

Dr. Gheorghe Dobre

Honey as a delicacy and medicine

PRODUCTION, ANALYSIS, CONSUMPTION



Beekeeping Fair in Campina (2023)



Here you will find useful knowledge and advice to be able, as a beekeeper, to harvest, to value and offer the consumer flawless honey, or to look for, if you are a buyer, premium quality honey, with the best taste and aromatic properties. If you appreciate honey and this brochure increases your curiosity, you can continue to document yourself by consulting books on honey, advice on apinutrition, advice on apiphytotherapy or cookbooks.

Painting made by a young beekeeper Ana Maria Stoica, a friend of bees

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1. HONEY,

MEDICINE OR “MASS-MARKET GOOD”?

*“Eat honey because it is healthy and
the honeycomb is sweet to the palate.”
(Solomon Proverbs 24:13)*

1.1 HONEY

A delicacy in its infinite variety of tastes and aromas, honey is used as a symbol of abundance alongside milk or in stark contrast to the adjective as bitter as gal. Considered an elixir and a natural remedy with its most important quality, honey is a complex natural product that stores the nectar and aroma of flowers. It is obtained by bees, with almost supernatural efforts, in an unlimited number of variants. Visiting all the flowers of the earth, bees certify their value by the presence of pollen grains that guarantee us naturalness and indicate us their provenance and origin.



Milk and honey.

Photo: Apostolescu MP



Photo: Apostolescu MP

Holiday gifts. Mother's basket

Honey as the nectar of the gods has been present in numerous myths, legends and customs throughout time. It was and is also used as an offering or drink at various ceremonies, it was and is used in cakes and culinary preparations at holidays, it was and is also used as a prize at sports competitions or as a gift, especially on the first day of the year.

By definition, honey is the natural sweet substance produced by bees by combining with their own specific substances (enzymes), both from the nectar of flowers, from the secretions of the living parts of plants and from the excretions of insects (Hemiptera) that suck the sap of living plants (honey dew).

During the elaboration by bees, after the hydrolysis of the nectar is done, the honey is dehydrated, left to mature in the cells of the honeycombs under the influence of enzymes and is stored as a finished product in the frames with honeycombs in the hive. Honey consists essentially of various monosaccharides, predominantly fructose and glucose, as well as other substances such as organic acids, enzymes and solid particles derived from its collection. Honey also contains a set of important compounds including protein substances (0.5%), a wide range of microelements, vegetable gums and odorous substances. The color of honey varies from almost colorless to dark brown, the flavor and aroma also vary, but all these characteristics are derived from the origin of the nectar secreted by the plant. The consistency can be fluid, viscous or partially to completely crystallized.

Beekeeping technology and bee colonies` maintenance operations have an influence on the final product – honey. Honey can be denatured by storage and processing (mixing, ultrafiltra-

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tion, addition of hydrolysates obtained from cereals, etc.). Therefore, we should not replace natural products with surrogates, and the consumer should not be misled about the quality of the product.

According to the origin, we can identify: flower honey (floral), derived from the processing of nectar and pollen collected by bees from the flowers of melliferous plants; extrafloral honey, derived from other parts of the plant (sugar cane), or honeydew honey derived from the excretions of insects. According to the species of honey plants (Romania) from which the bees have collected the nectar, we can speak about monofloral honey, derived entirely (or largely) from the nectar of the flowers of a single species: acacia, rapeseed, linden, raspberry, sunflower, mint, melilot (*Melilotus officinalis*), sánziene (*Galium verum*), etc. and polyfloral honey, derived from the processing of a mixture of nectar from the flowers of several plant species (hay honey). According to the method of obtaining, we have: honey in honeycombs (delivered in honeycombs); honey freely drained from honeycombs (drained); honey extracted by centrifugation;

honey obtained by pressing honeycombs; melted honey (combs are heated below 40–45 degrees C).

According to consistency, we find liquid honey (fluid); crystallized honey (sugared); cream honey (directly crystallized). According to color: we have colorless, light yellow, golden, greenish, brown or reddish honey. According to aroma, the various types of honey are appreciated by smell and tasting, indicating the name of the plant species they come from. When classifying, the following can also be taken into account: chemical composition, purity, caloric value, etc.

Photo: Apostolescu MP



Honey comb for consumption.

Any sweet substance claimed to be honey, which deviates from any of the aspects mentioned above, is not honey and cannot be marketed under this name! This category also includes any kind of additions to the composition of honey.

1.2. WHY IS IT NECESSARY TO KNOW THE VALUES AND PROPERTIES OF THIS WONDERFUL PRODUCT?

Beekeeping associations from the country and abroad and beyond, have repeatedly notified the authorities about the presence on the market of quantities of honey under suspicion, regarding various aspects, of questionable qualities ranging from non-conformities in terms of labeling, floral and geographical origin and to serious cases of adulteration with industrial glucose or fructose.

Since 2023, the European Union has organized a coordinated action called **From the Hives**, to assess the prevalence of adulterated honey on the market. The production of non-compliant or immature beekeeping products, the import of low-quality honey, and the spread of counterfeit or substitute products are all factors that distort the market. These practices place constant pressure on prices, degrade the overall quality of beekeeping products, and represent a direct attack on beekeepers and a ruthless discrediting of the beekeeping profession as a whole.

1.3. THE NUTRITIONAL AND MEDICINAL VALUE OF HONEY



Children's joy. Breakfast with honey in schools.

Human beings are interested in foods that give them the most pleasant sensations. Honey ensures the balanced ranking of the three medical-biological criteria relating to the health conditions that a food must meet: to be healthy, to be nutritious and to be appetizing. The energy value of honey is at least 328Kcal/100gr. Honey falls

into the category of exclusively energetic foods, which do not require digestive labor and enzymatic effort. Absorption and metabolic use is complete (100%). Apart from sugars, the nutritional value of honey is also given by the biologically active principles it contains (enzymes, volatile essential oils, pigments, mineral elements, etc.) and by components that we do not know yet. Thanks to these qualities, we can consume honey as a food for protection and restoration of the body.

The main objective for beekeepers must remain the preservation of the biological qualities of honey. The quality of honey is a sine qua non condition in guaranteeing therapeutic and nutritional properties. According to SR 784/2009, acacia honey is delivered in three qualities: superior, quality I and quality II, the other types of honey are delivered in two qualities, quality I and II. It is highly necessary to restore the standard and sell honey with a clear indication of its quality category and to clearly specify `honey intended for the food industry` (honey for cooking).

1.4. HONEY COMPOSITION

Monosaccharides are the main components of honey. Glucose (dextrose) and fructose (levulose), as reducing sugars, are in different proportions depending on the assortment. We also encounter complex sugars (sucrose, maltose) which are made up of two or more monosaccharides. Through chemical analysis we determine invert sugar (glucose, fructose and reducing sugars) and we express easily hydrolysable sugars (oligosaccharides) in sucrose.

The main enzymes in honey are carbohydrases, and of these: invertase and sucrase (sucrose), act on sucrose, splitting it into glucose and fructose, and amylase, alpha amylase (dextrinogenic amylase), acts on starch which it initially transforms into dextrans, and finally into maltose; beta amylase (saccharogenic amylase), which acts directly on starch, which it converts into maltose. The biological catalysts used by bees (enzymes or diastases) originate in the living cell. Structurally, they are organic compounds of protein nature, having a protein component, apoenzyme, (which gives it substrate specificity) and a chemical group, coenzyme, (which determines the catalytic activity of the enzyme). The action of enzymes is reversible, and this property is exerted on both decomposition and synthesis reactions. Enzyme activity is influenced by several factors: the room temperature, which must be optimal during ripening (enzymes are completely destroyed at 80 °C, and at low temperatures they are preserved), (enzymes in honey are active at a pH between 4-7, low pH favoring invertase activity, and high pH favoring amylase activity); - the presence of electrolytes can stimu-

late or inhibit enzyme activity; the influence of ultraviolet rays also has an effect on enzymatic activity.

