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Salonul Cercetării Științifice, Inovării și Inventicii
Ediția a XXII-a

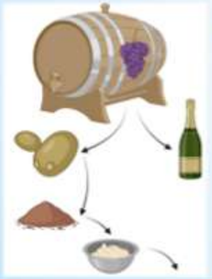
PROCEDURE FOR MANUFACTURING MUFFINS WITH REDUCED FAT CONTENT

BOIȘTEAN ALINA, CHIRSANOVA AURICA, SIMINIUC RODICA, CHIORU ANA

[1] TECHNICAL UNIVERSITY OF MOLDOVA, 168 STEFAN CEL MARE BLVD., CHISINAU, REPUBLIC OF MOLDOVA

Aim of the Invention

To obtain functional low-fat muffins by valorizing residual wine yeast, considered a by-product of the winemaking industry, in order to develop innovative, nutritious, and sustainable products.



Abstract

The invention relates to the food industry and describes a process for manufacturing functional muffins with reduced fat content. The method involves partially replacing sunflower oil with residual wine yeast, a by-product of the winemaking industry, during dough preparation. This substitution provides an innovative way to valorize wine lees, which contain valuable nutrients such as proteins, carbohydrates, anthocyanins, and β-glucans. The resulting muffins maintain desirable sensory and nutritional qualities while lowering overall fat content. The invention contributes to sustainable food production by reducing winery waste and diversifying the range of functional bakery products.

Results

Figure 1. Energy value of the developed muffins)

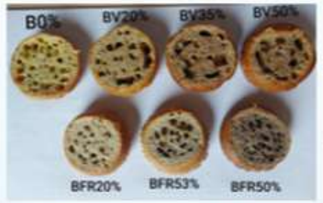


Figure 2. Appearance of muffins with residual wine yeast (Viorica and Feteasca Regală)

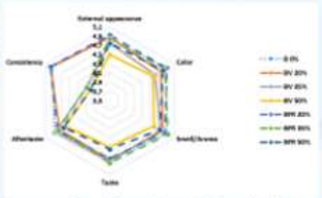


Figure 3. Organoleptic profile diagram of muffin samples

Novelty and Originality

- ✓ The invention introduces the use of residual wine yeast, a winemaking by-product usually considered waste, as a functional ingredient in muffin production.
- ✓ By replacing 35% of sunflower oil with wine yeast, the process reduces fat content while maintaining desirable technological and sensory properties.
- ✓ Wine yeast contributes valuable bioactive compounds, including proteins, anthocyanins, and β-glucans, enhancing the nutritional profile of the muffins.
- ✓ The method supports environmental sustainability by valorizing wine industry residues and reducing food production waste.
- ✓ The approach expands the assortment of functional bakery products, offering consumers innovative, nutritious, and health-oriented alternatives

ACKNOWLEDGEMENTS

Acknowledgments: The research [illegible] "Optimizing food processing technologies in the context of the [illegible] implemented at the Technical University of Moldova.

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Ediția a XXII-a

STATE PROJECT REBRAIN 25.80013.5107.03RE
Sustainable valorization of residual wine yeasts: exploring multifunctional bio-ingredients for innovative applications

Chirsanova Aurica, Siminiuc Rodica, Boiștean Alina

[1] Technical University of Moldova, 168 Stefan cel Mare Blvd., Chisinau, Republic of Moldova

AIM OF THE PROJECT:

to valorize residual wine yeasts by isolating and characterizing β-glucans as multifunctional bio-ingredients and assessing their techno-functional performance in model food and cosmetic systems. The project targets sustainable, cost-efficient processes and validated prototypes that advance the circular bioeconomy.

PROJECT WORKFLOW

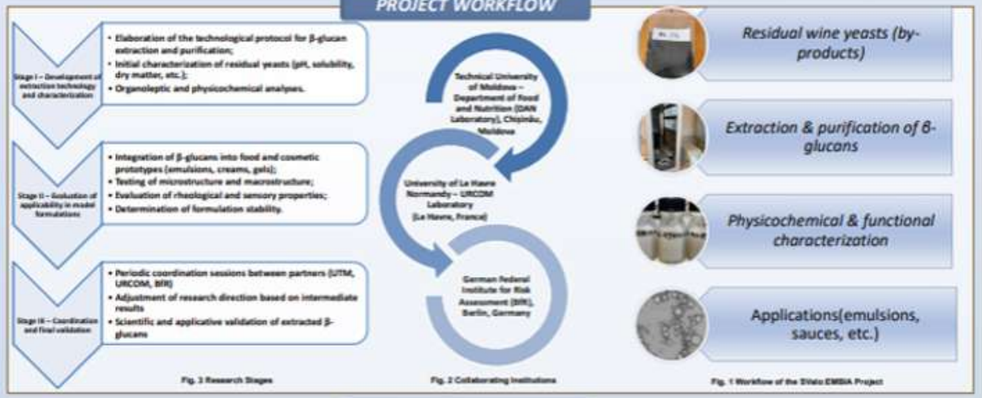

Fig. 3 Research Stages *Fig. 2 Collaborating Institutions* *Fig. 1 Workflow of the Static-EMBIA Project*

NOVELTY AND ORIGINALITY

- ✓ Promoters in Moldova the sustainability-driven valorization of residual wine yeasts, reframing waste as high-value resources.
- ✓ Isolates and characterizes yeast β-glucans (≈55–65% of cell walls) as multifunctional bio-ingredients.
- ✓ Links composition to techno-functional performance (thickening, stabilizing, emulsifying, gelling, water-holding, antioxidant).
- ✓ Couples eco-friendly extraction/purification with advanced physicochemical, rheological, interfacial, thermal, antioxidant, and sensory analyses in a coherent workflow.
- ✓ Delivers translatable tools—an integrated valorization strategy, a good-practice guide, and an illustrated outreach brochure—co-created with academia, producers, and the scientific diaspora; establishes a replicable regional platform advancing the circular bioeconomy and competitiveness in food/cosmetics.

EXPECTED RESULTS & IMPACT

An eco-friendly (solvent- and energy-efficient) β-glucan extraction protocol, an integrated characterization dataset, and validated food/cosmetic prototypes with thickening, stabilizing, emulsifying, gelling, and water-holding functionality. These outcomes will cut winery waste, generate high-value bio-ingredients, provide transferable valorization guidelines, and strengthen Moldova's alignment with EU circular-bioeconomy goals.

ACKNOWLEDGEMENTS

The research was supported by State Project 25.80013.5107.03RE, *"Sustainable valorization of residual wine yeasts: exploring multifunctional bio-ingredients for innovative applications,"* running within the Technical University of Moldova.

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Ediția a XXIII-a

STATE PROJECT FOR YOUNG RESEARCHERS 23.70105.5107.06T

"Valorization of vegetable proteins from secondary products of the local fat and oil industry (ProVeg)"

Radu Oxana, Capcanari Tatiana, Covaliov Eugenia, Boiștean Alina

[1]Technical University of Moldova, 168 Stefan cel Mare Blvd., Chisinau, Republic of Moldova

Aim of the Project:

The aim of the ProVeg project consists in the scientific and technological valorization of by-products from the oil and fat industry through the development of plant-based protein compositions with enhanced biological value.

Materials and Methods

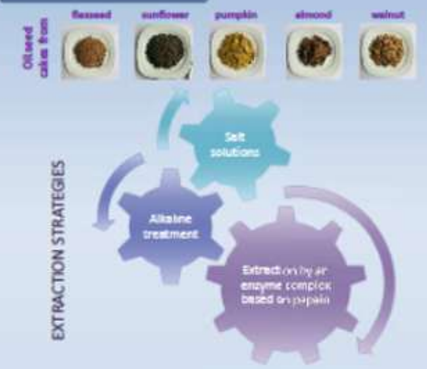

Figure 1. Assessment of methods for protein concentration from oil and fat industry by-products

Results

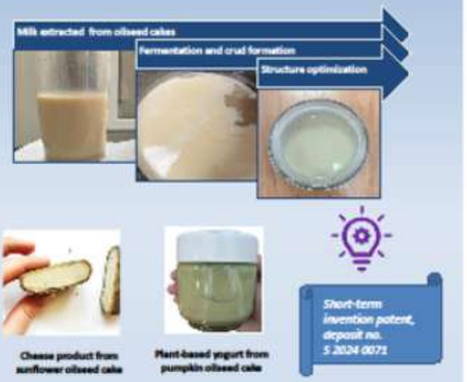

Figure 2. Food prototypes of vegan dairy products developed from oilseed cakes

Novelty and Originality

- ✓**Utilization of by-products** from the local oil and fat industry as **sources of plant proteins**;
- ✓**Elaboration of proposals to compensate for protein deficiency** in the population's diet through the use of renewable and available resources;
- ✓**Optimization of protein concentration methods** adapted to specific physicochemical properties of oilseed by-products;
- ✓**Development of dietary products** and formulation of functional additives for the production of modern foods;
- ✓**Demonstration of innovative prototypes of vegan dairy alternatives** (kefir, yogurt, cheese) with enhanced nutritional and functional value.

Impact

ACKNOWLEDGEMENTS

The research was supported by the State Project for Young Researchers 23.70105.5107.06T "Valorization of vegetable proteins from secondary products of the local fat and oil industry (ProVeg)", running within the Technical University of Moldova.

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Ediția a XXIII-a

STATE PROJECT FOR YOUNG RESEARCHERS 25.80012.5107.11TC

BIO-FERM - Valorization of bioactive compounds from alternative plant sources for the development of functional fermented foods

Covaliov Eugenia, Capcanari Tatiana, Popovici Violina, Radu Oxana, Negoiță Catalina

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Aim of the Project:

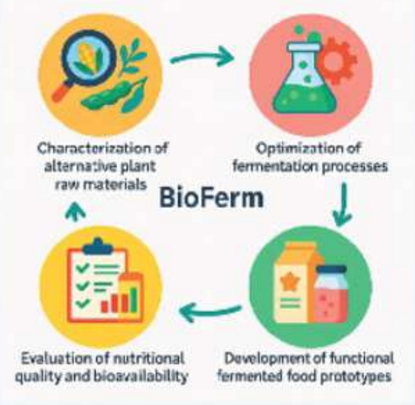
The BioFERM project aims to explore and valorize alternative plant raw materials through controlled fermentation in order to enhance the nutritional profile, digestibility, and bioavailability of bioactive compounds. By integrating cereals and legumes as sustainable substrates, the project develops prototypes of functional fermented foods that combine improved technological performance with added health benefits. This approach contributes to the circular use of agri-food resources and supports the creation of innovative food products aligned with consumers' increasing demand for healthier and more sustainable dietary options.

