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MEDICAL BEEKEEPING FOR BEEKEEPERS MODULE 2 HONEY



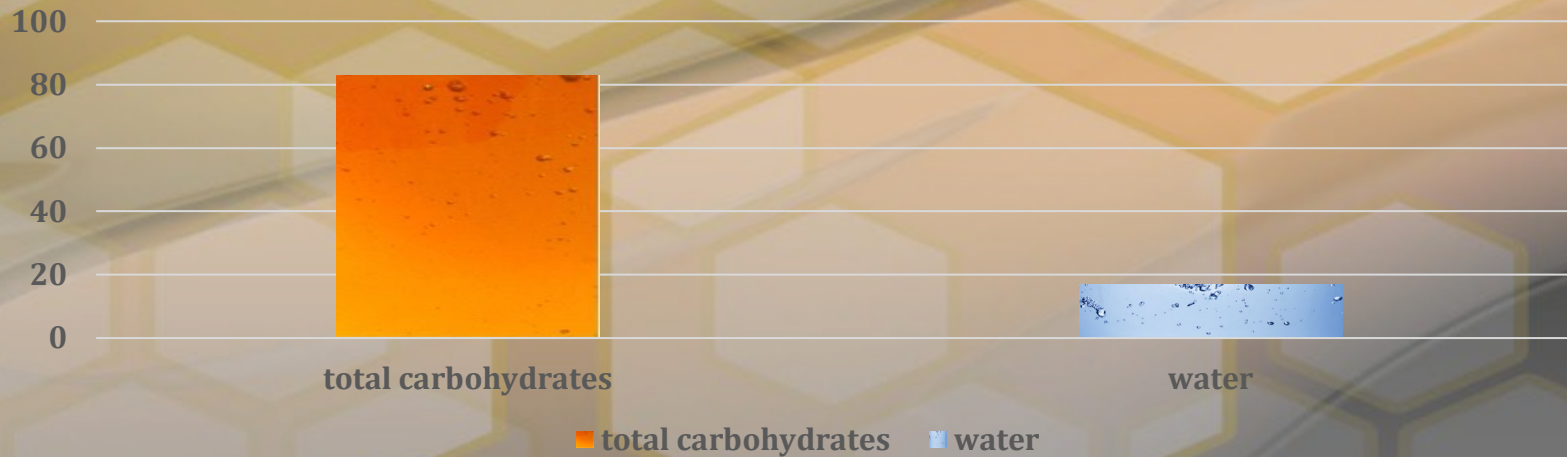
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HONEY

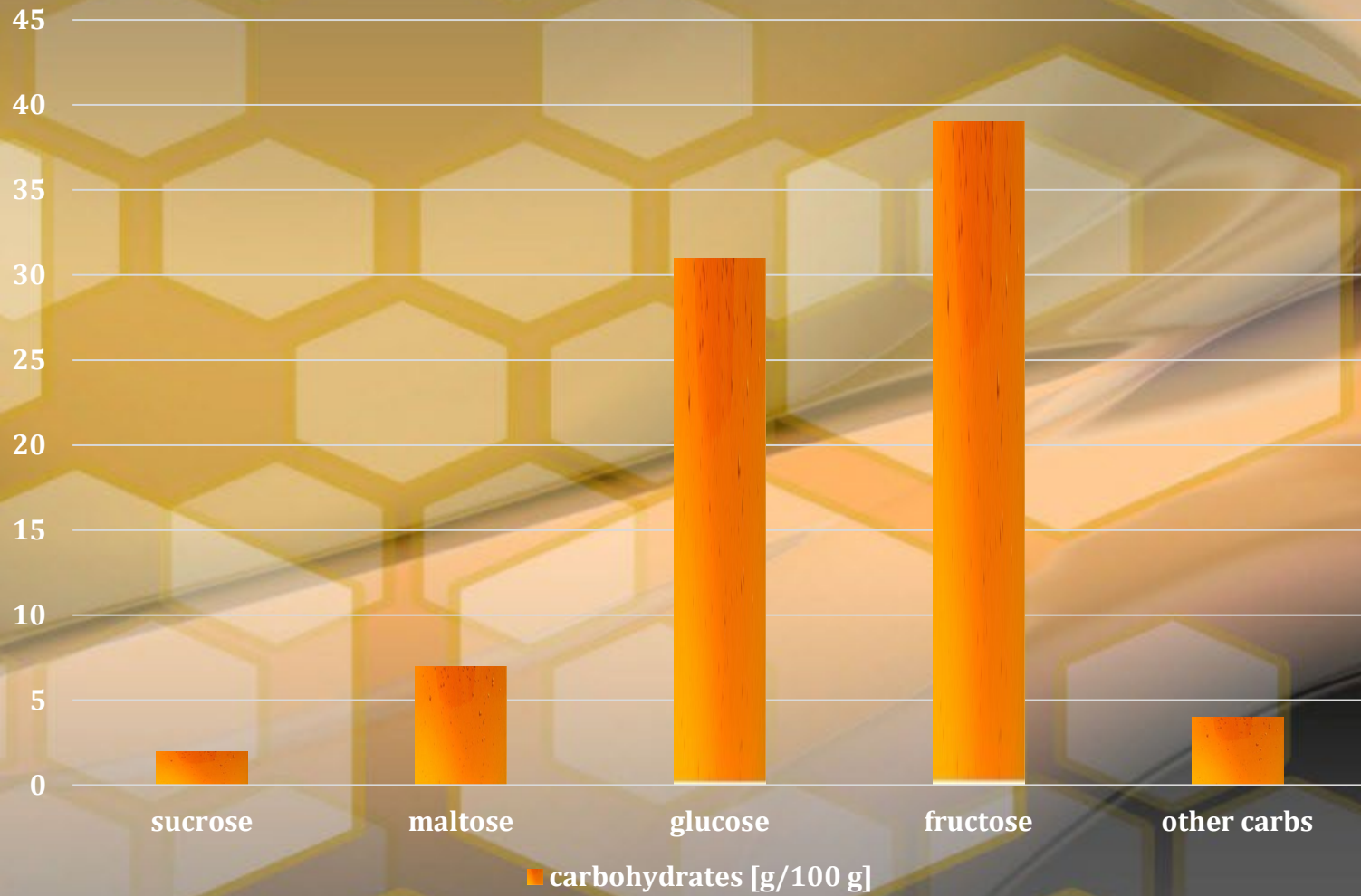
- HONEY - honey bee (*Apis mellifera*) and *A. mellifera caucasica*, *A. m. carnica*, *A.m. anatolica*) or other species such as *A. Andreniformis*. *A. caucasica*, *A. cerana*, *A. dorsata*, *A. florea*, *A. indica*, and *A. ligustica*; *Plebeia wittmanni*, *Tetragonisca angustula fiebrigi* and *Trigona carbonaria* from the single-multiflowered nectar were combined with a bee enzyme and then evaporated to reduce the water content in the honeycomb cells. About 300 species of honey are known today.



