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ECAMPUZ
Advancing Food Science Research and Education in Uzbekistan

CENTER FOR ADVANCED TECHNOLOGIES

Intra-project conference

Book of proceedings

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CENTER FOR ADVANCED TECHNOLOGIES

ECAMPUZ is a three-year joint capacity-building Erasmus+ project between six partner institutions from Uzbekistan and two HEI partners from the EU. The project is co-funded by the European Union. The main aim of the project is to build capacity, develop and implement sustainable tools to address the national priorities in Uzbekistan (UZB) related to the “Sustainable growth and jobs” (the subcategory of “Knowledge triangle, innovation”) within the Food sector.
The project addresses the two most important problems of the UZB food sector that need urgent solutions though strengthening of relations between HEIs, research and the food industry triangle. The first problem addresses a lack of food science and technology professionals (teachers and researchers) that are trained according to international standards and able to address and cope with today’s challenges of the food sector in UZB.

The **“Intra-project conference”** of the ECAMPUZ project was organized at the Center for Advanced Technologies. It brought together researchers, teachers, and industry representatives in the field of food science and technology of Uzbekistan, as well as European Union and Chinese specialists in food science and technology.
Lectures on topics such as Food Science and Technology, Biotechnology in Food Science, Genetic Engineering in Food Science, Food Safety, Food Microbiology, AI in Food Science, Development of Functional Ingredients in Food, and Diet and Nutrition was delivered by advanced foreign and local scientists during the conference.
Participants in the event had the opportunity to view scientific posters, related to Food Science and Technology, prepared by the ECAMPUZ project participants.

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RESEARCH ON OBTAINING INULIN EXTRACT FROM JERUSALEM ARTICHOKE TUBERS USING ULTRASONIC TREATMENT

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Co-funded by the European Union

Introduction

In recent years, there has been an increased interest in the use of natural sources of functional raw materials, especially in the field of health and nutrition. Among these raw materials, inulin, a multifunctional probiotic polysaccharide, deserves special attention because of its number of health benefits as well as because of its widespread use in industry. One promising source of inulin is Jerusalem artichoke tubers, also known as Helianthus Tuberosus.

Today, research into the production of inulin extract from Jerusalem Artichoke tubers is still relevant. Focusing on the ease of finding and extracting raw materials for inulin storage and the possibility of using it as a renewable resource, this research aims to meet the demand for useful raw materials while ensuring environmental sustainability.

This study is an extensive research paper devoted to the description of inulin extracted from the optimization of extraction methods and its possible application in various fields. Improving the efficiency of Jerusalem artichoke cultivation and processing can offer firms additional sources of income and help diversify the crop portfolio, thereby increasing the sustainability of agriculture.

Experimental procedure

Results and discussions

The tubers of Jerusalem artichoke of the local variety “Mujiza” were used in the research work. The main ingredient of dried and crushed Jerusalem artichoke tubers was studied. The powder obtained in the laboratory was analyzed, and the results were obtained:

- total carbohydrate content– 52,5%;
- in particular, the amount of inulin– 33,5%;
- protein content– 5,7%;
- moisture and light volatile content– 5,9%.

For the study, the pre-prepared Jerusalem artichoke was extracted for 30-120 minutes in the temperature range from 30 to 90 ˚ C with the addition of water in a ratio of 1:10 relative to the weight of the powder (figure 1). This study examined the effect of time and temperature on the extraction process. It is known from preliminary studies and a literature review that the extraction process was carried out for 30 minutes at a temperature below 30˚ C without indicating its effectiveness.

These indicators are used to study the effect of the hydro-module on the extraction of inulin from Jerusalem Artichoke tuber powder 1:8, 1:10, 1:12, 1:14, and 1:16. The temperature of the procedure was set at 90˚ C, and the duration was 30-120 minutes (figure 2).

The hydro-module was determined to be 1:14 when inulin was extracted from Jerusalem artichoke tuber powder. In this case, the extraction process was carried out at pH values of the water used, equal to 3, 5, 7, 9, and 11, respectively. The temperature of the extraction process was set at 90˚ C, and the duration was 30-120 minutes (figure 3).

In the analysis of the extracted extracts, samples were studied, which were extracted for 90 minutes. The study analyzed the amount of carbohydrate in the extract, including inulin, protein, moisture, and volatile substances (table 1).

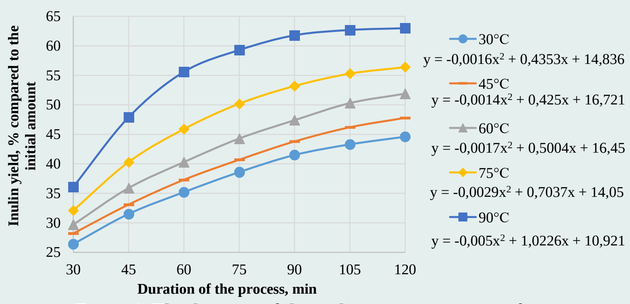


Figure 1. The duration of the inulin extraction process from tuganagi jerusalem artichoke powder on the output amount and the effect of temperature

