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A NEW WAY TO OBTAIN A VALUABLE PRODUCT FOR HUMAN HEALTH BASED ON BEE HONEY

НОВЫЙ СПОСОБ ПОЛУЧЕНИЯ ЦЕННОГО ДЛЯ ЗДОРОВЬЯ ЧЕЛОВЕКА ПРОДУКТА НА ОСНОВЕ ПЧЕЛИНОГО МЕДА

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A new method of obtaining a product valuable for human health based on bee honey is proposed, which expands the possibilities of organic nutrition and increases the body's resistance to changing environmental conditions, since the final one has a balanced carbohydrate-protein-vitamin-mineral composition and good organoleptic properties.

Предложен новый способ получения ценного для здоровья человека продукта на основе пчелиного мёда, который расширяет возможности органического питания и повышает устойчивость организма к изменяющимся условиям окружающей среды, поскольку конечный обладает сбалансированным углеводно-белково-витаминно-минеральным составом и хорошими органолептическими свойствами.

Keywords: Honey, carbohydrate-protein-vitamin-mineral composition, organoleptic characteristics, technical regulations, human body.

Ключевые слова: мёд, углеводно-белково-витаминно-минеральный состав, органолептические показатели, технический регламент, организм человека.

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Innovative ways to produce organic products are of particular importance nowadays especially because of environmental state. The production of honey is in the cutting edge because it is a valuable product containing a wide

range of various chemicals that have a beneficial effect on the human body. There are more than 400 components which have been identified in honey. Honey is aresource of nitrogen compounds: aromatic amino acids, free nucleosides and their derivatives.The chemical composition of honey depends on the breed of bees, the type of plants and the climatic conditions of the region where its grow, the intensity of solar radiation, production technology, the time of collection and maturity of honey[1–3]. Honey is characterized by a large range of flavors and aromas depending on the source of nectar, shelf life, and heat treatment. Honey may contain toxic elements as Pb, As, Cd. Among defects of honey can be the high humidity, foaming, darkening, the presence of a loose white layer and foreign odors.

The technology for producing natural honey includes extracting frames with honey from hives, printing frames, pumping honey, conditioning and packaging in consumer packaging.

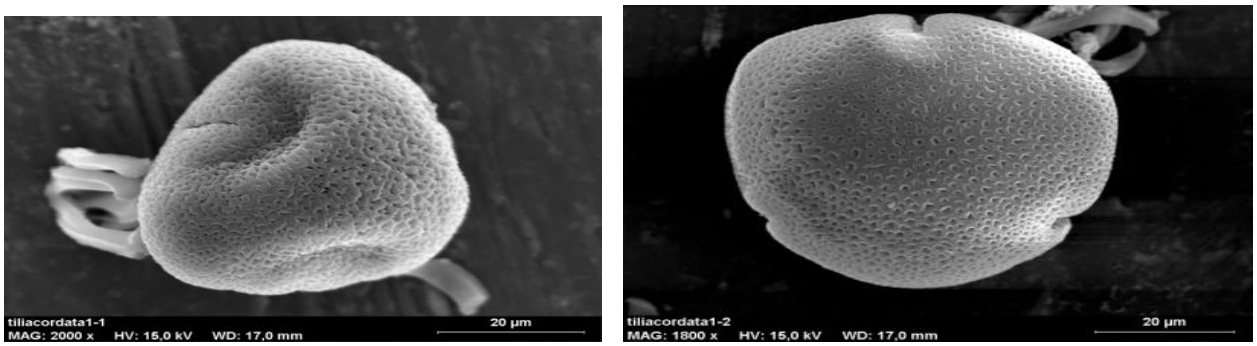
The disadvantage of the known traditional methods of obtaining honey is the duration of process, complexity, labor intensity and often not predictable. In addition, an important weakness can also be attributed to the uniformity of the honey content. The aim of the work is to develop the highly effective, economical and innovative method for producing environmentally valuable honey that has the balanced (with the possibility of regulation) carbohydrate-protein-vitamin-mineral composition, good organoleptic properties.The following objectives were set to achieve this aim:1. The literature review on the issue under study.2. Selection of research objects and development of the research method.3. Analysis of the results obtained and formulation of conclusions.The object of the study was natural honey obtained in accordance with ISO/TC 34/SC 19 [4]. Scanning electron micrographs of native starch granules were obtained using a LEO 1420 scanning (raster) electron microscope (Germany).