RAW HONEY COMPOSITION [%]



CARBOHYDRATE COMPOSITION OF RAW HONEY



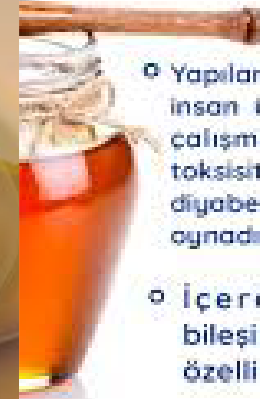
- **Properties of honey**

- The antimicrobial, antioxidant and hygroscopic properties of honey make it a popular food as well as an effective medicine. **Honey is hygroscopic:** Honey has a hygroscopic nature, which means; When it comes into contact with the air, it naturally traps the moisture in the air. Honey provides benefits in the treatment of open wounds, because it keeps the skin moist, prevents scar formation in the wound, supports the development of new tissues, and prevents the dressing from sticking to the skin, allowing the gland to be easily removed.
- Honey's hygroscopic properties also make it an ideal ingredient in many cosmetics; because it helps to keep the skin moist and new and prevents drying. This is why some people call honey a natural "moisturizer" because honey attracts and locks in moisture. When used in skin and hair treatments, honey captures and traps moisture; Thus, it makes the skin soft and supple, and the hair shiny and healthy.
- **Honey is antibacterial:** Researchers began to document the therapeutic properties of honey in the early 20th century. This situation ended with the development of antibiotics, but the recent emergence of resistance to antibiotics has led to a resurgence of interest in the therapeutic properties of honey.
- The effective antimicrobial component in honey prevents the emergence of certain bacteria. It contains an enzyme that produces hydrogen peroxide, which is thought to be the main reason for honey's antimicrobial property. For this reason, honey is a useful treatment for wounds and burns. Cuts, scrapes, and burns can be coated with honey to prevent bacteria from entering the wound and speed healing. Honey treats minor acne breakouts by attacking acne-causing bacteria, and also moisturizes and regenerates the skin. Honey types vary considerably in terms of antimicrobial effect, and this difference can even be up to a hundred times. It is claimed that honey obtained from the Manuka bush, which is abundant in New Zealand, has the highest effect in terms of the mentioned antimicrobial properties.



- **Honey shows antioxidant properties:** Honey contains natural antioxidant properties that can eliminate biodegrading chemicals associated with many diseases such as cancer. Studies have also determined that dark-colored honeys such as buckwheat contain more antioxidants than light-colored honey varieties.
- Honey's antioxidants not only help eliminate harmful substances from the body, they are also part of the nutritive source of new tissue growth. These invaluable honey properties help protect the skin from the sun and help regenerate the skin and keep it looking young. Accordingly, there is an increase in the number of manufacturers of skin care products made from honey, such as sunscreen and facial cleansers used to treat damaged or dry skin.
- **Honey and sugar:** Both of these sweet foods contain glucose and fructose. However, in the process of sugar production, organic acids, protein, nitrogen elements, enzymes and vitamins in sugar cane or beet are destroyed; whereas honey, which is a natural sweetener, undergoes only minimal heating. In addition, honey has certain beneficial antioxidant and antimicrobial properties that are not found in table sugar.
- There are three important quality criteria that will make you feel good when you eat honey: A tablespoon of table sugar or sugar contains 46 calories, and a tablespoon of natural sweetener honey contains 64 calories. Although honey contains more calories, we actually need to use less of it because it is sweeter than table sugar. As a result, you may consume fewer calories than you would with sugar. Although honey is more expensive, it may even be more economical than table sugar in the long run. How much sugar is in foods? Like 1 can of cola = 10 tablespoons and one 50 g chocolate = 7 tablespoons.

