

## Survey of consumer preferences on the bee product market. Part 2. Bee products

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**Abstract:** *Survey of consumer preferences on bee product market. Part 2. Bee products.* The aim of the work was to examine consumer preferences when choosing bee products. The research was conducted on the basis of the questionnaire presented in Part 1 of the article. Beeswax, propolis, bee bread were the bee products known to over half of the respondents. Education or work related to agriculture, animals and nutrition significantly affected the knowledge of the properties of individual bee products. After learning the medicinal properties of bee products unknown to the respondents, 37.3% of them declared willingness to use inhalation with beehive air, 33.2% of royal jelly, 30.5% bee pollen and honey, 25.5% bee venom, 17.6 propolis, and 15.6% beeswax.

*Key words:* consumer preferences, bee products

### INTRODUCTION

Apiculture is the science and art of prolonging, sustaining, and retaining health by using products obtained from honey bee hives such as honey, bee bread, bee venom, bee pollen, propolis, and royal jelly. Bee products are gaining prominence due to the presence of bioactive compounds that are associated with beneficial properties to health (Gabriele et al. 2015, Sattler et al. 2015). Recent

years have seen the fast application of them in both traditional and modern medicine (Visweswara et al. 2017).

Propolis has been reported to have various health benefits related to gastrointestinal disorders, allergies, and gynecological, oral, and dermatological problems (Kismet et al. 2017). Royal jelly is well known for its protective effects on reproductive health, neurodegenerative disorders, wound healing, and aging (Nagai and Inoue 2004).

In addition, royal jelly is composed of a significant number of bioactive compounds, including 10-hydroxy-2-decenoic acid (10-HAD), which has some immunomodulatory properties (Sugiyama et al. 2012). Pollen is the product that contains valuable substances such as essential amino acids, phenolic compounds, vitamins, pigments (chlorophyll, carotenoids), which can act as strong antioxidants (Conte et al. 2017).

Bee bread is characterized by a higher nutritional value than pollen, better digestibility, and richer chemical composition (Habryka et al. 2016).

The concept of sustainable development of bee products, which could become an alternative to the products

already present on the market, is a very important issue.

The aim of the work was to check the consumers' knowledge of the therapist bee products and their use by Polish consumers.

## MATERIAL AND METHODS

Materials and methods were described in the first part of the present paper "Survey of consumer preferences on the bee product market. Part 1. Honey". The research was carried out in 2018.

The diagnostic poll methods was used in this work. The survey concerning the market consumer preferences of bee products was based on the internet anonymous questionnaire. The questions concerned the respondent's living area, sex and age as well as preferences of bee products on the market. Questions concerning the bee products were divided on single and multiple choice questions. The survey was completed by 517 persons.

Among respondents 63% derived from Mazovian voivodship ( $n = 326$ ). The share of respondents from other voivodships was small and ranged from 2 to 4%. More than half of the respondents lived in big cities (100–500 thousand inhabitants) and people from cities with less than 100 thousand inhabitants were 21%. Rural areas were inhabited by 27% respondents.

There were 69% of women ( $n = 358$ ) and 31% men ( $n = 159$ ). Among respondents, the highest number of answers was given by people at the age of 18–24 (49%,  $n = 253$ ). At the age of 25–34, there were 26% of the respondents ( $n = 134$ ) and in the group from 35 to 44 years 11% ( $n = 57$ ). Definitely fewer answers were

obtained from older people. In the age group above 44 years ( $n = 73$ ) there were 14% of respondents.

Most of the respondents obtained university diplomas (61%,  $n = 315$ ), 181 people completed grammar school (35%), and 21 respondents (4%) primary ones. Mostly the education or profession of the surveyed people was not related to agriculture (61%).

In the case of quantitative variables, the distribution of the variable is put in the tables containing measures of central tendency and dispersion. The significance of the correlation between variables of a nominal nature has been tested using the independence  $\chi^2$  test.

Correlations between rank and quantitative variables were checked using the Spearman's rank correlation coefficient ( $r_s$ ). In the statistical analysis the significance level at 0.05 was assumed. The analyses were done using the SPSS Statistics 24.0.0 programme and the MS Office 2016.

## RESULTS AND DISCUSSION

Beeswax, propolis, and bee bread are the bee products which properties were known to over half of the respondents. The knowledge of therapeutic properties of royal jelly and venom was declared by less than 40% of respondents. The inhalation therapy with the bee hive air was the least known (Fig. 1). Przybyłowski and Wilczewska (2017), studying the knowledge of bee products contained in cosmetics, stated that women over 35 years of age take into account the special properties of cosmetics. They have stated that 21% of respondents have chosen cosmetics containing propolis,