Materials and Methods

Research materials:
Cereal flours - oats, barley, rye
Legume flours - chickpea, lentil, pea
Agro-industrial by-products - cereal bran, legume husks

Research methods:

- **Physicochemical analyses:** moisture (gravimetric), protein (Kjeldahl), starch (enzymatic/polarimetric), ash, dietary fiber (enzymatic-gravimetric)
- **Bioactive compounds:** total polyphenols (Folin–Ciocalteu), flavonoids, antioxidant capacity (DPPH, ABTS, FRAP)
- **Technological properties:** water absorption capacity, swelling index, water retention capacity
- **Fermentation trials:** monitoring pH, CFU, organic acid production
- **Digestibility & bioavailability:** in vitro gastrointestinal simulation (pepsin, pancreatin, trypsin), analysis of released peptides and polyphenols (UV-Vis, HPLC)



Novelty and Originality

- **Integrated multifunctional approach** to controlled fermentation of cereals and legumes, combining nutritional, technological, and bioactive evaluations.
- **Enhanced digestibility and bioavailability** of proteins, starch, and polyphenols through microbial biotransformation.
- **Valorization of alternative crops and agro-industrial residues** as sustainable substrates for fermentation.
- **Alignment with circular bioeconomy and sustainability principles**, reducing food waste and supporting climate-resilient nutrition.
- **Direct applications in innovative functional foods and nutraceuticals**, including beverages, bakery products, plant-based dairy alternatives, and powdered supplements.

Expected Results & Impact

- **Optimized fermentation protocols** for cereals and legumes as alternative substrates.
- **Enhanced nutritional profile** of fermented products: improved protein digestibility, mineral bioavailability, and reduced antinutritional factors.
- **Increased levels of bioactive compounds** (polyphenols, flavonoids, antioxidants) with higher functional potential.
- **Prototype development:** fermented beverages, protein bars, bakery products, plant-based yogurt, and powdered supplements.

ACKNOWLEDGEMENTS

The research was supported by the State Project for Young Researchers 25.80012.5107.11TC BIO-FERM - Valorization of bioactive compounds from alternative plant sources for the development of functional fermented foods, running within Technical University of Moldova.

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Ediţia a XXII-a

UNIVERSITATEA TEHNICĂ DIN CLUJ-NAPOCA

STATE PROJECT FOR YOUNG RESEARCHERS 24.80012.5107.06TC "Waste sustainable utilization from the oil industry (Va-D-Oil)"

Capcanari Tatiana, Covaliov Eugenia, Popovici Violina, Cojocari Alexandrina

[1] Technical University of Moldova, 168 Stefan cel Mare Blvd., Chisinau, Republic of Moldova

Aim of the Project:

The **aim** of the Va-D-Oil project consists in the sustainable valorization of waste from the local oil industry by extracting multifunctional compounds from seed shells, bran, meal and inflorescence and integrating them into new technologies for the manufacture of widely accessible functional food products.

Materials and Methods

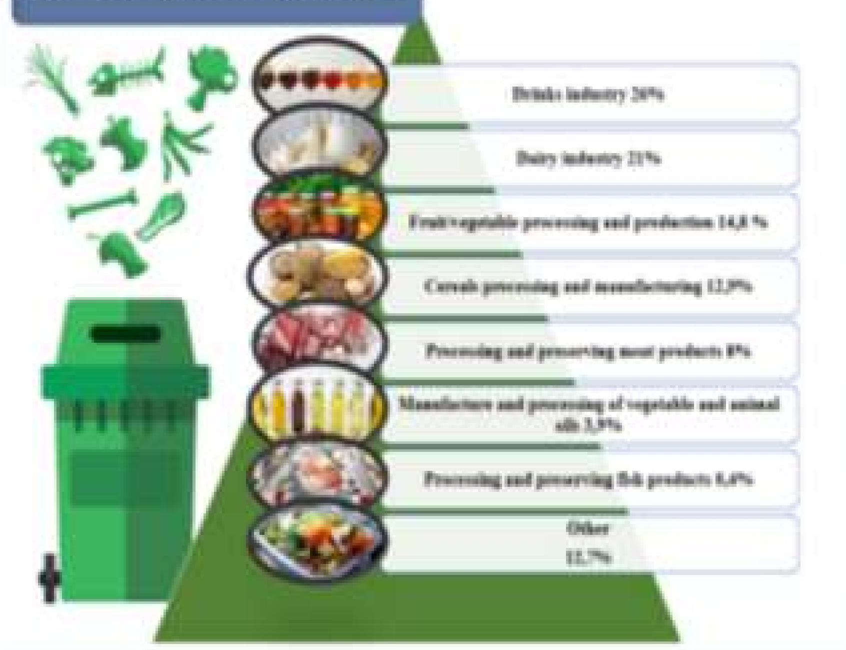

Figure 1. World production of agri-food waste

Results

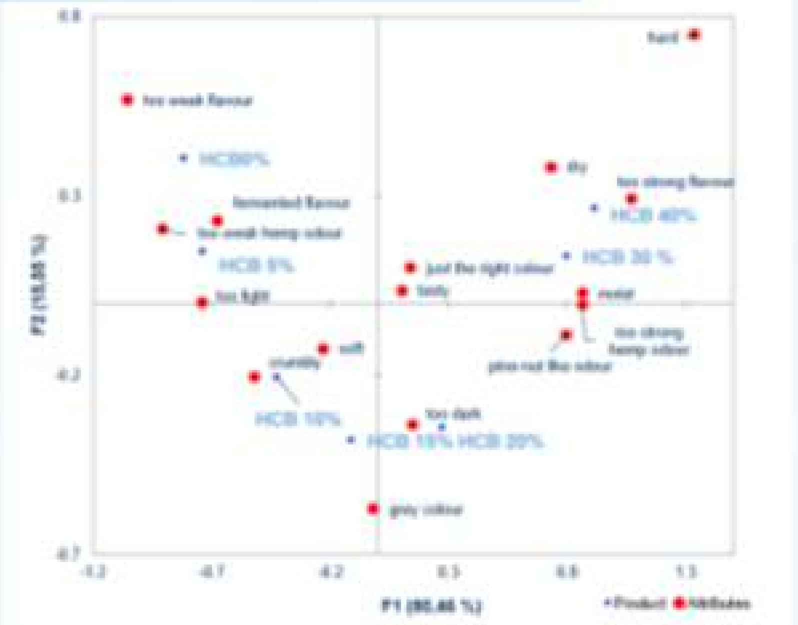

Figure 2. Visualized results of the check-all-that-apply (CATA) analysis of the seven bread samples. HCB0%—control sample, HCB5%—bread with 5% addition of hemp seed cake flour, HCB10%—bread with 10% addition of hemp seed cake flour, HCB15%—bread with 15% addition of hemp seed cake flour, HCB20%—bread with 20% addition of hemp seed cake flour, HCB30%—bread with 30% addition of hemp seed cake flour, HCB40%—bread with 40% addition of hemp seed cake flour.

Novelty and Originality

- ✓**Development and optimization of extraction methods** for multifunctional compounds from domestic oil industry by-products
- ✓**Assessment of nutritional and functional potential** of the extracted compounds
- ✓**Creation of innovative products** and diversification of locally available bakery goods
- ✓**Enrichment with bioactive compounds** to improve population nutrient intake
- ✓**Reduction of essential nutrient deficiencies** through sustainable resource use
- ✓**Affordable and sustainable solutions** to support healthy and balanced diets
- ✓**Positive community health impact** by encouraging healthier lifestyles

Impact

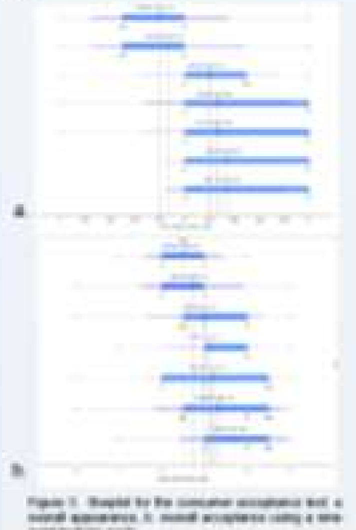

Figure 4. Bread samples viewed from above and cross-sections

ACKNOWLEDGEMENTS

The research was supported by the State Project for Young Researchers 24.80012.5107.06TC "Waste sustainable utilization from the oil industry (Va-D-Oil)", running within Technical University of Moldova.

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International Exhibition of Research, Innovations and Inventions PRO INVENT 2025, Cluj-Napoca, Romania

Technical University of Moldova, Institute of Electronic Engineering and Nanotechnologies „D. GHIŢU"

The process of obtaining the monocrystalline thin thermoelectric layers of type Bi2Te3, Bi2Se3 or Bi1-xSbx by means of liquids without substrates by mechanical exfoliation.

NIKOLAEVA Albina, MD; KONOPKO Leonid, MD; GHERGHIŞAN Igor, MD; PARA Gheorghe, MD; COROMISLICENCO Tatiana, MD

Ghitu Institute of Electronic Engineering and Nanotechnologies, str. Academiei 3/3, Chisinau, MD-2028 Republic of Moldova

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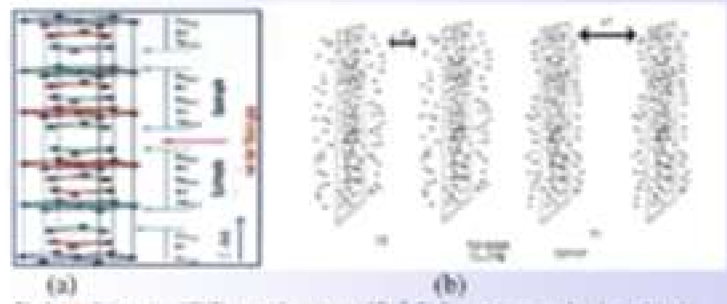
The invention relates to materials science, micro- and nanotechnologies, namely to a process for obtaining thin thermoelectric monocrystalline layers of the Bi2Te3, Bi2Se3 and Bi1-xSbx type with various dimensions, without supports, which can be used as n- and p-branches for thermoelectric devices.

The process, according to the invention, consists in that a single crystal sample, split along the cleavage plane from a massive ingot of layered thermoelectric single crystal material of the Bi2Te3, Bi2Se3 or Bi1-xSbx type, is pressed between two smooth plates, the joint surfaces of which are previously covered with a layer of wet porous material, after which the single crystal sample pressed between the smooth plates is placed in a vessel with liquid nitrogen until completely cooled. After extracting the single crystal sample pressed between the smooth plates from the liquid nitrogen vessel, the latter are removed from the single crystal sample with the simultaneous splitting from it along the cleavage plane of the thin single crystal layers with the frozen porous material layer, which are then immersed in a vessel with water at room temperature, where the porous material layers thaw and detach from the thin single crystal layers obtained, and the latter float on the surface of the water.

