



BASIC INFORMATION BOOKLET FOR MEDICAL BEEKEEPING



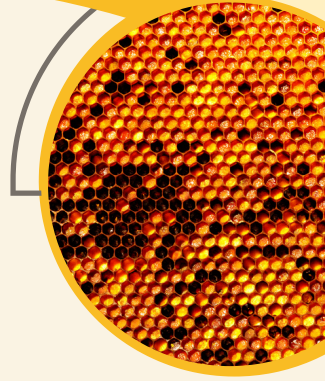
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MEDICINAL BEEKEEPING FOR BEEKEEPERS
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MEDI-BEEB

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Basic Information Booklet For Medicinal Beekeeping

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WHAT IS APITHERAPY?



Apitherapy refers to the use of bee products (e.g. honey, royal jelly, propolis, bee venom, etc.) for medical or health purposes, as supportive or direct treatment.

Apitherapy has been used throughout history as part of traditional medicine. It is known that bee products have properties such as anti-inflammatory, antibacterial, antiviral and antifungal. For this reason, it has been used to treat various health problems or relieve symptoms. For example, honey is known to promote wound healing and is used in burn treatments, and bee venom is known to relieve symptoms of some diseases such as rheumatoid arthritis.

However, in order to use bee products for apitherapy purposes, it should be known that they will be effective if they are produced in a healthy way using the right methods and stored with the right storage methods. In recent years, there has been an increase in scientific studies on the use of bee products in the field of health. In this regard, it is important to present more studies and evidence regarding the effects of each bee product.

For some people, bee products can cause allergic reactions and in some cases carry serious health risks. Therefore, it is important for individuals considering apitherapy to first meet with a competent healthcare professional and receive treatment.



LEGAL FRAMEWORK OF APITHERAPY IN TURKEY

Traditional and complementary medicine, including apitherapy, includes modern medicine as well as alternative health approaches such as various herbal treatments, natural products and traditional methods. It is important to keep traditional and complementary medicine practices under control to protect the public's health and ensure safety. Scientifically based evidence on the effectiveness and safety of such practices may be limited. For this reason, individuals considering such treatments are recommended to consult with healthcare professionals and obtain information from official healthcare institutions. In Turkey, traditional and complementary medicine practices are controlled by certain regulations. The Ministry of Health is the organization that supervises and regulates traditional and complementary medicine practices in Turkey. The Ministry has created a directive to ensure that such practices are carried out in accordance with certain standards and ethical rules.

The "Regulation on Traditional and Complementary Medicine Practices", which regulates traditional and complementary medicine practices in Turkey, came into force after being published in the Official Gazette No. 29029 dated 29 May 2014. This regulation covers the regulation, supervision, licensing, training and practice principles of traditional and complementary medicine practices.

The Regulation also aims to determine ethical rules in the provision of traditional and complementary medicine practices in the field of health to provide qualified health services and to protect and ensure the safety of patients. For this purpose, it provides a framework to determine, supervise and license the education and skills of health professionals who will perform such practices.



” PROBLEMS IN THE FIELD OF ” APITHERAPY IN TURKEY

In order to get good results in apitherapy applications, the most important condition is the appropriate product.

1-The problem is the conditions under which the products to be used for apitherapy are produced, stored and preserved using natural and correct methods. During the production phase, it is mandatory to train and supervise beekeepers in this regard and, in time, to create certified beekeepers who produce bee products for apitherapy. This project focused on this issue and aimed to educate beekeepers about apitherapy and to understand the importance of the subject.

It should not be forgotten that healthcare professionals, apitherapy experts and beekeepers play a key role in apitherapy. For people to be healthy or for the products to be used for health to be effective, it will only be possible with correct agricultural methods and natural and organic production. Therefore, the effectiveness of these and similar products used in health can be achieved through multidisciplinary studies of agricultural production fields, health fields and experts in the field.

2- Deficiencies in health, agricultural production and standardization of products used in Apitherapy are among the main factors that make it difficult to conduct clinical studies on apitherapy. More studies and updates on the subject are needed. In any case, one of the most important issues that cannot be ignored is the "quality" issue of these products.



Because, for the expected positive effect, the products used must be of high quality. Taking this situation into consideration, the relevant regulation requires chemical analysis to be performed on products to be used orally and compliance with the Turkish Food Codex.

Although the Turkish Food Codex has introduced criteria parallel to the recommendations of the International Honey Commission, the issue of quality criteria and standardization of other products to be used in Apitherapy is still being studied.

In this regard, quality criteria should be constantly updated, taking into account the scientific literature. However, at least this much can be easily said that in addition to the fact that these products to be used for healing purposes are 'genuine and natural', it is important that they should be 'pure and clean' in every aspect, both in production and in the subsequent process, and that they are consumed 'fresh'. In this regard, in addition to the quality of the products, it should not be neglected that their packaging is also of high quality and that information about 'content', 'usage', warnings and 'storage conditions' are clearly written on it.