• Bal antioksidan enzimleri artırarak bağışıklığı yükseltir.



• Yapılan çalışmalar ancak bu çalışmalar insan üzerinde değil hayvanlarda yapılan çalışmalar balın böbrek ve karaciğer toksisitesini azalttığı, alzheimer hastalığı, diyabet ve kanser gelişiminde koruyucu rol oynadığını göstermektedir.

• İçerdiği fenolik ve flavanoid bileşikler sayesinde anti inflamatuvar özellik gösterir.



- Table sugar is sucrose, which is formed by the combination of two molecules. When we eat table sugar, our stomach has to use its own enzymes to break down the molecules before using the energy of the sugar. Honey is quite different. Bees add a special enzyme to the nectar that breaks down sucrose into two simple sugars, glucose and fructose, so our bodies can digest them directly.
- Therefore, honey has a healthier Glycemic Index (GI) when compared to honey and sugar, and the glycemic index measures the negative impact a particular food has on the blood-glucose level. The lower the GI, the slower sugars enter the bloodstream and digest, resulting in a slower and healthier digestion process. Unlike honey, table sugar is deficient in minerals and vitamins.
- Minerals and vitamins enable the body's nutrients to be catalyzed in the system. When these nutrients are used fully, the catalysis of bad cholesterol and fatty acids is inhibited, which triggers high cholesterol and increased obesity due to excess fatty acids in organs and tissues.
- That's why it's common for obese people to suffer from malnutrition and many other health-related problems. The message to be taken from here is that when comparing honey with sugar, if you pay attention to your weight, honey will be a wiser choice than sugar.



- **Color and taste of honey:** Honey is normally bought and sold by variety and colour. Many consumers will often buy a blend of pure honey, whether they are buying from a supermarket, a market, or directly from a beekeeper. The color and taste of many honeys are related. So the darker the honey, the more likely it is to taste strong and harsh. The lighter colored honeys are generally softer and sweeter in taste. People sometimes struggle to find a particular kind of honey and there is a simple reason for this; they like the taste of it, reminds them of the honey they ate as a child or they want to impress their surroundings with such a good food. But in any case, consumers like the taste of honey and again the color is not so important to them.
- However, industrial users such as bakers, food processors and beverage manufacturers often buy honey by color. Industrial users typically consider the cost of content. Industrial users often contact a honey packer and purchase honey in large drums. It is important that the honey be pure because they desire a lasting taste in their products. In addition, the functional value of honey used in bakery products is not related to its light or dark color.



- Honey is hygroscopic and retains moisture in bread or dessert, which is invaluable in bakery production. Generally speaking, a very light-colored honey is much more expensive than a dark-colored honey. The bakery company may want a light-colored honey, such as water-white honey, rather than a darker hue, such as amber.
- A frequently asked question is how industrial grade honey is made. Many people understand how bees will go to flowers in a particular area to obtain a certain kind of honey, such as Sage honey; but he doesn't quite understand how to find an extra light sage-colored honey.
- Many commercial beekeepers are happy to collect any honey brought by the bees at the end of the season, rather than keeping track of which flowers the bees go to. This is, of course, a little more scientific than mentioned, but at the end of the season, at the end of the month, or whatever season, honey is collected and sorted by color.



Physical properties of honey

Honey mainly contains different types of sugars such as glucose and fructose. The color of honey varies from white to dark brown, depending on the source of the plant used. Honey may be liquid, viscous, or partially or completely crystallized. The taste and aroma of honey varies depending on the source of the honey and the plant species. Honey usually contains 80% sugar and 14-17% water. The remaining 3% consists of mineral substances, amino acids, pigments, vitamins and enzymes.

What makes honey more valuable than other sugary foods are the enzymes in it. Honey should not be heated at high temperatures, as enzymes will be damaged at high temperatures. Honey should not contain residues of drugs used for the wrong timing of the fight against varroa and problems caused by other diseases and parasites. For this reason, pesticides should not be given to colonies in early spring and after the last harvest, except in late autumn periods.

Otherwise, honey will become harmful to human health rather than being a valuable food. All honey types, whether honeycomb or ground, do not contain drug residues and contain a certain amount of enzymes, are of high quality and valuable. As long as it does not turn sour due to high water content, honey can be preserved for many years without spoiling. To prevent spoilage, the water content in honey should not be more than 20%, and to achieve this, all or at least two-thirds of the cells of the mature honeycombs, i.e. glazed honeycombs, must be harvested.