Patent MD 1818 Z 2025.08.31 Procedeu de obţinere a straturilor monocristaline termoelectrice subţiri de tipul Bi2Te3, Bi2Se3 sau Bi1-xSbx

NIKOLAEVA Albina, MD; KONOPKO Leonid, MD; GHERGHIŞAN Igor, MD; PARA Gheorghe, MD; COROMISLICENCO Tatiana, MD



Technology of manufacturing single crystal Bi_2Te_3 and $Bi_{1-x}Sb_x$ layers.

To peel bismuth-antimony layers off using an adhesive tape, the bulk sample was cooled to 70 K to increase the interatomic distance (Fig. 1b) and thereby to provide a decrease in the interaction (van der Waals) forces $P = m/d^2$ (patent).

Patent MD 1366 Z 2020.03.31 Procedeu de obţinere a peliculelor monocristaline subţiri

Albina Nikolaeva, Leonid Konopko, Pavel Bodiul, Igor Gherghisan, Tatiana Coromislichenco, Gheorge Para

Example of the process.

From a massive ingot of layered monocrystalline thermoelectric material of the Bi2Te3, Bi2Se3 or Bi1-xSbx type with certain thermoelectric parameters, it is split along the cleavage planes and a single crystal sample of the desired shape is cut, for example, with a thickness of 3 mm, a length of 2...10 mm and a width of 2...3 mm, which is placed under an MBS-1 microscope and pressed between two smooth plates, for example, metal, with a thickness of 3 mm. At the same time, the joint surfaces of the smooth plates with the single crystal sample are previously covered with a layer of moist porous material, for example, filter paper, 0.1 mm thick. The single crystal sample, pressed by the smooth metal plates with the thin wet layers of filter paper, is placed in a vessel with liquid nitrogen, for example, for 3 min, until it cools completely (to 77 K). After extracting the frozen single crystal sample from the liquid nitrogen vessel, in a few seconds, the metal plates are removed with a scalpel and the thin single crystal layers are split. Upon splitting, thin monocrystalline layers (1...10 μm) remain stuck to the frozen layers of filter paper. Then, the thin single-crystalline layers separated from the frozen layers of filter paper are immersed in the vessel with distilled water at a temperature of 300 K, where the frozen layers of filter paper thaw, and the thin single-crystalline layers obtained after 2...3 min appear floating freely on the surface of the water (Fig. 2a). The obtained thin, floating monocrystalline layers have the same parameters as the initially layered monocrystalline thermoelectric material and can be used as n- and p-branches for miniature thermoelectric microcooling devices and can also be moved in a free state onto any support (Fig. 2b) for further use for various purposes

The advantages of the proposed recrystallization technology:

27th INTERNATIONAL SPECIALIZED EXHIBITION

PROINVENT 2025

Technical University of Moldova, Department of Food Products Technology

Cluj-Napoca, Romania, 15-17 October 2025

PROCESS FOR OBTAINING CANNED RABBIT MEAT FOR YOUNG CHILDREN

GRUMEZA-CLEFOS Irina, POPA Nicolae, BANTEA-ZAGAREANU Valentina, DIANU Irina

Scope:

The invention relates to the food industry, namely to processes for obtaining canned rabbit meat with the addition of vegetables intended for young children.

Patent Application No. entry: MD 1812 Y 2025.01.31

Solution:

Diversifying the assortment of natural canned meat for young children (without fats (oils) and additives), developing processes and recipes for fine, dispersed compositions of attractive colors and balancing the nutritional value of the finished product.

Advantages:

- Reduction of sterilization time to 25-30 minutes;
- Product compatible with ages from 6 months;
- Balanced with vitamins, microelements and amino acids;
- The period of validity at +5...+25 °C for 24 months.

EXPERIMENTAL DETERMINATIONS

FINISHED PRODUCT

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Salonul Internațional al Cercetării Științifice, Inovării și Inventicii

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UNIVERSITATEA TEHNICĂ A MOLDOVEI

Cluj – Napoca, România, 15-17 octombrie 2025

Nutrient medium for cultivation of fungal strain Trichoderma longibrachiatum CNMN-FD-27

SÎRBU Tamara, MOLDOVAN Cristina, BÎRSA Maxim

Purpose:

The invention relates to microbiology and biotechnology, in particular a culture medium for the fungal strain *Trichoderma longibrachiatum*, which possesses antimicrobial and phytostimulatory properties, and can be used in agriculture for biological protection and for the stimulation of crop plants.

Patent 1835 MD/ 2025.04.30

Solution:

Nutrient medium for growth of the fungal strain *Trichoderma longibrachiatum* CNMN-FD-27, contains, g/L: corn syrup 20,0; glucose 10,0; KH_2PO_4 1,0; $MgSO_4x7H_2O$ 1,0; $NaNO_3$ 1,0; $CaCO_3$ 1,0; adjusted volume of the solution to 1 liter with water; pH 6,0-6,2.

Advantages:

The technical result of the invention consists in reducing the duration of strain cultivation and obtaining a biopreparation with more pronounced antifungal and phytostimulatory properties.

Fresh sunflower seedlings treated with:
a) Control (H_2O) and b) Experiment

The antifungal activity of *T. Longibrachiatum* strain cultivated in the nutrient medium M 3 *against B. cinerea*

The patent was funded within Research Subprogram 020101 "InBioS-Innovative biotechnological solutions for agriculture, medicine and environment" (the Republic of Moldova).

Agriculture, Horticulture

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Cluj – Napoca, România, 15-17 octombrie 2025

PROCESS FOR MANUFACTURING FUNCTIONAL VEGETABLE PÂTÉ

NETREBA Natalia, MD; SERGHEEVA Elena, MD; STURZA Rodica, MD; BĂLAN Greta, MD; COJOCARI Daniela, MD; SANIKIDZE Tamar, GE; CHKHKVISHVILI Irakli, GE; DZIDZIGURI Diana, GE; SHARASHENIDZE Alexander, GE; GHENDOV-MOȘANU Aliona, MD

Purpose:

The proposed invention relates to the food industry, in particular to the production of vegetable pâtés. The problem solved by the proposed invention is to obtain a pâté with increased nutritional and biological value, improved sensory characteristics, which does not require heat treatment and is stable during storage. Pâtés obtained according to the proposed process contain 15-16% protein, 23-30% lipids, 9-10% carbohydrates, and have an energy value of 305-370 kcal/100g.

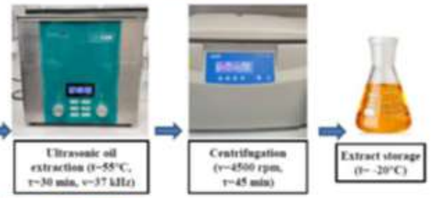
Brevet MD 1804 Z 2025.07.31 (Nr. depozit: s 2024 0054 Data depozit: 2024.06.04)

Advantages:

- **High nutritional and biological value** – rich in proteins (15–16%), essential amino acids, unsaturated fatty acids, vitamins, minerals, and dietary fiber.
- **Enhanced functional properties** – contains bioactive peptides, carotenoids, tocopherols, polyphenols, and antioxidants with proven health benefits.
- **No thermal treatment required** – preserves heat-sensitive vitamins, bioactive compounds, and sensory qualities.
- **Improved sensory characteristics** – smooth and homogeneous texture, pleasant taste with natural nutty and slightly sweet notes from walnuts and jujube fruits.
- **Natural antioxidant and antimicrobial protection** – due to pumpkin pulp liposoluble extract, ensuring product safety without artificial preservatives.
- **Extended shelf life and stability** – chemical and microbiological stability during storage at 3 ± 1 °C.
- **Balanced protein sources** – red lentils and/or mung beans provide complete essential amino acid profile with high digestibility.
- **Beneficial lipid composition** – walnuts and pumpkin extract enrich the pâté with omega-3, omega-6, and monounsaturated fatty acids, supporting cardiovascular health.
- **Rich in vitamins and minerals** – source of vitamins A, B-group, C, E, PP, and minerals such as iron, zinc, potassium, magnesium, and copper.
- **Antioxidant and health-promoting activity** – reduces oxidative stress, protects liver function, improves digestion, lowers cholesterol, and supports cardiovascular health.
- **Diet-friendly and cholesterol-free** – plant-based, with low glycemic carbohydrates, slow-digesting starch, and no cholesterol.
- **Innovative pumpkin extract application** – adds functional bioactivity (hepatoprotective, anti-inflammatory, antimicrobial), improves lipid profile, and enhances product color and flavor.
- **Functional jujube enrichment** – increases vitamin C, amino acids, dietary fiber, minerals; improves digestibility and provides a pleasant sweet aroma.
- **Environmentally sustainable** – based entirely on plant raw materials, supporting clean-label and eco-friendly food production trends.

Pumpkin powder obtaining:

Pumpkin pulp oil extract obtaining:



FUNCTIONAL VEGETABLE PÂTÉ

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a XXII-a editie

Cluj – Napoca, România, 15-17 octombrie 2025

PROCESS FOR MANUFACTURING MEAT ANALOGUES

BULGARU Viorica, MD; NETREBA Natalia, MD; MAZUR Mihail, MD; GUREV Angela, MD; GHENDOV-MOȘANU Aliona, MD

Purpose:

The invention relates to the food industry and can be used to manufacture low-moisture is the production of low-moisture meat analogues with increased biological value based meat analogues by extrusion, based on vegetable proteins. The result of the invention on vegetable proteins from chickpeas, soriz flour, and soy protein isolate or pea protein concentrate, chickpea or soybean cooking water, with the addition of jost extract with superior organoleptic properties and an extended shelf life.

Hotărâre de acordare nr. 10695 din 2025.09.12 (Nr. depozit: s 2025 0051 Data depozit: 2025.04.09)

Advantages:

- Natural composition – free from preservatives, artificial colors, and animal-derived ingredients.
- High nutritional value – chickpea and sorghum flours complement each other's amino acid profile; josta extract enriches with antioxidants.
- Use of cooking water (aquafaba) – acts as a natural emulsifier and thickener, improves texture, and reduces production waste.
- Stable color and antioxidant protection – josta extract ensures natural meat-like color and storage stability.
- Improved texture – protein prehydration and modern drying technology create a fibrous, meat-like structure.
- Shelf-life without preservatives – low moisture, pH adjustment, vacuum packaging, and microwave sterilization ensure durability.
- Economic and eco-friendly – reduced waste, energy-efficient processing, and low production cost.
- Enhanced organoleptic properties – taste and texture close to natural meat.
- Marketing attractiveness – 100% plant-based, gluten-free, in line with "clean label" and healthy nutrition trends.

