

Polish honey varieties

**and healthy aspects of bee
products**

Honey is one of the most-valued food products, due to its sweet taste and high energy value.

It contains about 80% sugars

These are mainly simple sugars that are immediately absorbed into the blood, without a number of intermediate processes.



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Honey also contains:

- **organic acids** - stimulate the secretion of digestive juices, significantly affect the value and taste of honey,
- **mineral salts** - have a significant impact on the processes of blood circulation and cellular respiration, more in dark honey, mainly in honeydew.
- **Fe, Mn, Cu, Co and B vitamins** - accelerate the formation of red blood cells,
- **potassium** - affects the correct heart rhythm, reducing its tension and frequency of contractions,
- **potassium and acetochlorin** - regulate the activity of the intestinal musculature, stimulate intestinal peristalsis,
- **acetylcholine** - regulates the activity of nerve cells - acetylcholine is a neurohormone, it also acts on the nervous system causing calming and relaxation, it causes a more economical heart (more blood at lower heart rate), causes tired heart to dilate coronary arteries, which improves heart oxygen supply and ingredients alimentary, affects the normalization of blood pressure,

Honey also contains:

- **choline** - contributes to better use of the sugar consumed by the body and facilitates the conversion of fructose into glycogen, regulates the metabolism of fats in the liver, preventing its steatosis,
- **pollen** - contributes to a better blood supply to the intestinal mucosa and stimulates the immune system,
- **enzymes** - facilitate digestive processes in the human body,
- **essential oils** - nectar origin, that's why almost every honey differs in its color, smell and taste.

The joint interaction of all honey components effectively improves the efficiency of the physiological processes of the human body, rebuilds its physical strength.

The following types of honey are distinguished depending on their origin:

- **Nectar honey** - which is honey produced by bees from the nectar of plants, excreted from flower nectaries
- **Honeydew honey** - which is honey produced by bees mainly from the excreta of insects sucking the juices of living parts of plants or secretions of living parts of plants
- **Nectar-honeydew honey** - which is honey produced by bees from the nectar of plants and from the excreta of insects that suck the juices of living parts of plants or secretions of living parts of plants

The most popular Polish varietal honeys

- Rapeseed honey
- Acacia honey
- Linden honey
- Buckwheat honey
- Heather honey
- Goldenrod honey
- Multi-flower honey
- Honeydew honey

Characteristics of Polish varietal honeys

Rapeseed honey - in a liquid state is almost colorless or slightly straw-colored, with a greenish shade. After crystallization, it takes on a white or gray-cream color.

Due to the advantage of simple sugar glucose over fructose, as well as low water content (18% on average) it undergoes rapid crystallization, giving small crystals and a smear consistency.

The smell of both liquid and crystallized honey is weak, similar to the smell of rape flowers. However, it is so characteristic that it is palpable in mead, even after 2 years.

The taste of this honey is very mild, slightly bland and slightly bitter.



Characteristics of Polish varietal honeys

Acacia honey - in the liquid state, acacia honey is light-to-greenish. Sometimes it can be even colorless, it is considered to be the brightest of all honeys.

After crystallization, it has a white to creamy-yellow color.
In terms of consistency and color, it resembles sugar beet syrup.

Due to its high fructose content, it crystallizes very slowly.
It is distinguished by a delicate, subtle, slightly bland aroma of acacia flowers. The taste is very sweet (fructose), delicate and slightly sour.



Characteristics of Polish varietal honeys

Linden honey - in the liquid state has a color from greenish yellow to light amber.

After crystallization, the color changes to white-yellow or golden-yellow.

In terms of consistency and color, lime-like honey in a liquid state resembles castor oil.

As a result of crystallization, it takes on a fine-grained, sometimes crust-shaped form.

The taste is quite sharp, often slightly bitter.



Characteristics of Polish varietal honeys

Buckwheat honey - the patoka is light brown with a slightly reddish hue. With the access of light during storage, the honey becomes dark brown, almost black.

It crystallizes very slowly, taking on a coarse-grained, non-uniform shape.
After crystallization, the honey becomes a little brighter.