Harvested and extracted honey should be placed in glass jars or suitable containers after resting. To prevent rancidity, honey containing more than 17% water should be heated at 60°C for half an hour before packaging. Remember that if the heating process is not carried out properly, the honey loses its enzyme value and the HMF (hydroxymethylfurfural) value, which is a quality criterion for honey, increases.

- **Physical and Chemical Properties of Honey**

Differences in the physical and chemical properties of honey; It is based on the plant source, the color, taste, moisture, protein and sugar content of the nectar and pollen that make up its content. Color Characteristics: The color of honey varies from water color to black, depending on the source from which it is obtained. In addition, heating the honey and keeping it open for a long time changes the color of the honey. Honey usually ranges from transparent to dark red, yellow, amber, brown, greenish and reddish. The substances that give color to honey are chlorophyll, carotene, xanthophyll and plant pigments that make up the yellow and green color of unknown composition. In the researches, it has been determined that the amount of amino acids and sugars and the amount of mineral substances, especially iron, copper and manganese, are high in dark colored honeys, and the color becomes darker as the mineral substances in honey increase. The reason why there are many honeys with original flavors and aromas is the richness of flora in our country. In order for this aroma to preserve its naturalness and not be artificial, chemical processes should not be applied to honey and care should be taken to carefully preserve the essence of nature in honey. The main components of the aroma in honey are esters, aldehydes, ketones, alcohols and free acids. Alcohols take the largest place among these substances. The flavorings come mostly from the raw material, nectar. It is possible to feel the aroma of the plant from which nectar is collected in this honey.

- **Scent of Honey:**

- Honey has a specific odor depending on the pollen in it. The smell of honey is felt when ingested and eaten. Honey that is heated too much loses most of its flavorings. If honey is stored next to a substance that smells intensely, it has the ability to absorb the smell of that substance. Generally, dark honey is more pungent and acidic than light colored honey.

- **Viscosity:** Viscosity, which means structure in beekeeping, is defined as the resistance of a substance to flow. Dense honeys have high viscosity and slow flow. This feature, which varies according to the structure of honey, is higher, less fluid and more viscous in dark colored and thick consistency honeys. These honeys go through more difficult processes while being discharged from the comb. Light-colored honeys have lower density and looser structures than dark-colored honeys. The different course of viscosity values between honeys is a feature that reveals its structure, not its quality. Viscosity, which is also called the texture of honey or its ability to resist fluidity, is closely related to the rate of water present in honey. It is possible to reduce the viscosity of honey by heating it. However, it is not recommended for honey with a water content of less than 14%.

- **Crystallization:**

- When the concentration of solute in a mixture that is in solution under normal conditions increases, the mixture first turns into a saturated solution, then the solute separates from the liquid and crystallizes. The crystallization of honey and the size of the crystals depend on whether heat treatment is applied, temperature fluctuation, water content and fructose/glucose ratio.
- Generally, in our country, 1/2-2/3 of the honeycomb surfaces are glazed and the honey is harvested before it is mature enough, causing it to contain a lot of water, thus early crystallization and fermentation. Crystallization is defined by the fineness and strength of the crystal grain. An unheated honey is generally fine-grained due to the number of crystal structures it naturally contains. Fewer but larger crystals form in honey that is heated to protect it from fermentation and crystallization.
- The granular structure of honey is an important quality criterion in trade and crystallization has many disadvantages. The most important disadvantage is the difficulty in processing and fluidity of honey. For this reason, the efficient operation of filling and packaging machines is prevented and the appearance of honey changes. Most consumers do not like crystallized honey.

- **Specific weight:**

- Density of a substance is the weight of its unit volume. Specific gravity is the ratio of the unit weight of a substance to the weight of the same volume of water at a given temperature. The specific gravity of honey varies depending on the amount of moisture and the temperature of the environment and is 1.4225 g/ml on average at 20 o C.
- The specific gravity of honey varies according to the amount of water and temperature in it. The high density of honey is due to its high sugar content. Rotation of Light (Optical Aberration) The way honey rotates polarized light left and right differs according to the sources of honey. Nectar (flower) honey turns the light to the left, and secretory honey to the right. Tea sugar, called sucrose, also turns the light to the right. This feature helps to identify fake honeys. By examining this feature of honey with a saccharometer, fake honey made from sucrose can be distinguished. Nectar contains a large amount of sucrose (disaccharide). Bees convert sucrose into glucose and fructose by the enzyme invertase. The amount of sucrose in honey varies according to the degree of maturation of the honey and the composition of the nectar. Immature honey harvested early contains a large amount of sucrose. If it is more than the amount of sucrose specified in the honey standard, it can be thought that cheating is done.

- **Electrical Conductivity:**

- Electrical conductivity in honey is an important criterion in determining the botanical origin of honey. Electrical conductivity is an important characteristic of secretory honeys and is mostly used to distinguish between secretory and floral honeys. Generally, the electrical conductivity of flower honey is lower than secretion honey. Electrical conductivity depends on organic acids, proteins, sugars and minerals. Therefore, there is a relationship between the electrical conductivity of honey and the ash content.