SPC1	Soy protein concentrate 120 °C
H1	Hazelnut 120 °C
Ch1	Chickpea 120 °C
S1	Sorghum 120 °C
SPC2	Soy protein concentrate 150 °C
H2	Hazelnut 150 °C
Ch2	Chickpea 150 °C
S2	Sorghum 150 °C

Departamentul „Tehnologia Produselor Alimentare"
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Salonul Cercetării Științifice, Inovării și Inventicii

PRO INVENT

a XXII-a editie

UNIVERSITATEA TEHNICĂ DIN CLUJ-NAPOCA

UNIVERSITATEA TEHNICĂ A MOLDOVEI

Cluj – Napoca, România, 15-17 octombrie 2025

COMPOSITION FOR THE PRODUCTION OF FORTIFIED SAUSAGES

DIANU Irina, MD; BAERLE Alexei, MD; MACARI Artur, MD;
NETREBA Natalia, MD; CUSMENCO Tatiana, MD

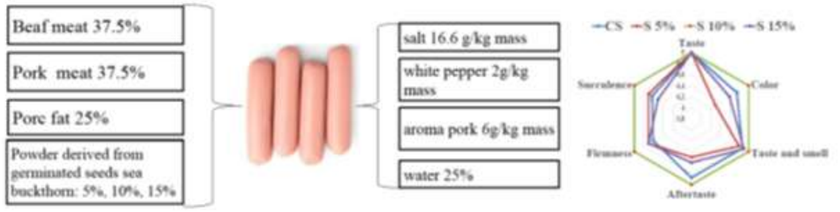
Purpose:

The present invention pertains to the food industry, specifically to a composition for the manufacture of fortified sausages. To develop a technological process and composition for producing fortified boiled sausages by incorporating natural powder derived from germinated sea buckthorn (*Hippophae rhamnoides* L.) seeds, in order to enhance the nutritional and functional properties of the final product, reduce the use of synthetic additives, and meet the growing demand for clean-label, health-oriented meat products.

MD 1795 Z 2025.06.30
(Nr. depozit: s.2024 0020
Data depozit: 2024.03.01)

Advantages:

- Natural, plant-based additive from germinated sea buckthorn seeds
- Rich source of biologically active compounds and antioxidants
- Enhances nutritional value of sausages
- Improves rheological properties and emulsion stability
- Provides tender texture and increased juiciness
- Reduces reliance on synthetic chemical additives
- Supports product safety and consumer health
- Compatible with existing sausage manufacturing processes
- Extends shelf life through antioxidant effects
- Contributes to clean-label and health-focused food trends
- Utilizes sustainable and underexploited plant resources



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UNIVERSITATEA TEHNICĂ DIN CLUJ-NAPOCA

UNIVERSITATEA TEHNICĂ A MOLDOVEI

Cluj – Napoca, România, 15-17 octombrie 2025

PROCEDURE OF CULTIVATION OF *Bacillus velezensis* STRAINS - SOURCE OF CATALASE

BALAN Ludmila, SLANINA Valerina, BOGDAN-GOLUBI Nina

Purpose:

The purpose was to elaborate a procedure of cultivation of *Bacillus velezensis* strains – source of catalase.

Patent grant decision
4928 MD/ 2025.06.30
4930 MD/2025.07.31
4931 MD/2025.07.31

Solution:

The present inventions relates to procedures of cultivation of *Bacillus velezensis* strains on a nutrient agar medium containing, g/L: peptone – 5.0; meat extract – 3.0; agar – 15.0. Strains are incubated for 72 hours at a temperature of 36±1°C. Increasing incubation period and temperature contributes to activate the synthesis mechanisms of biochemical and enzymatic components.

Description:

Developed processes provide increasing of biomass protein content and catalase activity. Enhancing biochemical activity depends on the strain used (Fig 1 and 2). Thus, *B. velezensis* CNMN-BB-13 showed increased protein content by 1.38 times and the catalase activity by 4.02 times, while *B. velezensis* CNMN-BB-12 showed protein content and catalase activity increased by 1.68 and 4.41 times, respectively, and *B. velezensis* CNMN-BB-18 strain has protein content increased by 3.10 times and enzymatic activity of catalase by 5.80 times.

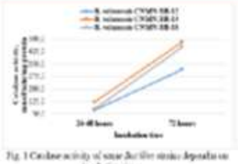

Fig. 1 Catalase activity of some *Bacillus* strains depending on incubation time

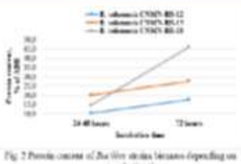

Fig. 2 Protein content of *Bacillus* strains biomass depending on incubation time

Advantages:

These inventions offer solutions of substantially stimulate protein content and catalase activity in bacterial biomass by increasing incubation period to 72 hours and temperature to 36±1°C. Catalase is an important antioxidant enzyme that destroys hydrogen peroxide formed as a result of normal cellular metabolism, preventing lipid peroxidation of membranes and cell damage. It is one of the antioxidant enzymes used in diagnostic and analytical methods, in the form of a biomarker and biosensor, as well as in the textile, food, and pharmaceutical industries.

The patents was funded within Research Subprogram 020101 "InBioS-Innovative biotechnological solutions for agriculture, medicine and environment" (the Republic of Moldova).

Institute of Microbiology and Biotechnology – National Collection of Non-pathogenic Microorganisms, Tel: (373 68) 309265, e-mail: ludmila.botir@imb.utm.md

G – Health – Medicine – Cosmetics

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UNIVERSITATEA TEHNICĂ A MOLDOVEI
Cluj – Napoca, România, 15-17 octombrie 2025

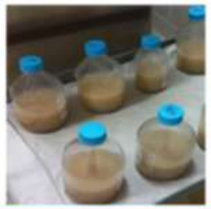
PROCEDURE FOR CULTIVATING THE *HANSENULA ANOMALA* CNM-YS-07 YEAST STRAIN

EFREMOVA Nadejda, CHISELIȚA Natalia, CHISELIȚA Oleg, ROZLOVAN Ana

Patent 1875 MD/ 2025.08.31

PURPOSE : **The invention relates to biotechnology, in particular to the procedure for cultivating the *Hansenula anomala* CNM-YS-07 yeast strain and can be applied to obtain proteins for use in agriculture, medicine, food industry and cosmetology.**

SOLUTION: **Elaboration of the procedure for cultivating the *Hansenula anomala* CNM-YS-07 yeast strain, which consists of obtaining the *Hansenula anomala* CNM-YS-07 yeast suspension by cultivating for 24 hours on YPD medium, inoculating the suspension in an amount of 5% by volume on a nutrient medium based on an extract of barley residues from beer production and cultivating on a shaker with a rotation speed of 180-200 rpm at a temperature of 30-32°C for 120 hours, at the same time, the nutrient medium is obtained by mixing barley residues with distilled water in a ratio of 1:1, autoclaving the mixture for 30 min at a pressure of 0.5 atm, filtering and autoclaving the extract for 30 min at a pressure of 0.5 atm.**


ADVANTAGES: **The elaborated procedure allows to increase the protein content in yeast biomass by 35.60-39.70% compared to the nearest solution. The obtained result is due to the use of the nutrient medium based on barley extract for the cultivation of the strain, which contains nitrogen sources, carbohydrates, vitamins of group B and E, which intensifies the process of protein biosynthesis in biomass.**

The patent was funded within Research Subprogram 020101 "InBioS-Innovative biotechnological solutions for agriculture, medicine and environment" (the Republic of Moldova).

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Cluj – Napoca, România, 15-17 octombrie 2025

METHOD OF FEEDING YOUNG RABBITS

CHISELIȚA Oleg, MACARI Vasile, CHISELIȚA Natalia, ROTARU Ana, MAȚENCU Dmitrii, EFREMOVA Nadejda

Patent 1859 MD/ 2025.07.31

PURPOSE : **The invention relates to animal husbandry, in particular to the method of feeding young rabbits and can be applied to raising rabbits on farms under intensive breeding conditions.**

SOLUTION : **Elaboration of the feeding procedure for young rabbits, which provides inclusion in the daily feed ration of rabbits of the complex microbial preparation, starting with the first day after weaning, at the age of 40 days, obtained from spirulina biomass and residual yeast biomass from the production of beer and red wines, containing a minimum of 55% peptidoglycan preparation, a minimum of 10% aminoacidoprotein extract and a minimum of 10% β-glucan preparation from beer yeasts, a minimum of 3% aminoacidoprotein extract and a minimum of 10% β-glucan preparation from wine yeasts and a minimum of 4% sulfated polysaccharide extract in an amount of 0.3 kg or 0.9 kg per 100 kg of feed for 43 days.**



ADVANTAGES: **The invention allows the significant increase of 4.0-5.4% (114.4-154.13 g) in the body weight of rabbits at the age of 83 days compared to the control, by 34.2-36.0% (751-791 g) at the age of 98 days compared to the nearest solution and an increase of 5.8-7.8% (2.7-3.6 g) in the average daily weight gain compared to the control values. Supplementing the feed ration with the microbial preparation has an anti-stress effect on rabbits, evidenced by a decrease in the number of leukocytes and lymphocytes in the blood and an increase in segmented neutrophils. The microbial preparation has a beneficial effect on the hematopoiesis of young rabbits, a fact confirmed by a decrease in MCV values - mean erythrocyte volume, and an increase in MCHC values - mean erythrocyte hemoglobin concentration (key indicators of the hemogram).**

The patent was funded within Research Subprogram 020101 "InBioS-Innovative biotechnological solutions for agriculture, medicine and environment" (the Republic of Moldova).

Contact adress: **Technical University of Moldova Institute of Microbiology and Biotechnology, Chișinău, Academiei 1 str., tel: +373-22-725524; fax: +373-22-725754; e-mail: oleg.chiselita@imb.utm.md**

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Cluj – Napoca, România, 15-17 octombrie 2025

PROCEDURE FOR CULTIVATING THE *RHODOTORULA MUCILAGINOSA* CNMN-YS-10 YEAST STRAIN

CHISELIȚA Oleg, CHISELIȚA Natalia, TOFAN Elena, DANILIȘ Marina, ROZLOVAN Ana

Patent 1853 MD/ 2025.06.30

PURPOSE : The invention relates to biotechnology, in particular to the process for cultivating the *Rhodotorula mucilaginosa* CNMN-Ys-10 yeast strain and can be applied to obtain yeast biomass with an increased content of carotenoids.