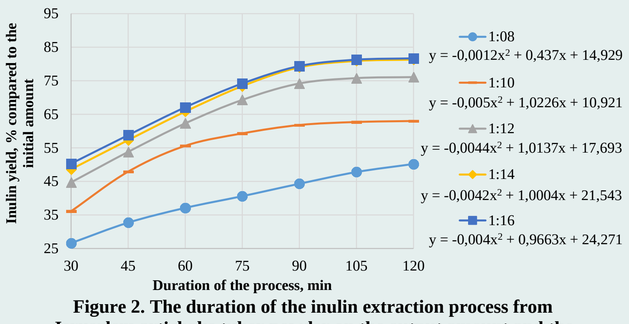


Figure 2. The duration of the inulin extraction process from Jerusalem artichoke tuber powder on the output amount and the effect of the hydro-module

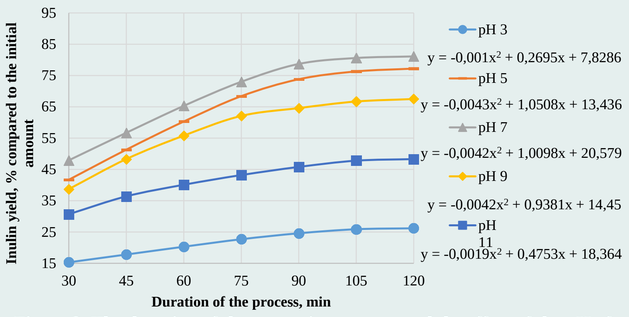
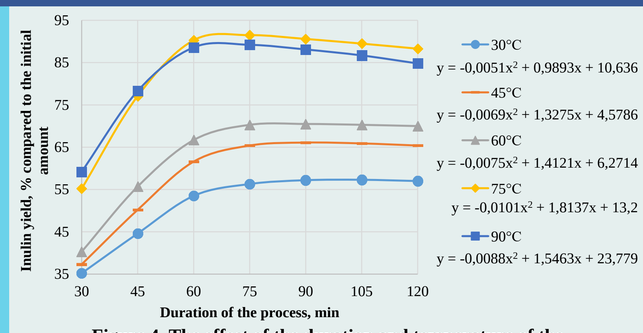


Figure 3. The duration of the extraction process and the effect of the pH of water on the amount of insulin released from Jerusalem artichoke powder

Table 1

The effect of temperature, hydro-module and pH of water during extraction on the parameters of inulin extract extracted from Jerusalem artichoke tuber powder (process duration 90 minutes)

Indications for the extraction process	Composition of Jerusalem artichoke tuber extract (extraction process of 90 minutes)			
	carbohydrate content, %	inulin content, %	protein content, %	moisture and volatile matter content, %
The composition of the extract isolated at different temperatures				
30°C	2,6	1,6	0,3	95,8
45°C	2,8	1,7	0,3	95,3
60°C	3,0	1,9	0,3	94,8
75°C	3,4	2,1	0,4	94,0
90°C	3,8	2,4	0,4	93,3
The composition of the extract isolated in various hydro-modules				
1:8	3,6	2,3	0,4	93,5
1:10	3,8	2,4	0,4	93,3
1:12	3,7	2,4	0,4	93,7
1:14	3,5	2,3	0,4	94,0
1:16	3,2	1,9	0,3	94,7
The composition of the extract extracted at different pH values of water				
pH 3	4,7	0,7	0,2	93,2
pH 5	3,6	2,2	0,3	94,1
pH 7	3,4	2,4	0,4	94,2
pH 9	3,1	2,0	0,4	94,5
pH 11	2,7	1,4	0,3	95,1



Jerusalem artichoke was mixed with water in an amount of 1:10 compared to the weight of Jerusalem artichoke powder. When the effect of temperature on inulin extraction was studied, it was determined that its index ranged from 30 to 90 ˚ C. The duration of the extraction process was determined in the range of 30 to 120 minutes. Ultrasound with a frequency of 40 kHz(kilohertz) was used in the extraction process using a laboratory device (figure 4).

Figure 4. The effect of the duration and temperature of the ultrasonic extraction of inulin from Jerusalem artichoke tuber powder on the amount of released

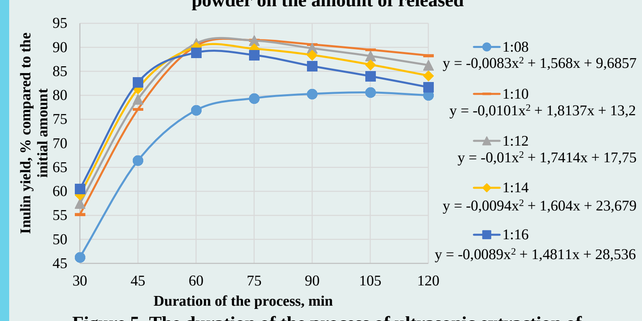


Figure 5. The duration of the process of ultrasonic extraction of inulin from Jerusalem artichoke tuber powder on the output amount and the effect of the hydro-module