It has a very intense and pleasant scent of buckwheat flowers, a characteristic taste: spicy, sweet and slightly roasting.
In terms of taste and aroma it is so specific that it can be sensed in honey even with a small amount of buckwheat nectar.



Characteristics of Polish varietal honeys

The heather honey - in a liquid state, has an amber-tea color and a jelly-like consistency, a strong heather flower smell, which gradually disappears in a slightly sweet, slightly bitter taste.

Crystallizes mostly fairly quickly, taking on a fine-crystalline and yellow-brown texture.

Its transition from the colloidal solution to the jelly-like state, called the gel occurs due to the high content of dextrans, which in combination with proteins contribute to the formation of gel.



Characteristics of Polish varietal honeys

Goldenrod honey - has a sweet taste with a delicate sour-bitter aftertaste and a pleasant aroma.

It takes colors from yellow to light amber.

Crystallization of this honey occurs quite quickly, it then takes on the consistency of a soft cream that is easily spread.

Research shows that it contains strong bactericidal properties compared to other honeys.



Characteristics of Polish varietal honeys

Multi-flower honey - may have a different color, from light cream to tea.

After crystallization, it slightly changes color to light gray or light brown.

The smell of multiflower honey is usually strong, reminiscent of wax.

The taste is very diverse, depending on the composition of nectar, but it is generally mild, sweet.

Honey from spring plants in a liquid state is bright, has a pleasant delicate floral aroma and a mild flavor.

In contrast, honey coming from the nectar of summer flowers is much darker and has a strong taste and aroma.



Characteristics of Polish varietal honeys

Honeydew honey - is usually dark with a greenish or gray shade and gives the impression of being dirty.

In the liquid state it is almost black, after crystallization it brightens up, but it can also be from yellow-brown to dark brown.

It has slightly spicy aroma, sweet taste (sometimes with a mild bitterish aftertaste).

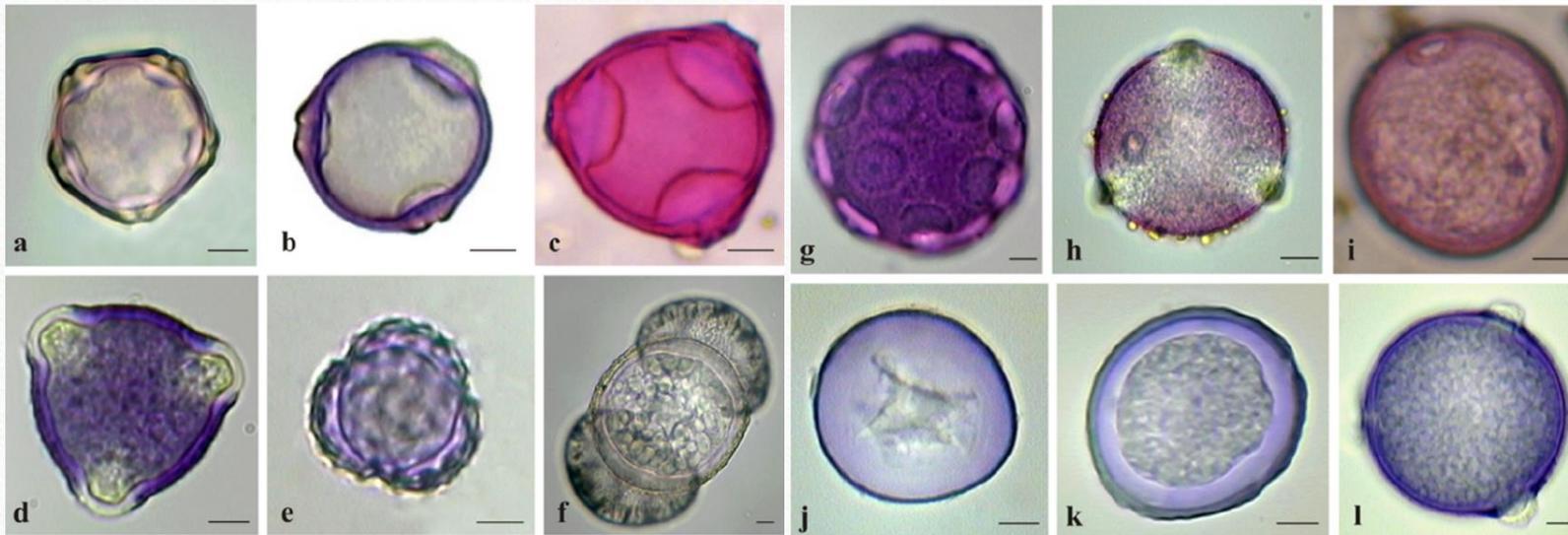
The crystallization process takes place in this honey within a few weeks.



