ROMANIA
MINISTRY OF EDUCATION

UNIVERSITY OF LIFE SCIENCES "KING MIHAI I" FROM TIMISOARA

ULST

Innovation and good practices in the technology of functional and dietary flouring products

Prof.habil.PhD. Ersilia ALEXA

SMART DIASPORA
Timisoara, 10-13.04.2023

THE IMPLEMENTATION OF MODERN TECHNOLOGY SYSTEMS TO OBTAIN DIETARY FLOURING PRODUCTS

financed BY Romanian Ministry of Agriculture Forest and Rural Development (MAPDR) and World partner SC AGROBANAT SRL Caransebes. No.141529/2008, AG 142044/02.10.2008, **DIRECTOR PROIECT ALEXA ERSILIA**

A
- **hypoglycemic products** for patients with diabetes,

B
- **Gluten free products** for people with gluten intolerance (Celiac disease)

C
- **Products fortified with iron** intended especially for people suffering from anemia.

D
Infant formula and baby food products based on processed cereals with and without added fruits and vegetables,

THE BAKERY AND PASTRY LABORATORY

Cereals dietary and functional products

Cereal products can be considered among the first foods included in the category of dietary foods.

Since 1997 was confirmed the importance of dietary fiber from whole grains in reducing the incidence of colon cancer, respectively cardiovascular disease.

Studies show that in our country 68% of the population never consume cereals at breakfast, while 23% do not know about their benefits.

Comparatively, a Romanian consume, a average, of 1.75 kg cereals annually, while a European consumes 2 to 9kg of Breakfast Cereals per year. The Breakfast Cereals segment is expected to show a volume growth of 3.4% in 2024. Breakfast Cereals - Romania | Statista Market Forecast

GLUTEN FREE PRODUCTS

1. premix flours based on corn and rice with addition of raisins and figs

Celiac disease (CD) is most prevalent genetic disease in Europe.

Epidemiological studies indicate that irritable bowel syndrome - celiac reach between 2% -15% of world population, with variations depending on the area, more common in Europe and lower in the U.S. and Asia. https://www.aoecs.org/

The overall CD prevalence in 2010 was 1.0%. In subjects aged 30-64 years CD prevalence was 2.4% in Finland, 0.3% in Germany, and 0.7% in Italy. (Mustalahti K et al., 2010).

In Romania the CD prevalence was 2.22% (Dobru D., 2003).

2. Gluten free pasta obtained from rice flour mixed with corn flour

3. Gluten free biscuits obtained from rice flour and sea buckthorn extract

Hypoglucidic products

Among the most common metabolic disease is diabetes. **Diabetes is** consider the disease of 21 century.

About 422 million people worldwide have diabetes, the majority living in low-and middle-income countries, and 1.5 million deaths are directly attributed to diabetes each year Diabetes (who.int)

Diabetes is one of the public health priorities in Romania, with increasing incidence, from 321.2 cases per 100 000 population in 2011 to 397.2 cases per 100 000 in 2019 (INSP, 2020), and prevalence, from 3% in 2011 to 3.9% in 2019 (WHO – HFA, 2020).

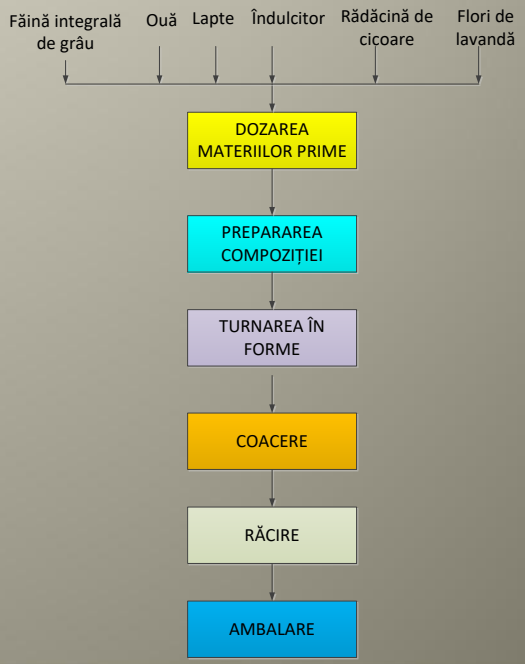
Products used in Hypoglycaemia diseases

BISCUITS WITH CHICKPEAS

Dietary Cake with Seabuckthorn jelly

MUFFINS with CHICORY and LAVENDER

- **Chicory (Cichorium intybus) is known as a hypoglycemic diuretic and laxative recommended in the hypoglycemic diet and chronic liver disease.**
- **Contents: whole wheat flour, lavender flowers and chicory root, eggs, milk, natural sweetener.**



