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SAFETY OF BEESWAX PRODUCTIONS

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Abstract

Beeswax is the second most important product in beekeeping industry. It secreted from four pairs of wax glands on the ventral (lower) side of the abdomen (belly) of the workers. The secretion occurs in bees that are about two week old and resulting reduction of sugar synthesis of digestive origin. The aim of this paper was to determine the chemical, physical, and organoleptic properties of beeswax, which could affect on its safety. Beeswax is a very stable substance under normal conditions and retains its characteristics, but under certain circumstances, it may still have some modifications and defects may occur. Due to high demand and low production in some countries, there is the rising need for import and counterfeiting of beeswax. Increased production of beeswax becomes important, as well as the production of honey and have implemented modern technology for wax. Technology of wax includes annual replacement of old honey combs, carefully collecting all laterals, construction and building material amputation, carefully collecting scrap of wax from the hive floor coverings, regeneration frames. In terms of safety beeswax explored the factors that influence on the quality and quantity of beeswax, the way of purification combs, beet, industrial processing of wax. Safety of beeswax often threatens wax pests.
Key words: beeswax, wax glands, technology acquisition

Introduction

Researches (Whitcomb, 1946) have shown that the amount of sugar consumed by the bees to produce 500gr wax varies in some bee colonies from 3.0 kg to 4.0 kg with an average of 3.8 kg. Pure beeswax as it is flaked after being excreted by bees is obligatory white regardless of whether the bees are fed with dark honey or sugar syrup. Yellow tint in the wax comb, resulting from carotene pigments derived from pollen (Vansell and Bisson, 1935,; Tisher, 1940). Combs that play the litter darken after prolonged use due to the accumulation of parts jacket bee pupae that remain after performing in cells. The bright color of wax is more appreciated than dark-colored wax (Bogdanov, 2004). The composition of beeswax depends on the content of paraffin hydrocarbons, free fatty acids, esters of fatty acids and fatty alcohols (Tulloch, 1980). The mass used gas chromatography detector, for detecting falsification wax (Apimondia, 2009). Archeological discoveries in a cave in Slovenia show that the beeswax used in dentistry for more than 6,500 years, found the bone of the human jaw with a tooth whose cavity is filled with beeswax (www. huffingtonpost.com, 2012).

Literature review

Chemical composition of pure beeswax thoroughly investigated one Australian study group (Downing et al, 1961). It was found that beeswax consists of 16 % hydrocarbons (C21 to C33 odd numbers), 31% straight-line monohydrate alcohols (C24 to C36 even numbers), 3 % linear monohydrate alcohol (C24 to C32), 31% acid (C12 to C34, mainly C16), 13 % hydroxyl acid (C12 to C32 , mainly C16), and 6% of other substances. Further analysis of the

hydrocarbon fraction of beeswax by gas chromatography (Streibl et al, 1966) indicated the presence of two homologous series of paraffin's and olefins 6 homologous series. For further interest in the study, should be of excellent study done by the Callow (1963), where the corrected certain inconsistencies and errors in interpreting the results of earlier research. Physical properties of pure beeswax that has a specific gravity of 0.95 and an aroma that is similar to honey and weakly expressed distinctive taste. It melts at 64, 4°C, and hardens to 63, 4°C and a density of 20°C (Vansell and Bisson, 1940). The scope of these three values was 62-65°C, 60, 6 to 63, 4°C and from 0,939 to 0,987. Beeswax does not dissolve in water, very slightly soluble in cold alcohol and completely dissolved in volatile oils, chloroform, ether, benzene at 30°C, and carbon disulfide at 30°C. During storage at low temperatures beeswax often develop a powdered substance on its surface, which is called the flour, it is not musty, as some beekeepers believe. It is not clear what is causing this, but it can be seen under a microscope, the characteristic crystal structure. Melting point of the powder surface wax is 39°C, which is far from those of wax (Vansell and Bisson, 1940). Organoleptic qualities that wax usually meet in the form of molded blocks that need to have a homogeneous structure, free of impurities inside or without porous mass at the bottom of the block and without emulsion zone or remains saponification. The fracture has the appearance of crystals. The shape and structure depends on the quality of the starting material and the cooling time and conditioning. White wax, extra class that is obtained by melting wax caps from constructional or laterals has a homogenous structure with a fine grit. Wax, which has obtained from old, combs a crystal structure with a granular medium. Plasticity beeswax is quite specific. Pressure between your fingers to soften, easily modeled and becomes sticky. When pressed into a thin film, becomes homogeneous and transparent. Color depends on the quality of the starting material, the technology of extraction and purification. Color is a characteristic feature for determining quality. White color is valid for top quality, yellow to black for the first of thirds. Smell the wax is specific, similar to the smell of warm honey, but it depends on the extraction process. Smell the fat shows the presence of seoul or sterin, the smell of kerosene indicates the presence kerosene etc. Organoleptic characteristics are generally sufficient to assess the quality and origin of wax, and if this is not possible because of the physic- chemical analysis.