Melisopalinology - honey varieties testing

Melisopalinology investigates pollen found in bee products.

Pollen identification allows to recognize nectar and pollen sources and reveals the geographical origin of the plants from which the pollen comes from, and thus the origin of the honey.



Pollen grains from Central Europe. a *Alnus glutinosa* (P). b *Betula pendula* (P). c *Corylus avellana* (P). d *Quercus robur* (P). e *Ambrosia artemisiifolia* (P). f *Pinus sylvestris* . g *Juglans regia* . h *Acer* sp. (P). i *Poa*

Phot. Krystyna Piotrowska-Weryszko

Melisopalynology - honey varieties testing

Recognizing pollen is possible due to its diverse structure.

The microscopic qualitative analysis of the honey deposit is aimed at determining the pollen grains in the sludge occupying the area of 1 cm² on the slide of the specimen closed in glycerinelatine, which corresponds to the amount of pollen in 1 g of honey.

Next, we count 300 seeds in consecutively shifted strips of the preparation.

We count pollen grains of non-ophthalmic or apoptilic plants.

We express the pollen of the nectariferous plant in the form of a percentage share.

In most types of honeys, the pollen of the main honey plant is over 45% and is called the pollen.

Accompanying dust is 16-45%, single pollen of 3-15%, and sporadic pollen less than 3%.

Melisopalinology - honey varieties testing

From certain species of plants, honeys overdried with their own pollen or underexposed are obtained, depending on the flower structure and the distribution of nectaries.

Honey with a very high amount of pollen in nectar includes honeys from chestnut (the share of pollen is 90%).

In honey from dioecious plants with nectarizing female flowers or from plants with out-of-world nectaries, pollen share was lowered to 10%.

Melisopalimology - honey varieties testing

Honey spotted

Very high pollination of nectar, found in some plants, such as chestnut (*Castanea sativa*), forget-me-not (*Myosotis*) or eucalyptus, makes those honey varieties rich in vitamins and amino acids present in pollen.

It also contain very large amounts of pollen, and to be considered a variety, must contain at least 90% of the pollen of this plant.

Melisopalinology - honey varieties testing

Uninflated honeys

These honeys are obtained from plants whose flowers have a structure that makes pollination of nectar difficult.

To such plants in our climate belong linden, in which a 20% share of pollen is enough to consider linden honey to be varietal, and acacia, for which it suffices 30%.

In the lime tree, despite the exposed nectary at the base of the goblet plots, the pollen has difficult access to nectar, because the inflorescences usually hang downwards, and the anthers are on long threads and are far away from the place of nectar secretion.

Difficult access of pollen to nectar in acacia flowers is caused by the construction of a flower, whose stamens and pistil are covered tightly by two petals of the crown forming the so-called boat.

Melisopalinology - honey varieties testing

Pollen analysis is the only test allowing to determine the botanical origin of honey, and hence the species of plants from which nectar has been created honey.

It also allows determining the geographical origin of honey.

During the analysis of honeydew honeys, the share of microscopic honeydew indicators was introduced.

These are fragments of mycelium, algae and spores of specific fungi growing on honeydew.

The degree of honeydew is expressed by the ratio of the sum of these indicators to the number of pollen grains of nectariferous plants.

The scale of this quotient was established: $IM / P > 4.5$ - very large amount of honeydew; $IM / P 3-4,5$ - a large amount of honeydew; $IM / P 1,5-3$ - the average amount of honeydew; $IM / P 0-1,5$ - little honeydew.