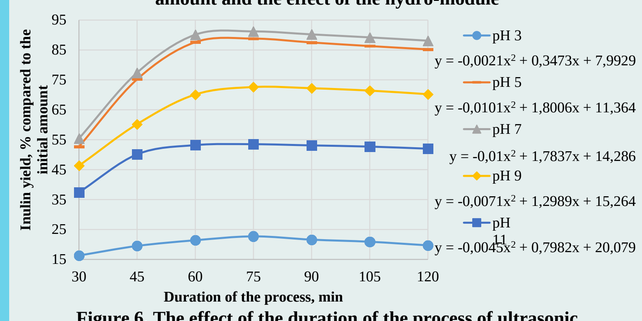


Figure 6. The effect of the duration of the process of ultrasonic extraction of inulin from Jerusalem artichoke tuber powder on the amount excreted and pH value of water

The proportions of the hydro-modules as described above when extracting inulin from Jerusalem Artichoke powder tubers 1:8, 1:10, 1:12, 1:14 and a ratio of 1:16 were chosen. The temperature of the procedure was determined by the temperature, which gave a high result during ultrasound examination, that is, 75 ˚ C, and the duration was 30-120 minutes (figure 5).

The effect of the solvent used in the inulin extraction process on the pH was studied. In this case, the process was carried out in a hydro-module with a ratio of 1:10 and a temperature of 75 ˚ C. The pH values of the water were determined as 3, 5, 7, 9, and 11, respectively (figure 6).

Extracts from Jerusalem artichoke tuber powder were studied by ultrasonic aqueous extraction. In this case, since the most optimal result is not the extraction of samples within 90 minutes, unlike the simple method, these extracts were analyzed within 60 minutes (table 2).

Table 2

The effect of temperature, hydromodule and pH of water during extraction on the parameters of inulin extract extracted from Jerusalem artichoke tuber powder using ultrasound (process duration 60 minutes)

Indications for the extraction process	Composition of Jerusalem artichoke tuber extract (extraction process of 60 minutes)			
	carbohydrate content, %	inulin content, %	protein content, %	moisture and volatile matter content, %
The composition of the extract isolated at different temperatures				
30°C	3,1	2,3	0,3	95,0
45°C	3,4	2,6	0,3	94,4
60°C	3,7	2,8	0,4	93,8
75°C	4,8	3,6	0,4	92,4
90°C	5,1	3,5	0,5	91,8
The composition of the extract isolated in various hydro-modules				
1:8	5,0	4,1	0,4	92,0
1:10	4,8	3,6	0,4	92,4
1:12	4,1	2,9	0,4	93,6
1:14	3,8	2,5	0,3	94,3
1:16	3,2	2,1	0,3	95,4
The composition of the extract extracted at different pH values of water				
pH 3	6,8	0,9	0,3	90,6
pH 5	5,3	3,5	0,4	92,0
pH 7	4,7	3,6	0,4	92,5
pH 9	4,2	2,9	0,4	93,1
pH 11	3,4	2,1	0,4	93,9

Conclusion

- the extraction of inulin from Jerusalem artichoke tuber powder using ultrasound has a positive effect on the yield of the final product compared to the traditional method;
- it has been established that with the traditional method, when the optimal procedure time is 90 minutes, ultrasound can reduce this time to 60 minutes;
- during the aqueous extraction of inulin from Jerusalem artichoke tuber powder, the concentration of the product obtained by ultrasound is higher than with the traditional method, and time savings make it easier to perform subsequent processes.

Co-funded by the European Union

National University of Uzbekistan

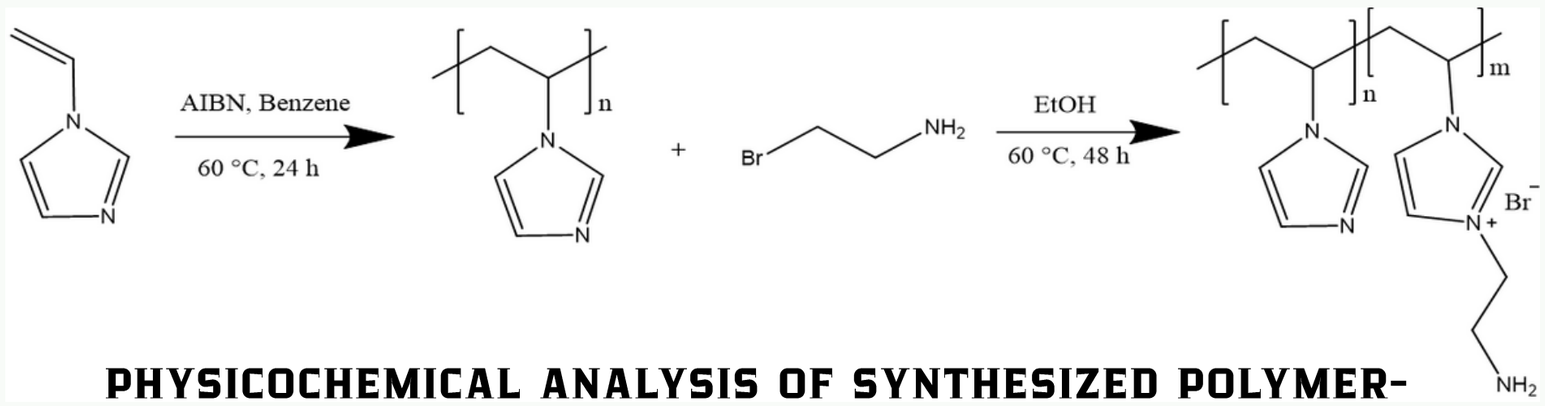
DETECTION OF TOXIC SUBSTANCES IN FOOD USING CONDUCTIVE MATERIALS BASED ON POLYVINYLIMIDAZOLE

