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TRI-CITY AND SURROUNDING AREA RESIDENTS' OPINION ABOUT HONEY PRODUCED BY BEES FED WITH NANOPARTICLES OF GOLD AND SILVER

The use of nanotechnology achievements may enable creation of products with yet unknown properties. Products created based on principles of nanotechnology are prone to carry a high risk related to lack of social acceptance. Following study attempts to assess degree of acceptance and readiness to consume honey produced by bees fed with nanoparticles. The study group consisted of 100 participants, at the age of 18 to 70 from the Tri-City and the surrounding areas. The research found that most people were not willing to try honey produced by bees fed with nanoparticles of gold and silver. They fear for their lives and health. Survey participants declared minimal level of knowledge about honey produced by bees fed with nanoparticles. Respondents agreed, that product innovations should not lead to increase of their retail prices.

Keywords: nanotechnology, nanoparticules, consumer opinion, honey, innovations.

INTRODUCTION

Innovative techniques and technologies are an integral part of the growing market. They are the basis for the design and introduction of innovative products. One of the areas of science and technology recognized as the basis for creating hitherto impossible solutions is considered nanotechnology. This is due to its interdisciplinary nature, which is the basis for the creation of previously impossible solutions in terms of functionality and utilization of the products. The result of changes in matter at miniature dimensions are nanoproducts. Those are the containing in their structure at least one element of size from 1 to 100 nm. This structure is responsible for the previously unknown functions and properties due to the nano-scale, while providing increased opportunities for efficiency in operation, for example, possess better/improved antibacterial properties [1, 3, 5].

Market introduction of nanoproducts, considered as innovative products, faced a number of barriers related to technical aspects, eg. lack of proper laboratory facilities, social factors, like lack of public acceptance, and legal, such as lack of legal legislation [2, 4, 5].

One of the innovative food products is honey produced by bees fed with nanoparticles of gold and silver. This honey was created in natural conditions, as a result of scientific experimentation. Due to the lack of legislation regulating process of feeding bees in this way, the mass production of this product is now impossible.

The aim of this study was to assess the consumer attitudes to the market innovations on the example of honey produced by bees fed with nanoparticles of gold and silver.

1. MATERIAL I METHODS

The study was conducted in autumn/winter 2015. The study group consisted of 100 participants, at the age of 18 to 70 from the Tri-City and the surrounding areas. Diagnostic survey was used in the research with proprietary survey form consisting of 12 questions single and multiple choice.

2. RESULTS OF RESEARCH AND DISCUSSION

Initially, all the respondents were asked to determine, if honey produced by bees fed with nanoparticles is an innovative product. The vast majority of people (78%) believes that this honey deserves to be called innovative (Fig. 1).

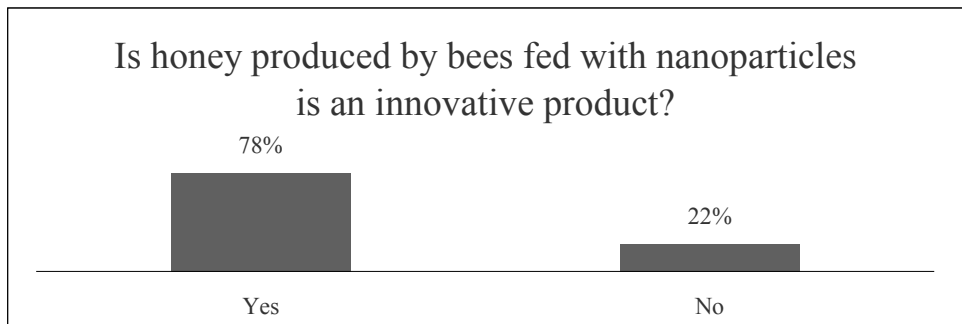


Fig. 1. Participants' response regarding innovative character of the honey produced by bees fed with nanoparticles of gold and silver

Source: Own research.

