Topic 1: Bee products. Organoleptic evaluation and processing of bee products
Lecture

Honey bee is one of the most talented and versatile creatures. In the animal kingdom, but also the most human-friendly insect. The benefits of using bee labor have long been known. Bees offer people a wide range of valuable natural products. From honey through beeswax, propolis, royal jelly, and even bee venom. Many products can be bought in stores and at beekeeping stands based on bee products. Pharmacies and drugstores also offer us numerous cosmetics and supplements which include bee products.
In the picture, we have a stand with beekeeping products, centrally located on the slide. On the sides, we see selected bee products from propolis through beeswax, honey candies, pollen, beeswax, and royal jelly.
One of the most well-known and appreciated products of bees is honey. Honey consists mainly of water and sugars. These are simple sugars, glucose, fructose, but also contain small amounts of sucrose.
In addition to sugars in honey, we can distinguish organic acids, series of mineral compounds, vitamins, nitrogen compounds, essential oils and dyes.
How is honey made and what is honey made of?
Honey is made from either nectar, or honeydew, or both nectar and honeydew. Therefore, we can talk about nectar honeys, honeydew honeys and honeydew-nectar honeys.
What is nectar?
Nectar is a sweet secretion of flower nectaries and contains a high amount of sugars. Its sugar content ranges from 8 to 70%. Besides sugars and nectar, we will find mineral salts and nitrogen compounds, colorants, vitamins, enzymes, water and essential oils.
What, then, is honeydew?
Honeydew is a metabolic byproduct excreted by hemipteran insects, such as aphids or scale insects. Honeydew is a sweet, sticky liquid that contains not only simple sugars but also disaccharides and trisaccharides.
These raw materials are what honey is made from. Bees collect nectar or honeydew, or both, transport these resources to the hive, and there they process them in an incredible way – incredibly fascinating and wonderful – into honey.
And how does this happen?
The bee uses its proboscis to suck up nectar or lick honeydew. These raw materials are stored in its crop. It transports them to the hive in its crop, and once there, it 'expels' the contents of the crop. During this expulsion, the bee enriches it with its own enzymes and biologically active substances. At this stage, we are already dealing with partially processed honey."
This partially processed honey is stored in the lower cells of the comb, after which the bees work on evaporating the water from it. As the water content decreases, the bees move the more mature honey to the upper parts of the comb. Fully matured honey contains a maximum of about 20% water, no more. When the honey is fully enriched with the necessary enzymes and contains the right amount of water, it is sealed in the upper cells of the honeycomb, which can be seen.
Here on the slide, right, in the attached images. We have two frames with honeycombs shown, and in the upper part, you can clearly see the mature honey, covered with a wax layer by the bees.
When the honey is already saturated with the right enzymes in this upper part, you can already see ripe honey covered with a layer of beeswax.
The characteristics of honey include its color, scent, taste, consistency, and acidity.
The color of honey can range from almost white, through light and dark yellow, amber, tea-colored, to brown with a brownish-green tint."

The color, flavor, aroma, consistency, and acidity of honey are the main characteristics.
Many factors influence the color of honey, including:
climate, the geographical location of bee foraging, the color of the combs, and the species of bees.
As for the scent... • THE SCENT is dependent on various aromatic substances and the forages that served as the raw material in the production of honey. Most often, the scent of honey resembles the fragrance of the flower from which the nectar originates. In the case of honeydew honey, where the raw material is honeydew, the scent of this honey will remind us of the fragrance of conifer needles and resin.
When it comes to taste. The taste of honey is also diverse, just like its color. Generally, the taste of honey is described as sweet, pleasant, and mild. They give me honeys that can be delicately sharp and spicy in taste, and even slightly bitter.
The consistency of honey depends on its freshness. Very fresh honey obtained directly during honey collection from bees with a liquid consistency. Over time, such honey crystallizes and of course this is a very natural and desirable process. Honeys crystallize in different ways.
These are tiny crystals scattered all over the surface of the product, sometimes in the form of large crystals. However, the most important thing is for this honey to crystallize.
This is also a sign of good quality honey.