Pasta with Momordica charantia extract

- Contents: wholemeal flour, wheat germ and Momordica charantia extract, egg, salt, egg.

- Momordica Charantia - bitter cucumber or plant insulin. Momordica charantia has a very low glycemic index (GI = 15).

IRON ENRICHED FLOURING PRODUCTS

1. Fe enriched premix

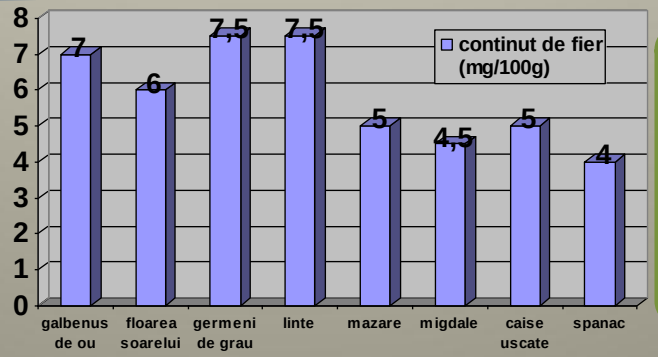
Iron is an essential trace element present in all cells of the body. The absence of iron in the diet leads to the disease called Iron Deficiency Anemia.
In 2019, global anaemia prevalence was 39.8% in children aged 6-59 months, equivalent to 269 million children with anaemia https://www.who.
In Romania, in 2016, the prevalance was 48.7-59% at 6-23 months of age (Stativa, 2016).
Prevalence of anemia among non-pregnant women (% of women ages 15-49) in Romania was reported at 22.6 % in 2019, according to the World Bank collection of development indicators, compiled from officially recognized sources.