2. HONEY MARKET

HONEY AND HONEY PRODUCTS

Honey in honeycombs and extracted honey is a food that can be consumed as such without the need for special preparation.

| | |
|---|--|
| HONEY IN CULINARY PREPARATIONS: | HONEY IN PASTRY PRODUCTS: |
| Bread, biscuits and rolls with milk and honey Tartines: honey with butter (margarine) and cinnamon; Salads and sauces; Preserved vegetables and fruits: Steaks prepared with honey. | Gingerbread; Saraille; Baklava; Mucenici etc. |
| HONEY AS A THERAPEUTIC ADJUVANT: | PHARMACEUTICAL FORMS WITH HONEY: |
| Deficiency states; Overwork, weakness, insomnia; Hangover; Senility, diabetes*; Topical: protective and soothing in burns and wounds. | Syrups; Tonic wines; Medicinal vinegar; Gelatin capsules with honey. . |
| HONEY AS ENERGY SUPPORT: | HONEY AS A COSMETIC ELIXIR: |
| Performance athletes; Students and pupils; Convalescents. | Mask for care and revitalization; Bath scrub and/or foam; Hair conditioner; Make-up removal gels. |
| HONEY IN FERMENTED PRODUCTS: | INDUSTRIAL USES: |
| Hydromel (Mead); Beer; Soft drinks with fragrant fruits and flowers; Alcoholic spirits (brandy, punch). | Tobacco industry-for hygroscopicity; Horticulture-for rooting; Pharmaceutical industry-as a sweetener; |

* *Only under prior medical supervision and advice.*

2.1. ONLY UNDER PRIOR MEDICAL SUPERVISION AND ADVICE

Towards the end of the 20th century, professional beekeepers appeared who practiced beekeeping on an industrial scale, and honey production also exploded in several countries around the world, such as Mexico, Argentina, Australia, China, etc. However, the quantity of sold honey experienced large fluctuations from year to year for various reasons. In order to cope with fierce competition, large traders who handled large quan-



Shelf with honey jars at the fair.

tities of honey, the processing of which became increasingly complex and mechanized, sought to obtain standard honey. Using mixtures of different origins, additives or corrective technologies (ultrafiltration, acidity neutralization, etc.), attempts are made to obtain large quantities of standard commodity honey, often of unsatisfactory quality. The processing of honey through modern technologies and the production of a cheap “mass-market” product irreversibly distorts the miraculous natural qualities of honey, and multinational companies make a profit by selling a large volume of goods as “mass-market honey”.

Honey counterfeiting is a global phenomenon. Authorities in all countries are involved in thwarting the evil actions of companies involved in the ever-evolving honey fraud.

2.2. PREMIUM HONEY

Romanian *premium* honey - is a hope for modern beekeeping. We consider *premium* honey, a monofloral honey and/or polyfloral honey of known botanical origin, unprocessed (virgin), coming from the nectar brought to the hive together with the pollen, micronutrients, enzymes and aromas (essential oils), specific to the melliferous plants in the area. This type of honey is obtained by the beekeeper based on a good practice guide, which does not need to be processed and which has kept its beneficial qualities alive and unaltered from harvesting to the consumer. It is preferable that this honey be produced and stored separately from the bees in stores (hoards).

Virgin honey (unprocessed) is honey extracted from honeycombs, strained, homogenized, decanted and cleaned of floating impurities and is unheated. Unprocessed honey must be stored in the dark, in closed food containers and at a constant temperature (14-16°C). Bee honey extracted from honeycombs is thermolabile, photosensitive, hygroscopic and oxidizes very easily. Honey, if harvested hygienically, if stored under appropriate conditions of light, temperature and humidity and does not degrade in the "harvest-storage circuit", can have an unlimited shelf life. "*Et tamen degradatio*" - and yet it degrades - if honey is not regarded as a living, easily perishable product within the production and sales chain and if a good practice code is not followed. At the 47th Apimondia Congress (Montreal 2019) and beyond, it was requested that honey on the market should have full traceability from beekeeper to con-



Ceramic pot with honey

sumer. *Premium* honey must have the beekeeper's name and the guarantee stamp of the associative form on the label.

Unprocessed (virgin) honey - unheated - packaged immediately after harvest can crystallize naturally or in a controlled manner. Controlled crystallization can be done by adding crystallization yeast or by slow homogenization and uniform spreading throughout the mass of small crystallization nuclei. Its decrystallization, if necessary, must be done by kneading, or by heating to 40-45°C. In addition, its selling must be preferably done in short supply chains (markets, drugstores, phyto-pharmaceutical stores, etc.) and storage, pre-packaging, marking and distribution should also be done with the help of associative forms.

Pure, virgin (unprocessed), premium honey can also be considered a medicine. Due to its biological properties, honey has been used in medicine since the beginning of history and is still used today as a medicine (topical, oral) but also as a therapeutic supplement. Premium honey must be promoted by us, beekeepers, who must guarantee its quality, and a scientific approach to the use of honey, applied on a case-by-case basis, as a medicine or as a therapeutic supplement can only be made by bee-phyto-aroma-therapist specialists. Crystallized premium honey, after homogenization and/or mechanical decrystallization, must be pre-packaged and distributed in the form of cream honey.

Premium honey is also honey in honeycomb, fully honeycombed, which has not changed its qualities in contact with air. Honey in honeycombs is valuable because it does not allow contamination, does not oxidize because it does not come into contact with air, and when stored in optimal conditions it maintains all its qualities, including its commercial appearance.

Romanian honey obtained through the premium method can compete in quality with the most expensive, most elaborate and rare kinds of honey on the market, such as Manuka (New Zealand, Australia), Pine Honey (Greece, Turkey), White Honey (Ethiopia), etc. It also rivals specialty products with certifications, such as halal-certified Polyfloral Honey from the El Bierzo region (Spain). Quality depends on our actions as beekeepers. Romanian premium honey is a necessity and a hope for modern beekeeping. We must offer only premium honey on the market. Romanian organic honey* is also an important future objective, alongside premium honey, which we will have to take into account.

*"Organic" honey requires the guarantee of an official control body..

2.3. CREAM HONEY (directed crystallized honey)

To eliminate the shortcomings related to crystallization or recrystallization of honey during storage, a fine crystallization method (appreciated by consumers) can be applied for obtaining cream honey. Liquefied honey is subjected to a directed recrystallization process (Dyce procedure or another one, usually kept secret). Directed crystallization can also be done by adding crystallization yeast or by slow homogenization to spread the crystallization nuclei

throughout the honey mass. Blending and homogenization – is performed in the case of large quantities, and of the same quality by large producers. Thus, honey from several harvests (sources) can be subjected to the mixing (blending) and homogenization process. This measure is more often applied in the case of polyfloral honey.

2.4. HONEY INTENDED FOR THE FOOD INDUSTRY (honey for cooking)

Mass-market honey, which does not fall within the parameters established for raw, premium honey, is used in the household or in the food industry. It is required that a food product declared "honey or with honey" is not marketed if it does not contain at least 50% honey of the total amount of sugars. Bioengineering in the fermentative food industry produces vinegar, mead and beer from honey. In pastry, gingerbread, sarailii and kataif are highly valued, but only and only if they are prepared with honey.