THE MAIN PROBLEMS IN THE PRODUCTION OF BEE PRODUCTS TO BE USED IN APITHERAPY:

These problems are environmental pollution and agricultural spraying, incorrect beekeeping practices, harvesting, storage and packaging problems, difficulty in standardization and legal deficiencies. The characteristics of bee products to be used in apitherapy and the points to be considered in their production are given below:

- The area within 5 km radius where the hives are placed should be free from environmental pollution, pesticide residues and heavy metal risks.
- In the hive, there should be no residue of synthetic-chemical drugs used against diseases and pests like Varroa and etc. and biological methods should be preferred in the fight. If synthetic-chemical control is necessary, it must be done after harvest.
- There should be no residue of antibiotics.
- Harvested products must be recorded and labeled, and the harvest date must be included on the labels.



” HONEY

“Honey” is known as a sweet and dense nutrient substance that bees process and store after collecting flower nectar. The chemical and physical properties of honey may vary depending on its ingredients and production process. Here are the basic chemical and physical properties of honey:

Chemical Properties:

- **Water content:** The water content of honey usually varies between 14% and 18%. When the water content is low, the durability of honey increases.
- **Sugar content:** The main components of honey are sugars in the form of fructose (38-44%), glucose (31-35%) and sucrose (1-2%). Fructose and glucose provide the sweetness of honey.
- **Other ingredients:** Honey also contains various components such as minerals (e.g., potassium, calcium, and magnesium), amino acids, enzymes, vitamins (e.g., B vitamins), organic acids, and polyphenols.
- **Antioxidants:** Antioxidants such as polyphenols contained in honey can prevent cellular damage caused by free radicals.

Physical Properties:

- **Density and Viscosity:** Honey has high density and viscosity. Therefore, it flows slowly and remains liquid.
- **Colour:** The colour of honey may vary. The colour varies depending on the source of the nectar and the degree of processing of the honey. Colours of honey can include light golden yellow, dark brown and even white tones.
- **Crystallization:** Honey may crystallize over time. This crystallization occurs as a result of the precipitation of honey components. The texture of crystallized honey may be darker and creamier.



Within the scope of the Honey Communiqué; It is essential that honey does not contain any pathogenic microorganisms, parasites and/or parasite eggs that threaten human health. There should be no additives in honey, as well as pesticide and drug residues. Honey must be produced in accordance with the general rules in the Food Hygiene section of the Turkish Food Codex Regulation and must comply with the 'Turkish Food Codex Microbiological Criteria Communiqué'. It should be ensured that the honey to be used in apitherapy is **not heated** in a way that would destroy or significantly inactivate the natural enzymes it contains. It should be taken into consideration that some of the parameters such as HMF and enzyme activity will change with heating and storage. Fresh honey has a very low level of HMF and a high level of natural enzymes. In terms of apitherapy, there are recommendations that honey should have a maximum of 25 mg/kg HMF, even 15 mg/kg, and an invertase activity of at least 10 Hadorn units.

The use of honey for apitherapy dates back to ancient times. Accordingly, studies have been conducted on the standardization criteria of honey.

Heat treatment, filtration and pasteurization processes damage the natural structure of honey.



When it comes to use for apitherapy purposes, raw honey should be preferred. Heat treatment and pasteurization are not applied to raw honey.

In the new communiqué numbered 2020/7 published in the Official Gazette dated April 22, 2020, the criteria regarding honey were revised and the concept of raw honey was included. Considering all these, honey to be used for apitherapy purposes:

- Honey must meet the criteria required by the relevant regulation.
- Honey should not be heat treated. It should be raw honey. Honey that has not undergone pasteurization, filtration and heat treatment is called raw honey.
- Heat treatment should not be applied to make crystallized honey fluid. This increases the HMF and diastase value of honey. Increasing the diastasis level increases the acidity of honey. It has been proven by scientific studies that HMF causes carcinogenic effects.
- Honey should not be harvested before it is fully ripe. Since the moisture in honey harvested before ripening is high, microbial deterioration occurs rapidly and this type of honey is not suitable for use in apitherapy. When using a queen grid, honey should be harvested when 2/3 of the total surface is glazed. Honey with moisture content above 20% is in the risk group.
- Attention should be paid to the cleanliness of materials used in production, such as hand iron and honey processing equipment. (It can be disinfected with a mixture of 5% sodium hypochlorite and caustic soda.)
- The material used during production and in contact with honey must be made of stainless steel.
- The insides of the tins where honey is stored should be lacquered.
- Honey should be stored in cool, dark and low humidity places.