Content: wheat semolina, apricot, lentil, starch, ascorbic acid

2. Pasta enriched in iron

Content:
Faina grau durum pentru paste, oua, spanac, apa

3. Premix based on wheat semolina, with the addition of legumes (lentils) in different proportions



Content:
wheat semolina, Lentil, starch, ascorbic acid

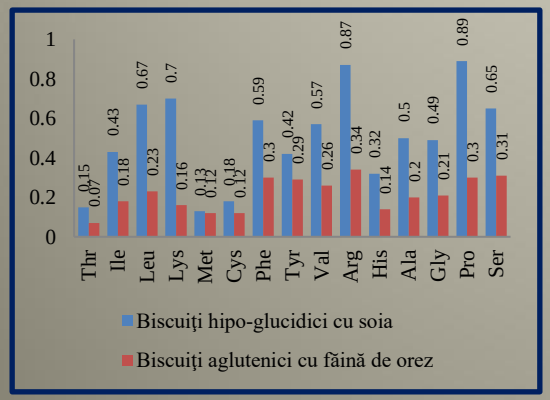
TRADEMARKS

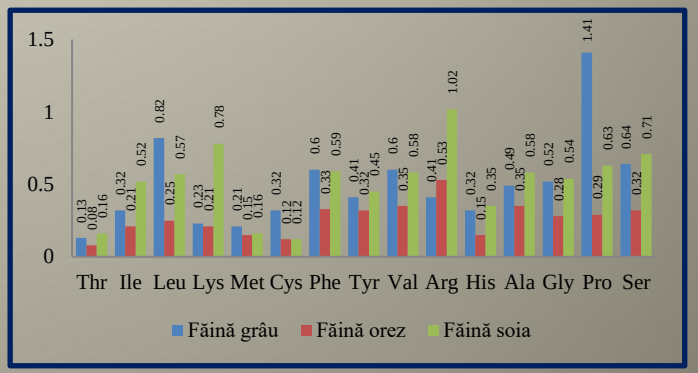
1. **Marcă înregistrată OSIM, produsul funcțional BIOGERMPASTA,** NR.**00913/12.02.2014, autori: Alexa Ersilia,** Botău Dorica, Riviş Adrian, Mârzu Ionela, Ciulca Sorin
2. **Marcă înregistrată OSIM produsul funcțional TPA Muffins,** NR.**00914/12.02.2014 autori: Alexa Ersilia,** Botău Dorica, Poiană Mariana, Riviş Adrian, Vasilcin Anka,
3. **Marcă înregistrată OSIM produsul funcțional MOMGERMBISC,** NR.**00913/12.02.2014, autori:** Botău Dorica, **Alexa Ersilia,** Negrea Monica**,** Pîrvulescu Panfil, Vasilcin Anka,
4. **Marcă înregistrată OSIM produsul cozonac hipoglucidic cu fructe TPA DIET,** NR. 112402/05.08.2010. autori: **Alexa Ersilia**, Traşcă Teodor, Poiană Mariana Atena, Pop Georgeta, Stoin Daniela, Negrea Monica, Cocan Ileana.
5. Marca: **TPA DIET Fe NUTRIPREMIX,** OSIM nr. 112403, *Autori:* **Alexa Ersilia,** Traşcă Teodor Ioan, Poiană Mariana-Atena, Pop Georgeta, Stoin Daniela, Negrea Monica, Cocan Ileana
6. Marca: **TPA DIET HIPOGLUCIDICBISC**, OSIM nr. 112438,*:* **Alexa Ersilia**, Traşcă Teodor Ioan, Poiană Mariana-Atena, Pop Georgeta, Stoin Daniela, Negrea Monica, Cocan Ileana
7. Cerere de brevet **OSIM A/01037, 2017,** Alexandru Rinovetz, **Alexa Ersilia Călina**, Traşcă Teodor Ioan, Cocan Ileana, Popescu Iuliana, Rădoi Bogdan Petru, *Procedeu de obținere a foetajului cu stearină separată din untura de porc prin fracționare uscată*.

Nutritional characterization of functional and dietary foods

- **A** • Proximate composition
- **B** • Chromatographic profile
  • LC-IC, LC-MS, GC-MS
- **C** • Macro and microelements SAA

LC-IC Dionnex IC - 3000





Interdisciplinary Research Platform (IRP)

OBJECTIVES

RESEARCH ACTIVITY WITH PHD AND MASTER STUDENTS

SERVICES TO THIRD PARTIES

RESEARCH&INOVATION&DEVELOPMENT

Domain of R&D interest: **Food technologies and analysis of food products**

1. Obtain functional/ dietary flouring products
2. **Develop technologies** to obtain functional flouring products
3. Analyze food products

Research infrastructure focus area: **Targeted nutrition**

- **HACCP authorized** for **manufacture of bread, cakes and fresh pastries** (no. 2242.18.09.2020)
- **GMP** (good production practices) & **GHP** (good hygiene.

EXPERTISE - EXISTING KNOW-HOW

1. **Technologies to obtain functional/dietary flouring products** (premix with cereals, fruits, leguminous, corn flakes, hypoglucidic bread hypoglucidic biscuits, muffins, flouring products enriched in bioactive principle from byproducts, gluten free products).
2. **Analysis of vegetal raw materials and food products** (physical-chemical analysis, rheological bakery parameters, senzorial analysis, chromatographic and spectophotometric methods for detection and quantification of organic compounds)
3. **Elaboration of technical flow and specifications for bakery products**, identification parameters for food labels.
4. **Elaboration of documentation necessary for trademarks and patents in food area**.

FACILITIES & TECHNICAL EQUIPMENT

1. MICROPILOT STATION TO OBTAIN BAKERY AND PASTRY PRODUCTS

Dadex bakery oven; electric baking oven with 12 trays; manual dough divider; electric pastry oven; spiral mixer with a capacity of 32 l; electric fryer with a capacity of 30 l; planetary mixer

2. AUTOMATED TECHNOLOGICAL LINE FOR CEREALS PROCESSING

Combi Junior laboratory mill with a production capacity of 50-80 kg / h; automated technological line for obtaining cereal flakes consisting of: mixer, extruder, oven and flavouring line.