Technology of production of beeswax:

By finding the hive with movable comb, beekeepers were forced to come to the breaking up of the majority of honeycomb, so all that wax melts, and received substantial amounts of pure wax. After that, using modern hives and beekeepers centrifugation frames back most of the honeycomb in the hive so that the only part of mostly old frames melts and gets a small amount of wax. Since it is a small part of beekeepers producing wax is estimated that each hive produces 200-300g of wax, which is well below the need for beekeeping, let alone for other purposes. Due to the large deficit raises the urgent question of purity and quality of the wax in the form of honeycomb to the health of bees and the impact on quality of bee products. The fact that the uncontrolled quality of input materials in hourly basis, and the quality of honeycomb, showing how much danger beekeeping. It is necessary to break the conventional opinion that the production of wax reduces the production of honey in the hive. Beekeepers stimulate natural instincts of bees that disgusted litter and collect food reserves and neglected instinct to build honeycombs. Experience shows that there is a strong correlation between the intensity of nectar intake (pasture) and production of wax. A bee can produce 500g of wax and raise 26,000 larvae (V.Taranov) so that it takes on a real production capacity of wax. Production of wax, especially dependents on the amount of pollen in the hive that helps wax gland activity. Instinct construction is particularly pronounced when it is parallel with the presence of good pasture with raising a large brood, we have enough heat in

the hive, and enough space for the construction (frames with hourly basis). Knowing the factors that affect the production of wax in the hive beekeeper can increase production through the following measures: Annual replacement of old frames (min1/3), carefully collect all the laterals, construction, and amputation building material (biological fight against varroa), carefully collecting debris from the hive floor coverings, regeneration frames (deeper tilting honeycomb).

Cleanses wax:
Cleaning operation or refining wax has done by cleaning wax from foreign bodies. The method consists of repeated melting wax in soft water and cooling by precipitation with cleaning the bottom of a block of wax. The melting temperature should not exceed 90°C. In this it should be noted that many waste in wax having a specific gravity close wax and precipitated after 48-72 hours, and sometimes more. For this reason it is necessary to ensure slow cooling wax in a warm room with a well- insulated court in which the wax cools. The wax should melt in enameled or aluminum. The Court should be clean and at the bottom there is 2-3cm soft water or rainwater. When the wax is melted off the court with the heat and well drowns and leave to cool to room temperature. After this cooling wax in the form of a block can be easily removed from the mold and clean the various supplements on the underside of the block. This procedure wax becomes brighter colors and with fewer additives. When melting honeycomb extra class (even eating my wax and virginal honeycomb). The purification process is not necessary, if properly carried out extraction. Remnants of wax are the rest of the first melting honeycomb, in the extraction process, which still contains a certain amount of wax. It is assumed that in our remnants of wax contains 40% wax. With the use of powerful industrial presses pressed to install processing solvents can wax content reduced to only 3-4% that cannot get away, the rest of the otherwise good fertilizer. In order to obtain a good quality wax remnants of wax, it must be well dried in pieces that are not too large and placed in bags that they would not be attacked by moths or mildew. Should be free of other impurities such as straw, wood, wire, earth, stones, etc. must not be attacked by enemies wax: mouse, moth, mildew. Poor remnants of wax crumbly when squeezed by hand, while rich in real lumps. Remnants of wax color close to the color of old comb with poor flavor on wax. If smells of solvents, it is not good. Humidity should not exceed 7%, which can be roughly determined. Wax content also determines the approximate organoleptic comparing the pattern and should not be below 25%. The larger quantities will be controlled laboratory in the prescribed manner. Wax pests: The biggest pests are wax or wax moth caterpillars and mice. Wax can be attacked, and one type of bacteria that feed on honeybee bread from the comb and damaged different mold. Wax moth larvae feed on wax and honey beebread from the comb making galleries in the comb. This pest causes heavy losses particularly in the reserve comb out bee society, the apiary weak and sick society by helping the spread of the disease called galeroza because the tracks full of bee venom. Larvae live 30 days later transformed into dolls, and after 14 days in the adult butterflies. In favorable conditions (20-30°C) complete cycle takes 44 days at a temperature of 20°C is 120 days at 10°C metamorphosis stops, while at 0°C larvae, dolls and insects die in 12 hours. Cold is the biggest opponent of moths. For this reason, some beekeepers in the fall, before discarding frames in reserve, put it in the freezer, those who have attacked moth. Protection against of this pest is disinfecting combs, and annual disinfection of all combs of reserves. Mice are rodents to 12cm long and can be a house, fields, and forest. These are very tough enemies of the bee, and transmitting the disease. Entering the hive in the cold season, in the fall or winter it attaches litter in hive and eats honeycomb with honeybee bread and honey, and bees. They bite the wood frames and hives dirty around the floor and on the frames. Their activity disturbs bees therefore consume more food and suffer from diarrhea. Honeycomb from mice