Honeys that do not crystallize most of the time likely contain too much water and possibly these honeys are adulterated with various other substances.
I was just mentioning that depending on the source material, honey can vary.
We have nectar honeydew or nectar-honeydew mixed honeys.
On the other hand, if we consider the type of benefit that bees derive from it, we highlight here multifloral honeys, rapeseed honey, buckwheat honey, acacia honey, heather honey. There are actually a variety of different versions, depending on where the bees were and where they sourced the raw material in the form of nectar.
Multifloral honey is light, creamy-straw colored, with a delicate floral scent. It crystallizes into a sweet taste within a few weeks, from three to six weeks.
Rapeseed honey, on the other hand, crystallizes very quickly and can even crystallize within a week after harvesting. It has a sweet, slightly bitter taste and is practically white in color. Loved by children because it spreads very well on bread after solidifying. It tastes sweet and pleasant to the palate.
Acacia honey is pale cream. The scent of acacia is clearly felt in fresh acacia honey. This is one of the honeys that contains a fairly high water content. Therefore, it can crystallize for a longer period of time.
Linden honey, one of the most well-known linden honeys recommended for the autumn-winter period. Honey is very tasty, it may have a slightly spicy taste, which of course does not diminish its value. The color of linden honey can vary from almost white to dark yellow or amber with a greenish hue.
Buckwheat honey is dark amber to brown, with a strong, buckwheat aroma; it has a sweet and slightly spicy taste.
Multifloral summer honey has a color ranging from light yellow to dark greenish.
The scent varies depending on the flowers from which bees collect nectar.
Heather honey is amber-green in color. it has a very pleasant smell, quite strong, sweet, slightly bitter.
You can say that this honey does not crystallize, but jelifies, because after crystallization it maintains a gelatinous form.
Honeydew honey is amber with a greenish tint, lightly spicy aroma, sweet taste, and crystallizes within a few weeks.

Needle and deciduous honeydew. Needle honeydew is dark brown with a greenish or gray-green hue, with a strong scent of pine needles and resin, with a sweet-resinous taste.
The leafy one is brown with a brownish-green hue and a sweet-bitter taste.
Although honey is mainly a mixture of sugars, it is considered one of the healthiest products on the market. These are simple sugars, contained here in honey in the form of glucose and fructose. And these are sugars easily absorbed by us, by our body and do not burden the heart muscle.
Research shows that the human body requires much more energy to metabolize sucrose compared to sugars found in honey. Glucose derived from honey is about 40 times more effective and efficiently utilized by the body than glucose produced artificially.
As research has shown, scientists have proven that regular consumption of honey has a positive impact on the human body, on our health. Favors increased mental development, enhanced immunity, and regeneration in cases of mental or physical exhaustion.
What is the effect of honey? Primarily, it has antibiotic, anti-inflammatory, expectorant, antiallergic, and liver and bile duct support properties. Promotes rapid wound healing, prevents tooth decay, inhibits atherosclerosis, lowers blood pressure, and dilates blood vessels.
Another product highly valued by us humans is flower pollen.
Flower pollen is also called bee bread.
Pollen grains are the male gametes of plants, which bees collect when they land on a flower and their bodies become covered in this pollen. The bee then gathers this pollen from its body and forms it into pollen. These little balls and those balls are called bee bread.
The bee carries pollen in the baskets of its hind legs.
In the pictures, we see exactly that third pair of legs to which shopping bags are attached. These are the baskets in which flower pollen, or bee bread, has been carefully placed.
Each of the opened beads contains about 100,000 pollen grains and weighs between 8 to 20 milligrams.
After transferring the pollen, or these pellets to the hive, the bee shakes them into the cells of the comb. After that, the bees are killed by pouring honey on them in a way that cuts off their access to air. Fermentation occurs under such conditions and the product formed in this process is bee bread.
Bee bread is another very valuable food not only for bees, but also for us humans.
This is a high-protein food that has beneficial effects for many diseases.
It shows antibiotic activity, recommended for physical and mental exhaustion, supports concentration, memory, very beneficial for vision.
Both pollen and bee bread are increasingly being used in the production of food products.
Additionally, bee bread is used in cosmetology as it reduces wrinkles and stretch marks.