FACILITIES & TECHNICAL EQUIPMENT

1. **The physical – chemical laboratories**
   - Equipment for proximate analysis of food (protein, lipids, mineral substances)
2. **The chromatographic laboratory**
   - Liquid chromatography (Dionex ICS 3000), LC/MS (SHIMADZU), HPLC
   - Gas chromatography (GC/MS)
3. **Spectrophotometric laboratory**
   - UV-Vis spectrophotometer (Specord 210)
   - Spectrophotometer with atomic absorption (AAS), XRF analyzer
   - Eliza (PR1100) equipment.

4. Microbiological laboratory

- two MEMERT incubators type INB 500; an incubator with a controllable atmosphere (high concentration of CO); Nucleocounter SCC – 100
- Tryton type continuous culture biofermenter, as well as on the Leica TCS SPE DM 2500 laser confocal microscope

COOPERATION WITH INDUSTRY

Since 2012 PCI offers **services** to 3rd parties for the physical-chemical and nutritional analysis of food products, serving around **50 clients each year**, by providing a number of approximately 200 analyses/year.

It also had and continues to have **R&D contracts with private companies** in the food sector and supports and promotes **cross-border collaboration** through the Erasmus **strategic partnerships developed at transnational levels**.

OUR COMMERCIAL OFFER

- BAKERY & PASTRY INDUSTRY
- PEOPLE WIT[H] SPECIAL DEITARY NEEDS

FOR

- HEALTHY BAKERY INGREDIENTS
- CUSTOM DIETS (diabetes, anemia, digestive disorders)

WHO NEED

- HIGH NUTRITIONAL FOOD INGREDIENTS

WE OFFER

- TEHNOLOGIES & RECEIPES FOR FUNCTIONAL BAKERY PRODUCTS *

OUR PRODUCTS

- HIGH NUTRITIONAL VALUES
- LOW GLICEMIC INDEX
- HIGH SENSORIAL PROPERTIES
- MICROBIOLOGICAL SAFETY
- BIOLOGICAL ACTIVE PRINCIPLES

THAT PROVIDES

PRODUCT DEVELOPMENT PORTFOLIO

1. Functional premixes and products with low glycemic index
2. Functional bakery / pastry products with high antioxidant activity;
3. Innovative bakery products based on agricultural / horticultural by-products;
4. Gluten free premixes mixed with fruits and / or legumes;

• RESEARCH AND COOPERATION WITH INDUSTRY

Patent application with industry

Patent Number	Patent Assignee Name(s)	Topic
RO132919-A0	PANETONE SRL	**Natural products**
RO132842-A0	Prospero	**Lipids for pastry**
RO133305-A0	PANETONE SRL	**Natural products**
RO133316-A0	PANETONE SRL	**Natural products**

Technological transfer in partnerships with enterprises

1.	**Strategies to predict, prevent and reduce the effect of fungal contamination on cereals quality, production and food safety** Project Reference : 2017-1-RO01-KA202-037215
2	**BG-15, Natural preparation with antifungal activity** UEFISCDI,15BG din 30/09/2016, Project code: PN-III-P2-2.1-BG-2016-0126, Partner: SC Panetone SRL
3	**Use of stearin obtained by dry fractionation of pork lard as a substitute for margarine in the puff pastry technology** Contract nr.61CI/2017 , UEFISCDI, Project code PN-III-P2-2.1-CI-2017-0493, Partner: SC Prospero SRL
4	**Natural biofertilizers for organic agriculture** Contract nr.63CI, UEFISCDI, PN-III-P2-2.1-CI-2017-0346, contract nr. 63/CI/2017, Partner: SC Panetone SRL
5	**Modern technologies for monitoring land covered with waste in order to restore their initial use, IPA ROMANIA SERBIA INTERREG, RORS 365, 2019-2021**