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PROPOLIS



Propolis is a natural bee product produced by bees. Bees collect tree resin, plant sap and secretions and use them to repair, sterilize and protect their hives. They create propolis by combining these materials with the wax in their mouths and the enzymes they secrete from their special glands.

Propolis contains antioxidants, vitamins, minerals, essential oils and other biologically active ingredients. Therefore, propolis has become a natural product used for medicinal and health purposes. Some potential benefits of propolis include:

- **Antioxidant Effects:** Propolis can reduce cellular damage by neutralizing free radicals.
- **Antibacterial, Antimicrobial, Antiviral and Antifungal Effects:** Propolis can kill microorganisms such as bacteria, fungi and viruses or prevent them from multiplying.
- **Inflammation Reduction:** Propolis can reduce inflammation and speed up the healing of wounds.
- **Immune System Support:** Some studies show that propolis may increase immune system functions.
- **Oral Health:** Propolis may be effective against gingivitis and mouth sores and may support dental health.
- **Skin Care:** Propolis can reduce skin inflammation and help skin problems such as acne.
- **Cancer Research:** Some research shows that propolis may inhibit the growth of cancer cells and help fight cancer.



Propolis is a complex natural bee product and its composition may vary depending on regional, seasonal and plant flora. Therefore, the physical and chemical properties of propolis may differ depending on its source and environmental conditions. However, in general, propolis has the following physical and chemical properties:

1. **Colour:** Propolis can be in different colours, usually brown, green, red and black.
2. **Smell and Taste:** Propolis can have a varying odour and taste profile depending on the type. Some types of propolis may have an unpleasant or bitter taste.
3. **Density:** Propolis generally has a dense structure. It may have a solid or sticky consistency.
4. **Melting point:** The melting point of propolis may vary depending on its composition and source. It usually melts on average between 60 and 70 °C.
5. **Chemical Components:** Propolis is a mixture of tree resin, plant extracts and enzymes secreted by bees. These components include flavonoids, phenolic acids, essential oils, beeswax and vitamins.
6. **Resolution:** Propolis is generally soluble in solvents such as alcohol, ethanol or water. However, it is not completely soluble and may contain some solid particles.
7. **Refractive Index:** Propolis has an optical property known as refractive index. This property can be used to detect and analyse differences in propolis samples.



Propolis has a complex composition because it is created by bees processing a natural resin mixture. Things to consider in the production of propolis to be used for apitherapy purpose

- Pollen and propolis are the products most affected by environmental factors.
- When bees cannot collect propolis from the environment due to various negativities, they may have to collect substances containing paint residues, asphalt or mineral oils in order to use them as propolis. As a result, toxic contaminations reduce the quality of harvested propolis and limit its pharmacological use.
- Propolis balsam to be used for apitherapy purposes should have high content and high bioactivity and should be pure and organic.
- The most suitable period for production is the end of summer and autumn, when the temperature is 20-25°C.
- It should not be contaminated with heavy metals and acaricides used against Varroa.
- Propolis should be collected and harvested with special traps instead of scraping it from the hive and flight hole.
- Plates made of plastic material with 4-6 mm gaps are preferred as traps.
- Since quality propolis is collected at these points of the hive, traps should be placed on the top or side walls of the hive.
- After harvesting, propolis should be placed in plastic bags and kept in the refrigerator (+4-8°C).



” POLLEN “

Pollen is an excellent food that bees bring to the hive when they collect nectar from flowers and cause pollination, by wetting the fallen pollen with their mandibles, collecting it through their front legs, and placing it in the pollen collection mechanisms on their hind legs. Bee pollen has a complex chemical composition and contains carbohydrates, proteins, amino acids, vitamins and minerals, as well as phenolic compounds with important biological activities.

Although the place of pollen in apitherapy is quite extensive, it can be listed as follows. It reduces blood cholesterol levels and therefore has an antiatherogenic effect. It may also show immune system stimulating and anti-inflammatory activity. Moreover, it is known that it is effective in prostate problems with its antibacterial properties, increases athletic performance, increases appetite, improves skin vitality, improves sexual power and is useful in the treatment of diseases such as anaemia, acne, colds and ulcers.