When sugar is used in combination with honey in pastry and confectionery products, they will never have the delicate taste or texture of the original product that only honey can impart.

2.5. PROCESSED HONEY

Honey processed with added food products, made in the food or household industry, to which various products are added as food supplements, to make it tastier, more savory, more valuable or to transform it into an energizing, psychoactive or aphrodisiac product, often toxic, raises a big question mark, especially if a standard is not respected and it cannot be verified, tested and analyzed in detail.

Honey with added natural products should be consumed with caution, because it is usually made in the household industry, without standards, without pertinent research and analysis. The presence and the continued placing of these products on the market, especially in fairs and markets, is a reality and their nutritional and therapeutic value is illusory and difficult to prove.

Filtering and blending. It is usually used to create large batches of product, with similar properties. Filtration also removes pollen grains and the geographical origin can no longer be determined. Blending, in industrial quantities, usually hides some defects and turns the honey into a "mass-market good" with questionable properties.



Manuka honey in a special presentation.

2.5.1. ADULTERATION

We encounter it more and more often. For adulteration, sugar syrups of various botanical origins as well as syrups hydrolyzed from cereals are used. It goes as far as one even uses artificially inverted syrups. Synthetic sweeteners, thickeners or preservatives are also used. Ultrafiltration is used to remove pollen in order to mask the origin in the case of a mixture with honey.

Indirect adulteration. Honey coming from bees which were fed sugar syrup or hydrolysates made from starch is honey that has been adulterated indirectly with the help of bees. Although bees process and store the resulting product in the cells of the honeycombs, its origin is artificial. This honey lacks plant enzymes and all other natural components of honey that originate in nectar, pollen or honeydew. Also, sugars are found in a different proportion than in natural honey. This operation also leads to early wear and tear of worker bees, to the shortening the bees' lifespan and to compromising natural harvesting. (Popescu & Meica 1997)

In beekeeping practice, in periods of drought, in the absence of harvesting or in spring, supplementary feeding is accepted with the aim of stimulating the laying and of obtaining a vigorous generation of bees. In order not to compromise the honey during harvesting, the nest is separated from the stores (compartments) by Hanneman's grace and the honey is extracted only from the compartments.

Intensive feeding with sugar syrup or starch hydrolysates for the purpose of obtaining commercial honey is a crime (it is prohibited)

2.6. DEPRECIATED HONEY

Fermentation usually occurs after honey has crystallized and is stored under inappropriate temperature and humidity conditions. The lower tendency to crystallize indirectly prevents the development of yeasts. Honey is hygroscopic and can gradually increase its water content if stored in humid spaces and in poorly closed containers. This type of honey presents very high values of the diastase index due to the production of amylase by the yeasts in their active phase. The fermentation of honey is triggered by a wide range of yeasts, to which some bacteria with the ability to ferment sugars can also attach. These microorganisms can come from nectar, honey, pollen, but can also come from the air and from all surfaces with which honey comes into contact. The level of contamination with fermentation germs is influenced by hygiene conditions throughout the entire process — from honey extraction to conditioning, storage, and packaging.

The storage temperature influences the fermentation of honey. We can avoid fermentation by storing it at temperatures below 10°C or above 20°C and in tightly closed containers. The onset and development of initial honey fermentation can be alcoholic, producing ethyl alcohol and carbon dioxide as end products. This may be followed by acetic fermentation, which occurs as a secondary or later stage. During the fermentation process, the honey swells and tends to come out of the container due to the release of carbon dioxide. Acetic fermentation sets in slowly and it usually happens at the upper layer. Fermented honey is not recommended for human consumption. It can be used industrially to produce alcoholic beverages or vinegar.

It is not recommended to harvest honey from uncapped combs because of its immaturity and high-water content. To avoid the risk of fermentation, only capped honey — with at least two-thirds of the comb surface sealed - and a moisture content below 18% should be harvested.

The decisive factor which triggers fermentative spoilage is the water content of honey at harvest time. Honey with a moisture content of 17–19% and low yeast contamination demonstrates resistance to fermentative spoilage.

HOW DOES HONEY DEGRADE?

NEGLECTFUL HARVESTING:

Field harvesting: dust, spores, organic particles;
Harvesting frames from the nest or from diseased colonies;
Using improper containers (vessels) for food products.

The careless beekeeper loses customers.

IMPROPER STORAGE:

Hygroscopicity – water absorption and foreign odors;
Acetic or alcoholic fermentation;
Crystallization anomalies. (phase separation, arborescent or coarse crystallization, crystallization sediments).

The jar of honey can be stored at room temperature.

HONEY DECRYSTALLIZATION BY HEATING, HEAT TREATMENTS:

Changes in color and taste;
Neutralizes enzymes and flavors;
Increases the amount of hydroxymethylfurfural.

A teaspoon of honey added to hot tea or coffee maintains its qualities.

PREPARATION FOR SALE THROUGH COMMERCIAL PROCESSES:

Blending to correct defects;
Ultrafiltration;
Removal of water by vacuum evaporation;
Other processes (usually secret) !?

Transformarea mierii de albine dintr-un produs natural neprețuit într-un îndulcitor banal'

2.7 HONEY MADE FROM TOXIC OR GENETICALLY MODIFIED PLANTS (GMO)

Toxic honey has a long history, it is obtained from plants producing toxic nectar, plants that are not found massively in the Romanian flora. The first references were mentioned since antiquity. Toxic honey is described as *meli oenomenon* ("crazy honey") and it is also referred to as *miraculum mellis* or "miraculous honey". Crazy honey has turned into an aphrodisiac drug from a biological weapon. Consumed in excess, toxic honey can cause low blood pressure, nausea, dizziness, fainting, visual disturbances, etc. The effects are similar to a drug, they last up to several hours and can also include limbs and mouth paralysis, profuse salivation, sweating, vomiting, loss of balance, high excitability, muscle weakness, hallucinations, violent convulsions and even death.

However, toxic honey is also used as a treatment for high blood pressure, stomach diseases, diabetes, and to enhance sexual performance, its aphrodisiac effect being well

known. In very exceptional situations, there may be cases when honey derived from certain nectar sources may cause transient toxicity, hallucinations, or other temporary disorders in humans.

At the European Union level, the cultivation of genetically modified plants is strictly regulated. Currently, there is no requirement for costly analyses related to new quality criteria or additional restrictions on the marketing of bee products. (Dobrescu-2011) However, we must be careful, as beekeepers, not to use protein supplements obtained from genetically modified plants (GMOs) in the bee food.

Eventually, the guarantee of honey quality can only be proved by the beekeeper and the associative forms he is a part of, through traceability control and appropriate marking.

2.8 HONEY WITH RESIDUES

In recent years, honey has been increasingly checked for contamination with impurities and residues, both by beekeepers through unadvised antibiotic treatments and by farmers through excessive chemicalization of agriculture. Official regulations establish maximum residue limits (MRLs) for pesticides and antibiotics in honey, typically expressed in nanograms per gram (ng/g). What is worrying is the fact that systemic pesticides are increasingly used, which penetrate the entire plant, which contaminate not only nectar but also pollen, or pesticides are used, resistant to biodegradation, which decompose slowly and pollute the soil, air and surface or groundwater for decades. Honey can be contaminated with residues if hygiene rules are not followed during harvesting, storage to packaging and distribution. It is necessary to avoid contamination of honey with pesticides and to prohibit treatments with pharmaceutical products not recommended by specialists. No prophylactic antibiotic treatments are performed in apiaries.