PROIECT POR/824/1/1/Creşterea inovării în firme prin susținerea entităților de inovare şi transfer tehnologic în domenii de specializare inteligentă

REALIZAREA TRANSFERULUI TEHNOLOGIC ÎN VEDEREA OBȚINERII UNOR ALIMENTE FUNCTIONALE INOVATIVE IMBOGĂTITE IN COMPUSI BIOACTIVI - CTTU 2020 SMIS 140030

Project manager: Prof.dr.ing. Isidora Radulov

The project aims to continuously develop links and synergies between academia and the private sector in technology research, technology transfer and eco-innovation. In this sense, the Technology Transfer Centre (TTC) of the USVT provides scientific, logistical and informational support for the development and implementation of technologies to obtain functional flour premixes with added fruits, rich in active principles, which can be used as vegetable matrices in bakery, farinaceous food, pastry and confectionery technology.
The research results expressed in optimised solutions for obtaining functional premixes with multiple food uses will be transferred to the economic environment, agricultural raw material processing units, for production and marketing on the food market or HORECA.

ESTABLISHED BY
THE PROJECT POR/824/1/1/
Increasing innovation in
firms by supporting innovation
and technology transfer entities
in domains of smart specialisation

TITLE:
IMPLEMENTATION OF TECHNOLOGY TRANSFER TO ACHIEVE INNOVATIVE FUNCTIONAL FOODS ENRICHED IN BIOACTIVE COMPOUNDS - CTTU 2020 SMIS 140030

Erasmus+

Cooperation on innovation and exchange of good practice in the hypoglycemia diet for people with diabetes

ERASMUS K2, project nr. 2019-1-RO01-KA203-063499

Banat`s University of Agriculture and Veterinary Medicine "King Michael I of Romania" from Timisoara, Romania BUAS (LP)

"Victor Babes" University of Medicine and Pharmacy Timisoara (UMFT) (P1)

Romanian Association of Milling and Bakery ROMPAN (P2)

University of Calabria, Italy (P3),

University of Szeged, Hungary (P4).

LET'S PRODUCE NEW FUNCTIONAL BAKERY PRODUCTS FOR PEOPLE WITH DIGESTIVE DISORDERS

Program Erasmus+ - Strategic partnership ERASMUS K2–2019-1-RO01-KA202-063170

SA PRODUCEM PRODUSE DE PANIFICATIE FUNCTIONALE PENTRU PERSOANELE CU PROBLEME DIGESTIVE

ACRONIM FBforPDD

2019-2021

Coordonator proiect:
Patronatul Român din Industria de Morărit, Panificație și Produse Făinoase (ROMPAN)
Parteneri:
Universitatea din Szeged (Ungaria)
Universitatea din Bari (Italia)
KERI Ingredients (Irlanda)
Universitatea de Stiinte Agricole si Medicină Veterinară a Banatului „Regele Mihai I al României''din Timisoara (USAMVBT),
Universitatea de Medicină si Farmacie „Carol Davila`` din Bucuresti (Romania)

The project, through its objectives, responds to the requirements of the bakery industry in the partner countries to obtain functional products for people with digestive disorders, in order to ensure a healthy and rational diet, with high fiber content and low nutritional value, without salt or gluten.

SPECIFIC OBIECTIVES

Exchange of best practices and training of specialists from partner countries on the manufacture of functional bakery products for people with digestive disorders.	Awareness of manufacturers in the bakery industry and consumers about the importance of using functional bakery products in the diet.	Awareness of manufacturers in the bakery industry and consumers about the importance of using functional bakery products in the diet.	Echipa proiectului USAMVBT Prof. Alexa Ersilia, Prof.Radulov Isidora, Ec.Chet Cornelia, Prof.Poiana Mariana, s.l.Cocan Ileana s.l.Negrea Monica, drd.Plustea Loredana

STRATEGIES REGARDING THE VALORIZATION OF HORTICULTURAL AND AGRICULTURAL BY-PRODUCTS AS FUNCTIONAL FOODS IN THE CONTEXT OF A CIRCULAR ECONOMY

project no. 2020-1-RO01-KA203-080172

Erasmus+

ByProduct

Banat`s University of Agriculture and Veterinary Medicine "King Michael I of Romania" from Timisoara, Romania BUAS (LP)

University of Agriculture and Veterinary Medicine Cluj Napoca, Romania (P1)

University of Calabria, Italy (P2)

Estonian university of life sciences EESTI MAAULIKOOL (P3)

Romanian Association of Milling and Bakery (ROMPAN), Romania (P4).