- **Hygroscopic Property** Hygroscopic means the ability to absorb moisture. Honey is a hygroscopic substance and has the ability to absorb moisture from the air in its environment. The moisture absorption of honey from the air changes depending on its special structure, sugar content and the amount of water in it. When there is 58% humidity in the air, there is 17.4% water in honey. If the humidity of the air is below 58%, the honey will lose some of its water content, if it is more, the water amount will increase. It should also be noted that honeys with a water content above normal tend to sour quickly. It is very important to know this feature, as the increase in the moisture content of honey will cause the honey to ferment.

- **Chemical Properties of Honey Brix Degree** is the percentage of water-soluble substances by weight. The brix of honey is mostly due to the sugar it contains. The brix value and sugar content of fraudulent honey may differ from that of natural honey. It is stated that the natural brix degree of honey is between 78.8-84.0% and an average of 81.9. There is also a relationship between moisture and sugar content.

- **Moisture Content** The moisture of the honey in the comb is the amount after the nectar has matured by the bee. For this reason, factors affecting maturation such as weather conditions, moisture content in nectar, secretion rate of nectar, colony size, temperature, precipitation, filtration and marketing processes affect the moisture content of honey.

- The moisture permeability of the containers in which honey is stored and the relative humidity of the place where it is stored can also increase the humidity level of honey due to its hygroscopic feature. The moisture content of honey is an important factor for the stability of its granulation (crystallization) and fermentation during storage. It is also an important indicator of the quality of honey. The high moisture content of honey reduces its shelf life as it causes both microbial spoilage and crystallization. It is also stated that excess moisture may cause deterioration of honey as a result of yeast fermentation and accordingly a change in taste and aroma.

- **Acidity and pH Level** One of the important quality criteria of honey is acidity. The main factors that determine the acidity of honey are organic acids and mineral substances, as well as amino acids, peptides and carbohydrates. In addition, the enzymes in honey create acid in honey, and honey containing high levels of enzymes contains more acid. Honey generally has a pH between 3.5-5.5.
- Detection of high acid value in honey indicates that it undergoes fermentation over time, and ultimately the alcohol turns into acetic acid with bacterial effects. 1.3.2.4. **Ash Content** Ash is a residue formed by oxides of inorganic matter left over from the combustion of organic materials. The ash content of honey also varies depending on the diversity of the flora used by the bees. Studies show that the highest ash is found in pine honey. According to the Turkish Food Codex Honey Communiqué, the amount of mineral matter - ash cannot exceed 0.6% in flower honey and 1.2% in secretion honey.
- **Enzyme Activity** Enzymes are known to be substances of protein structure, which are formed by living cells and have the ability to specifically catalyze chemical reactions. One of the most important components of honey is enzymes. Since they are sensitive to heat, they reflect the quality of honey, especially in terms of nutrition. It is also an important criterion in distinguishing natural and artificial honey from each other.

- Enzyme content is one of the characteristic features of honey that distinguishes it from sweeteners obtained from other sources. However, enzyme activity can be greatly reduced as a result of processing, heating and long-term storage. Diastase is an enzyme that hydrolyzes polysaccharide starch in different ways. As with other enzymes, it is decomposed by temperature. Also, the amount changes during storage. Due to this feature, any cheating to be done with honey and whether the honey is subjected to heat treatment can be determined by the decrease in the amount of this enzyme. **Sugar Content.** Carbohydrates are the main components of honey and make up about 95% of its dry matter. The sugar content of honey is the most appropriate quality criterion to determine the properties of honey from different sources. Most of the sugars in the structure of honey are simple sugars that can be easily digested, as in fruits. The most abundant monosaccharides in all honey are glucose and fructose. Hydroxy Methyl Furfural (HMF) HMF occurs as an intermediate product during the maillard reaction or by the decomposition of hexose in acidic medium. **HMF formation;** It is used as a chemical index to understand whether many products such as fruit juices, milk, honey, cereal products, jam are stored under suitable conditions and whether the appropriate heat treatment is carried out, and it also has a negative effect on health. In other words, the HMF value is a quality criterion in honey. HMF analysis is done in honey to understand whether there is cheating in honey.