2.9. SURROGATES

2.9.1. VEGAN HONEY !?

According to **Donald Watson's** definition, veganism is a lifestyle that excludes any form of exploitation and cruelty against animals and birds, and the vegan diet must exclude foods such as: meat, fish, eggs, milk, roe, honey and any other product obtained from animals. Therefore, honey was included on the list and most vegans do not eat honey, considering it a product of bee exploitation (?!) – a controversial topic, which has given rise to numerous polemics. There are already several products on the market called "honey not produced by bees" or vegan honey.

It is not known how it got this name, vegan honey but it is certain that it is not made by bees although it perfectly resembles honey, it has the same color and the same consistency. Some consumers even prefer vegan honey because they find it much better and more aromatic (artificial) and it is cheaper. The so-called vegan honey in America is nothing more than a mixture of sugar, fruit juice (apple) and lemon juice in certain concentrations to imitate the consistency of honey. Natural honey, produced by bees, - due to anthropogenic mercantile actions in agriculture - is increasingly difficult to find, it is produced in ever smaller quantities and will soon become a luxury product, particularly expensive.

We already consume impressive amounts of counterfeit honey, to which a lot of sugar and sweet fruit, corn or maple syrups are added. From here to vegan or artificial honey was only one step away! The fact is that bee populations are in massive decline, and the reason is not their exploitation for honey, but intensive agriculture - monocultures (green deserts) and

pesticides, poisons used to protect grain, vegetable or orchard crops through chemical treatment. Beside all these, one can mention massive air and water pollution, the destruction of natural green spaces (flower meadows), deforestation and the increasing reduction of natural and clean areas where bees can find vital resources.

2.9.2. ARTIFICIAL HONEY

Artificial honey on the market is a syrup containing mono or disaccharides. It is a surrogate, a counterfeit, a forgery. It has neither enzymes, nor flavors, nor trace elements, nor vitamins, which are the characteristic features of the natural product. Medicinal and cosmetic properties are absent. It is only a sweetener. Guaranteeing the quality of honey placed on the market by beekeepers is essential both for public health and for maintaining the good image of honey as a food and medicinal product, as well as the reputation of beekeeping as a valuable activity. Bee honey is part of the category of products that are susceptible to a wide range of falsifications through substitutions or unauthorized additions. The arsenal of modern analytical methods and techniques available to specialized laboratories allows highlighting the physicochemical and sensory qualities and detecting all types of counterfeit. The detection of falsifications is based on target analyses and their interpretation according to several criteria. The trouble is that these analyses are very expensive.

Artificial honey cannot be assimilated to bee honey.

3. HOW DO BEES PRODUCE HONEY? (Melliferous base)

Honey production comes from plants that require pollination by insects. Melliferous plants provide bees with the pollen and nectar necessary for the colony survival and development. Honey represents the surplus produced by bees after meeting their nutritional needs. The honey base of an apiary is represented by all the honey plants within the bees' range of activity (1-3 km).

The honey base of a beekeeping operation must have as many and as varied species of nectar and pollen-producing plants as possible nearby, with different flowering periods throughout the entire beekeeping season. In the Romanian flora, about 3,700 species are described, some of which are pollen and nectar-producing, and over 12% of the plants are used in scientific and traditional medicine. Honey plants can be divided into cultivated agricultural honey plants, fodder plants, medicinal plants, fruit trees and shrubs, forest or delta plants, honey plants from meadows and pastures or plants specially cultivated for bees (honey conveyor). Protected areas, bee colonies, botanical gardens and other areas, far from intensive agriculture, which is based on chemicalization and monoculture, can be ideal areas for raising bees. In a modern, ecological agriculture, the honey conveyor is a system of organizing apiaries and of planning the cultivation of honey plants to ensure flowering and the supply of nectar and pollen necessary for bees from spring to autumn.



THE MAIN TYPES OF ROMANIAN HONEY

| ASSORTMENT | COLOUR | FLAVOR | TASTE | PARTICULARITY |
|------------------|---|-----------------------------------|----------------------------------|--|
| Acacia honey | Transparent with yellowish tints | Discreet acacia flowers | Very sweet, pleasant | Very appreciated. Rich in fructose. Recommended for diabetes. Hard to crystallize |
| Rapeseed honey | White to light yellow | Discreet, pleasant | Temperate sweet | Rich in pollen, the granules can reach 100% Crystallizes in a very beautifully directed manner |
| Linden honey | Yellow with light green reflections | Intense, of lime blossom | Pleasant, minty | Rich in pollen, the granules can reach 70-80%. Calming effect, recommended for insomnia |
| Raspberry honey | Yellow with a greenis, reddish tint | Discreet, raspberry | Pleasant, sweet | Viscous or crystallized fluid mass. Specific pollen grains |
| Sunflower honey | Bright, golden yellow to orange | Delicate, specific for sunflowers | Strong sweet | Rich in pollen, the granules can reach 100%. It crystallizes slightly coarsely |
| Meadow honey | Light brown to reddish brown | Pleasantly flavored | Bittersweet | Viscous or crystallized fluid mass, very diverse pollen grains |
| Polyfloral honey | Light brown to brown | Pleasant, well-marked aroma | Sweet, pleasant | Viscous or crystallized fluid mass, very diverse pollen grains |
| Honeydew honey | Brown, reddish yellow to greenish black | Characteristic | Pleasant taste, moderately sweet | Traces of pollen. Rich in mineral salts. Manna granules. Sticky consistency |

3.1. HONEYBEE FORAGING POTENTIAL

Honeybees forage most intensively within a radius of 1 or 2 km from their hive, but they have been seen flying at distances of almost 13 km. (Eva Crane; 1979). The flight area of a colony is variable and irregular depending on the relief, nectar-rich vegetation, weather and other insufficiently studied conditions.



3.2. THE FORAGING POWER OF A BEE COLONY

The foraging power of a bee colony is mainly made up of older workers, if and only if there are enough young bees to care for the brood and maintain the temperature in the nest.

3.3. THE HONEY POTENTIAL OF DIFFERENT PLANT SPECIES

The honey potential of different plant species represents the theoretical amount of honey that could be obtained in a season from one acre cultivated (or covered) with the respective plant. It is assumed that there are optimal climatic and vegetation conditions and sufficient foraging bees.



3.4. ENSURING THE FLORISTIC QUALITY

Ensuring the floristic quality of the area where bees carry out their activity is increasingly difficult for the beekeepers. Nectar is collected by bees from the natural environment where it is secreted by millions of flowers. In the times we live in, climate change, irresponsible anthropogenic actions, excessive chemicalization, monocultures, the destruction of biodiversity, such as pollution and defective waste management, the impact of water resources, but also air currents, destroy biodiversity and can contaminate or reduce nectar secretion.

4. HONEY. MINIMUM RULES FOR HARVESTING, STORAGE AND DISTRIBUTION

Honey production by bees is a complex process that begins with the collection of nectar, followed by its storage in its honeycomb cell and its biochemical transformation with the help of enzymes secreted by bees. Meanwhile, approximately 90% of the sugars in nectar (polysaccharides) end up in the form of simple sugars (monosaccharides). At the same time, humidity is reduced through trophallaxis and ventilation to around 20%. After this stage, the bees cover the cells with a thin layer of wax. Modern exploitation technologies assume the harmonious development of the colony. If we want to have quality honey, we should not harvest honey from the nest, but use separating grates for the queen between the nest and the stores (cat).