BY OTAJONOV SARDOR

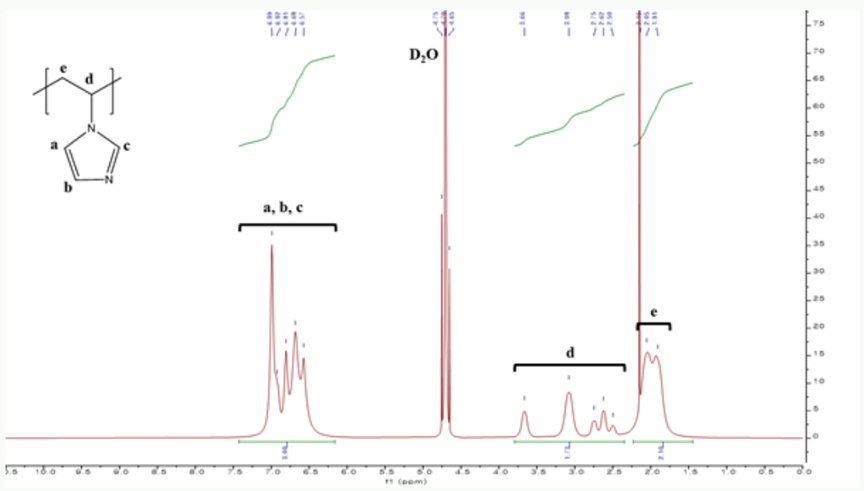
PREPARED FOR THE "INTRA-PROJECT CONFERENCE" OF THE ECAMPUZ PROJECT, CO-FUNDED BY THE EUROPEAN UNION

INTRODUCTION

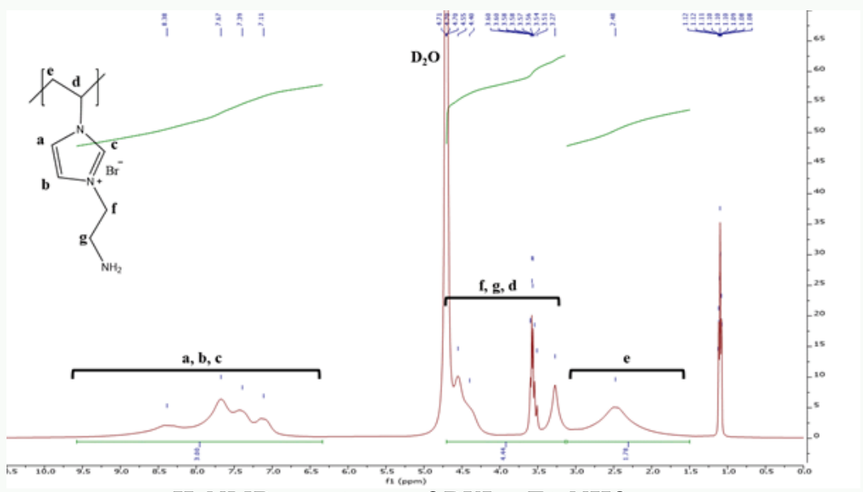
The potential of paper-based analytical devices (PADs) has been extensively explored over the past few decades, particularly in the context of selective detection of toxic elements in food. More recently, a PAD system has been developed that has been modified to detect toxic substances such as heavy metals and pesticides. One example is the synthesis of PVIA, which is then physically applied to a PAD. This system can be adapted using wax to detect toxic substances including lead and cadmium. The reaction between the amino groups (-NH2) of PVIA and toxic elements results in a change in fluorescence, allowing for quantitative analysis. In addition, PADs show potential for colorimetric analysis, making them useful for determining the concentration of toxic elements in food. The new PAD may be particularly relevant for real-time toxicity monitoring in manufacturing plants, laboratories, and indoor environments where food quality control is of utmost importance.