The general objective of project is *to develop a transnational partnership as well as joint initiatives for cooperation and exchange of good practices at EU level regarding the possibilities to recover the by-products rich in biologically active compounds from agriculture and horticulture and to include this matrix in functional foods obtained in other technologies (bread and pastry).*

To support the development, transfer and implementation of innovative practices in context of 'circular economy'

A curriculum and a course destined to specialists in agro-food technologies and nutrition that establish the cognitive skills and practical ability regarding:

i) the management of by-products resulted in wine-making technology, fruit/vegetable processing industry and beer industry

ii) the possibilities to obtain functional foods (bakery and pastry products) with nutritional added value recommended in a healthy diet.

Increasing the training level of 10 specialists

(2 from each partner) and of **72 MSc and PhD students** (3trainig x4Institutions x6 students) with high qualification in the field of food technologies and nutrition.

Awareness of the population.

Through dissemination activities (4 multiplier events, 10 newsletter)

STRATEGIES REGARDING THE VALORIZATION OF HORTICULTURAL AND AGRICULTURAL BY-PRODUCTS AS FUNCTIONAL FOODS IN THE CONTEXT OF A CIRCULAR ECONOMY

project no. 2020-1-RO01-KA203-080172

7th September, 2021

Co-funded by the European Union

STOP WASTE TO VET

"Methods to reduce food waste in flour products by developing the specific competence of specialists in the sector„
ERASMUS K2, project no. 2021-1-RO01-KA220-VET-000028008

Romanian Association of Milling and Bakery ROMPAN (Coordinator)

Banat`s University of Agriculture and Veterinary Medicine "King Michael I of Romania" from Timisoara, Romania (P1)

University of Calabria, Italy (P2)

University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania (P3)

Estonian University of Life Sciences, Estonia (P4)

GENERAL OBJECTIVE OF THE PROJECT is to reduce food waste on flour products in the current conditions of sustainable development of circular economy in partner countries with effects on all actors involved in the chain of producers-distributors-merchants

SPECIFIC OBJECTIVES

Improving procedures and means to reduce food waste in institutions from the partner countries	Decrease food waste on flour products in the production sector of flour products	Empowering specialists in distribution and marketing of flour products to save natural resources and protect the environment	Strengthening the institutional capacity of partner organizations by achieving exchanges of good practices on reducing food waste in the flour industry	Awareness of specialists in the flour products industry in the distribution and marketing chain in partner countries on the importance of reducing food waste of flour products

BY-PRODUCTS DERIVED FROM WINE MAKING PROCESS

1. *Produse naturale ecologice cu **acțiune antifungică***, Bridge Grant, PNCDI III, UEFISCDI, PNIII-P2-2.1.BG-2016-0126, BG-15, Acronim PNA, 2016-2018, Director Alexa Ersilia

2. *Systems to reduce mycotoxin contamination of cereals and medicinal plants in order to preservation native species and traditional products in Romania-Serbia-Croatia*, Regional Programme for Cooperation with South-East Europe (ReP-SEE), SEE-ERA.NET PLUS, Project reference number: ERA 139/01, 2010-2012, Director Alexa Ersilia