Points to consider in pollen production:

- It should be collected daily with pollen traps.
- Clean plastic or stainless steel containers should be used when collecting pollen.
- Care should be taken to disinfect the materials used during pollen production.
- Fresh pollen should be stored in dark containers in the deep freezer (-18 °C).
- Fresh pollen contains 25-30% moisture and it is necessary to reduce the moisture rate by 5-10% for drying. It should not be dried under the sun, but should be dried in drafty places or in pollen drying cabinets.
- Dried pollen should be stored in a deep freezer (<24 months) at +4 °C (6-9 months).
- It should not be forgotten that many useful volatile compounds will be lost in dried pollen. Fresh pollen should be collected daily, transported in a cold chain in a dark-coloured container, protected from light and consumed by keeping it in the refrigerator at -18 degrees.
- Pollen must be cleaned from wax residues, bee parts, etc.
 - Perga-Bee bread Pollen





” PERGA “

Generally speaking, perga (bee bread) is a fermented bee product that is enriched with the secretions added by the bee from its own body, while the pollen is collected from the nature by the bees to feed their own offspring and it is stored in the cells of the honeycomb, and matures to the consistency desired by the bee after a certain period of time. Perga can be applied for paediatric purposes, especially in premature children up to the age of 10, as well as in children with anaemia, pneumonia and bacterial infections. Bee bread helps treat blood pressure and chronic constipation with its high content of acetyl-choline. It helps individuals increase their physical and mental strength. It also has antiseptic and germicidal properties. It is useful in the treatment of bleeding gum protection. With its contribution to reproductive hormones, it helps to improve men's sexual life and increases muscle strength. Collected Bee bread should be stored in a thermos with a cold chain in the refrigerator at -18 degrees.





ROYAL JELLY

Rich in nutrients, royal jelly is the food substance secreted from the upper jaw (mandibular) and hypopharyngeal glands of worker bees aged 5-15 days. This cream-coloured, jelly-like food substance, with its unique odour and slightly pungent taste, is used to feed queen bees and young larvae. The content of royal jelly varies depending on the nutrition of the bees, their age, season and the age of the larvae.

Structure and properties of royal jelly:

Royal jelly is a viscous, gel-like substance that is partially soluble in water, has a density of 1.1 g/ml and a pH of 3.4-4.5. Its colour is yellowish and becomes darker as storage time increases. Its smell is pungent and its taste is sour or sweet. These are the important sensory properties and important quality criteria of royal jelly. Royal jelly is quickly affected by sunlight, moisture, heat and air and may lose its properties. Therefore, for optimum quality of royal jelly, it is necessary to keep this product frozen. The viscosity of royal jelly varies depending on the water content and the age of the bee, and its viscosity increases when stored at room temperature or in the refrigerator at +5°C. These changes are due to on-going enzymatic activities and interaction between lipid and protein fractions. In this regard, although royal jelly does not have an international standard, some countries have determined national standards regarding royal jelly. Switzerland, Bulgaria, Brazil and Uruguay are some of these countries. It is known that the International Honey Commission is working on the development of an international standard on this subject. In the studies conducted, the most important quality criteria for the standardization of Royal Jelly are 10-Hydroxy-2-Decenoic Acid (HDA). The 10-HDA content decreases with the storage of royal jelly. This decrease is higher in royal jelly containing honey.

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The Importance of Royal Jelly in Terms of Apitherapy



Royal jelly is used in many areas for humans. Studies have been carried out on its use in cosmetics, in stimulating physical performance, in ensuring learning capacity and self-confidence, in sexual problems, in increasing resistance to anemia, cholesterol, viral infections, in the treatment of cancer, high and low blood pressure, arteriosclerosis, chronic and recurrent diseases. Many studies have been conducted on laboratory animals regarding the effects of bee products and especially of royal jelly. This is a product that needs further studies in humans as well. Nevertheless, many positive effects of royal jelly on living things are known.



It has been reported that royal jelly has a positive effect on the cardiovascular system and has a blood pressure regulating effect. It has been reported that regular use for 2-3 weeks as an alternative medicine for anaemia positively affects the quality and number of red blood cells and therefore can be used in the treatment of hypertension and atherosclerosis. In some studies, it has been stated that trans-2-octenic acid and hydroxydecanoic acid in royal jelly may be responsible for the anti-hypertensive effect, and royal jelly has been associated with protective and therapeutic effects in cases of adrenaline-induced arrhythmia (irregular heartbeat), but it still has not been fully observed whether it has an effect on the heart rate or not.



Elderly people were given 10 grams of royal jelly orally a day for 14 days, and the good cholesterol (HDL) rate in the blood increased and the bad cholesterol (LDL) rate decreased. In another study, when 6 g of royal jelly/day was given orally for 4 weeks, a decrease in the total LDL cholesterol rate in the blood was observed, while the good cholesterol (HDL) and triglyceride rates were not affected. In studies conducted on humans and experimental animals, it has been observed that oral royal jelly has a positive effect on cholesterol and triglyceride levels in terms of health and reduces the level of bad cholesterol.