4.1. THE HARVESTING OF THE HONEY FRAMES

The harvesting of the honey frames is done only after this maturation process is completed, namely when the honeycombs with honey are mostly covered (at least 2/3 of their surface) before being harvested from the hive. This stage requires the removal of bees from the honeycombs, which can be done by using special bee lids (bee chaser), by shaking and brushing, or by using air blowers. The use of bee repellents (substances for their removal) is not recommended in order not to pollute the honey or wax. The use of excessive smoke is also not recommended.

The harvested honeycombs are brought as quickly as possible to the extraction chambers. Before extraction, the honeycombs are stripped. Stripping should be done without heated knives so that the taste of wax does not remain in the honey. Honey can be extracted using several methods: by pressing, by free-flowing, by centrifugation, or by melting at a controlled temperature, followed by conditioning of the honey.



2/3 covered frame.

4.2. THE MAIN POST-EXTRACTION HONEY CONDITIONING OPERATIONS

The main post-extraction honey conditioning operations that can be applied by beekeepers are: pre-filtration (strain); clarification (decanting and elimination of impurities that separate on top). To avoid contamination of honey by bees, permanent extraction chambers (photo) are recommended in large apiaries in which the HACCP (Hazard Analysis Critical Control Points) system should be applied. This system applies a systematic method of identifying, evaluating and controlling contamination risks and ensures maximum safety conditions and guaranteeing product quality.

4.3. HONEY STORAGE

Honey storage will be done in a dry, cool place (10-20°C, ideally +15°C) and away from a direct light source. The use of rooms with temperatures higher than 35 °C is prohibited. If the honey humidity is above 19%, storage must be done in cold spaces (below 11°C).

4.4. LIQUEFACTION OF CRYSTALLIZED HONEY

In the case of crystallized (sugared) honey in storage containers, for bottling, **de-crystallization** is necessary - liquefaction of honey by heating must be done under controlled temperature conditions. The most widely used method of decrystallization is heating honey in thermostatic chambers at a temperature of 45°C for 24-48 h. Decrystallization is one of the most important operations to which the beekeeper must pay increased attention in order to preserve the integrity of the natural components of honey. Improper decrystallization leads to the increase of HMF, a compound resulting from the decomposition of fructose, but also to the destruction of enzymes and other biologically active substances that are thermo-

labile. Therefore, liquefaction of crystallized honey must be done in specialized units, if possible mechanically and under laboratory control.

Thermal treatment carried out under empirical conditions leads to the degradation of honey, through the formation of furan compounds, darkening of color, development of a caramel-like taste, weakening of its characteristic aroma, and the transformation of honey into an ordinary sugar solution.

4.5. PREPARING HONEY FOR SALE INVOLVES BOTTLING AND LABELING

Bottling is usually done in small food-grade containers, ensuring the mandatory information on the label. Therefore, in order to be closer to the definition of honey which needs to be recognized by the consumer as a natural product, unmodified by any processing operations, either direct or indirect, it is important that the honey produced and packaged by the beekeeper can be labeled with the mention e.g. "honey conditioned at the apiary, by the beekeeper or by the association".

Commercial honey must be labeled correctly. The label must specify the origin, sugar content, HMF (hydroxymethylfurfural) content, acidity and other relevant information. These criteria ensure the quality and authenticity of honey for consumers. If you want to use honey as medicine, you should call on specialists in bee nutrition.

According to the latest legislative amendments, producers, processors and traders are required to visibly display the country of origin for bee honey on the label, and for honey blends originating from the European Community and/or third countries, producers, processors and traders are required to visibly display the country or countries of origin on the label, as appropriate. The QR code with traceability information must not be missing from the label.

Apiary



4.6. THE ROLE OF THE BEEKEEPER IN THE HONEY QUALITY ASSURANCE SYSTEM

At present, there is a great variety of factors that amplify the harmful anthropogenic pressures that threaten beekeeping. Among them, we can identify the following: unfair competition from those who have monopolized the market, the tendency to falsify honey along the production, acquisition, and processing chain through blending, and the price monopoly imposed by large retailers—who aim to sell cheaply at the expense of quality—along with the abusive, excessive, and uncontrolled use of chemicals by farmers.

As beekeepers, we know Romanian honey very well, its special nutritional qualities, its healing and regenerating power, its pleasant and aromatic taste. We must preserve these qualities at all costs. We must be very demanding of ourselves and strictly respect good practices, from the beekeeper's chisel to the consumer's spoon (harvest, handling, storage, pre-packaging, sale, consumption),

In order to offer consumers monofloral (preferably) or polyfloral (from a specific geographical area) premium honey with healing qualities, rich in pollen, enzymes and essential oils, we must have the guarantee of a healthy apiary.

After harvesting, honey must be stored in closed containers (they can also be food storage bags or well-cleaned and disinfected packaging) and at a constant temperature because, at low temperatures, honey crystallizes and at high temperatures, honey ferments. Bee honey is hygroscopic and absorbs moisture from the air, it dilutes and favors the fermentation of yeasts. Decrystallization must be done mechanically (cream honey) or at a constant temperature below 45°C in cabinets or thermostat rooms.



High temperatures (above 80°C) alter the aroma and taste of honey. Enzymes are lost, the fragrance of flowers (essential oils) disappears and fructose is degraded, ultimately losing the therapeutic qualities of premium honey.

WHAT WE LOOK FOR WHEN ANALYZING HONEY

MOISTURE

Water content is regulated by standards. Exceeding the amount of water in honey reduces its nutritional value, alters its organoleptic properties and predisposes it to fermentation.

DEVIATIONS FROM SUGAR CONTENT

The content of invert sugar and sucrose exceeding the standards indicates that honey was likely to have been harvested from uncapped combs, that the honey is fermented or that the honey is adulterated.

ENZYME LEVELS IN HONEY

The brutal heating of honey causes thermal inactivation of enzymes. The quantitative value of enzymes in honey also changes when honey is indirectly adulterated by the bees which were fed syrup or when honey is mixed with artificial invert sugar syrup.

ACIDITY

Free acidity is exceeded in the case of adulteration with artificial invert sugar syrup through chemical hydrolysis. Active acidity (pH) is given by the level of dissociated organic acids.

ELECTRICAL CONDUCTIVITY

Parameter used to verify the authenticity of manna honey.

HYDROXYMETHYLFURFURAL (HMF)

Exceeding the regulated values occurs through the use of non-compliant storage, conditioning and packaging practices.

POLLEN SPECTRUM

Correct assessment of monofloral honey variety, area of origin and harvesting period.

ANTIBIOTICS, PESTICIDES, COUNTERFEIT AGENTS

5. HONEY ANALYSIS

Honey examination is performed to assess its quality and purity, to establish the origin, the state of degradation or alteration, but also to establish and detect adulterations and involves several stages. The first examination is the organoleptic one when we assess the general appearance of the product, the label and the way it is presented with the help of the senses (sight, smell, taste). On the market, many products are sold under the name 'honey'; therefore, they must be differentiated by both origin and type, either before or after processing.

For routine commercial analyses, after the organoleptic examination, the humidity, HMF (hydroxymethylfurfural), pH, free acidity and diastase index are determined. When we

want to better characterize a honey assortment or when there is suspicion of degradation, contamination with residues or adulteration of honey, the set of analyses and the parameters we are looking for are expanded.

5.1. ORGANOLEPTIC ANALYSIS

In the colony, or immediately after extraction, honey has a fluid consistency. Viscosity is determined by the water content. It is fluid-thin when the humidity is above 20% water and fluid-thick when the water content is below 20%. Honeydew honey, due to its specific composition (pectic and gummy substances) has a fluid-sticky viscosity.