Antibiotic properties of honey

Osmotic effect

Honey is a saturated or supersaturated solution of sugars with a water content not exceeding 15-21% by weight.

The strong interaction of molecules of these sugars with water molecules causes that only a few molecules of water are available for microorganisms

Antibiotic properties of honey

Acidity

The characteristic feature of honey is its acidity - **pH ranges from 3.2 to 4.5**

The acidity of honey is low enough to inhibit the growth of pathogenic microorganisms that develop under pH conditions between 7.2 and 7.4, as well as common pathogenic bacteria for which the respective minimum pH values are:

- Escherichia coli 4.3
- Salmonella 4.0
- Pseudomonas aeruginosa 4.4
- Streptococcus pyogenes 4.5

Antibiotic properties of honey

Hydrogen peroxide

The antibiotic activity of honey is conditioned in particular by the presence of substances with antibiotic action, called inhibins.

Hydrogen peroxide (H_2O_2) is considered as the most important inhibitor.

This compound is formed by the oxidation of water and glucose.

This reaction is stimulated by glucose oxidase.

It is an enzyme that goes to honey along with the secretion of the beehive glands.

Antibiotic properties of honey

Non-peroxide inhibitors

It has been found that mature honey contains substances with antibacterial properties, e.g. lysozyme, flavonoids, aromatic acids and other unidentified ingredients.

They were called conventionally non-oxidic inhibins.

Some other aromatic compounds and volatile substances present in honey also have antibacterial effects.

Inhibine values of honey

The results of conducted studies show the different antibiotic activity of monofloral honeys.

The highest antibiotic activity have such honeys like:

- **goldenrod honey** - the mean antibiotic activity 31.8 UA/g
- **buckwheat honey** - the mean antibiotic activity 30.0 UA/g
- **Honeydew honey** (from deciduous trees)- the mean antibiotic activity 29.3 UA/g

Somewhat lower antibiotic activity show:

- **linden honey** - the mean antibiotic activity 24.2 UA/g
- **honeydew** (mainly produced from coniferous dew) - the mean antibiotic activity 23.5 UA/g
- **heather honey** - the mean antibiotic activity 23.4 UA/g

The relatively low antibiotic activity show such honeys like rapeseed honey, multifloral honeys other varieties of nectar honeys and acacia honey. The mean antibiotic activity is adequately 18.0; 16.5; 12.4 and 11.0 UA/g. The results of studies on antibiotic activity on level 18.6 UA/g) and others foreign honeys (mean antibiotic activity on level 1.2 UA/g).

The antibiotic activity of Polish monofloral honeys

after Holderna-Kędzia i Kędzia 2005 Staphylococcus aureus 1-6

Varietal honey	number of tries	Average inhibin value
Buckwheat	19	3,10
Honeydew	14	3,39
Heather	10	3,33
Goldenrod	4	3,61
Acacia	6	2,83
Linden	20	2,78
Rapeseed	6	2,75
Multiflorous	38	1,84
Manuka	25	3,34

The antibiotic activity of Polish monofloral honeys

after Hołderna-Kędzia i Kędzia 2012 Staphylococcus aureus 1-6

Varietal honey	number of tries	Average inhibin value
Goldenrod	4	3,61
Buckwheat	39	3,51
Manuka	48	3,13

Properties of varietal honeys

Rapeseed honey

- helpful in the treatment of liver, pancreas, kidneys, digestive system, gastric and duodenal ulcers, cardiovascular disease, heart failure, atherosclerosis,
- lowers blood pressure, compensates for potassium deficiencies in the body,
- relieves colds and inflammation of the airways, accelerates wound healing, prevents infections in burns

Properties of varietal honeys

Linden honey

- high antibiotic activity, antiseptic, antispasmodic, diaphoretic, antipyretic, expectorant, slightly hypnotic and sedative,
- reduces fever, helps in the treatment of influenza, colds, coughs, acute and chronic cold diseases, anginas, paranasal sinusitis, respiratory tract,
- recommended in diseases of the urinary tract and neuroses

Properties of varietal honeys

Acacia honey

- low antibiotic activity,
- helpful in the treatment of stomach ulcers, duodenum, mucositis and spastic conditions of the small and large intestine, treatment of hyperacidity of the stomach, gastrointestinal disorders and digestive system,
- peptic ulcer - accelerates tissue regeneration, protection of the mucous membrane, erosion and ulcers,
- facilitates falling asleep, strengthens the body, due to the high fructose content can be used with some types of diabetes.