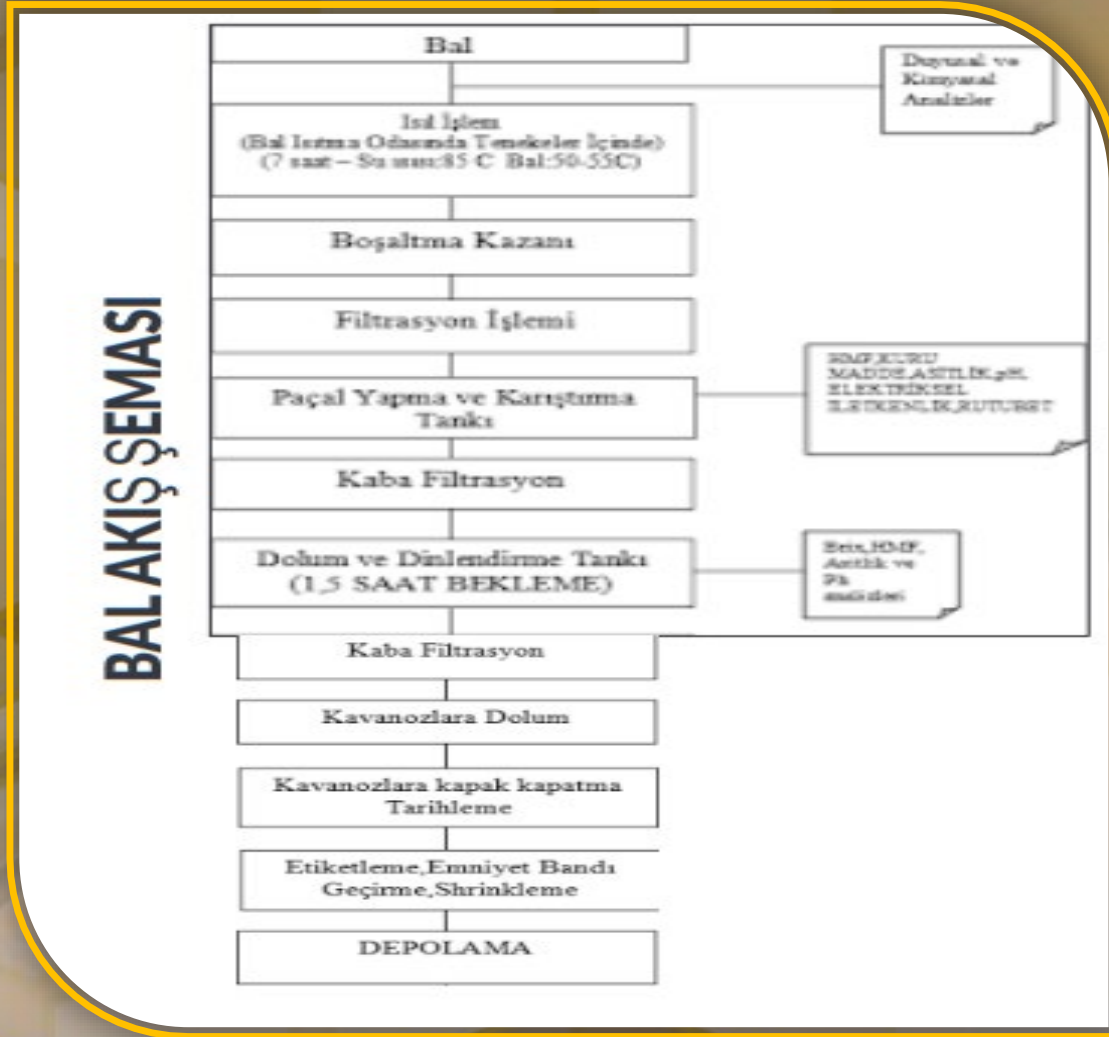
Changes That May Occur During Storage of Honey

- After the honey is filtered and rested, it should be stored in a suitable environment. This is a very important process in order to preserve the quality of honey. Since honey consists of different building blocks, it undergoes structural changes even during storage. Changes that may occur during the storage of honey; © Crystallization, © Darkening of color, © Increase in acidity, © Increase and decrease in sugar types in honey, © Increase in HMF (hydroxy methylfurfurol) value due to increase in storage time and heating of honey. In order to control these negativities that affect the quality of honey, some factors should be considered during storage.
- During the storage of honey, the most important factors related to quality are; © The temperature of the storage location, © Humidity of the storage place, © Feature of packaging containers, © Storage time. Color darkening can be seen in honey that is heated or kept waiting. When the storage temperature drops below 11°C, the activity of the yeasts that cause fermentation stops. To prevent the formation of undesirable properties in honey, it should be stored in cold places. It should be stored in tightly closed containers so that it cannot absorb the humidity of the air. The most suitable packaging container for honey is glass jars with lids.
- Since honey has an acid structure, it will react with plastic materials, causing the quality of honey to decrease. Packaged honey should be kept at room temperature. In honey kept at room temperature, diastase and invertase enzymes are also reduced. In order to prevent the reduction of sugar and enzyme content of honey, the temperature of the storage location should be lowered.

- **Methods for honey harvest**

- During honey harvest, bees should be kept away from honeycombs. The methods used for this purpose are as follows:
 - Shaking and brushing: After shaking and brushing the frames are taken and taken to the harvest room.
 - Bee smugglers method: Bee smugglers are placed in the middle of the inner cover of the hive and on the honeycombs to be harvested. Then the roof of the hive is opened a little and the inside is smoked.
- **Filtering and resting of honey:** Honeycombs and containers to be filtered are taken to the extraction room. All the frames are removed and the glaze on the honeycombs is scraped off with a glaze comb or glaze knife. The honeycombs, the glazes of which are removed, are put into the honey filtering machine. These machines have a mechanism based on centrifugation. There are different types of these strainers, such as electrically operated and manually operated. At the end of the process, some honey residue still remains in the drained combs.
- Those combs should be cleaned and repaired by giving them to stronger hives, and they must be distributed to other hives the next day. The honey obtained from the strainer is not clean. It contains parts, larvae, dead bees and pollen grains. A zero-numbered wire sieve is used to remove impurities from honey. After filtering, the honey is transferred to resting containers. protects the hive. It ensures the hygiene of the hive by preventing the development of various spores and the like.