Recently, various studies have been conducted on the antimicrobial activity of this valuable bee product, as it is seen as a product that can be used in medicine as well as its widespread traditional use due to its protein and lipid components. It has been reported that royalisin, 10-hydroxy-2-decenoic acid, gelleins and major royal jelly proteins found in unprocessed royal jelly have antimicrobial activity against different bacteria. Royal jelly and other natural bee products have demonstrated antimicrobial activities in various fields where they are used as natural additives. Storage conditions of royal jelly are important for human use. **Royal jelly is sensitive to light and heat and undergoes oxidation in direct contact with air.** The expected benefits cannot be obtained from royal jelly that is not collected and stored under appropriate conditions.

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Royal Jelly Storage Conditions



Royal jelly is affected by heat, light, humidity, air and many other factors. For this reason, it is difficult to preserve it. Royal jelly is stored in **dark glass containers** in the refrigerator at +4 °C. Additionally, when royal jelly containers are removed from cold cabinets and transported, they should be transported in a special freezer. It can be stored at room temperature for 6 hours, in the refrigerator at +5°C for 2 months, and frozen and dried at -18°C for 6 months without deterioration. If there is no refrigerator where you are, it can be preserved by adding honey. Additionally, royal jelly can be stored at -170 °C for 24 months.

Freezing Royal Jelly

Refrigeration and freezing delay and reduce chemical changes in royal jelly during storage. The following points should be taken into consideration for storing fresh royal jelly:

- (1) Immediately after collecting the royal jelly, transfer it to a dark, airtight container.
- (2) If royal jelly is to be consumed quickly, cool it at 0–5 °C.
- (3) Alternatively, if royal jelly will be stored for a longer period of time, freeze it at temperatures below -18 °C.
 - It is necessary to package royal jelly in dark containers to protect it from light.
 - The container must be airtight to protect it from oxidation.
 - Since there are no criteria for establishing "safety" limits for product effectiveness, storage and shelf life should be as short as possible.
 - After thawing and packaging, the product should not be stored in the refrigerator for more than 12 months.
 - Repeated freeze-thaw cycles should be avoided.



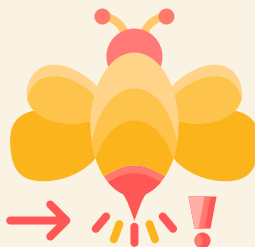
” BEE VENOM (APITOXIN) ”

Bee venom is a physically clear, odourless, watery liquid with a bitter taste and a basic pH (4.5 to 5.5). It causes severe burning and irritation on contact with mucous membranes or eyes. Dried poison has a light yellow colour and some commercial preparations are Brown. This is thought to be due to the oxidation of some venom proteins. Bee venom is synthesized in the venom glands of worker bees and queen bees. The venom is produced by two glands attached to the sting apparatus of worker bees and is stored in the venom sac.

There are more than 60 compounds in bee venom. Honeybee venom consists of enzymes, proteins, peptides and various small molecules (amino acids, catecholamines, sugars and minerals). Most types of venom cause instant pain because they contain phospholipases, hyaluronidase and other enzymes.

In classical medicine, bee venom is used in the treatment of chronic inflammatory disorders due to its various effects such as anti-arthritis, anti-cancer and analgesic. In bee sting treatment, bees go directly to the target point through the needle, while in bee venom treatment; lyophilized venom (taken from the bee and then freeze-dried) is directly injected in different doses.

The main problem in collecting bee venom is to limit the loss of valuable volatile compounds that occur when bee venom dries. For this reason, it is recommended that standard venom collection devices should be equipped with a cooling system that will reduce the evaporation of volatile compounds. No bees are harmed during the bee venom collection process. A bee secretes an average of 50 μg of poison under the influence of electrical stimulation. The venom is obtained in spring or summer, and the acquisition cycle lasts 12-15 days, during which you can collect about 1 g of bee venom. Up to 4 g of bee venom can be collected in 3 cycles during the season.





Different extraction or collection methods result in different components of the final product. Venom collected from surgically removed venom sacs showed different protein contents than those collected by electroshock. The main problem in venom collection is how to protect volatile substances from evaporation. Poison collected underwater seems to produce the strongest venom and to appear to use a cooling system with standard electroshock collection apparatus to retain more of the volatile compounds.

Dried bee venom is durable when packaged in tight, moisture- and light-proof glass packaging and can be stored at room temperature without changing its biological properties. Dried bee venom can also be lyophilized and stored at low temperatures (-15 to -20°C) for up to 5 years.

During storage, it should be protected from sunlight and temperatures above 40°C because it will decompose in these conditions.

Since bee venom does not need to be touched by hand, bee venom treatment can be prepared wherever there is sufficient support. It is easy to produce small quantities as long as strict hygiene controls and sterile working conditions can be maintained.

Exceptional hygiene conditions must be obeyed when collecting bee venom. When working with dry poison, lab coats, gloves, and face masks should be worn to prevent poison powder from getting into the eyes and lungs. Using bee venom injections, bee venom solutions are prepared with sterile water, some salts or oils stored in special ampoules. Such ampoules are prepared only by certified pharmaceutical laboratories due to the need to prepare strictly defined doses of bee venom and maintain strict aseptic conditions.