The average chemical composition of researched samples of honey (motley grass) is presented in table 1.

Table 1 – Nutrition value of 100 g of natural honey (average value)

Indicators	Averagevalues
Calorificvalue, кДж	1371
Carbohydrates, g	80,3
Mono - and disaccharides (sugars), g	74,6
Starchanddextrins, g	5,5
Proteins, g	0,8
Organicacids, g	1,2
Water (H_2O), г	17,4
Ash, g	0,3
Vitamin PP (nicotinic acid), mg	2
Vitamin B_1 (thiamine), mg	0,01
Vitamin B_2 (riboflavin), mg	0,03
Vitamin B_5 (pantothenic acid), mg	0,1
Vitamin B_6 (pyridoxine), mg	0,1
Vitamin B_9 (folic acid), µg	15
Vitamin C (ascorbic acid), mg	2
Vitamin H (biotin), µg	0,04
Vitamin PP (Niacin equivalent), mg	0,4
Calcium (Ca), mg	14
Magnesium (Mg), mg	3
Sodium (Na), mg	10
Potassium (K), mg	36
Phosphorus (P), mg	18
Chlorine (Cl), mg	19
Sulfur (S), mg	1
Iron (Fe), mg	0,8
Zinc (Zn), mg	0,094
Iodine (I), µg	2
Copper (Cu), µg	59
Manganese (Mr), mg	0,034
Fluorine (F), µg	100
Cobalt (Co), µg	0,3

The most reliable method for determining the authenticity of honey is the determination of pollen grains in it. Genuine bee honey contains about 2 % pollen. Honey is considered monoflore if it is dominated by the pollen of any plant in an amount of at least 45 % (fig. 1).



a *b*

Figure 1 – Scanning electron microscope images(a), (b) pollen Tíliacordáta L.

We have proposed a method for producing ecologically valuable honey that has the balanced (with the possibility of regulation) carbohydrate-protein-vitamin-mineral composition, and good organoleptic properties.

The technology for producing ecologically valuable honey, which provides for the production of honey and mixing honey with enriching ingredients, differsfrom the known methods in that the following are used as honey: flower and/or lime, and/or buckwheat, and/or Heather, and/or melon, and/or acacia, and/or chestnut, and/or hawthorn, and/or goldenrod, and/or cypress, and/or clover, and/or coriander, and/or dandelion, and/or sedge, and/or sunflower, and/or rapeseed, and/or bruise, and/or lavender, and/or pumpkin, and/or esparzet, and/or milk Thistle, and/or cotton, and/or intoxicating and/or mustard and/or raspberry and/or Apple and/or fruit and/or cedar and/or pine and/or taiga, and/or mountain and/or steppe and/or field and/or grassland, and/or may and/or propolis and/or honeydew, and/or borreby, and as an enriching ingredient used in dry powder form (flower additive and/or aromatic vegetable additive and/or additive to tea and/or Supplement cocoa, and/or the addition of nuts and/or additive algae, and/or theaddition of vitamins and/or Supplement mushrooms, and/or protein Supplement), in this case, the amount of the enriching ingredient should not exceed 10% of the total amount of honey. The quality of raw materials used must comply with existing technical regulations.

As the main component, honey is used in accordance with the technical regulatory legal act: flower and/or lime and/or buckwheat and/or Heather and/or melon and/or acacia and/or chestnut and/or hawthorn and/or goldenrod and/or cypress and/or clover and/or coriander and/or dandelion and/or osote and/or sunflower and/or rapeseed and/or blue and/or lavender and/or pumpkin and/or esparcet and/or milk Thistle and/or cotton and/or hop and/or mustard and/or raspberry and/or Apple and/or fruit and/or cedar and/or pine and/or taiga and/or mountain and/or steppe and/or field and/or meadow and/or may and/or propolis and/or paddy and / or sideways.

Modern environmental conditions are largely determined by the human economic activity. As a result of this activity, heavy metals, pesticides, herbicides, radionuclides, carbon and nitrogen oxides are released into the environment. However, despite the pollution of the natural environment of bee, the main product of its life – honey– is subject to strict requirements of State standards [5].