- Annualy Grape production
- 75 million tons

Grape pomace

- grape byproducts
- 13-14.5 million tons

Grape seeds

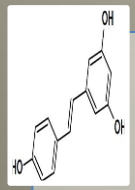
FUNCTIONAL FOODS WITH GRAPE BYPRODUCTS

Bread with grape pomace/seeds

Control P+RI P+PN

Pasta with grape pomace/seeds

Control B+RI B+PN



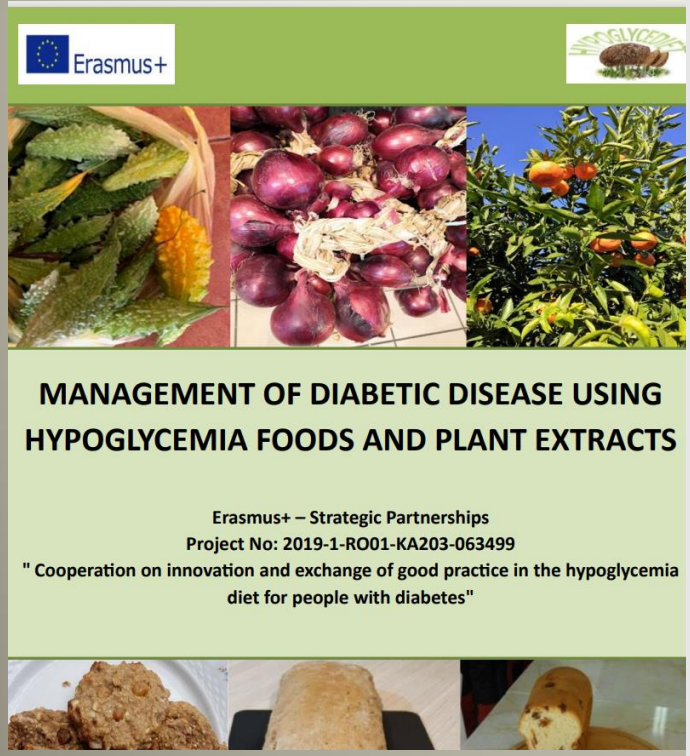
Biscuits with grape pomace/seeds

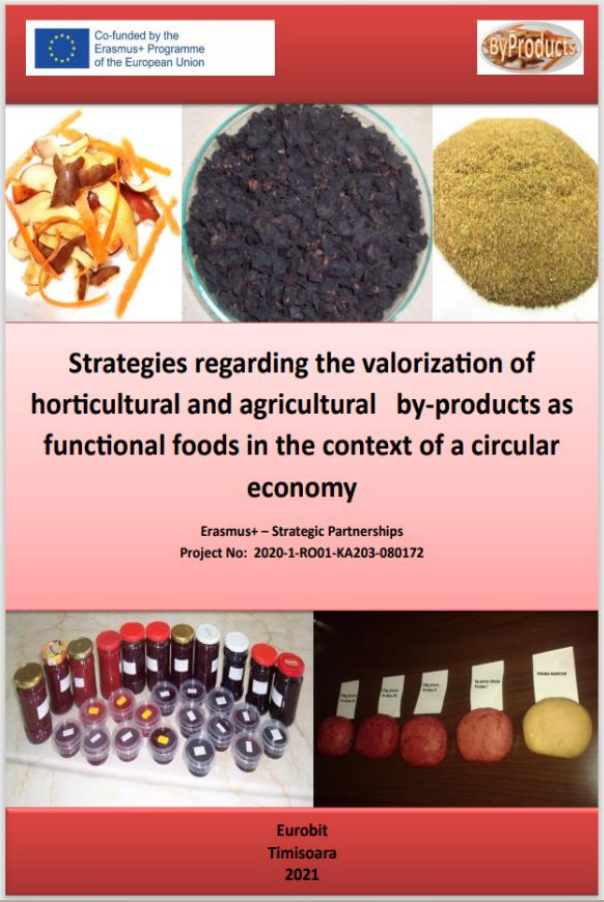
BY-PRODUCTS DERIVED FROM BEER MAKING PROCESS

- According to (Amoriello, Mellara, Galli, Amoriello, & Ciccoritti, 2020), from every 1000 tons of beer a total amount ranging from 137 to 173 tons of solid waste are generated.

- From the beer making process, several by-products such as barley malt roots, spent grain, spent hops and trub, spent yeast are generated.

Barley malt rootlets are rich sources of bioactive compounds such as protein (25%), crude fibre ranging from 11% to 14%, radical scavenging activity of 49.9% and free phenolic content 3.8 mg/g dry weight (Budaraju et al., 2018)





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