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HIVE AIR



The air inside the hive is called HIVE AIR. Due to its specific climate, it is saturated with many volatile substances secreted by the bees themselves (pheromones), as well as semi-finished products collected by the bees (nectar, pollen, honeydew, resin secretion of leaf buds) and bee products (honey, bee, propolis and beeswax). Hive air is often referred to as the “hive microclimate.” The chemical composition of the hive air reflects the health status of the bee colony as well as the sanitary conditions inside the hive.

The chemical composition of hive air is complex and not yet fully understood. It is known that there are around 44 volatile substances in the hive air.

Bee pheromones identified in hive air include geraniol and nerol. These are volatile compounds secreted by the nasonow gland.

Geraniol:

- It has anti-bacterial and anti-fungal effects.

Nerol:

- It has an anti-depressant, calming effect and regulates menopausal problems.

Among the volatile compounds found in the hive air, there are also volatile substances found in bee semi-finished products and final products obtained from bees, such as honey, bee bread, royal jelly, beeswax or propolis. During storage or processing in the hive, these substances release many chemical compounds into the hive environment.

As research has shown, approximately 26,3% volatile acids (e.g. Germacrene, Copaene, α -Farnesene Terpene, β -Caryophyllene, α -Humulene, 6-Cadinene); 16,4% volatile aldehydes (including benzaldehyde, benzeneacetaldehyde, (E)-2-octenal, nonanal, decanal, 5-hydroxymethylfurfural, (Z)-2-Decenal, (E)-Cinnamaldehyde); 14,4% ketones (including 2Nonanone, Pyranone, 2-Decanone, 9-Hydroxy-2-nonanone, (Z)-Geranylacetone); 11,0% hydrocarbons (e.g. Decanea, Tridecane, Hexadecanea, Octadecane, 9-Nonadecene); 8,7% esters (Methyl salicylate, 2-Octyl acetate, (E)-2-Decenyl acetate); 2,9% volatile alcohols (isopropyl alcohol, 3-hexenol, cyclooctanol, dec-2-en-1-ol), also eugenol (2,2%), n-butyl nitrite (0,8%) and (E)-anethole (0,2%) have been found in hive air.



The air of the hive is 25 - 35°C and is characterized by relatively high humidity (70-75%). A very important characteristic of the hive air is its purity; It should not contain bacteria, viruses or pathogenic fungi. Breathing clean, antiseptic air scented with honey, pollen and propolis has a very good effect on health and vitality, and the new field of apitherapy, "APIINHALATION", has become increasingly important in recent times, as it also helps in the treatment or prevention of various diseases.

Hive air is used in the treatment of **respiratory diseases, allergic diseases, cardiovascular diseases**, as well as **nervous and mental diseases**. It can be used to treat bronchitis as well as inflammation of the mucosa of the upper respiratory tract. It also has a positive effect on blood pressure and improves **blood circulation and microcirculation** and **unblocks blood vessels**. Observations also confirm the positive effect of bee air on **mental health**.

Beehives where API INHALATION will be used must be located in an environment free of environmental pollution and where pesticides and chemicals are not used.

The hives must be controlled, free from bee diseases and have the characteristics of natural beehives where no chemicals are used.

Applications should be made with healthy materials suitably prepared by experts in the field.



” DEAD BEES ”

Dead bees, most often found after the winter period are the dead bees that beekeepers find at the bottom of the hive. The raw material is a black brown mass with a specific odor. Upon closer inspection, all undisturbed bees and various parts of the bees (head, legs, abdomen, wings, etc.) can be seen.

The causes of bee deaths may be various, but may also be caused by the weakness of the bee colony, bad weather conditions, improper distribution or depletion of materials in the hive, and sometimes bee diseases. The weight of dead bees can reach 205-300 grams. From an economic perspective, the death of bees is undesirable, but these dead bees can be used for medical purposes.

The chemical composition of dead bees is not fixed. **Protein content can vary between 47.8 and 65%, melanin content between 20.0 and 25.0%, wax and lipid substances between 11.0 and 27.7%, chitin between 11.00 and 24.0% and trace minerals (mainly iron, zinc, tin, nickel, cadmium, copper and cobalt) between 1.8% and 2.5.**

In order for **dead bees** to be used for medicinal purposes, they must come **from bees that do not show signs of bacterial or fungal infection**. Also, it can't be **moldy**. To preserve them, dead bees are dried at temperatures **up to 45°C**, crushed and stored in tightly closed, clean packages in a cool, dry place, preferably in a glass container, in the refrigerator. If bees are not to be dried, they should be stored at -18 degrees.