To prepare an enriching ingredient in the form of a spicy-aromatic vegetable supplement, the following vegetable raw materials are used in a mixture or separately according to thetechnicalregulatorylegalact: asafoetida (*Ferula assa-foetida* L.), badian (*Anis stellatum*), vanilla (*Vanilla planifolia* and *V. pompona*),clove (*Caryophyllus aromaticus* L.), ginger (*Zingiber officinale Rosc*), Kalgan or Galgan (*Alpinia officinalis*-small root, *A. Galanga*-large root, *A. Chinensis*-Chinese root), cardamom (*Elettaria Cardamomum*), cinnamon (Ceylon cinnamon (*Cinnamomum ceylanicum* Br.), turmeric (*Curcuma longa* L.), laurel (*Laurus nobilis* L.), nutmeg (*Myristica fragrans Houtt*.), black pepper (*Piper nigrum* L.), white pepper (*Piper nigrum* L.), cubeba pepper (*Piper Cubeba* L.), long pepper (*Piper longum* L., *P. officinarum* L.), african pepper (*Piper Clusii* D.), *capsicum annuum* L., *C. longum* L.), Cayenne pepper (*Capsicum fastigiatum* Bl., *C. frutescens*), bird's pepper (*Capsicum minimum* Roxb.), kumba or moorish pepper (*Xylopia aethiopica*), black or guinea pepper (*Xyopia aromatica*), jamaican pepper (*Pimentus officinalis* L.), japanese pepper (*Zanthoxylum piperitum* D.C.), paradise grain or malagetta (*Amomum Meleguetta* Rosc.), rosemary (*Rosmarinusofficinalis*), saffron (*Crocus sativus* L.), onion (*Allium cepa* L.), multi-tiered onion *(Allium proliferum Schrad*), shallot (*Allium ascolonicum* L.), leek (*Allium porrum* L.), chives (*Allium fistulosum* L.), chives (*Allium schoenoprasum* L.), mangir (*Allium senscens* L.), Altai onion (*Allium altaicum* Pall), Pskov onion (*Allium Pskov Fedtsch*), garlic (*Allium sativum* L.), cherry (*Allium ursinum*), flask (*Allium victorialis*), garlic (*Alliara officinallis Andrz, Alliaria brachycarpa*), garlic mushroom (*Marasmius scorodonius*), parsley (*Petroselinum crispum, P. sativum Hoffm*.), parsnip (*Pastinaca sativa* L.), celery (*Apium graveolens* L.), fennel (*Anetum foeniculum L., Foeniculum vulgare Mill*), horseradish (*Armoracia rusticana Lam*., *Cochlearia armoracia* L.), azhgon (*Carum ajowan Bent. et Hook, Trachyspermum copticum* L.), calamus (*Acorus calamus* L.), anise (*Pimpinella anisum* L., *Anisum vulgare Gaertn*), Basil (*Ocimum basilicum* L.), black mustard(*Brassica nigra* Koch.), Sarepta mustard (*Brassica juncea* Czern.), white mustard (*Brassica alba* Boiss), gravilat (*Geum urbanum* L.), blue melon (*Melilotus*

coerules L., *Trigonella coerulea*), oregano (*Origanum vulgare* L.), Angelica (*Angelica archangelica* L., *A. Officinalis Hoffm*.), hyssop (*Hyssopus officinalis* L.), caloufer (*Tanacetum balsamita* L., *Pyretrum balsamita*), chervil (*Anthriscus Cerefolium Hoffm*.), Spanish chervil (*Myrrhis aromatica* L., *Myrrhis odarata Scop*.), cumin (*Cuminum Cyminum* L.), coluria (*Coluria geoides*), coriander (*Coriandrum sativum* L.), watercress (*Nasturtium officinale* R. BR.), bitter cress (*Cochlearia arctica Sch*., *C. officinalis* L.), meadow cress (*Cardamina pratensis* L.), garden cress (*Lepidium sativum* L.).

To prepare an enriching ingredient in the form of a tea supplement, the following raw materials are used in a mixture or separately according to thetechnicalregulatorylegalact: green tea, black tea, red tea, white tea.

To prepare an enriching ingredient in the form of cocoa supplement, crushed cocoa beans are used in the form of dry powder according to thetechnicalregulatorylegalact.