Properties of varietal honeys

Buckwheat honey

- recommended for atherosclerosis, coronary artery disease and hypertension (high rutin content),
- promotes the reconstruction of bone cells, strengthens the immune system, accelerates wound healing and bone healing,
- helpful in the weakening of memory, in the treatment of glaucoma, impaired eyesight and hearing

Properties of varietal honeys

Goldenrod honey

- high antibiotic activity,
- recommended for ailments and diseases of the urinary tract, bladder, prostate, nephrolithiasis and intestinal inflammation,
- helpful in the treatment of influenza, colds, colds and diarrheas

Properties of varietal honeys

Heather honey

- recommended for diseases of the urinary tract, prostate, nephrolithiasis and inflammation of the intestines and diarrhea,
- increases the body's resistance and protects against the development of infections

Properties of varietal honeys

Multi-flower honey

- supports the heart muscle,
- is helpful in diseases of the liver and gallbladder,
- recommended in allergies

Properties of varietal honeys

Honeydew honey

- high antibiotic and bactericidal activity, antiseptic, anti-inflammatory and expectorant,
- supports the immune system, recommended in diseases of the respiratory tract, gastrointestinal tract, heart, cardiovascular system, nervous system, in disorders of digestion.

Healthy aspects of other bee products

Bee venom

- A bee-worker produces it from the 2nd to the 20th day of life
- The poison bag is 0.3 mg of venom on average
- Bee venom, in biotic terms, is an enzyme-hormonal concentrate



Healthy aspects of other bee products

Api-Therapy

Bee venom exhibits haemolytic activity against red blood cells, causing their destruction.

The biological activity of venom is expressed in micrograms of dry product, and one international unit of bee venom corresponds to 10 micrograms of this product.

Venom enhances the action of streptomycin, biomyacin and sulfonamides, and weakens penicillin and has a protective effect against ionizing radiation.

It is assumed that the venom has effects: **antibacterial, antifungal, anti-inflammatory, analgesic, anti-atherosclerotic, antithrombotic, hypotonic** (hypotensive), **allergenic**.

For medicinal purposes, a sting treatment, rubbing inks, injection solutions, iontophoresis tablets, electrophoresis, phonophoresis and chemoacupuncture are used.

Healthy aspects of other bee products

The use of bee venom

- rheumatic diseases; rheumatoid arthritis, ankylosing spondylitis, rheumatic rheumatism
- nervous system diseases, shingles, neuralgia (sciatica, lumbago), polyneuritis
- heart and peripheral vascular diseases; myocarditis on the rheumatic background, atherosclerosis of the lower limbs and thromboangiitis obliterans (Buerger's disease)
- inflammation of the mucous membrane and periodontitis
- post-traumatic pain syndromes, discopathy, nerve palsy caused by sudden cooling or trauma, inflammation of bursitis and tendon sheaths, dislocations

Healthy aspects of other bee products

The use of bee venom

- treatment of postoperative scars and difficult to heal wounds
- hypertension
- in gynecology
- in allergology, especially in the treatment of atopic bronchial asthma
- thins the blood and has an anti-thrombotic effect, thus preventing heart attacks and strokes

Healthy aspects of other bee products

Royal jelly

Royal jelly is a secretion of the throat and mandibular glands of young worker bees, located in the front of the head. These glands begin to function between the 3rd and 6th days of life of a mature bee.

Pollen is necessary for the production of this raw material.

Research has shown that the rich composition of royal jelly has a beneficial effect on metabolism and body functions. Due to the numerous biologically active compounds (vitamins, enzymes, hormones) and the abundance of amino acids and mineral compounds, royal jelly products are an excellent conditioner for people who are facing a lot of physical or mental effort.