The most common way to utilize dead bees is to obtain **CHITOSAN** from them. Chitosan is a derivative obtained by partial de-acetylation of chitin. Chitosan-melanin complex is obtained from chitin for therapeutic purposes.

Chitosan is used in medicine due to its **antibacterial, anti-inflammatory and analgesic** properties. It **stops bleeding and aids wound healing** and is therefore a component of dressings. It is also used as a carrier in **mucoadhesive drug delivery systems**. Chitosan is also used as **a dietary supplement** to support weight loss because it blocks the absorption of fats, although its effect has not been fully confirmed by research.



CHITOSAN-MELANINE COMPLEX has strong antioxidant, anti-radiation, detoxifying, antimicrobial and antimutagenic properties. Preparations based on the chitosan-melanin complex, which contain other substances, such as extracts from Siberian pine needles, turned out to be effective in the following cases:

- **gastroenterology** , (improving bowel function)
- **ardiology** (Regeneration of heart muscle after heart attack),
- **neurology** (improvement of cerebral microcirculation after multiple sclerosis, Parkinson's disease and cerebral hemorrhage),
- **endocrinology**, (muscle-skeleton system diseases),
- **pancreatitis**
- **immunologic diseases**

Dead bees are also used in the preparation of decoctions, **ethanol extracts**, and **supercritical fluid CO2** extracts. Decoctions and ethanol extracts of dead bees have been shown to be an effective remedy used in prostatic hyperplasia, and dead bee extracts can be used for the following diseases:

- **atherosclerosis**;
- **gastrointestinal disorders** (Dysbacteriosis, indigestion, constipation);
- **sexual disorders** (impotence and coldness);

In the form of compresses of dead bees rubbed with vegetable oil in patients suffering from diseases of the circulatory system (varicose veins, thrombophlebitis);

Boiling dead bees: It is provided by boiling with water (at correct ratios). A tablespoon of honey can be added to the decoction after cooling and straining. The boiled material is stored in a dark and cool place.

Ethanol extract is obtained by pouring 70% ethyl alcohol onto dead bees, shaking every day and storing for 10-12 days. After filtration, the extract is stored in a dark glass container at room temperature.





REFERENCES



1. Kędzia B., Hołderna-Kędzia E. Apiterapia. Leczenie miodem i innymi produktami pszczelimi. 2020. Wydawnictwo SBM Sp. z o.o.
2. Kędzia B., Hołderna-Kędzia E. Lecznicze właściwości osypu pszczół. Materiały konferencyjne. VI Lubelska Konferencja Pszczelarska. 2015, 48-52.
3. Khaydarova H. A., Ikhtiyarova G. A., Khaydarov A.A., Mengliyev A. S. Method of obtaining a chitosan aminopolysaccharide from behbat apis millifera. 2019. Chemical Journal of Kazakhstan 2 (66), 69-74
4. Nemtsev S.V., Zueva O.U., Khismatoullin R.G., Khismatoullin M.R., Varlamov V.P. Bees As Potential Source Of Chitosan.
5. Aida A. Abd El-Wahed, Mohamed A. Farag, Walaa A. Eraqi, Gaber A.M. Mersal, Chao Zhao, Shaden A.M. Khalifa, Hesham R. El-Seedi. Unravelling the beehive air volatiles profile as analysed via solid-phase microextraction (SPME) and chemometrics. Journal of King Saud University – Science. 2021. 33, 101449.
6. Guardia T. Identifying the chemical compounds of beehive air. 1st International Beehive Air Therapy Conference. 12th- 13th Feb, 2022.
7. Guardia T., Stângaciu S. Anti microbial properties of the beehive air. A short review. 1st International Beehive Air Therapy Conference. 12th- 13th Feb, 2022.
8. Szczurek, A.; Maciejewska, M. Beehive Air Sampling and Sensing Device Operation in Apicultural Applications—Methodological and Technical Aspects. Sensors 2021, 21, 4019. <https://doi.org/10.3390/s21124019>
9. Beehive Air Therapy: Requirements for the Treatment of Patients. <https://www.beecurasytem.de/en/2021/04/14/bienenstocklufttherapie-voraussetzungen-fuer-die-behandlung-von-patienten/>
10. Apiterapia - zdrowie z ula, inne metody leczenia. <http://www.apiterapia.net/inne/inne.html>
11. Lecznicze właściwości osypu pszczół. <https://pasieka24.pl/index.php/pl-pl/pasieka-czasopismo-dla-pszczelarzy/150-pasieka-1-2017/1623-lecznicze-wlasciwosci-osypu-pszczol>
12. How to make added value products with dead bees. <https://teca.apps.fao.org/teca/en/technologies/8774>
13. Osyp pszczół jako produkt do produkcji chitozanu. <https://pasieka24.pl/index.php/pl-pl/pasieka-czasopismo-dla-pszczelarzy/162-pasieka-2-2017/1652-osyp-pszczol-jako-produkt-do-produkcji-chitozanu>