Next, respondents were asked about their attitude toward honey produced by bees fed with nanoparticles. Almost 40% of respondents showed lack of confidence and considered that it was a hoax of honey (Fig. 2). The vast majority of

participants expressing this opinion was over 55 years of age (Tab. 1). One-third of respondents believe, that innovative nature of honey produced by bees fed with nanoparticles is associated with a higher content of vitamins and minerals, which is linked to nature of nanoparticles (Fig. 2). Few (12%) believe that it is a substitute for antibiotics (Fig. 2). Group of respondents that agree with this statement consists mainly from people aged 25 to 34 (Tab. 1).

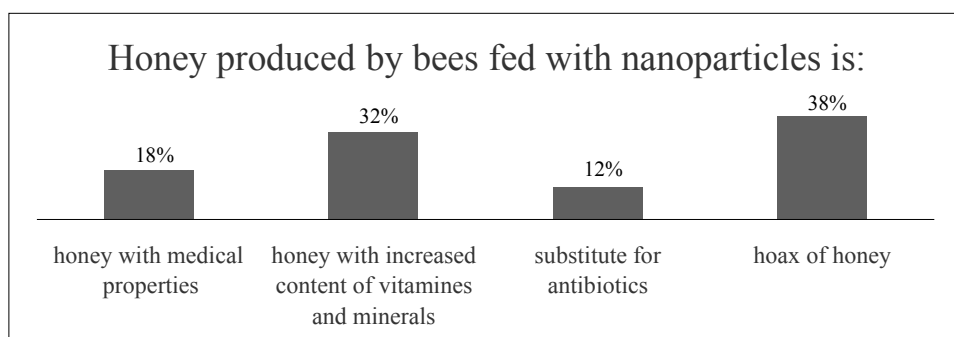


Fig. 2. Perception of honey produced by bees fed with nanoparticles

Source: Own research.

Tab. 1. Perception of honey produced by bees fed with nanoparticles by age

Honey produced by bees fed with nanoparticles is:		Age of the respondents				
	generally answers	18–24	25–34	35–44	45–54	55–70
honey with medical properties	18%	4%	4%	2%	8%	0%
honey with increased content of vitamins and minerals	32%	6%	2%	18%	4%	2%
substitute for antibiotics	12%	0%	10%	0%	1%	1%
hoax of honey	38%	1%	0%	2%	3%	32%

Source: Own research.

According to the vast majority of respondents, nanoparticles content in honey affects predominantly increased antibacterial properties of honey. Few believe (22%), that nanoparticles in honey may affect its sensory characteristics, for example, smell and colour (Fig. 3).

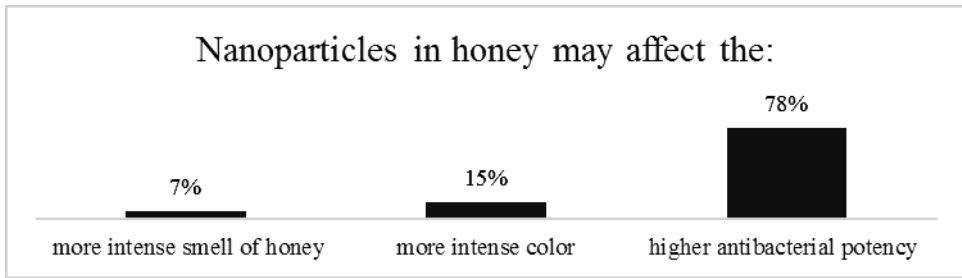


Fig. 3. Effect of the nanoparticles on the sensory properties of honey

Source: Own research.

Respondents have relatively positive attitude toward nano-products. The evidence to this is the fact that 32% of participants believe that products containing nanoparticles can have a positive impact on the environment, health and human life. The same percentage of people stated that the nano-products are not fully audited/researched, so their use could put consumer at risk. In addition, nearly 20% believe that nanoparticles may adversely affect human health and life (Fig. 4). Fear of a new and unknown product is very vivid, especially at the time when respondents were asked whether they would try honey produced this way. Nearly 70% of participants stated that they would not consume honey produced by bees fed with nanoparticles.