SOLUTION: Elaboration of the process for cultivating the *Rhodotorula mucilaginosa* CNMN-Ys-10 yeast strain, which consists of obtaining the *Rhodotorula mucilaginosa* CNMN-Ys-10 yeast suspension by cultivating on YPD medium for 48 hours, inoculating the suspension at the concentration of 5% in the nutrient medium, containing carrot peel extract or carrot peel extract and celery peel extract in the ratio of 1:1, submerged cultivation of the strain at the temperature of +27-28°C with continuous stirring at 200 rpm for 120 hours. The extracts from carrot peel and celery peel are obtained by grinding the peels, mixing with distilled water in the ratio of 1:1, autoclaving at the temperature of 115°C, for 30 minutes, separation of supernatant by centrifugation and sterilization at the temperature of 115°C for 30 minutes.




ADVANTAGES: The procedure allows to increase the amount of biomass by 6.9-68.1%, the content of carotenoids in biomass by 145.7-226.9%, the carotenoid yield of by 3-5.5 times, the CAT activity by 29.8-43.0% compared to the control (table) and to increase the content of carotenoids in biomass by 17.9-56.8% and the yield of carotenoids by about 3 times compared to the nearest solution.

The patent was funded within Research Subprogram 020101 "InBioS-Innovative biotechnological solutions for agriculture, medicine and environment" (the Republic of Moldova).

Contact adress: Technical University of Moldova Institute of Microbiology and Biotechnology, Chișinău, Academiei 1 str., tel: +373-22-725524; fax: +373-22-725754; e-mail: oleg.chiselita@imb.utm.md

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UNIVERSITATEA TEHNICĂ DIN CLUJ-NAPOCA

UNIVERSITATEA TEHNICĂ A MOLDOVEI

Cluj – Napoca, România, 15-17 octombrie 2025

A LOW-DENSITY POLYETHYLENE DESTRUCTION PROCEDURE

CORCIMARU Serghei, GUȚUL Tatiana, MERENIUC Lilia, SÎTNIC Feodora, LUPU Maria

Patent 1799 MD/ 2025.06.30

Purpose:

The purpose was to elaborate a procedure of accelerated biodegradation of low-density polyethylene (LDPE) waste from common single-use plastic bags.

Solution:

The LDPE film destruction procedure consists of 3 consecutive stages: (a) LDPE photooxidation by UV radiation (2 hours), (b) LDPE treatment by a nanocomposite containing magnesium ferrite stabilized by polyvinylpyrrolidone ($MgFe_2O_4$/PVP), and (c) LDPE incubation in a mineral medium (pH=6.5) containing K_2HPO_4 (1 g/L), KH_2PO_4 (1 g/L), NH_4NO_3 (1 g/L), $MgSO_4*7H_2O$ (0.2 g/L), $FeCl_3$ (0.05 g/L), $CaCl_2$ (0.02 g/L) and supplemented with hydrolyzed lignin (33 g/L).

Description:

The introduction of LDPE film strips pretreated by UV light and by $MgFe_2O_4$/PVP (fig. 1) into the mineral medium with added lignin caused a substantial increase in microbial activity comparing to the controls with untreated LDPE and without LDPE: the CO_2 efflux measured on different incubation days was statistically higher in most of the cases, and by the end of the incubation the total CO_2 efflux significantly surpassed the controls by 1.3 and 2.0 times respectively (fig. 2). By the end of the incubation the weight loss in the control with untreated LDPE was negligible, while in the variant with the pretreated LDPE it reached 18.0±5.2%.

The patent was funded within Research Subprogram 020101 "InBioS-Innovative biotechnological solutions for agriculture, medicine and environment" (the Republic of Moldova).

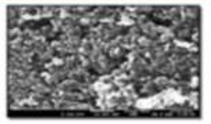
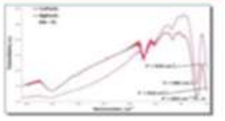

Fig.1. SEM images and FT-IR spectra of the $MgFe_2O_4$/PVP nanocomposite.

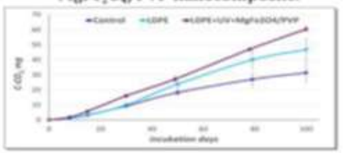

Fig.2. The total efflux of CO2 in the variant with pretreated LDPE (LDPE+UV+MgFe2O4/PVP) compared to the controls without LDPE (Control) and with untreated LDPE (LDPE).

Advantages:

Pretreatment of polyethylene films by UV light and by the $MgFe_2O_4$/PVP nanocomposite substantially stimulates the microbial activity during the incubation of the polymer in the mineral medium with added hydrolyzed lignin and increases the LDPE degradation rate to the level of 18% in 100 days. Through contributing to recycling of LDPE and hydrolyzed lignin wastes the invention offers solutions to the related problems of environmental pollution.

Institute of Microbiology and Biotechnology – Soil Microbiology Laboratory, Tel: (373 22) 72-55-24, e-mail: serghei.corcimaru@imb.utm.md

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Cluj – Napoca, România, 15-17 octombrie 2025
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QUAILS RAISING PROCESS

CHISELIȚA Oleg, CHISELIȚA Natalia, CARAMAN Mariana

PURPOSE : The invention relates to animal husbandry, in particular to the process of raising quails for increase productivity, meat quality and the egg laying intensity by using the complex biologically active microbial preparation.

Patents
MD 1839;
MD 1840;
MD 1841.
from 2025.05.31

SOLUTION: The development of the new process for quail raising based on the biologically active microbial preparation, obtained from yeast biomass from winemaking wastes and spirulina biomass, as the part of the daily ration of quails in the ratio of 0.5% of the ration during the period of 1-44 days and 0.25% during the period of 45-60 days.

ADVANTAGES: The process ensures the viability of chicks of 98% in the experimental group (EG) compared to 83% in the control group (CG), the decrease of the titer of conditionally pathogenic bacteria *E. coli* by 4.96%, the increase of the titer of beneficial microorganisms *Lactobacillus spp.* by 18.40%, *Bifidobacterium spp.* by 11.61% and *Bacillus spp.* by 4.56% in the gastrointestinal tract of the chicks, increasing the body mass of the chicks by 13.46% compared to the control, obtaining quail meat with the higher protein content by 3.92% and lower fat content by 3.02% compared to the control group and obtaining economic efficiency of 0.23€/quail. The process contributes to increasing the egg laying intensity of quails at the age of 60 days by 29.54%, increasing the weight, longitudinal and transverse diameter of eggs by 25.79%, 21.84% and 14.38% respectively, and obtaining of daily income of 0.03 €/head of laying quail from egg production.

The research was carried out within the project 24.80012.5107.SE „Diversification of feed aditives in poultry farming", funded by NARD.

Contact adress: **Technical University of Moldova**
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TECHNICAL UNIVERSITY OF MOLDOVA,
STATE UNIVERSITY OF MOLDOVA

1. QUEEN BEE BREEDING PROCESS

AUTORS: EREMIA, N., MACAEV, F., PETCU, I., ZAGAREANU, A. CATARAGA, I., JEREGHI, V., COȘELEVA, O., VUTCAREV, A.

Email: vitalie_jereghi@yahoo.com

Patent application MD no.2684 of 05.09.2025

DESCRIPTION: The queen rearing process includes forming the nurse bee colony by removing the queen comb from the nest and 2-3 combs with uncapped brood, introducing the frame with transferred larvae into the nest between the frames with capped brood and feeding the nurse bees with a mixture of 50% sugar syrup and 0.75-2.5 mL/L of 3% Choline Chloride aqueous solution, in an amount of 0.5 L of the mixture per bee colony, daily for 5 days, from the introduction of the frame with transferred larvae until the brood is capped.

The result of the invention consists in increasing the number of larvae accepted for growth by 19.4-30.4%, the diameter of the bolls - by 5.9-12.3%, the length - by 2.5-8.4% and the mass of unmated queens - by 0.05-3.98% and fertilized ones - by 12.4-22.5%.

APPLICATION: Can be used in beekeeping for raising queen bees.



TECHNICAL UNIVERSITY OF MOLDOVA,
STATE UNIVERSITY OF MOLDOVA

2. QUEEN BEE BREEDING PROCESS

AUTORS: EREMIA, N., MACAEV, F., PETCU, I., ZAGAREANU, A., JEREGHI, V., COȘELEVA, O., SUCMAN, N., CATARAGA, I.

Email: vitalie_jereghi@yahoo.com

Patent application MD no. 2680 of 21.08.2025

DESCRIPTION: The process of raising queens includes forming the nurse bee family by removing the queen and the combs with uncapped brood, introducing the frame with the transferred larvae into the nest and feeding the nurse bees with a mixture of 50% sugar syrup and 1.2-3.6 ml/L of an equimolar 3% aqueous solution of the mixture of glucuronic acid with choline chloride, in an amount of 0.5 L of the mixture per bee family, daily for 5 days, from the introduction of the frame with the transferred larvae until the hives are hatched.

The result of the invention is to increase the number of larvae accepted for growth by 22.3-36.2%, the diameter of the combs - by 1.8-12.7%, the length - by 1.2-5.0% and the mass of unmated queens - by 0.2-5.5% and fertilized ones - by 0.3-9.1%.

APPLICATION: Can be used in beekeeping for raising queen bees.




TECHNICAL UNIVERSITY OF MOLDOVA,
STATE UNIVERSITY OF MOLDOVA

1. ROYAL JELLY PRODUCTION PROCESS

AUTORS: EREMIA, N., MACAEV, F., JEREGHI, V., COȘELEVA, O., POGREBNOI, S., MARDARI, T., MODVALA, S., SUCMAN, N.
Email: eremia.nicolac@gmail.com

Patent MD no. 1860 Y, s 2024 0098

DESCRIPTION: The royal jelly obtaining process includes the introduction of 1....3 standard 435x300 mm frames of two types: frames with 2 slats (upper and middle) which were equipped with 30 starters (15/15); with 3 slats (upper, middle and lower level) equipped with 40 first queen cells (14/13/13) consisting of the fixing cap for the cup holder, cup holder and cup, with 40.....110 transferred larvae, in the breeding families and the daily feeding of the nurse bees, in the absence of a maintenance honey collection, with a mixture of sugar syrup, in a concentration of 50% and with a biostimulator, in doses of 1.25.....3.25 ml/L, in an amount of 1.0 L of the mixture from the introduction of the frames with transferred larvae for 3 days, after which the frames are removed from the hive to collect the royal jelly, then the procedure is repeated twice, at the same time the biostimulator presents an aqueous solution of hexaaminocobalt (III) chloride.