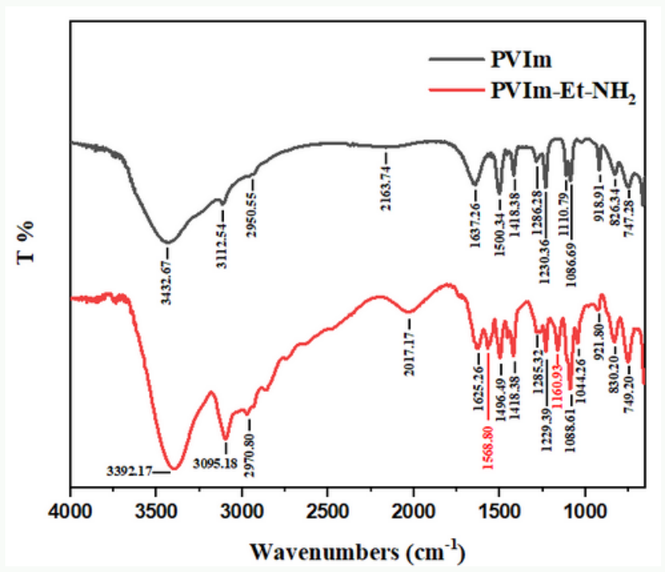
PHYSICOCHEMICAL ANALYSIS OF SYNTHESIZED POLYMER-BASED SENSORS



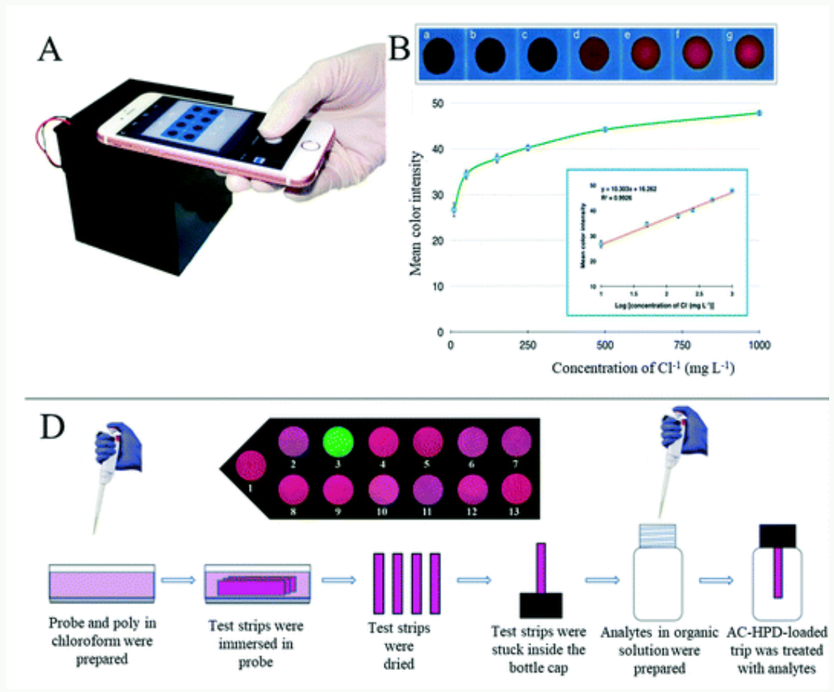
H-NMR spectrum of PVIm



H-NMR spectrum of PVIm-Et-NH2



FT-IR spectra of PVIm and PVIm-Et-NH2



RESULTS & DISCUSSION

1. To develop a new method for the rapid detection of toxic substances (Pesticide Residues) in food.
2. Enhance the sensitivity and specificity of current-conducting polymers in detecting various toxins (Pesticide Residues).
3. Validate the application of synthesized materials in real food samples under controlled conditions.
To validate the application of synthesized materials for detecting pesticide residues in food samples under controlled conditions, consider the following streamlined setup:
Temperature Control:
Range: 4°C (refrigeration) to 25°C (room temperature).
Purpose: Assess sensor stability and effectiveness across common storage temperatures.
Humidity Control:
Range: 30% to 80% relative humidity.
Purpose: Evaluate the sensor's performance in varying atmospheric moisture levels.
Sample Preparation:
Procedure: Mimic typical consumer handling such as washing and peeling.
Purpose: Ensure realistic testing conditions for food samples.
Pesticide Concentration:
Levels: Spanning below and above regulatory limits.
Purpose: Test sensor sensitivity and accuracy for safety compliance.
Interfering Substances:
Types: Include common food components like sugars and salts.
Purpose: Verify sensor selectivity against potential interference.
Duration of Exposure:
Timeline: Immediate and delayed testing post pesticide application.
Purpose: Determine the impact of storage time on detection efficacy.
Analytical Validation:
Techniques: Correlate results with standard analytical methods to confirm accuracy.

Co-funded by the European Union

RESEARCH ON OBTAINING ALTERNATIVE FOOD PRODUCTS FROM LOCAL INDUSTRIAL WASTE

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PREPARED FOR THE "INTRA-PROJECT CONFERENCE" OF THE ECAMPUZ PROJECT, CO-FUNDED BY THE EUROPEAN UNION

INTRODUCTION

THE PROCESSING OF SILKWORM COCOONS IS AN URGENT PROBLEM BECAUSE THE DECOMPOSITION OF WASTE HARMS THE ENVIRONMENT. OIL ALONE MAKES UP ABOUT 30% OF THE TOTAL WEIGHT OF DRY PUPAE. THE STATE PROGRAM FOR THE DEVELOPMENT OF THE PHARMACEUTICAL INDUSTRY IN 2016-2020 IS AIMED AT USING LOCAL RAW MATERIALS INSTEAD OF EXPENSIVE IMPORTED SUBSTANCES. IN THIS REGARD, THE POSSIBILITIES OF USING ONE OF THE WASTES OF COCOON PRODUCTION - PUPAE OIL IN THE PHARMACEUTICAL INDUSTRY WERE STUDIED. HOWEVER USING SILKWORM PUPAE OIL FOR FOOD INDUSTRY HAVE NOT BEEN STUDYED.