References For Images

PAGE 1

https://pngtree.com/freebackground/beekeeping-bee-hive-one-person-photo_14308961.html
<https://medium.com/@edwarddugger0/buzzing-growth-navigating-the-landscape-of-the-indian-apiculture-market-28cdd346b6dd>

PAGE 2

<https://www.istockphoto.com/tr/foto%C4%9Fraf/textile-textured-wallpaper-for-walls-gm520223490-90891223>

PAGE 4

<https://www.istockphoto.com/tr/foto%C4%9Fraf/i-bal-ar%C4%B1lar%C4%B1-i%C3%A7in-yeni-ar%C4%B1-kovan%C4%B1-aktar%C4%B1n-trigona-meliponini-kolonileri-kitle-gm1041473676-278831035>

<https://depositphotos.com/photo/jar-sweet-honey-pieces-fresh-combs-metal-tray-228360080.html>

PAGE 5

<https://www.vecteezy.com/photo/23938978-oilseed-rape-field-and-beehives-on-a-sunny-day>

PAGE 6

<https://www.shutterstock.com/tr/search/create-honey?page=7>

PAGE 7

<https://create.vista.com/tr/photos/create-honey/>

<https://ar.pinterest.com/pin/how-to-start-a-beehive--96757091979070105/>

PAGE 8

<https://www.burtongreenhoney.co.uk/bees-wax.html>

PAGE 9

<https://www.shutterstock.com/tr/search/acacia-leves>

PAGE 10

<https://www.shutterstock.com/tr/image-photo/beekeeper-takes-out-honeycomb-his-hands-2168796793>

PAGE 11

<https://www.istockphoto.com/tr/foto%C4%9Fraf/bal-ar%C4%B1s%C4%B1-toplama-propolis-gran%C3%BClleri-gm1201410626-344528888>

PAGE 12

<https://butterflybeegarden.com/royal-jelly-vs-propolis/bee-propolis/>

<https://www.dreamstime.com/beekeeper-removes-propolis-hive-harvest-beekeeping-products-apiary-image230201023>

PAGE 13

<https://depositphotos.com/photos/propolis.html?qview=310873738>

PAGE 14

<https://beekeepingbasic.com/what-makes-them-wonderful-10-honey-bee-facts/>

<https://www.istockphoto.com/tr/foto%C4%9Fraf/bee-collecting-pollen-gm177520439-21859593>

PAGE 15

<https://www.istockphoto.com/id/foto/tampilan-atas-bee-pollen-lebah-perga-latar-belakang-tekstur-tampilan-atas-perga-gm1445464633-483862285>

https://www.freepik.com/premium-photo/bee-pollen-grains-bee-bread_9089223.htm

PAGE 16

<https://www.thegrocer.co.uk/sustainability-and-environment/glyphosate-licence-to-be-extended-by-five-years-after-eu-vote/560598.article>

<https://www.shutterstock.com/tr/image-photo/honey-drip-milk-splash-295909361>

PAGE 17

<https://www.istockphoto.com/tr/foto%C4%9Fraf/raw-organic-royal-jelly-in-a-small-bottle-gm526273601-52666028>

<https://clay.ca.uky.edu/events/clay-county-beekeepers>

PAGE 18

<https://stock.adobe.com/images/flock-of-bees-flying-near-the-beehive/181011894>

PAGE 19

<https://depositphotos.com/photo/raw-organic-royal-jelly-in-a-small-bottle-with-passiflora-125785696.html>

PAGE 20

<https://www.alamy.com/stock-photo/bee-sting-hand.html?sortBy=relevant>

PAGE 21

<https://suficado.com/que-significa-sonar-con-abejas/volando/>

<https://bpharmweekly.com/2021/04/21/what-to-do-when-a-bee-swarm-attacks/>

PAGE 22

<https://www.istockphoto.com/tr/foto%C4%9Fraf/swarms-of-bees-at-the-hive-entrance-in-a-heavily-populated-honey-bee-flying-gm1497143270-519606834?searchscope=image%2Cfilm>

PAGE 23

<https://www.ecocolmena.org/breathe-the-air-of-the-hive/>

PAGE 24

<https://www.istockphoto.com/tr/foto%C4%9Fraf/dead-bees-gm517706784-89637979>

PAGE 25

<https://carolinahoneybees.com/the-truth-about-dead-beehives-that-beekeepers-shouldnt-ignore/>

<https://www.istockphoto.com/tr/foto%C4%9Fraf/dead-bee-gm182208773-10824053>