Healthy aspects of other bee products

Application of royal jelly

- states of weakness and lowering of the body's fitness, malnutrition and anorexia, reduced immunity of the body due to diseases, weakness after long-term diseases and surgical procedures,
- has antibacterial properties: it acts on both Gram-positive cocci, oxygen bacilli and mycobacteria, as well as Gram-negative rods. It has been found that it inhibits the development of pathogenic yeasts and molds for humans. It is also a great ally in the fight against influenza viruses, mumps and herpes simplex.
- it affects the hematopoietic system. The results of many studies have shown that it also has a significant effect on the central nervous system (enhances the work of the cerebral cortex)
- cardiovascular disease, ischemic heart disease, atherosclerosis, post-infarction, arterial hypertension, iron deficiency anemia, and vitamin B12

Healthy aspects of other bee products

Application of royal jelly

- gastrointestinal disorders gastric and duodenal ulcer disease, inflammation of the large intestine, intestinal motility disorders, inflammation of the liver, gall bladder and pancreas
- under the influence of royal jelly, the level of uric acid in the blood serum decreases
- in geriatrics, nervous system disorders, depressive and anxiety neuroses, psychosis, cerebrovascular atherosclerosis, bone diseases (osteoporosis), malabsorption syndrome, impairment of the efficiency of the organs of sight and hearing
- other diseases include pulmonary tuberculosis, diabetes, and rheumatic diseases
- in cosmetics for skin care
- varicose veins, inflammation of the veins

Healthy aspects of other bee products

Application of royal jelly

- hemorrhage
- respiratory diseases, e.g. bronchial asthma (of course, if one is allergic to pollen)
- neuropathy (sciatica)
- post-traumatic pains
- urinary incontinence

Healthy aspects of other bee products

Pollen

The floral pollen consists of the male reproductive cells of the seed plants, formed in flower anthers.

In the bee family, it is the main source of protein necessary for larvae and young workers.

It belongs to important components of bee nutrition, being a source of nutrients and minerals necessary for the production of royal jelly, which is food for emerging larvae.



Healthy aspects of other bee products

Pollen - Chemical composition:

- sugars (fructose, glucose, sucrose, maltose),
- biogenic amines, amino acids, pollen protein contains 32 amino acids, including all exogenous, peptides,
- enzymes (invertase, amylase, phosphatase, catalase),
- vitamin B1 (thiamine), B2 (riboflavin), B6 (pyridoxine), folic acid, pantothenic acid, nicotinic acid (vitamin PP), vitamin E (tocopherol), vitamin K (phytochinon), vitamin C (ascorbic acid), vitamin H (biotin), provitamin A (carotenoids),

Due to the presence of all vitamins in pollen, it is called a "vitamin bomb,,

Healthy aspects of other bee products

Pollen - Chemical composition:

- fumaric acid, succinic acid,
- fats - EFA - linoleic, linolenic and peanut, palmitic acid, phospholipids

From 9 to 31 fatty acids were isolated from the fat fraction depending on the plant species
hormones – acetylcholine

- flavonoids (hesperidin), triperpenes,
- bioelements (eg cadmium, tungsten, selenium, vanadium, copper)
- essential oils

Healthy aspects of other bee products

Bee bread

It arises from pollen foci deposited by beekeeper-gatherers in the cells of the patch.

Beehives crumble and compact the fetus until they fill up about 3/4 the volume of a single patch cell, after which they fill the cell with honey, cutting off the access of air.

Pollen is subject to further changes already under anaerobic conditions.

Due to lack of oxygen, microorganisms present in pollen use glucose; in the path of anaerobic transformation - this process ends with the formation of lactic acid, not carbon dioxide and water.

Lactic acid has a preservative effect and inhibits further fermentation.



Healthy aspects of other bee products

Propolis

It is made of sticky resin substances collected by bees from buds of trees and herbaceous plants mixed with the secretions of the gland and throat glands.

It has a bactericidal and bacteriostatic, regenerating and analgesic effect.

The most sensitive to the action of propolis preparations are Gram-positive bacteria, influenza viruses and jaundice, it is active against some fungi and protozoa.

Regenerates bone tissue, cartilage, epithelium and others. It has an accelerating effect on cellular metabolism, increases the body's immune system.





Thank you for your attention

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