OBJECTIVE

The two primary nutrients in silkworm cocoons are protein and oil, 48–67% and 17–30% (on a dry weight basis), respectively . Silkworm cocoon oil is a safe source of oil and nutritionally equivalent to commonly used vegetable oils such as sunflower oil This oil is a source of unsaturated fatty acids (about 60–70% of the total fatty acid content), especially α-linoleic and oleic acids. We offer alternative food product based on silkworm pupae for food industry.

METHODOLOGY

The Chinese hybrid variety of mulberry silkworms of the enterprise 'Khorezm Silk' Ltd was used in the conducted research. The samples were dried, ground and then oil extracted using 6 different methods: 5 different organic solvents - extraction petrol, n-hexane, ethyl alcohol, petroleum ether, isopropyl alcohol and pressing method. Samples are analyzed by modern physico-chemical equipment

RESULTS

Analysis of fatty acid composition based on gas chromatogram of oil samples

№	FATTY ACID COMPOSITION	SAMPLE №1	SAMPLE №2
1	C11:0	0,99	-
2	C12:0	-	0,05
3	C14:0	0,15	0,15
4	C16:0	21,2	22,71
5	C16:1	0,92	1,11
6	C18:0	4,6	4,34
7	C18:1	28,96	27,11
8	C18:2	7,07	6,94
9	C18:3	35,47	37,41
10	C20:4	0,63	-
11	C23:0	-	0,09

GC ANALYSIS OF SILKWORM COCOON OIL, WHICH IS A WASTE FROM THE TEXTILE INDUSTRY, SHOWED THAT THE OIL CONTAINED HIGH AMOUNTS OF UNSATURATED FATTY ACIDS ESSENTIAL FOR HUMAN HEALTH: C18:1 (28.96%), C18: 1 (35.47%).

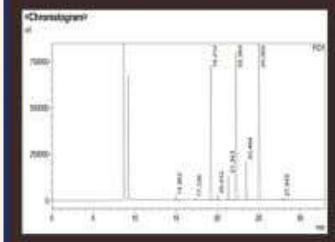
CHARTS

RESULTS OF OIL EXTRACTION FROM SAMPLES WITH ORGANIC SOLVENTS

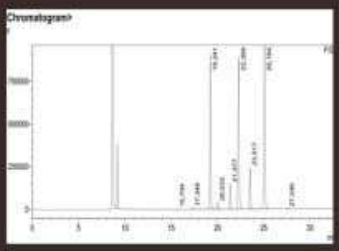
№	Solvent	Sample weight, g	Solvent quantity, ml	Extraction temperature,	Extraction time, hour	Oil yield, %
1	Gasoline	50	200	50	3	33
2	N-hexane	50	200	80	3	37
3	Ethyl alcohol	50	200	70	3	33
4	Isopropyl alcohol	50	200	50	3	26
5	Petroleum ether	50	200	50	3	34,7

ACCORDING TO THE RESULTS PRESENTED IN THE TABLE, THE PROCESS OF OIL EXTRACTION FROM THE SAMPLES BY SOLVENT EXTRACTION GAVE THE HIGHEST RESULT OF 37% WHEN IT WAS CARRIED OUT IN N-HEXANE. THE OIL YIELD IN THE NEXT TWO SOLVENTS, PETROLEUM ETHER AND EXTRACTION PETROL WERE 34.7% AND 33% RESPECTIVELY. NEXT, THE OIL WAS SEPARATED FROM THE SAMPLES BY PRESSING.

ANALYSIS



GAS CHROMATOGRAPHIC ANALYSIS CHROMATOGRAM OF THE OBTAINED OIL SAMPLES: 1-SAMPLE EXTRACTED VIA GASOLINE, 2-SAMPLE PETROLEUM ETHER EXTRACTED OIL SAMPLES.



CONCLUSION

This all analysis indicators shows that in order to study the possibility of its use in the food sector, the technological indicators of refining should be determined. In our future work, we will continue our research on this type of oil and study its refining process.

Prospects of using natural non-conventional raw materials and secondary raw materials in the production of bread of specific purpose

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Co-funded by the European Union

PREPARED FOR THE "INTRA-PROJECT CONFERENCE" OF THE ECAMPUZ PROJECT, CO-FUNDED BY THE EUROPEAN UNION

INTRODUCTION

IN SOLVING THE PROBLEM OF ENSURING THE FOOD SECURITY OF THE POPULATION AND IMPROVING THE ENVIRONMENTAL SITUATION IN THE COUNTRY, RESEARCH ON THE RATIONAL USE OF ITS RAW MATERIALS, INCLUDING SECONDARY ONES, THAT IS, PLANT WASTE FROM VARIOUS SECTORS OF THE FOOD INDUSTRY, IS BECOMING INCREASINGLY IMPORTANT. THE PROBLEM OF UTILIZATION OF THIS RAW MATERIAL, WHICH HAS A RELATIVELY HIGH BIOTECHNOLOGICAL POTENTIAL AS A SOURCE OF PROTEINS, DIETARY FIBER, MINERALS, VITAMINS, AND OTHER ESSENTIAL NUTRIENTS, IS ESPECIALLY ACUTE FOR REGIONS WITH A HOT CLIMATE. THIS RAW MATERIAL, AS A PERISHABLE PRODUCT, SIGNIFICANTLY WORSENS THE ECOLOGICAL SITUATION IN THE REGION AND REQUIRES IMMEDIATE TECHNOLOGICALLY JUSTIFIED, AND COST-EFFECTIVE PROCESSING. IN THIS ASPECT, AUSPICIOUS STUDIES ARE CONDUCTED ON USING THIS RAW MATERIAL, POSITIONED AS ADDITIVES - FORTIFIERS- IN PRODUCING THE MOST POPULAR SOCIALLY SIGNIFICANT FOOD PRODUCTS, SUCH AS BREAD AND BAKERY PRODUCTS. THE CREATION OF MODEL MIXTURES FROM VARIOUS RAW MATERIALS WILL SIGNIFICANTLY EXPAND THE RANGE OF THESE PRODUCTS FOR THEIR INTENDED USE, NAMELY, TO INCREASE THE SEGMENT OF PRODUCTS FOR MEDICAL PREVENTIVE AND DIETARY PURPOSES, TO MAKE THEM MORE ACCESSIBLE, ESPECIALLY FOR SOCIALLY VULNERABLE SEGMENTS OF THE POPULATION THROUGH THE USE OF CHEAP SECONDARY RAW MATERIALS.