The use of the royal jelly obtaining process ensures an increase in the number of transferred larvae accepted for growth by 7.27-16.36% and the total amount of royal jelly obtained by 21.11-48.06% higher than the control batch.

APPLICATION: Can be used in beekeeping to obtain royal jelly.



TECHNICAL UNIVERSITY OF MOLDOVA,
STATE UNIVERSITY OF MOLDOVA

2. QUEEN BEE BREEDING PROCESS

AUTORS: EREMIA, N., MACAEV, F., KRASOCICO, P., JEREGHI, V., COȘELEVA, O., ZAGAREANU, A., POGREBNOI, S., SUCMAN, N., CATARAGA, I.

E-mail: eremia.nicolae@gmail.com

Patent MD no. 1871 Y s 2024. 0115 din 2024.11.29

DESCRIPTION: Queen bee rearing process includes forming the nurse bee colony by removing the queen and the uncapped brood combs, introducing the frame with transferred larvae into the nest and feeding the nurse bees with a mixture of 50% sugar syrup and 1.0-3.0 ml/L of 2% aqueous solution of hexaaminocobalt (III) chloride in an amount of 1.0 L of the mixture per bee colony, daily for 5 days, from the introduction of the frame with transferred larvae until the hives are capped.

The result of the invention ensures the acceptance of the Transvaal larvae for growth, the length of the bolls and the mass of the fertilized queens.

APPLICATION: Can be used in beekeeping for raising queen bees.



Salonul Internațional al Cercetării Științifice, Inovării și Inventicii

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UNIVERSITATEA TEHNICĂ DIN CLUJ-NAPOCA

UNIVERSITATEA TEHNICĂ A MOLDOVEI

Cluj – Napoca, România, 15-77 octombrie 2025

PRECESSIONAL GEAR TRANSMISSION

Dr. Sc., prof. Viorel BOSTAN; Dr. Sc., prof. Ion BOSTAN; Dr. Sc., prof. Valeriu DULGHERU; PhD., assoc. prof. Maxim VACULENCO; PhD., assoc. prof. Ion BODNARIUC; PhD., assoc. prof. Radu CIOBANU; PhD., assoc. prof. Oleg CIOBANU; PhD., assoc. prof. Nicolae TRIFAN; PhD., assoc. prof. Iulian MALCOCI.

Patent nr. 1800 Y MD, of 30.11.2024, AGEPI.

Goal: Increasing the convex-concave contact load bearing capacity by identifying the conjugated profiles with the small difference in the curvature radius.

Solution:

✓ Increasing the bearing capacity of the transmission by separating the reception of axial loads by the axial bearings and radial forces by the radial bearings, while ensuring axial flotation of the satellite wheel between the central bevel gears. At the same time, the transmission ensures the adjustment of the backlash or pre-tightening of the teeth in the gear by changing the axial positioning of the central bevel gears relative to each other.

Advantages:

✓ Increasing the load-bearing capacity of the transmission by engaging the teeth in contacts with the convex-concave geometry and the minimum difference in the curvatures of the mating flanks;

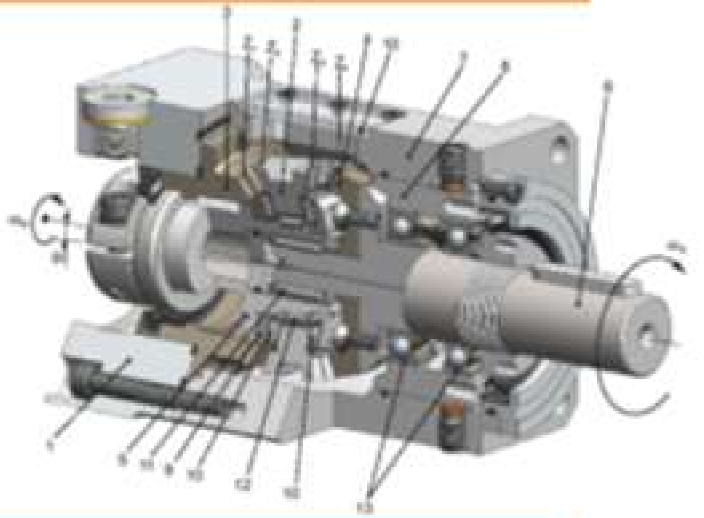
✓ Increasing the mechanical efficiency by changing the tooth shape, reducing the pressure angle between the flanks and at the expense of increasing the rolling share of the engaging teeth by decreasing the relative frictional sliding between the flanks with a reduction in the frontal overlap degree and a compensatory increase in the longitudinal overlap degree with pure rolling of teeth in the sphero-spatial interaction of the mating wheels with the nutation angle θ;

✓ Extending the kinematic and technological possibilities.

Stage: Technical project, industrial prototype.

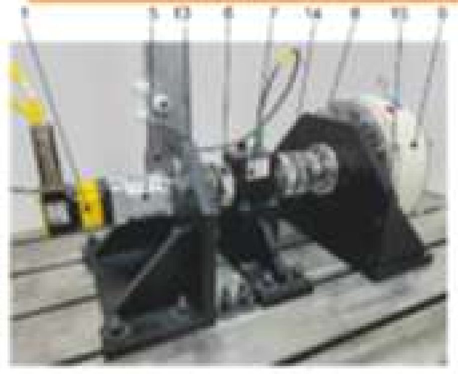
Precessional gear transmission

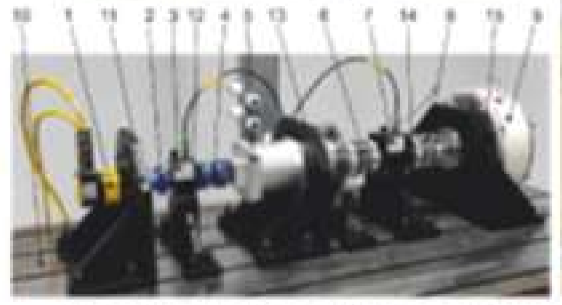
Precessional toothed gear transmission comprises a body (1), a satellite wheel (2) with two bevel gear rings (3) and (4) driven by a crankshaft (5) in sphero-spatial motion around a fixed point, two central bevel wheels (6) and (7), one immobile (6) fixed in the body (1) and the other mobile (7) mounted on a driven shaft (8).



Precessional servo motor reducers with satellite-wheels driven with cams inclined under the nutation angle θ:
a) i = -13,3; b) i = -124; c) i = +15

Research infrastructure





1 - Servo motor (Parker BE232GJ-NMSN), 2 - MIC Miniature Couplings (MIC-5-2470 19H7/9H7), 3 - In-Line Torque Sensors (TS 107/500S), 4 - MIC Miniature Couplings (MIC-5-2470 9H7/12H7), 5 - GEARBOX UNDER TEST, 6 - Metal Bellows Couplings (BKC-150-78), 7 - In-Line Torque Sensors (TS 111/500S), 8 - Metal Bellows Couplings (BKC-150-78), 9 - Torque Powder Brake (TPB 100), 10 - T-slot Base Plates, 11 - L shaped fixture, 12 - Riser Kit, 13 - Support L-shaped fixture, 14 - Riser Kit, 15 - Support L shaped fixture.

Functional characteristics of precessional transmission researched:

- Mechanical efficiency, %;
- Bearing capacity of tooth contact, Mpa;
- Specific material consumption, kg/Nm;
- Noise and vibration emission, dB;
- Torsional rigidity, Nm/rad;
- Kinematic precision, arc.angle;
- The moment of inertia, kg·m²;
- The moment of starting, g·cm;
- Start and stop time, sec.

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PRO INVENT

UNIVERSITATEA TEHNICĂ DIN CLUJ-NAPOCA

UNIVERSITATEA TEHNICĂ A MOLDOVEI

Cluj – Napoca, România, 15-17 octombrie 2025

MICRO-HYDROPOWER PLANT WITH INDIVIDUAL BLADE ORIENTATION

Dr. Sc., prof. Viorel BOSTAN; Dr. Sc., prof. Ion BOSTAN; Dr. Sc., prof. Valeriu DULGHERU; PhD. Ivan RABEI; PhD., assoc. prof. Marin GUȚU; PhD., assoc. prof. Radu CIOBANU; PhD., assoc. prof. Oleg CIOBANU.

Patent nr. 1876 Y MD, of 31.08.2025, AGEPI

Goal: The invention can be used in hydropower and relates to a micro-flow hydropower plant containing a low-power hydraulic turbine, intended for the production of electrical or mechanical energy in individual households, villages, for irrigation in areas near rivers, using the kinetic energy of flowing river water.

Solution:

✓ increasing conversion efficiency;

✓ expanding functional possibilities.

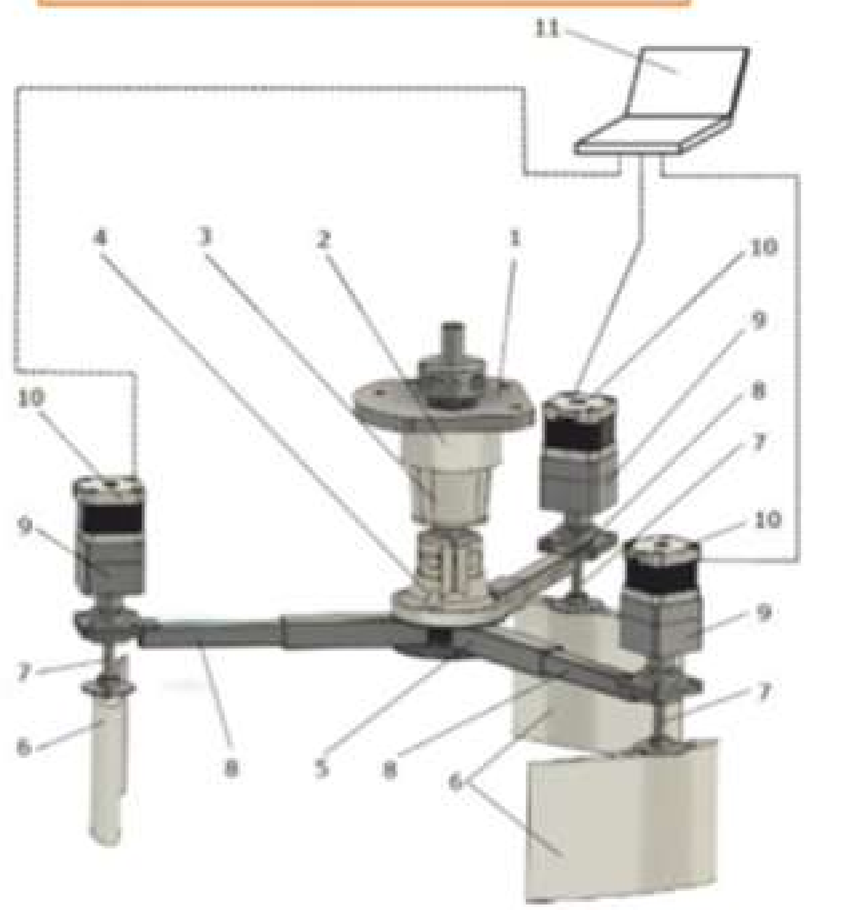
Advantages:

✓ Equipping each hydrodynamic profile blade with a drive mechanism consisting of a reducer and an electric motor, connected to a system for monitoring the angular orientation of the blades relative to the water currents, ensures increased efficiency in converting water kinetic energy through optimal orientation of the blades relative to the water currents;

✓ Equipping each hydrodynamic profile blade with an additional axis located at a distance "*a*" from the blade axis, which is kinematically connected by means of a bar with a cam, fixed on the main axis of the hydrodynamic rotor, ensures optimal and simple orientation of the blades relative to the water currents;

Stage: The technical project and laboratory stand are being developed.