Beeswax is also a very valuable bee product. This is a product that comes directly from bees, as it is produced or secreted by the wax glands of worker bees. Wax glands are located on the ventral side of the worker's body. From these glands, wax flows out of the ducts in a liquid form initially. When caught in the air, it crystallizes and takes the form of thin white flakes.
To produce 1 kg of beeswax, bees need to consume about 4 kg of honey.
The wax glands of bees are most active between the 12th and 8th day of their life.
It mainly consists of carbohydrate fatty acids, hydroxyacids, alcohols, and esters. Wax is a solid, brittle substance that becomes flexible in the fingers and under heat. It has a pleasant smell, like honey and propolis. When it comes to color, the wax can also vary, from almost white to dark yellow and even brown, with the darker wax, the worse its quality.
Wax melts at a temperature between 62 and 65 degrees Celsius, fresh wax secreted directly by worker bees, it melts at a temperature of 72 degrees Celsius.

Wax is used to produce candles, in the pharmaceutical industry as an addition to patches, ointments, chemical industry. Wax-based products such as pastes, varnishes, and polishes are produced and is also used for candle production. Beeswax candles work much better for us.
Not to our well-being, but rather those artificially created. Beeswax candles negatively ionize the air they help us focus, help eliminate unpleasant odors. Therefore, I personally also recommend using. In the comfort of home, such candles and not others.
More and more often you can also find on the market candles made of wax or beeswax.
A very valuable product, also directly sourced from bees it's bee milk. Bee milk will be the secretion of pharyngeal glands, young worker bees. This is food for larvae and bees especially larvae during this early stage of development. The queen mother is also fed with royal jelly throughout her life. In the absence of pollen, pharyngeal glands stop producing royal jelly.
What are the properties of royal jelly?
The color of bee milk is white or blue-white. It may be slightly yellow and dirty gray. Fresh milk is liquid, relatively thick and creamy. On the market, we find milk in the form of lyophilized. The scent of royal jelly is faint, slightly sour, and reminiscent of milk. On the other hand, in taste milk is sour, bitter-tart or tart-sour.
Where is royal jelly used?
It is used both internally and externally. Milk has bactericidal and fungicidal properties. It fights viruses from group A and B. It contains a variety of mineral compounds, organic compounds, amino acids, enzymes, and vitamins. Bee pollen has high nutritional value, beneficially affects metabolism, helps in treating anemia and in diseases of old age. It also lowers cholesterol levels, expands coronary vessels, it has a good effect on all kinds of skin irritations and more often we can come across royal jelly as an ingredient in many cosmetics.
It is also worth mentioning that the queen mother was fed during this time, early bee milk, and nothing else. Worker bees feed her throughout the entire development period for 16 days and a fully functional organism emerges from it. A fertilized, queen bee. So this is also evidence that royal jelly is very good food, providing all necessary nutritional needs.
Another product to propolis. Bee propolis otherwise known as bee glue. Bees produce it in balsamic, resinous substances, which they collect from buds, trees and shrubs as well as resins. The propolis collection is dependent on the bee race and their demand for this product.
Propolis is mainly used by bees for disinfecting all parts of the hive, including sealing the hive, polishing, disinfecting the cells of the comb, and for sealing purposes. It is also used for embalming large contaminants that the bees cannot remove from the hive.
In color, propolis is brownish-green, yellow and sometimes even reddish. Depending on where it comes from? The consistency of propolis is that of a sticky solid, which is hard at a temperature of 15 degrees Celsius, soft and pliable at 36 degrees Celsius, and liquid at temperatures of 60-70 degrees Celsius.
In taste, propolis is sharp, bitter, astringent, and pungent. Its scent is pleasant, spicy, somewhat reminiscent of cinnamon. The composition of propolis is of course varied and depends on its geographical and botanical origin, as well as the time it was collected and located in the hive.
Propolis is commonly used as a raw material in cardiovascular, otolaryngological, dermatological, respiratory, and gastrointestinal disorders. It has bacteriostatic properties and is also used in skin diseases. Additionally, it is widely utilized in the cosmetic industry.