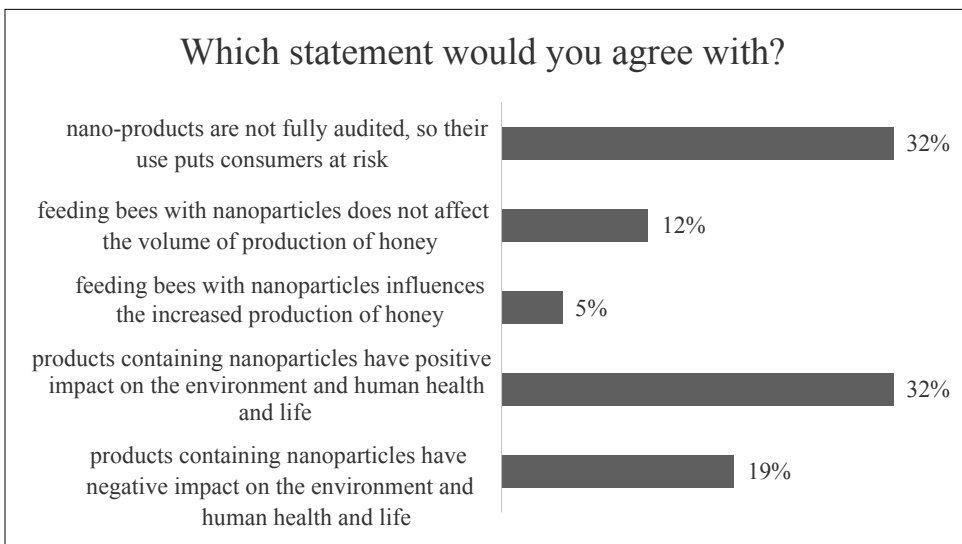


Fig. 4. The attitude of respondents toward innovative product

Source: Own research.

For market placement of new products, especially the innovative kind, has a very important aspect that needs to be considered, and it is the economic factor, that was why, respondents were asked to declare how much they would be willing to pay for the honey produced by bees fed with nanoparticles of gold and silver, and if the price of honey should vary from the traditional honey. More than half of respondents stated, that the price should be the same as the price of traditional honey. 20% of respondents believe, that honey should be cheaper than traditional honeys, because they are artificial products. Nearly one-third of respondents agreed to pay more than for the ordinary honey due to its special characteristics (Fig. 5).

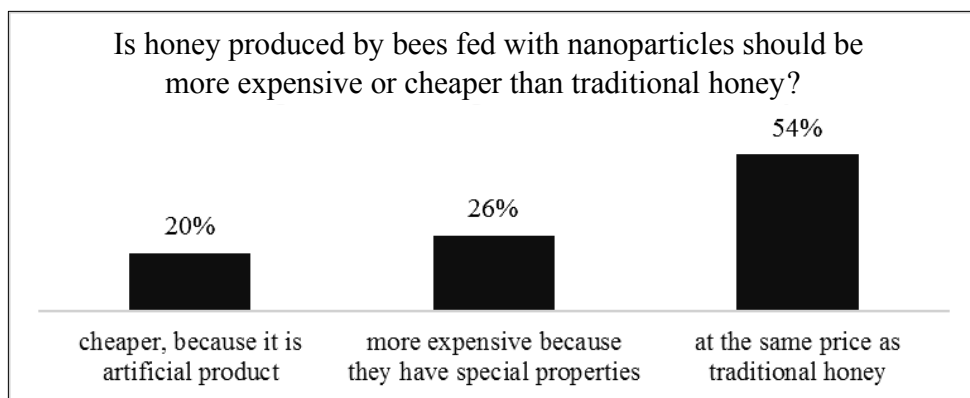


Fig. 5. Opinions concerning price of honey produced by bees fed with nanoparticles of gold and silver

Source: Own research.