To prepare an enriching ingredient in the form of a flower supplement, the following raw materials are used in a mixture or separately according to thetechnicalregulatorylegalact: buckwheat (dry crushed flowers), red and white clover (dry crushed flowers), honeydew (dry crushed flowers), narrow-leaved cypress (dry crushed flowers), oregano (dry crushed flowers), goldenrod (dry crushed flowers), heather (dry crushed flowers), yarrow (dry crushed flowers), peppermint (dry crushed flowers), yellow and white melon (dry crushed flowers), echinops cue ball (dry powdered flowers), common shiner (dry powdered flowers), lime-tree (dried crushed flowers), raspberries (dried crushed flowers), chestnut-tree (dried crushed flowers), porphyry sainfoin (dry powdered flowers), phacelia (dry powdered flowers), safflower (dried crushed flowers), Angelica (dried crushed flowers), lofant anise (dried crushed flowers), galega (dry powdered flowers), hyssop (dried crushed flowers), apple-tree (dried crushed flowers).

To prepare an enriching ingredient in the form of a proteinsupplement, the following raw materials are used in a mixture or separately according to thetechnicalregulatorylegalact: milk (dry powdered), albumin (dry powdered), chicken protein (dry powdered), dry powdered blood (bovine and / or pig).

To prepare an enriching ingredient in the form of a mushroomsupplement, the following raw materials are used in a mixture or separately according to thetechnicalregulatorylegalact:White fungus:penny bun (*Boletusedulis L*.) and / or dark cep or bronze bolete(*B. aereus L.),* and / or royal bolete(*B. regius L*.), and / or rooting bolete(*B. radicans L.),* and / or butter bolete(*B. appendiculatus L.*), and / or boletus reticulata(*B. reticulates L.).*

The flap mushrooms: boletus reddish (*Boletusrubellus*L.) and / or yellow-cracked bolete(*B. subtomentosus* L.), and / or bay bolete(*B. badius L.)*.Birch mushrooms:birch mushroom orboletusscaber or birch bolete(*Leccinumscabrum* L.) and / or leccinumvariicolor(*L. variicolor L.*), and / or white bog bolete(*L. holopus L.*).Scaberstalks:red-capped scaber stalk (*Leccinumaurantiacum L.),* and / or orange birch bolete (*L. versipelle*L.), and / or yellowfootbolete(*Tylopiluschromapes L.*).

Boletus: champagne bolete (*SuillusBellinii L.*) and / or suillusflavidus(*S. flavidus L.*), and / or larch bolete(*S. grevillei*L.), and / or slippery jack (*S. luteus L.*),and / or weeping bolete (*S. granulatus L.),* and / or orange larch bolete(*S. tridentinus L.*).Golden chanterelle mushrooms:hedgehog mushroom (*Hydnumrepandum* L.) and / or common funnel (*Clitocybegibba L.),* and / or pale chanterelle (*Cantharelluspallens L.)*, and / or winter mushroom (*C. tubaeformis L.*), and / or yellow foot (*C.lutescens L.*), and / or girolle(*C.cibarius L.*), and / or ashen chanterelle (*C.cinereus L.*).Honey mushrooms:Co llybiadryophila(*Collybiadryophila L.*) and / or sheathed woodtuft(*Kuehneromycesmutabilis L.),* and / or honey fungus (*Armillariamellea L.*), and / or armillariamellea (*A. ostoyae L.*), and / or enokitake(*Flammulinavelutipes L.*), and / or fairy ring champignon (*Marasmiusoreades L.*), and / or armillariagallica(*ArmillariaGallica L.*).Russulamushrooms:r ussulapaludosa(*Russulapaludosa L.)* and / or green-cracking russula(*R. virescens L.),* and / or greasy green brittlegill (*R. heterophylla L.*), and / or shrimp mushroom (*R. xerampelina L.*), and / or grass-green russula(*R. aeruginea L.*), and / or gilded brittlegill(*R. aurata L.*), and / or bare-toothed russula (*R. vesca L.),* and / or yellow swamp russula(*R.* claroflava *L.*).

Truffle mushrooms:black truffle (Tubermelanosporum L.), and / or summer truffle (*Tuberaestivum L.*).