After extraction, the appearance is generally transparent and bright, but it may become opalescent or cloudy when sugar microcrystals appear. Crystallization can be incipient, partial, or total. Partial crystallization is common and is characterized by the distinct separation of the liquid-solid phases. The liquid phase occupies the upper layer. The solid phase is made up of large, rough crystals. In fermented honey, we notice a pronounced alcoholic or acetic aroma and taste, reminiscent of fermented fruit pomace.

Crystallization is a natural characteristic of almost all types of honey and is due to the fact that most types are supersaturated solutions of sugars. The limit of honey crystallization corresponds to a fructose to glucose ratio of 1.30. In pure acacia honey, this ratio is higher than 1.30 and it will crystallize more slowly, for the other types, the ratio is less than 1.30 and they will crystallize more quickly.

Depending on the factors that condition it, crystallization can be incipient, partial or total and the crystals can be fine, medium or coarse. The crystallization of honey - especially when we obtain it in a controlled manner - can be considered a guarantee of its authenticity and quality.

The crystallization of honey is a natural process and is a guarantee of its authenticity and quality.

5.2. MICROSCOPIC ANALYSIS

Honey microscopy is performed on honey as such and on the sediment obtained by centrifuging the honey solution. Direct examination detects microcrystals of sugars, residues, manna indicators, starch granules, etc. Botanical and geographical origin, harvesting period are determined by pollen analysis. Pollen analysis certifies the botanical origin, authenticity of plant components and therapeutic qualities.

5.2.1. DETERMINATION OF IMPURITIES

The content of impurities is determined in the laboratory and calculated as a percentage. Water-insoluble substances must not exceed 0.1%. By examining the sediment deposited by a honey solution in water, we identify foreign bodies.

5.2.2. THE POLLEN SPECTRUM

The pollen spectrum is the basic criterion for determining the area of origin, the harvesting period and especially the correct classification of the monofloral honey variety. It also constitutes a helpful criterion for detecting counterfeits.

The pollen density in honey differs from one variety to another. The lowest density is found in the mint and acacia assortment and the richest in the sunflower assortment. Fully adulterated honey does not contain pollen and in partially substituted honey the pollen density is insignificant. For a specialist, even the attempt to add pollen is easy to detect. Manna honey contains mainly pollen grains coming from anemophilous plants and also microscopic formations generically called manna indicators.

5.2.2.1. SPECIFIC POLLEN GRAINS

Specific pollen grains compared to the total number of pollen grains examined (%) are an important indicator in honey analysis. For monofloral honey, specific pollen grains percentages are considered to be at least 15% for mint, 20% for acacia, 25% for linden, 35% for sunflower, 55% for rapeseed, etc.

5.3. DENSITY

Density (specific gravity) refers to the ratio between mass and volume. The density of honey is strongly influenced by its water content.

5.3.1. THE WATER CONTENT

The water content is regulated by official norms at a maximum of 20% for floral honey and 23% for honeydew honey. We can determine the moisture content of honey using a refractometer, by extracting with organic solvents, or by drying in an oven. We can find out the water content by weighing because there is a direct correlation between the density of honey and the water content. There is also a correlation between the water content and the refractive index. These particularities allow the calculation of a parameter from another one with great practical significance. The density and refractive index are the most easily determined. The excess water content reduces the value of honey and predisposes it to fermentation.

5.4. DEFLECTION OF POLARIZED LIGHT

Floral honeys are levorotatory (optically active to the left, or negative), while honeydew honey or adulterated honeys are usually dextrorotatory (optically active to the right, or positive). Using a polarized light microscope, we can identify sugar crystals and starch granules in honey.

5.5. DETERMINATION OF ASH

The honey sample is calcined to constant mass and the result is expressed as a percentage. Ash should not be greater than 0.6% for floral honey and 1% for honey.

5.6. MICROBIOLOGICAL INDICATORS OF BEE HONEY

The total number of microbial germs, which should not be bigger than 300 units per gram, is determined microbiologically. The number of yeasts should not exceed three units per gram and molds should be absent. If this number is exceeded, the honey has limited shelf life or is unfit for consumption.

5.7. HYDROXYMETHYLFURFURAL

Hydroxymethylfurfural (HMF) originates in honey, following the partial decomposition of fructose. In case of substitutions (falsifications) HMF may be of exogenous origin. Accepted values of HMF (hydroxymethylfurfural) are between 15-40 mg per 1000 g of honey. The absence or exceeding of the regulated values is observed in the case of honey adulterated with artificial invert sugar syrup or in the case of deteriorated natural honey.

5.8. DETERMINATION OF ACIDITY

Due to the content of organic acids, the chemical reaction of honey is acidic. Free (titratable) acidity refers to all acids and salts with an acidic reaction found in honey. It is calculated and expressed in ml (One normal (1 N) sodium hydroxide solution is used to titrate 100 grams of honey). The regulated values are max. 4.0 ml for flower honey and 5.0 ml for manna honey. Active (real) acidity refers to acids in dissociated form and is expressed in the form of pH units. Normal values are within the pH limits of 3.5-4.5. Acidity can be exceeded in the case of fermentative alteration. In the case of adulteration with invert sugar syrup, the reaction can be strongly acidic if the acid used has not been neutralized, or neutral to alkaline in the case of excessive neutralization.

5.9. DIASTASE INDEX

Honey has a rich and varied enzymatic equipment: invertase, amylase, catalase. Enzymes in honey catalyze the chemical reactions that occur in the process of transforming complex sugars into simple sugars. Their presence proves the authenticity and quality of honey. To verify the quality of honey, amylase was chosen as a global enzymatic indicator (diastase index) because it is the most stable enzyme compared to the others. The average normal value for the diastase index is 10.9 (6.5 for acacia honey, minimum 13.9 for manna honey). The weakening of enzymatic activity occurs by brutal heating of honey or by its storage at high temperature. The lack of enzymatic activity occurs when honey comes from bees intensively fed with sugar syrup or honey is adulterated with artificial inverted sugar syrup. In the case of fermentative alteration, the diastase index tends to reach 50 or more.

5.10. SUGARS

Another group of analyses refers to the content of sugars and other carbohydrates in honey. Fructose, glucose, sucrose, fructose/glucose ratio and invert sugar are mainly determined. Determining the content of invert sugar and sucrose constitutes basic criteria for verifying the authenticity of bee honey. Current analytical methods for determining invert sugar are based on the reducing properties of glucose and fructose. In addition to invert sugar, mono, di and trisaccharides found in honey are determined. The minimum content of invert sugar in flower honey must be 70% and that of manna at least 60%. The term 'invert sugar' is a conventional expression; the correct designation is 'reducing sugars,' expressed as invert sugar equivalents.

The maximum content of sucrose is 5% in flower honey and 10% in manna and acacia honey. Exceeding the maximum limit of sucrose confirms adulteration. Polysaccharides (malto-dextrins) can be found only in trace amounts without quantitative significance. The presence of poorly hydrolyzable sugar (dextrins) is not allowed. There are as many types of

honey as there are nectar-producing plants. Rapeseed, acacia, linden, sunflower, mint honey can be harvested from honey pools. Also, raspberry, mustard, alfalfa, chestnut honey etc. is harvested.