ТЕКСТ АКЗАЙЛА

OBJECTIVE

The purpose of research is the selection and study of the chemical composition and biotechnological potential of raw materials for the production of bakery products for medical and preventive purposes.
The task of research was to determine the feasibility of using natural additives - fortifiers in the technology of preparing whole-grain bread varieties for special purposes by studying their chemical composition and modeling composite mixtures.
Objects of study: germinated grain of wheat (Triticum), sesame seeds (Sesamum indicium L., S. orientale L.), husks of grape (Vitis).

METHODOLOGY

The quality of raw materials and their chemical composition were evaluated based on a priori analysis of specialized literature. The chemical composition of the objects of study was determined according to modern generally accepted methods of physicochemical analysis.
The experimental part of the work was carried out in the laboratories of the Department of Food Technology of the Bukhara Engineering-Technological Institute. The reliability of
the obtained data is also confirmed by repeated experiments.

RESULTS/FINDINGS

Enrichment of food products with vitamins, minerals, and other essential nutrients to ensure good nutrition is carried out by the following basic principles:

- Determining the hygienic safety of new sources of raw materials and finished food products.
- The use of food and flavoring additives per the existing hygienic requirements imposed by the health authorities.
- Combination of organoleptic indicators of the combined product with people's habits, traditions, and national peculiarities in the nutrition of certain population groups.
- Balance of products by main components, storage stability, and availability for the consumer.
- Indication of the direction of the combined product, characterized by a certain nutritional and biological value, the indicators of which are marked on the individual packaging of the product.
- Implementation of purposeful control of quality indicators by state bodies.

To determine the functional properties of selected natural additives, positioned as enrichers of the nutritional value of bread and bakery products, the chemical composition was studied and a comparative analysis was made.

CHARTS/GRAPHS

Nutrients	Indicator value					
	Sprouted wheat grain		Sesame seeds		Husks of grape	
	100 g product	100 g dry matter	100 g product	100 g dry matter	100 g product	100 g dry matter
Nutrients, g:						
Water	15.75	-	4.30	-	7.6	-
proteins	12.18	14.46	21.10	22.05	10.45	11.3
carbohydrates	64.15	76.10	18.20	19.00	41.05	44.4
Fat	2.8	3.35	49.00	51.20	11.0	11.9
cellulose	3.02	3.59	5.20	5.45	28.4	30.7
Ash	2.1	2.50	2.20	2.30	1.5	1.7
Minerals, mg:						
Calcium	7.1	8.3	360	376	150	156.7
phosphorus	49.2	58.3	667	697	25.6	26.7
magnesium	12.7	15.1	345	360	96	99.8
silicon	52	61.8	497	519	3.0	4.2
Iron	7.4	8.3	6.4	6.7	170	176.8
Vitamins, mg:						
phyllochinon, K	0.27	0.30	0.30	0.41	48.1	52.2
cholecalciferol,	0.07	0.08	2.3	2.5	-	-
D_3	0.23	0.27	0.75	0.78	0.09	0.1
thiamine, B_1	0.86	1.02	0.28	0.29	0.04	0.05
riboflavin, B_2	5.9	7.0	4.50	4.70	0.57	0.61
niacin, PP	28.1	33.3	19.17	20.03	0.76	0.83
tocopherol, E						
Energy value, kcal	327.5	-	593.6	-	72.2	
Distinctive minor components	P-active substances: flavonoids, rutin, anthocyanins		Sesamin, sesamoline, sesamol		Resveratol	

ANALYSIS

A priori analysis of the profiling literature showed that there are enough works on the use of the studied additives in the production of bread and bakery products, but there is practically no information on the use of this raw material in the composition of the composite mixture, which will significantly increase the physiological effect of their combined use in the production of targeted bread.