Honey Processing Flow Chart Flow chart of filtered honey production



Storage of Honey



Storage of Honey and Thawing of Frozen Honey Crystallization, which is a natural change, can be controlled by appropriate storage, heating or filtration. One way to prevent honey from crystallizing is to keep it at 0 °C for at least 5 weeks and then store it at 14 °C. The healthiest packaging for honey is a glass jar.

The containers in which the honey is stored affect the crystallization in the ambient humidity, heat and light. In addition, air bubbles, pollen, garbage, dust, wax, propolis and other foreign substances in the honey cause crystallization in filtered honey.

Crystallized packaged honeys become liquid again if they are kept in a cabinet with air at a temperature of 45 °C or in a boiler with adjustable temperature, kept at a temperature of 45 °C. While doing this process, the heating process should be finished as soon as the thawing is completed so that some of the beneficial properties in the honey are not lost.

- **Storage conditions:**

- **Firmness.** One of the most important storage conditions is a tightly closed glass container. **Lighting.** Store honey in a dark place. You should not leave the jars in the apartment: on the kitchen table or on the windowsill.
- When direct sunlight strikes a bee product, especially in a transparent container, its medicinal and nutritional value is significantly reduced. For a product stored in a dark container, it is also undesirable to stay for a long time in a strongly lit place, especially because of the danger of overheating.
- Diffused light entering the cabinet through a glass insert also has a negative effect on the antimicrobial qualities of the product. **Moisture.** Honey can absorb moisture from the environment. Therefore, in order to best preserve the beneficial properties of the product, they choose a dry place with an optimum humidity of about 60%.
- The feature of being hygroscopic, especially in rooms with high humidity, causes the consistency of the product to liquefy and deteriorate. The room should be well ventilated to avoid mold, this will also determine how much honey is stored.



- **It stinks.** Honey absorbs odors easily, so it is not recommended to store it near spices, garlic or onions, pickles, and other scented items such as gasoline or paint. Also, you should not place jars near bulk products such as flour - due to the sticky consistency of honey, flour particles can settle on its surface, causing fermentation. The smell of tobacco or smoke can enter the composition of the nectar.
- **Heat.** Healthy sweetness is preserved only in a cool place. At temperatures above + 20C °, the beekeeping product loses its healing properties, turning into an ordinary sweet mass, so it should not be stored in cabinets near the stove or heated radiator. The ideal container for storing honey is a dark glass jar with a closed lid. The presence of a rubberized or plastic seal on the lid is allowed for a tighter closure. Consider other suitable storage container materials. Wood: suitable barrels made of alder, birch, linden or beech, with a moisture content of not more than 16%, moistened with wax from the inside. Pots made of coniferous wood are not used, since such dishes give off tar and odor. Oak barrels dry out over time, lose their firmness, and the honey in them darkens.
- **Clay.** For storage, use clay, ceramic or porcelain containers that are likely to close tightly. For long-term storage, the dishes can be sealed with wax at the junction with the lid. Ceramic pots must be glazed inside. Clay has a porous structure that allows it to maintain a suitable temperature. But you should also take into account the ability of the material to absorb odors, therefore, before using a clay pot from fragrant products, it should be washed and ignited in the oven without the use of detergents, especially with the content of chemical elements in the composition. Pottery, ceramic and porcelain dishes have one drawback - increased fragility, especially with temperature changes.
- **Plastic.** Plastic containers for storage or shipping may be used with those marked "for food". Honey can interact with the chemical elements of non-food plastic and absorb them into its body. Therefore, if sweet amber was purchased in a plastic bottle, raising doubts about its suitability, then at home it should be poured into a more suitable container. Even food-grade plastic is still not recommended for long-term storage of the product.

• Other materials

- It is allowed to store honey in stainless steel and aluminum containers. However, it is dangerous to leave the product in an iron, copper or galvanized container for a long time. Honey in such containers interacts with the oxidized metal to form chemical compounds that are harmful to health. For the same reason, it is not recommended to use iron spoons for a set of desserts or leave them in bulk.
- Important! When storing honey in an enameled container, the presence of chips or other damage is not allowed.
- Make sure the storage containers and lid are clean and dry. You cannot pour a new piece of nectar into a jar that has not been cleansed of previous residues. The residues left behind come into contact with the fresh product, causing it to ferment.
- It's best to use a permanent, tested container, but not jars and other strong-smelling products to avoid odors in fresh honey storage space. The residence time of medicinal substances and trace elements in the product composition depends on the place of storage.
- What is the best storage space for a refrigerator or pantry? Honey can be stored in the refrigerator, in a compartment with a temperature of + 5C °, for example, at the door. However, humidity changes, intermittent lighting, and various strong odors from other products in the refrigerator can make storage difficult.
- True, in conditions of high room temperature, without the possibility of adjustment, provided that containers with closed lids are used, the refrigerator becomes the only place and way to properly store honey with honey. Sweet amber is allowed to be stored on cool loggias in cabinets. Storage locations should not be changed frequently

Important!