5.11. ELECTRICAL CONDUCTIVITY

Electrical conductivity is one of the parameters used to verify the authenticity of honey derived from the manna tree. Honey from the manna tree contains a large amount of mineral substances, acids and nitrogenous substances. Honey has a low content of mineral substances (0.1% flower honey - maximum 1% manna tree honey). Exceeding the maximum limits occurs when careless work is done during extraction and the honey is contaminated with dust or when the honey has prolonged contact with unacceptable metal surfaces. In the case of adulteration of honey with artificial inverted sugar syrup, due to the neutralization of the acid used for inversion, the content of mineral substances and the alkalinity of the ash exceed normal values.

5.12. NITROGENOUS SUBSTANCES

Nitrogenous substances expressed in protein equivalent are found in honey below 1% (0.25 in acacia and mint honey and 0.6% in manna honey). The investigations do not stop here. We can control residues of antibiotics and chemotherapeutics or antiparasitic drugs and pesticides through standardized and accredited technologies. We can control the presence of heavy metals or genetically modified organisms (GMOs). We can control the hygiene status of the product by determining the total number of germs (NTG) and the number of yeasts and molds per gram. Deviations from the norms mean extraction from uncapped combs (when the honey production process is not completed) and technological errors in harvesting, conditioning and storage.

6. ROMANIAN HONEY – HOW DO WE HARVEST IT? HOW DO WE PRESERVE IT? HOW DO WE SELL IT?

“Never forget that the beekeeper is not just a merchant, he is first and foremost an apostle of good, of public health, an assistant to the doctor, a sweetener of the poor's bitter life, one who brings a ray of joy to children”.
(C.L. Cristea-1935)

The honey trade is at a standstill, often generated by counterfeits or mercantile market games, which promote mixed honey or cocktail honey to cover up non-conformities and/or to offer it on the market at dumping prices. Honeys with more special qualities and names or from rarer areas have also appeared on the market, with exorbitant prices that cannot surpass the quality of Romanian premium honey. To protect our interests, as beekeepers, we



Shelf with honey at the fair.

Dr. Gheorghe Dobre

must use a good practice guide in beekeeping technologies, join forces and act responsibly.

We need honey that is harvested, preserved and pre-packaged properly by the beekeeper, in a manner that preserves its natural beneficial qualities unaltered. We need medicinal honey so that we can benefit from the monosaccharides in honey, the etheric components, the minerals taken from flowers and the enzymatic composition added by the bees, and this is **premium** honey.

Standard hygiene rules represent the application of the code of good practice and, where applicable, the HACCP (Hazard Analysis Critical Control Points) system.

6.1. HONEY TRACEABILITY

Any container containing honey must have on its body (not on the lid) a label, an indication that ensures traceability: identification of the harvest lot (honey that comes from the same apiary and is harvested at the same time), identification of the batch and assortment (honey coming from different harvests or from a mixture of different honeys intended for bottling (Label chart)

We must use protected names and geographical indications on the label. Honey with a protected designation of origin (PDO) is obtained in a certain area, the quality is determined exclusively by the flora of a certain geographical area, having unique qualities.

A protected geographical indication (PGI) is the name of an area, a place, an areal. To receive PGI status, honey must be harvested from the specified area or area.



Labels that ensure the guarantee of authenticity.

6.2. PREMIUM MEDICINAL HONEY

Premium medicinal honey must be monofloral or polyfloral and must come from a well-defined geographical area. One of the most valuable products of the beekeeper, honey is considered a natural product with miraculous qualities and it is used in many fields both as food and as medicine. Since immemorial times, miraculous qualities have been attributed to it, and bees, as a symbol of diligence and order, have been used in symbolism on the nobles' coats of arms. As beekeepers, we have the task of keeping this image and these characteristics intact over time.

6.3. GUARANTEEING THE QUALITY OF BEE HONEY BY ASSOCIATIVE FORMS IS BOTH A NECESSITY AND A SOURCE OF HOPE

Individual beekeepers are weak and vulnerable in terms of economic power, therefore, knowing the risks and pitfalls of the market economy, it is necessary to



Vending machine for honey jars at the market.

unite and cooperate under the motto: one for all and all for one.

In order to be successful in negotiating the price of honey, beekeepers in a honey-producing area must come together in a club, in a beekeeping circle, in a beekeeping cooperative, because honey obtained in a known area, having the same botanical origin, is more valuable. Extraction must be done after each harvest.

Honey is the food of the gods. When we want to please children, when we have friends visiting (guests), when we crave something sweet, let's enjoy honey, which is aromatic, tasty and nutritious. Honey is a magical dessert that lifts our spirits and keeps us healthy!

The associative groups in collaboration with the Romanian Society of Phyto-Apitherapy must prioritize the distribution of premium medicinal honey to stores specializing in organic beekeeping and phytopharmaceutical products. We need short supply chains focused on delivering premium-quality honey.

HOW CAN WE BUY PREMIUM HONEY?

Storage, prepackaging, marking and distribution should be done under control and with the help of associative forms.

Carefully reading the label to restore the product's traceability if necessary.

Preferably use short supply chains:

- Beekeeping fairs;
- Online trade
- Vending machines in markets;
- Boutiques or small shops in recreational areas;
- Drugstores;
- Phytopharmaceutical stores.

Orice suspiciune trebuie anunțată autorităților și verificată prin analize de laborator.

7. LET'S NOT FORGET

Being scientifically analyzed with increasingly precise means, the number and nature of the components in honey prove to be increasingly greater, and its biological virtues increasingly unexpected. Due to its taste qualities, honey has been used as food since ancient times. Easily digested, dense and with a great energy potential, a food that can be stored almost indefinitely, honey is the only sweet that does not need processing to delight us. We can identify a multitude of varieties and variations of culinary specialties prepared with honey such as: sauces, steaks, etc.; sweets: candies, gingerbread, nougat, etc.; as well as drinks, like : liqueur, beer, mead, vinegar, etc., which are irreplaceable.

As a liquor of eternal life, honey has been used and is used in various magical and religious rituals or for embalming. It is consumed by athletes in the Olympic arena and enjoyed by astronauts in extraterrestrial space. It combats chronic fatigue, insomnia and chronic headaches. It was used by the Romanians to preserve raw game and is used by gardeners to root cuttings.

Honey is energizing, detoxifying, laxative, due to its certain biological properties ,and

it has undeniable therapeutic qualities. It can be used with discernment in various health conditions - including diabetes, due to fructose (levulose) which has a retarding effect. Used as a medicine, honey brings in small volumes of easily assimilable sugars that easily enter the bloodstream. It can be used, regardless of age, as a tonic for intellectual effort, and in pediatric medicine it has a favorable effect on calcium fixation and growth. It is successfully used in chronic respiratory conditions and in the treatment of wounds and burns. Consumed after drinking, it accelerates the metabolism of alcohol and wakes you up from a hangover. Richly represented in our country, the medicinal honey flora ensures the production of very good quality honey.

However, suspicion often arises. Honey may diminish its qualities because of pollution, feeding bees with sugar, the irresponsibility and ignorance of some ill-informed people in the use of empirical “stimulants” to increase the productivity of bee colonies, or because of the indiscriminate application of phytosanitary treatments in agriculture. All these modify the physicochemical characteristics of honey and can lead to the accumulation of residues in it. Storing honey in oxidizing vessels and preserving it in inappropriate humidity and temperature conditions can alter the qualities of honey. Adulteration, a crime from a legal perspective, degrades the product and, consequently, endangers the health of the consumer.

