pay attention to consume natural and organic bee products" with an average rate of 4.47. Consumers also express importance in the conditions of obtaining the product from the producer, health benefits, and the overall quality, appearance, and class of bee products, respectively. Consumers tend to avoid open purchases of bee products, favouring sealed jars. Since the early days of the COVID-19 pandemic in our country, natural immune-supporting products like bee products have garnered intense interest. While the sustainability of bees and bee products in agriculture has always been important, public

attention heightened during the pandemic. The value of honey and bee products as nature's miraculous food became more apparent, reflecting positively in sales. If natural and economic conditions remain favourable, the upward trend in the sector is expected to continue. According to the survey results, consumers now demand high-quality and additive-free bee products post-pandemic. Considering this consumer sensitivity, there is likely to be a sustained demand for bee products in the market.

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