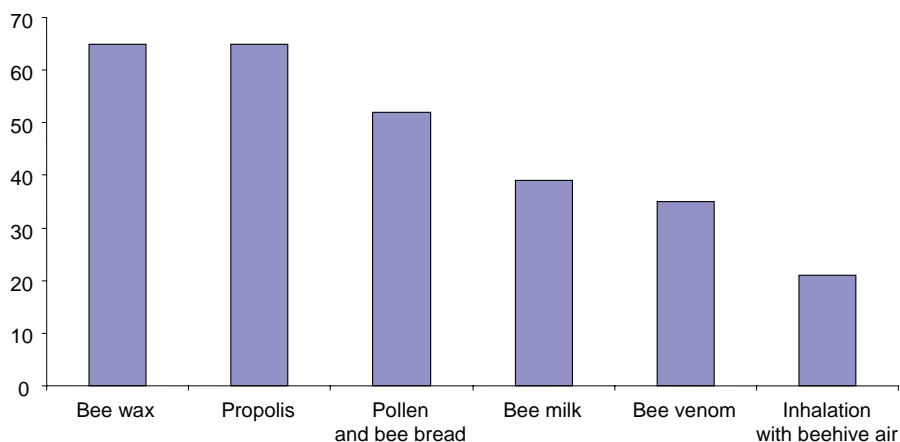


FIGURE 1. The knowledge of the properties of bee products among the respondents (%)

18% have looked for products containing royal jelly and 4% pollen. The respondents have not chosen venom as one of the ingredients used in cosmetics.

There were 48.6% of respondents using propolis, 34.3% used pollen and bee bread, 33% of beeswax, 17.6% royal jelly, 13.5% venom, while 9.7% of respondents used inhalation with beehive air. Gontarz et al. (2016) analysed consumer preferences among students in Siedlce, and stated that over 73% of

respondents knew bee products and their pro-health properties, but they were not buying them.

In the case of all the described products, the percentage of respondents who knew the product properties was higher among the people related to agriculture than those within the group of the other respondents ( $P < 0.001$ ). Knowledge of bee products depending on their relationship with agriculture is presented in the table.

TABLE. Answers to the questions: please tick the bee product/therapies that you know and is your education or work related to agriculture, animals or nutrition?

Item	Is your education or work related to agriculture?			
	Yes		No	
	<i>N</i>	%	<i>N</i>	%
Pollen and bee bread	123	60.6	145	46.0
Propolis	147	72.4	189	60.0
Royal jelly	98	48.3	104	33.0
Beeswax	150	73.9	188	59.7
Venom	91	44.8	91	28.9
Inhalation with beehive air	51	25.1	60	19.0

$\chi^2$  test at significance level  $P < 0.001$ .

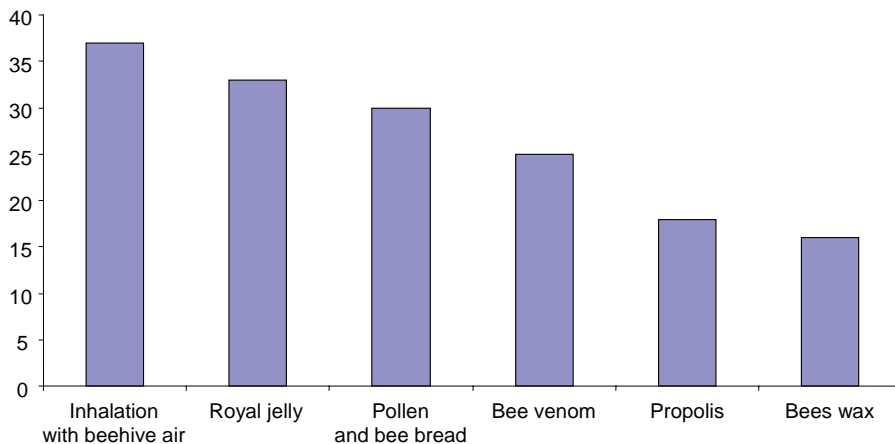


FIGURE 2. The interest of the respondents in the use of therapy (%)

Over 30% of the respondents, after learning about the medicinal properties of bee products unknown to them so far, declared their willingness to use inhalation with beehive air, preparations made of royal jelly, and pollen and bee bread. The quarter of respondents was interested in venom (Fig. 2).

## CONCLUSIONS

Beeswax, propolis, and bee bread are the bee products which properties were known to over half of the respondents.

The inhalation therapy with the beehive air was the least known.

Education or work related to agriculture, animals and nutrition significantly affected the knowledge of the properties of individual bee products.

The respondents, after learning about the medicinal properties of bee products unknown to them so far, declared their willingness to use inhalation with beehive air, preparations made of royal jelly and bee bread.

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**Streszczenie:** *Badanie preferencji konsumentów na rynku produktów pszczelich. Część 2. Produkty pszczele.* Celem pracy było sprawdzenie preferencji konsumentów przy wyborze produktów pszczelich. Badania prowadzono na podstawie wyników ankiety przedstawionej w części I artykułu. Wosk, propolis oraz pierzga to produkty

pszczele, których właściwości były znane ponad połowie respondentów. Wykształcenie lub praca związana z rolnictwem istotnie wpływa na znajomość właściwości poszczególnych produktów pszczelich ( $P < 0,001$ ). Po poznaniu właściwości leczniczych produktów pszczelich nieznanym dotychczas ankietowanym chęć stosowania inhalacji powietrzem ulowym zadeklarowało 37,3% respondentów, mleczkiem pszczelim 33,2%, pyłkiem i pierzgą 30,5%, jadem pszczelim 25,5%, propolisem 17,6% oraz woskiem pszczelim 15,6%.

*Słowa kluczowe:* preferencje konsumenckie, produkty pszczele

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