3D general view of the micro-flow hydropower plant according to the first variant



Testing the experimental model under laboratory conditions

The optimal orientation of the hydrodynamic profile blades in terms of generating hydrodynamic and water pressure effects on the working surface of the blade by equipping each hydrodynamic profile blade with an electromechanical drive mechanism or with mechanical orientation systems (with a lever system or a cam system) ensures increased efficiency in converting the energy of flowing water flow thanks to the accumulation of hydrodynamic and pressure effects of water currents on the working surface of the blades, broadening the functional possibilities of the microhydropower plant.

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UNIVERSITATEA TEHNICĂ A MOLDOVEI

Cluj – Napoca, România, 15-17 octombrie 2025

PRECESSIONAL PLANETARY TRANSMISSION WITH BALANCING OF UNBALANCED DRIVE SHAFT MASSES

Dr. Sc., prof. Viorel BOSTAN; Dr. Sc., prof. Ion BOSTAN; Dr. Sc., prof. Sergiu MAZURU; PhD., assoc. prof. Maxim VACULENCO; PhD. Stanislav LEALIN; PhD. st. Alina BREGNOVA; PhD., assoc. prof. Radu CIOBANU; PhD., assoc. prof. Oleg CIOBANU.

Goal: Increasing the technological efficiency of the precessional transmission, reducing the stress on the gear components, reducing noise and vibration emissions, reducing manufacturing costs by reducing the execution precision of the crank's dimensional chain.

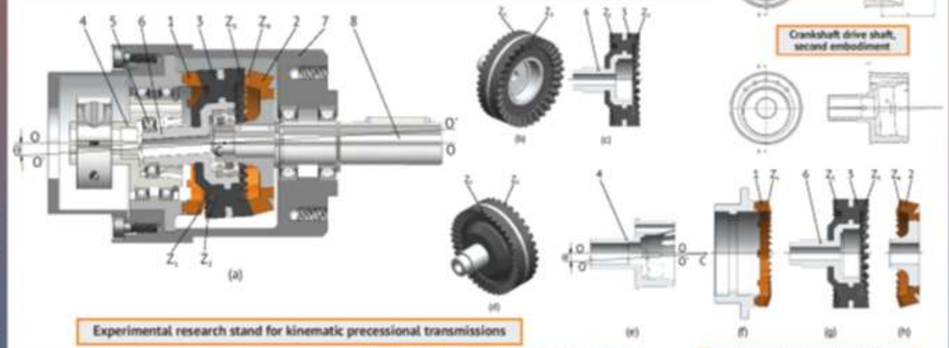
Patent nr. 4910 MD, of 31.07.2025, AGEPI.

Solution: ✓ There is a reduction in the influence of errors in the execution of gear components in any mechanical transmission on the dynamics of the demands, including on the uniformity of the load distribution between the teeth, and therefore on the state of tension of the teeth, generated by the action of the forces in the gear.

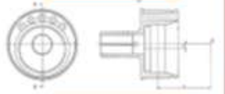
Advantages:
- ✓ increasing the technological efficiency of the precessional transmission;
- ✓ reducing the stress on the gear components, reducing noise and vibration emissions;
- ✓ reducing manufacturing costs by reducing the execution precision of the crank's dimensional chain.

Stage: Technical project, industrial prototype.

Precessional transmission with gear A^{e}_{ozz} with wheels injected from plastics on metal casings: (a) axial section; (b), (c), (d) satellite-wheel injected on the metal satellite carrier with semi-axle and perforated belt; (e) crank; (f) mobile central wheel with crown with teeth Z1, (g) semi-axle satellite-wheel; (h) mobile central wheel with Z4 teeth (3D presentation)



Crankshaft drive shaft, first embodiment

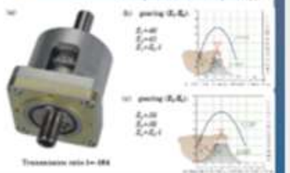


Crankshaft drive shaft, second embodiment

Experimental research stand for kinematic precessional transmissions

Precessional transmission 2K-H, D_{ex}=42mm

Manufactured sample of the precessional planetary transmission



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UNIVERSITATEA TEHNICĂ A MOLDOVEI

Cluj – Napoca, România, 15-17 octombrie 2025

PRECESSIONAL PLANETARY TRANSMISSION WITH AXIAL FLOATATION OF THE SATELLITE WHEEL AND PORTSATELLITE

Dr. Sc., prof. Viorel BOSTAN; Dr. Sc., prof. Ion BOSTAN; Dr. Sc., prof. Sergiu MAZURU; PhD., assoc. prof. Maxim VACULENCO; PhD., assoc. prof. Ion BODNARIUC; PhD., assoc. prof. Radu CIOBANU; PhD., assoc. prof. Oleg CIOBANU; PhD. st. Dumitru VENGHER.

Goal: Reducing the precision requirements of the precessional node components by ensuring axial flotation and tangential sliding of the satellite wheel, increasing the technological capability of the precessional transmission, which supports an increased load-bearing capacity at the same overall dimensions.

Patent nr. 4911 MD, of 31.07.2025, AGEPI.

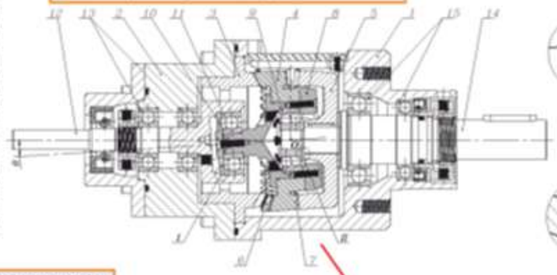
Solution: ✓ The influence of execution errors of the transmission gear components on the dynamics of the demands, including on the uniformity of the load distribution between the teeth, and therefore on the state of tension of the teeth, generated by the action of the forces in the gearing, is reduced.

Advantages: ✓ The advantages of the invention consist in the self-positioning of the satellite wheel together with the satellite carrier between the central wheels. In a common case, before the load begins to be transmitted, between the central wheels and the gear crowns of the satellite wheel, the load is transmitted unevenly, by the fact that the satellite wheel is located more to the left of the precession center O or to the right of the precession center O, a transmission stage being more loaded or less loaded. As a result, the floating of the satellite wheel allows its self-positioning between the central wheels, ensuring a decrease in the precision requirements of the components of the precession node and an increase in the bearing capacity of the transmission.

Stage: Technical project, industrial prototype.

The precessional planetary transmission contains a housing 1 with a flange 2, in which are located the satellite wheel 4 with two conical crown gears 6, 7, the driving shaft with a crank 12, installed on bearings 13, the driven shaft 14, installed on bearings 15, and two central conical gears, fixed 3 and movable 5, which interact with the satellite wheel 4 through the crown gears 6, 7. The satellite wheel 4 is rigidly mounted on the satellite carrier 8, placed on the spherical support 9, located on the driven shaft 14 with the possibility of axial movement, in the center of precession O thereof, coaxial with the movable wheel 5. The satellite wheel 4 is equipped with a half-shaft 10, at the end of which are mounted bearings 11, kinematically connected with the driving shaft with a crank 12. In the driving shaft with a crank 12, laterally, an inner cylindrical surface is made inclined at the nutation angle ϑ with respect to the axis of the central wheels 3, 5, in which the semi-axis 10 of the satellite wheel 4 is installed with the possibility of axial movement, so that the satellite wheel 4 together with the satellite carrier 8 floats axially with a positioning with clearances I, II between the central wheels 3, 5 with the center of mass merged with the center of precession O.

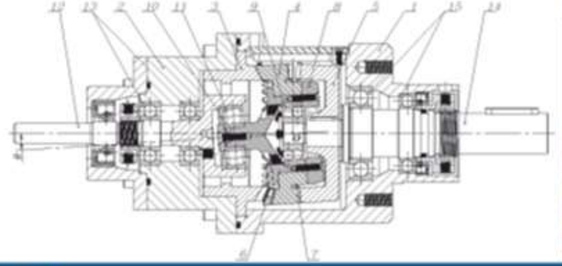
Precessional planetary transmission, the first achievement



View I
I (5:1)

View II
II (5:1)

Precessional planetary transmission, second implementation



Research infrastructure

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UNIVERSITATEA TEHNICĂ DIN CLUJ-NAPOCA

UNIVERSITATEA TEHNICĂ A MOLDOVEI

Cluj – Napoca, România, 15-17 octombrie 2025

DEVICE FOR UNIFORM AIR DISTRIBUTION IN A TUNNEL DRYER

BALAN Mihail; ȚISLINSCAIA Natalia; STURZA Rodica; POPESCU Victor; BALAN Tatiana; ȘENILĂ Lacrimioara-Ramona; JIAN Mariana; MELENCIUC Mihail; VIȘANU Vitali; GÎDEI Igor; GUȚU Marin

Purpose:

The purpose of the invention is to ensure uniform air distribution in the cross-section of the drying chamber, both horizontally and vertically. This provides the possibility of ensuring uniform distribution of the drying agent (air) throughout the entire section of the drying chamber of the installation, thus increasing the efficiency of the dehydration process by reducing energy consumption and increasing the quality of the finished product.