need to be replaced because it avoids and nuts. Good protection of mice combs are to be set up in October, and if there are too many mice to perform pest control in the apiary. Common vole shrewmouse is a dangerous pest in the apiary. It looks like a mouse but it is much smaller, has a small head so much easier to pass through the openings. While the mouse has a section head 10mm common vole has only 4mm lives in underground galleries, and most loves mountain forests, glades and is quite widespread. Her head looks like a mole's head with a pointed snout, ears and eyes are much smaller, and the tail is shorter. It is especially dangerous because while the mouse eats honeycomb she eats bees. Beekeepers should not be late in the fight against these pests because losses of them very large. Mycoses are parasitic diseases caused by various species of fungi. Some fungal infections caused by beekeepers as aspergioza. In the corners of the hive are different mold spores, diseases caused by these fungi represent over 30% of bee diseases such as askoferoza (chalk brood) or aspergilioza (stone litter). Mold or fungi feed on organic matter from the comb or dead bees. Development degrades the environment in which they can cause a variety of diseases. Old comb with honeybee bread are suitable for the development of mold. These fungi produce toxins, some of which poison the bees, especially when adequate moisture and temperature hive. Mildew can be induced and inappropriate grazing in a zone, especially due to the high acidity of nectar. To avoid moldiness comb is necessary to ensure good ventilation, and warehouses where they stored spare comb, humidity should not be higher than that outside. Of course it is necessary annual disinfection.

Keeping honeycomb:
Well-organized apiary during the year must have a sufficient amount of frames with spare comb good quality. This means that the beekeeper must provide the appropriate conditions for the preservation of the honeycomb. Spare honeycomb kept indoors with the possible impact of appropriate insecticide. To do this, use cabinets, shelves or rooms that occasionally deration and disinfected. It should keep only good quality honeycomb while frames with brood (closed or open) right blend and bases disinfected bases need to be separately so that separate it from light brown, honeycomb with honey comb with powder. Honeycomb with honeybee bread should sprinkle with powdered sugar to avoid mold. Protect the room from the presence of mice and wax moth because they are very dangerous for spare cores. A space in which to keep spare cores should be closed, dry and in the summer it has a lower temperature. For this purpose the best basement dries rooms that are well sealed. The active season bases and extensions should be so spaced that provide airflow between the honeycomb and access vapor disinfectants. Disinfecting used sulfur, naphthalene, and more. The process consists of carbonation honeycomb sulfur dioxide resulting from the combustion of sulfur in the room. The dose that is used is 50g sulfur cubic meter warehouse space. Sulfur is burned at 120°C (in one court) blue flame producing sulfur dioxide. Gas kills caterpillars and butterflies wax moth and egg remains, and is therefore in the current season need to repeat the treatment after 10-15 days. Burning sulfur in the damp room creates acid H2SO2 detrimental to all metal parts, especially the wire, but also acts as an insecticide because it can remain in the comb and so poison bees. For these reasons, we must before putting the combs in the hive to make sure ventilation and washing old comb. Honeycomb put at least 30min in the water after which is centrifuged and dried in the sun. Another procedure is set mothballs in areas where it is stored to the closet or warehouse. Naphthalene is white hydroscope powder that evaporates at room temperature and prevents the development of caterpillars. Get in honey (even when the lid), creating an unpleasant taste. Has great acidity and insert standards. Before re- starting the beehive honeycomb, which is treated mothballs, should aerate 2-3days. There are other methods of destruction and wax moths and microbiological using pathogenic microorganisms. Beekeeping practices has some interesting ways of