Even though more than 92% of respondents claimed, that they knew nothing about the honey produced by bees fed with nanoparticles, their level of knowledge about basic definitions for nanotechnology was rated quite high (Fig. 6). A good example could be that more than half of the respondents know how to correctly identify the definition of nanoparticles, by noting that it is a molecule smaller than 100 nm. It can be assumed, that attitudes/feelings of respondents may be negative, due to the not well-established knowledge. In general, consumers are afraid of new and unexplored products.

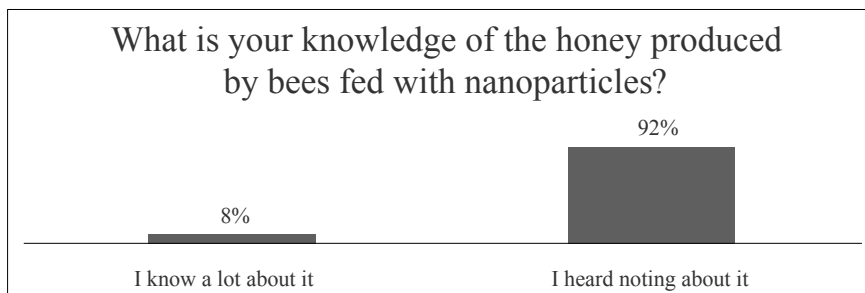


Fig. 6. Selfassessment of respondents knowledge about the honey produced by bees fed with nanoparticles of gold and silver

Source: Own research.

In order to verify the level of knowledge about legal regulations concerning the use of nanoparticles, respondents were asked to answer the question whether feeding bees with nanoparticles of gold and silver is lawful. More than half respondents – 52% did not know whether it is right according with the law (Fig. 7). Over 25% of respondents puts a great trust in food manufacturers, considering feeding bees with nanoparticles of gold and silver as lawful. In the majority there were young people. It should be noted though, that the above aspect is not regulated by law.

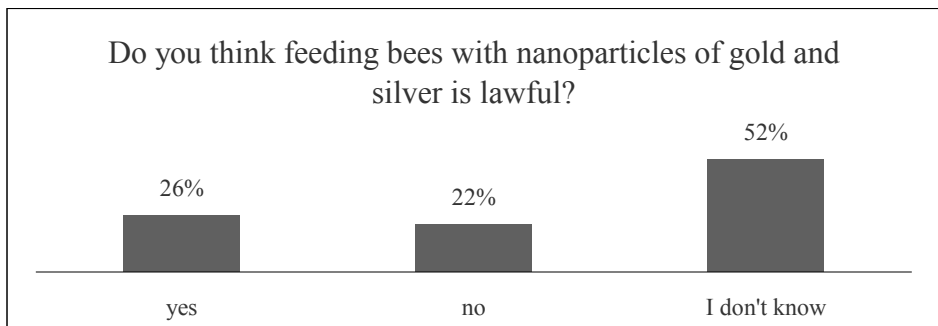


Fig. 7. Respondents' views on feeding bees with nanoparticles of gold and silver in terms of legislation

Source: Own research.

SUMMARY

Based on the survey findings, it can be stated that:

1. Respondents believe that honey produced by bees fed with nanoparticles is an innovative product, claiming that it contains more vitamins and minerals.
2. Participants declare a low level of knowledge about honey that contains nanoparticles.
3. A significant number of respondents is afraid of negative impact of nanoparticles on the human body. Two-thirds of respondents (68%) would not consume honey produced by bees fed with nanoparticles of gold and silver.
4. It was expressed, that product innovation should not lead to an increase in its market prices.
5. Remarkable factor in this study turned out to be the age of respondents, as older participants were driven by a greater degree of caution in relation to the new.

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