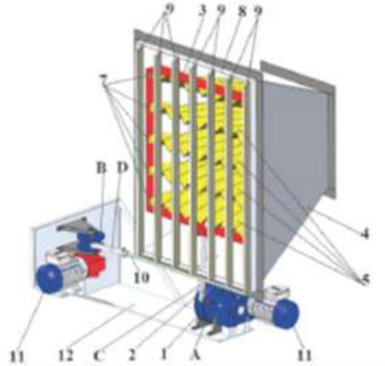
Positive decision nr: 10675, from 21.07.2025

Advantages:

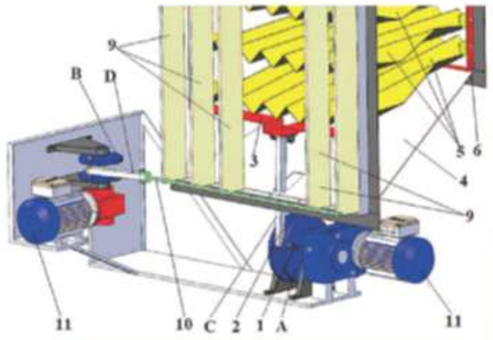
- Simple construction;
- Non-wastes technology application;
- Possibility of quick and easy modules interchange;
- Increase the quality and quantity of treated product.

Description of the invention

The efficiency of air distribution in the drying plant is achieved through the oscillatory movement of the blades in the horizontal and vertical planes.



General view in 3D



Local view in 3D

The device for uniform air distribution in a tunnel dryer consists of: two cranks A and B, and two connecting rods C and D. Crank A and connecting rod C transmit the oscillatory movements of the mobile metal frame 3 mounted in the body 4 for passing the air flow, in which the fluted blades 5 are installed, fixedly mounted with one end on a fixed metal frame 6, and with the other end moving synchronously vertically with the help of the mobile metal frame 3, coupled to it by means of cylindrical couplings 7. On the perimeter of the large section of the body 4, a quadrangular metal plate 8 is mounted, in which flat blades 9 are movably articulated in a vertical position, the opposite end of which is movably articulated with the spacer plate 10, which is set in motion by the crank B and the connecting rod D.

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Cluj – Napoca, România, 15-17 octombrie 2025

MODULAR DRYING INSTALLATION

BALAN Mihail; ȚISLINSCAIA Natalia; VIȘANU Vitali; MELENCIUC Mihail; POPESCU Victor; BALAN Tatiana; BERNIC Valentin; CAISÎM Natalia

Purpose:

The object of the invention is to optimize the drying process of fruits and vegetables by using the modular construction of the drying plant, with the addition or removal of a module in its construction, regardless of the quantity of product subjected to the drying process

Patent nr: 1736, from 31.01.2024

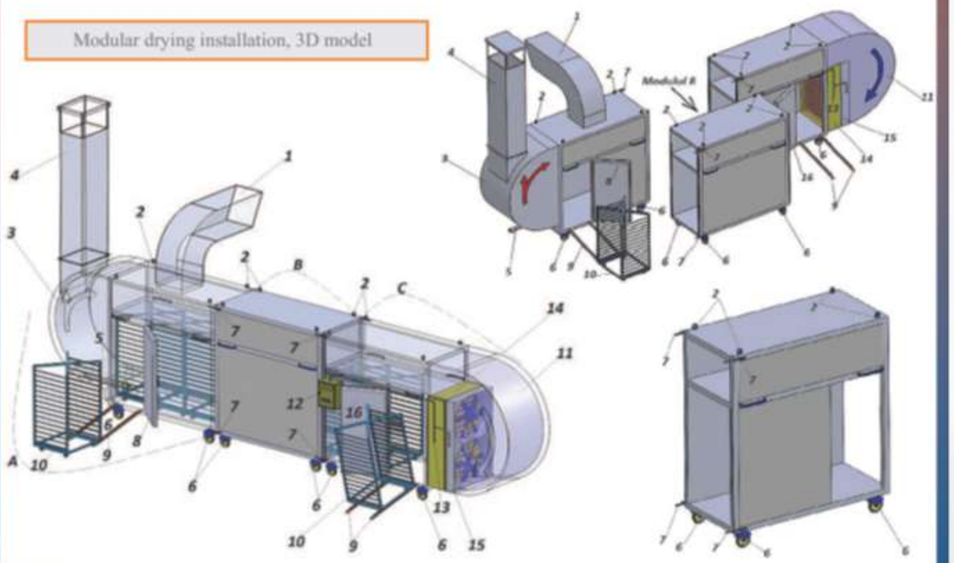
Advantages:

- Simple adjustable construction;
- The modular system permits to adapt the quantity of drying product;
- Increase the quality of the final product;
- Creating new jobs;
- Increasing the export of autochthonous production.

Description of the invention

The invention relates to the food industry, in particular to a modular drying plant, and can be applied to enterprises in the food industry, within peasant households engaged in growing orchards, as well as individually for the dehydration of agro food products

Modular drying installation, 3D model



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a XXII-a editie

Cluj – Napoca, România, 15-17 octombrie 2025

Process of forming cherry trees in the shape of a slender spindle

Balan V., Russu S., Buză C., Șarban V.

Patent: nr. 1802. MD

Application Fields: **Agriculture, Horticulture K**

Purpose:

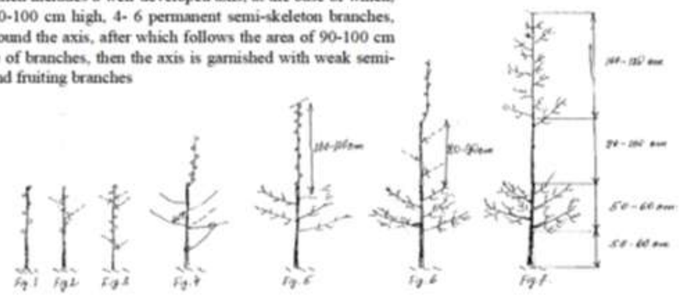
The formation of conical crowns, with a well-developed central axis and garnished with semi-skeletal branches and fruiting branches, which decrease in size from the base to the top of the tree and ensure the optimal use of solar energy to increase the size and quality of the fruits.

Advantages:

The branch-free area favors the penetration of light into the area of the semi-skeleton branches at the base of the crown, the deposition of fruit buds and the obtaining of higher quality fruits. Basically, we get crowns formed by a well-developed vertical axis garnished with a single level of semi-skeleton branches and fruiting branches, well lit and ventilated, which decrease in length from the base to the top of the tree.

Application:

The invention relates to agriculture, especially to fruit growing, namely to a method of forming cherry trees in the form of a slender spindle, which includes a well-developed axis, at the base of which, between 60-100 cm high, 4- 6 permanent semi-skeleton branches, radially around the axis, after which follows the area of 90-100 cm length free of branches, then the axis is garnished with weak semi-skeleton and fruiting branches



Implementation stage:

The technical result of the invention allows the creation of optimal conditions for care, radical improvement of the illumination of fruits and leaves, which ensures an increase in the size and quality of the fruits without affecting the yield.
Moldova Fruit Association

Acknowledgments: This research was supported by the Technical University of Moldova within the institutional subprogram the *Research and Extension Centre in Agriculture, Biodiversity and Rural Development*.

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Cluj – Napoca, România, 15-17 octombrie 2025

Universitatea Tehnică a Moldovei
INCDTIM Cluj-Napoca

DEZVOLTAREA UNOR SOLUȚII INOVATOARE PENTRU ATENUAREA EFECTELOR SECETEI

Rodica STURZA, dr. hab., prof. univ.; Dmitrii LAZACOVICI, dr.;
Aliona GHENDOV-MOȘANU, dr. hab., conf. univ.; Olga LAZACOVICI, drd.;
Ildikó LUNG, dr. (RO); Ocsana-Ileana OPRIȘ, dr. (RO);
Adina STEGARESCU, dr. (RO); Maria-Loredana SORAN, dr. hab., prof. univ. (RO)

Scopul

Dezvoltarea unui material multifuncțional nou, cu costuri reduse, bazat pe hidrogel nanocompozit funcționalizat cu MO-biochar (Fe_3O_4), pentru o gamă largă de aplicații: tratarea apei poluate; pentru atenuarea evenimentelor hidroclimatice extreme, în special a secetei în bazinele hidrografice ale diferitelor surse de apă pentru irigații; economisirea apei și fertilizarea solului.

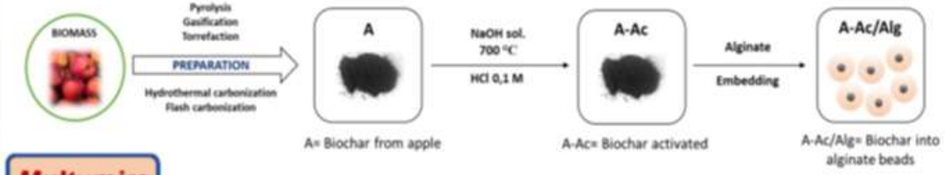
Proiect de cercetare 101060874 (UE) 23.80013.7007.1M (MD)

Obiective

1. Prepararea și caracterizarea unor noi materiale superabsorbante rentabile, bazate pe polimeri biocompatibili și biocărbune funcționalizat cu MO.
2. Evaluarea eficienței de eliminare a poluanților organici din ape gri cu materialul superabsorbant elaborat.
3. Evaluarea eficienței reciclării și reutilizării materialului superabsorbant.
4. Testarea atenuării ARG-urilor și ARB-urilor de către noul adsorbant din efluenții de ape gri folosind metode moleculare consacrate (qPCR și secvențiere).
5. Evaluarea impactului materialului superabsorbant asupra proprietăților fizice, chimice și biologice ale solului și a efectelor sale asupra culturilor de fasole (dezvoltarea creșterii, randamentul și cultura) în cadrul scenariilor actuale și previzionate privind schimbările climatice.

Rezultate

3 aplicații simultane ale materialului superabsorbant pentru îndepărtarea poluanților din efluenții de ape gri, atenuarea stresului secetei în scenariile actuale și prevăzute ale schimbărilor climatice, ameliorarea proprietăților solului prin aplicarea materialului preparat pentru eliminarea ARG-urilor și ARB-urilor.



A= Biochar from apple | A-Ac= Biochar activated | A-Ac/Alg= Biochar into alginate beads

Mulţumire

Autorii doresc să mulțumească Comisiei Europene, UEFISCDI, România, pentru finanțarea în cadrul consorțiului internațional de colaborare COFUND-WATER4ALL-DIME, finanțat în cadrul apelului comun 2022 al Parteneriatului European 101060874 — Water4All și ANCD, Republica Moldova, 23.80013.7007.1M.