keeping the honeycomb out of enclosed space saving space, transport, ventilation, and washing. When hives followers with strong bee society honeycomb is left in installments under clew. Honeycomb is under constant protection of bees and implemented to better winter because the club has risen and less accessible to the cold winds. Some beekeepers kept extensions with honeycomb on apiary outside. Honeycomb is supposed to be light and no honey that would not have caused the bees. On the stand, sort 6-8 bodies with honeycomb, with the top and bottom ventilation over the grid. Body can plaster tape, if not sealed well. Old and invalid comb should not be kept for blends. If you cannot immediately blends honeycomb should be removed from the frames rid of wires and calendar strainer or manually in lumps that are easier to keep and fewer attacks moth.

Industrial processing of wax:

It is estimated that the processing of wax by beekeepers in ruins with remnants of wax remains 45% wax with the proper functioning and good equipment. Even if the beekeeper can allocate 75% of wax means that the rest is lost. There is an obvious need for the industrial processing of wax and buying remnants of wax. For industrial processing needs special installation of larger capacity. When pressing the warm are necessary hydraulic presses large capacity up to 140 atmospheres, heating and melting remnants of wax and crushed honeycomb is made in kettles with water that is heated to 120°C. Principle extraction is the same as in the apiary, but higher capacity. In the industrial production are used: Smelter wax sump for liquid wax applied extraction dissolving wax machine for industrial lifting quality wax, a device for the production of honeycomb, making installation of honeycomb casting, installation for making hourly basis through the creation of bands, lines processing wax honeycomb.

Conclusion

Increased production of wax must be important for beekeepers and honey production. Security beeswax depends directly of the critical points of wax from: ways of obtaining's composition, processing, storage, transport, sales and so on. Wax is widely used in the world, even here in RS the demand for clean wax growing.

Literature

Jevtic, D., (2005): Beeswax production technology, Kamino trade, Kraljevo, Serbia, Belgrade.

Krivcov NI, Lebedev VI, (2000): Production Technology production. Alliance of bee beekeeping organizations in Serbia, Belgrade.

www.huffingtonpost.com / ancient-tooth-Slovenia-beeswax-toothache-n-html. Accessed: 26/06/2013.

Whitcomb, (1946). Jevtic D., (2005): Beeswax production technology, Kamino trade, Kraljevo, Serbia, Belgrade.

Vansell and Bisson, (1935): Jevtic, D., (2005): Beeswax production technology, Kamino trade, Kraljevo, Serbia, Belgrade.

Bogdanov S., (2004): Quality and standards of pollen and beeswax. Apiacta 38. 334-341. J. Seer Bonvehi, (2010): FJ Orantes Bermejo., (2010): Analytical Methods. Detection of adulterate commercial Spanish beeswax. Food Chemistry. journal homepage: www.elsevier.com / locate / food hem 2010th Tulloch AP, (1980): Beeswax - composition and analysis. Bee. World, 61.47 to 62. J. Serra Bonvehi, (2010): F.J. Orantes Bermejo., (2010): Analytical Methods. Detection of adulterate commercial Spanish beeswax. Food Chemistry. Journal homepage: www.elsevier.com/locate/foodchem2010.

Apimondia, (2009): Gas chromatography with mass detector technique (GC-MS) is used for detection of adulteration beeswax witch paraffin. Ewa Was Helena Rybak- Chmielewska, Teresa Szczesna.Kazimierska 2 24-100, PUEAWY Poland, and Ewa. @ Manwas. pulawy.pl.