Temperature changes adversely affect the quality, color and smell of honey. By moving the jars from the refrigerator to rooms with room temperature, you should not change the storage places frequently to avoid the appearance of condensation.

Is it possible to freeze jars of honey. Honey can be frozen in a freezer at a temperature not lower than -20C °. However, this method does not affect the shelf life and makes it difficult to remove the product from the container after it is at a lower temperature.

Therefore, for this type of storage, you should choose small containers, given that when freezing, the mass of the liquid will increase. For this reason, the bee product is not poured into the container to the brim, space is left at the top. Thaw the honey at room temperature without removing the lid. You should know! Staying in the freezer can spoil the taste of the product.

Storage temperature. The best temperature for storing honey jars is between -5C° and +20C° which is below normal room temperature. Therefore, a dark cellar with a constant temperature that does not rise above + 20C ° will be the best storage option. Lower temperatures are less intimidating than higher temperatures, where vitamins are destroyed for natural sweetness. A dark, constant temperature cellar is the best place to store it.

- **When honey is Sugaring,**
- **How to store honey in honeycombs**
- **Sugaring is a natural process and an indicator of quality. Crystallization does not change the nutritional and medicinal properties of the product. Crystals can be of different sizes and inevitably appear 3-6 months after removal from the honeycomb. Crystallization occurs due to the characteristics of the chemical composition of the product, the main components of which are glucose and fructose. The more glucose in honey, the faster it turns into sugar. For example, a sunflower may begin to form crystals while in honeycombs. Irregular crystallization is considered normal. High fructose honey, such as chestnut or sage honey, does not crystallize as quickly as others. Acacia can remain in liquid form for the longest time.**
- **Additional info: Glucose in the product can form a white film or spots of various sizes on the surface, which is a good sign for natural, ripe honey. When layering a beekeeping product, an important factor is that the upper liquid part is not too watery, which may indicate a violation of the pumping time and poor quality of the product. Additionally, the reason why honey remains in liquid form for more than six months may be that the heating temperature was exceeded during thawing for packaging. There are no vitamins and minerals in such a product. The quality of sweetness can be checked by dissolving the mass in water: the natural product completely dissolves within 10 minutes, leaving a cloudy yellowish solution. To restore the fluidity of the sugary product, melt a separate portion on a steam bath. If you want to restore the fluidity of the sugary product, melt a separate portion on a steam bath. Do not melt the mass over an open fire and do not let it boil, otherwise honey will turn into a carbohydrate that has no medicinal properties. You do not need to melt large quantities for subsequent storage purposes, the cooked product is stored worse and loses its useful qualities faster.**

- **Storage time**

- Honey should be stored in suitable containers that prevent light and air. In completely open containers with access to oxygen or in honey, all useful elements disappear within a few days, the product deteriorates and may become unusable. For medicinal use, it is recommended to use fresh honey, and not purchase honey for future use in large quantities. Determination of how long honey can be stored at home - the shelf life of pre-packaged honey for grocery stores is eight months to two years, according to the state standard. However, even after this period, if the product does not have fermentation odors, foam on the surface or a sour taste, it can be used.
- Honey does not have a specific shelf life. Honey has protective properties and can be stored in hives under suitable conditions for many years. But as it leaves the honeycomb and interacts with oxygen, these qualities are lost over time.
- **The following factors can affect shelf life:**
- Honeydew collected by bees not from nectar but from the sweet sticky secretions of insects remaining on plants. This type of honey is dark green in color, its aroma is less pronounced and its taste is often bitter. The sweet sap product goes rancid quickly. Honey produced by bees fed with sugar syrup. In addition to a shorter shelf life, it contains fewer nutrients. Considering the regional or climatic characteristics of the beehive, bees can be given sugar syrup due to their limited ability to naturally collect nectar from flowers. Additionally, dry summers can significantly affect the amount of flower nectar. The honey pumped from the honeycomb is not ripe. This type of honey does not have time to ferment enough, it will be too liquid, because the bees have not completely expelled excess moisture and closed the honeycomb. Immature honey flakes, is poorly stored and quickly turns sour. The quality of honey can only be checked by laboratory means, so before buying it is better to find out the location of the apiary, the ability of the bees to collect a sufficient amount of flower nectar and the beekeeper's responsibility for the timing of the harvest.
- **You can extend the shelf life of a home beekeeping product by storing it in a dark, dry and cool place. Bee honey has antibacterial and anti-inflammatory properties, has a tonic and tonic effect on the human body. To benefit from all the healing properties of the product, it should be purchased from reliable beekeepers and know the rules for storing jars of fresh honey at home.**

Kaynakça

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