Honey should be consumed in moderation and must come from hives with healthy bees or treated with natural substances (organic), it is preferable to choose unprocessed honey. If hygienic conditions are not respected, there is an increased risk of botulism (a severe condition caused by the botulinum toxin*), if raw honey is offered to children under one year old who have an immature digestive system, it can also cause health problems. Honey should not contain foreign substances, such as pesticides, antibiotics or heavy metals. Api-phytotherapy specialists should be consulted to give proper advice about consuming honey as medicine. Its preservation must be done in optimal conditions, the more it is exposed to heat and light, the more ingredients in the composition of honey will lose their value. (Stranț Mirela s.a. 2018)

Although we have been benefiting from bee products for thousands of years, even today we are trying to discover behaviors and phenomena characteristic of the bee colony, which are still shrouded in mystery. The bee colony responds to stimuli and works all the time to adapt to the environment. Mercantile and devastating anthropogenic actions, climate change, as well as natural disasters can lead to extinction. We cannot wait for providential mercy, we must act. Compared to wild colonies that usually perish during the winter, human-managed colonies must be defended.

*The data presented refer only to honey produced by *Apis mellifera mellifera*, in the text honey bee. We have not considered honey from other bees belonging to the genus *Apis* or from other insects.*

8. LEGISLATION AND STANDARDS

Honey on sale must comply with laws and standards regarding quality assurance. We mention SR 984-1,2,3. of 2009; European Council Directive 2001/110/EEC (on bee honey); European Council Directive 2014/63/EU (on residues); STANDARD FOR HONEY CXS 12-1981. (Revised in 1987, 2001. Amended in 2019, 2022); Codex Alimentarius. EEC Regulations 852/2002 and 853/2004 (on trade in honey). Law 4911/2003 on aromatic plants and beehive products.

9. CONCLUSIONS

9.1. We must promote and obtain **premium** quality Romanian honey. **Premium honey** (real honey) is a monofloral and/or polyfloral honey of known botanical origin, virgin (unprocessed), originating from the nectar brought to the hive together with pollen, micronutrients, enzymes and specific aromas (essential oils), which does not need to be processed and which, from harvest to consumer, has kept its beneficial qualities alive and unaltered.

9.2 The beekeeper must use modern technologies (Hanneman grates) and make sure, at each stage of the production process, that he respects the conditions of hygiene and food safety. Extraction must be done after each harvest. It is preferable that premium honey be produced and stored separately from the bees in stores (caches). This goal can only be achieved through: good hygiene practices and in accordance with the general principles of food hygiene stipulated in the Codex Alimentarius.

9.3 Obtaining non-compliant or immature beekeeping products, imports of poor quality honey, counterfeits and honey substitutes are elements that lead to market distortion and exert constant pressure on prices and the final quality of beekeeping products on the market. Addressing and preventing these practices must be a major concern of associative forms and authorities.

9.4 Wholesalers usually monopolize the market and impose prices. In a competitive economy, it is not possible for each beekeeper to manage not only production, but also processing, transport, retail or export activities independently. Where there is competition, you need professionals, because you cannot solve all your problems alone effectively.

9.5 Individual beekeepers are weak and vulnerable in terms of economic power, therefore, knowing the risks and pitfalls of the market economy, it is necessary to associate and cooperate under the motto: one for all and all for one. Premium honey can be promoted and exploited by beekeepers on the stock exchange and/or in short supply-sale chains (markets, small natural stores, vending machines, "online" trade, etc.)

9.6 Guaranteeing the quality of bee honey by associative forms is a necessity and a hope. In order to be successful in negotiating the price of honey, beekeepers from a honey-producing area must come together in a club, in a beekeeping circle, in a beekeeping cooperative, because honey obtained in a known area, having the same botanical origin, is more valuable. The price of a quality honey, in the amount of about 30 tons, can be negotiated on the stock exchange.

9.7 Commercial honey must be labeled correctly. The label must specify the origin, sugar content, HMF (hydroxymethylfurfural) content, acidity and other relevant information. These criteria ensure the quality and authenticity of honey for consumers. The honey label can and should contain protected geographical names and indications.

9.8 Without a modern standard, the processing of honey through mercantile technologies and the obtaining of a cheap "mass market" product irreversibly distorts the miraculous natural qualities of honey and in the end it becomes an open aggression against beekeepers and a ruthless discrediting of beekeeping in general.

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TABLE OF CONTENTS

| | | |
|-----------|--|-----------|
| 1. | HONEY, MEDICINE OR “MASS-MARKET GOOD”? | 1 |
| 1.1. | Honey | 3 |
| 1.2. | Why is it necessary to know the values and properties of this wonderful product? | 4 |
| 1.3. | The nutritional and medicinal value of honey | 5 |
| 1.4. | Honey composition | 5 |
| 2. | HONEY MARKET | 6 |
| 2.1. | Only under prior medical supervision and advice | 6 |
| 2.2. | Premium honey | 7 |
| 2.3. | Cream honey (directed crystallized honey) | 8 |
| 2.4. | Honey intended for the food industry (honey for cooking) | 9 |
| 2.5. | Processed honey | 9 |
| 2.5.1. | Adulteration | 10 |
| 2.6. | Depreciated honey | 10 |
| 2.7. | Honey made from toxic or genetically modified plants (GMO) | 11 |
| 2.8. | Honey with residues | 12 |
| 2.9. | Surrogates | 12 |
| 2.9.1. | Vegan honey !? | 12 |
| 2.9.2. | Artificial honey | 13 |
| 3. | HOW DO BEES PRODUCE HONEY? (Melliferous base) | 13 |
| 3.1. | Honeybee foraging potential | 15 |
| 3.2. | The foraging power of a bee colony | 15 |
| 3.3. | The honey potential of different plant species | 15 |
| 3.4. | Ensuring floristic quality | 15 |
| 4. | HONEY, MINIMUM RULES FOR HARVESTING, STORAGE AND DISTRIBUTION | 15 |
| 4.1. | The harvesting of the honey frames | 16 |
| 4.2. | The Main post-extraction honey conditioning operations | 16 |
| 4.3. | Honey storage | 16 |

| | | |
|------------|--|-----------|
| 4.4. | Liquefaction of crystallized honey | 16 |
| 4.5. | Preparing honey for sale involves bottling and labeling | 17 |
| 4.6. | The role of the beekeeper in the honey quality assurance system | 18 |
| 5. | HONEY ANALYSIS | 19 |
| 5.1. | Organoleptic analysis | 20 |
| 5.2. | Microscopic analysis | 20 |
| 5.2.1. | Determination of impurities | 20 |
| 5.2.2. | The pollen spectrum | 20 |
| 5.2.2.1. | Specific pollen grains | 21 |
| 5.3. | Density | 21 |
| 5.3.1. | The water content | 21 |
| 5.4. | Deflection of polarized light | 21 |
| 5.5. | Determination of ash | 21 |
| 5.6. | Microbiological indicators of bee honey | 21 |
| 5.7. | Hydroxymethylfurfural (HMF) | 22 |
| 5.8. | Determination of acidity | 22 |
| 5.9. | Diastase index | 22 |
| 5.10. | Sugars | 22 |
| 5.11. | Electrical conductivity | 23 |
| 5.12. | Nitrogenous substances | 23 |
| 6. | ROMANIAN HONEY – HOW DO WE HARVEST IT? HOW DO WE SELL IT? | 23 |
| 6.1. | Honey traceability | 24 |
| 6.2. | Premium medicinal honey | 24 |
| 6.3. | Guaranteeing the quality of bee honey by associative forms is both a necessity and source of hope | 24 |
| 7. | Let's not forget | 25 |
| 8. | Legislation and standards | 26 |
| 9. | Conclusions | 27 |
| 10. | BIBLIOGRAPHY | 28 |



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