Agaricusmushrooms:banded agaric (*Agaricusbitorquis* L.),and / or field mushroom (*A. campestris L.),* and / or the prince (*A. augustus L.*), and / or agaricusbisporus (*A. bisporus L.*), and / or scaly wood mushroom (*A. sylvaticus L.),* and / or wood mushroom (*A. sylvicola L.*), and / or horse mushroom (*A. arvensis L.*). Oyster mushrooms:tree oyster mushroom (*Pleurotusostreatus L.*), and / or indianoyster, (*P. pulmonarius L.),* and / or late oyster (*Panellusserotinus L.*).

To prepare an enriching ingredient in the form of a nutsupplement, the following raw materials are used in a mixture or separately:walnuts, hazelnuts, almonds, brazil nuts, water nuts (chilim), chestnuts, cashews, pecans (olive), pistachios, pine nuts. To prepare an enriching ingredient in the form of a vitaminsupplement, the following raw materials:C_3, D_2, D_3, A_1,A_2,K_1,K_2, α-tocopherol, β-tocopherol, γ-tocopherol, PP, BvitaminsB_6, B_9, B_1, B_2,B_{12},are used in a mixture or separately.

The dosing of the obtained honey is carried out according to the recipe. If several types of honey are used, the measured amounts of different types of honey are drained together and mechanically thoroughly mixed for at least 5–10 minutes until a uniform distribution of different types of honey is obtained in relation to each other.

Next, the enriching ingredients are obtained in dry powdered form as a result of the following sequential technological procedures: separation, drying and grinding, as well as the removal of metal-magnetic impurities. Metal-magnetic impurities are removed by passing the resulting dry crushed (powdered) product through a section with permanent magnets, the thickness of the product layer is 6–8 mm, the speed is not more than 0,5 m/s.

According to the recipe, the enriching ingredients are selected and dosed to increase the biological value. The selected enriching ingredients are added to the prepared honey and mechanically thoroughly mixed for 5–10 minutes until the enriching ingredient(s) is evenly distributed in the honey mass.It should be noted that the amount of the enriching ingredient in the recipe should not exceed 10% of the total amount of honey.The resulting product (biologically valuable honey) is packed and weighed.

At hard environmental conditions honey becomes a valuable factor in enhancing human health. Proposed innovative method of producing environmentally valuable honey expands the possibilities for organic nutrition and increase the human body's resistance to changing environmental conditions, because it has a balanced carbohydrate-protein-vitamin-mineral composition and good organoleptic properties.

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АНТИРАДИКАЛЬНАЯ АКТИВНОСТЬ ПОЛИФЕНОЛЬНЫХ СОЕДИНЕНИЙ, ВЫДЕЛЕННЫХ ИЗ РАСТЕНИЙ *HELICHRYSUM MARACANDICUM*

ANTIRADICAL ACTIVITY OF POLYPHENOLIC COMPOUNDS ISOLATED FROM *HELICHRYSUM MARACANDICUM* PLANTS

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Выявление антиоксидантной активности природных веществ и оценка их эффективности является важнейшей задачей для разработки новых антиоксидантных систем на их основе. Исследование антирадикальных возможностей природных соединений как одного из компонентов антиоксидантной активности является одним из методологических подходов, используемых в этой работе. В данной работе изучена антирадикальная активность (АРА) по отношению к свободному радикалу 2,2-дифенил-1-пикрилгидразилу (ДФПГ) две полифенольных соединений сумма 1 и сумма 2, выделенных из растений. Установлены количественные характеристики реакции восстановления ДФПГ исследованными полифенолами.

Identifying the antioxidant activity of natural substances and assessing their effectiveness is the most important task for the development of new antioxidant systems based on them. The study of the anti-radical possibilities of natural compounds as one of the components of antioxidant activity is one of the methodological approaches used in this work. Identifying the antioxidant activity of natural substances and assessing their effectiveness is the most important task for the development of new antioxidant systems based on them. The study of the anti-radical possibilities of natural compounds as one of the components of antioxidant activity is one of the methodological approaches used in this work. In this work, the antiradical activity (ARA) with respect to the free radical 2,2-diphenyl-1-picrylhydrazyl (DPPH) of two polyphenolic compounds (summa 1 and summa 2) isolated from plants was studied. The quantitative characteristics of the reduction reaction of DPPH by the studied polyphenols were established.

Ключевые слова: свободные радикалы, ДФПГ, полифенольных соединений, антирадикал, сумма 1 и сумма 2.