CONCLUSION

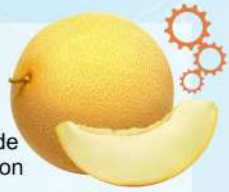
Thereby, it has been established that the relationship between osteoporosis and nutrition is one of the most discussed. Degenerative processes associated with aging, a sedentary lifestyle, irrational and unbalanced nutrition, and environmental degradation are becoming an increasing problem not only for individuals but also for society as a whole. Therefore, it is very important to develop functional products, especially bread and bakery products, for the intended purpose, that is, for the prevention of alimentary-dependent diseases.
The use of bioactivated and secondary raw materials (waste) from various branches of the food industry will not only enrich the bread with missing essential nutrients and reduce its cost but also significantly improve the ecological situation of the environment. It should be noted that the disposal of food production waste is especially relevant for countries with a dry and hot climate, including Uzbekistan since this raw material quickly begins to deteriorate and thereby pollute the environment.
Therefore, the results of evaluating the effectiveness of enterprises in various industries, including food industry enterprises [21-23], show that the issues of recycling valuable secondary raw materials and research on their integrated use as part of composite mixtures in the production of targeted bread are technologically and economically efficient, have a practical and scientific value.

TECHNOLOGY OF MAKING MARMALADE AND ICE CREAM FROM MELON

Makhliyo Khujayeva

PREPARED FOR THE "INTRA-PROJECT CONFERENCE" OF THE ECAMPUZ PROJECT, CO-FOUNDED BY THE EUROPAN UNION

1 DESIGN OF THE PROJECT



The purpose of the scientific work: to obtain two types of products from melon raw materials - ice cream from puree, marmalade from juice. Also design a production line for melon sticks and melon powder from sideline quality.

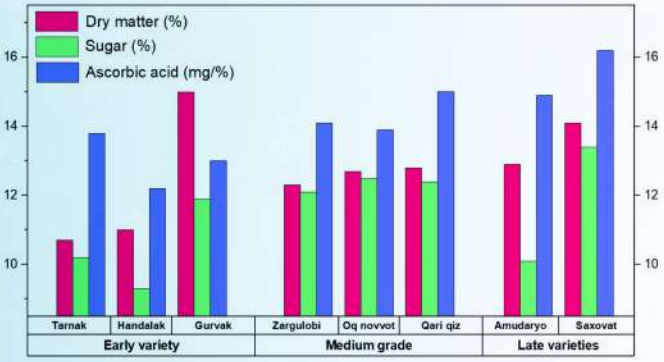
Tasks: to determine the appropriate melon variety for the purpose.

Creating a technology for producing marmalade from melon juice, determining the optimal recipe, checking compliance with standard requirements.

Creation of ice cream production technology from melon puree, testing of organoleptic and microbiological safety of ice cream.

2 CHOOSE A VARIETY OF MELONS

More than 40 melon varieties were analyzed, and the ones with the highest performance in the chart:

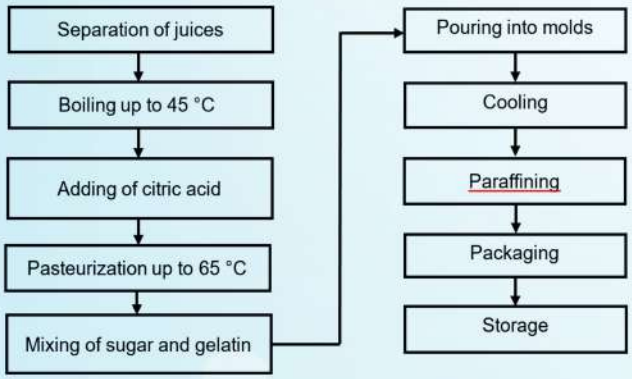


Among the varieties, the "Sakhavat" variety had the highest indicators.

3 MARMALADE TECHNOLOGY

Many experiments were conducted in the preparation of marmalade, according to which the optimal temperature, optimal time, optimal recipe were determined and a suitable technological scheme was created.

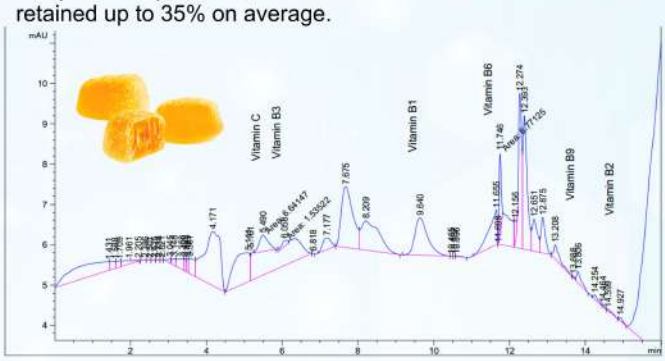
Technological scheme of making melon marmalade



Marmalade was prepared in more than 60 variants. The best 4 samples were evaluated by tasters. According to this, the best figure is: 74% juice, 4.3% sugar, and the rest is gelatin and vitamin C. The marmalades were kept in the warehouse for 180 days and their organoleptic indicators were analyzed every weeks / month.

4 CHEMICAL ANALYSIS

The amount of carbohydrates and vitamins in the prepared marmalade was analyzed by liquid chromatography. According to this, it was determined that vitamin C was retained in its composition up to 70%, and the rest of the vitamins were also retained up to 35% on average.



5 ICE CREAM TECHNOLOGY

More than 40 variants of melon ice cream were prepared according to the recipe. The best 3 samples that fully met the standard parameters (taste, smell, consistency, structure, appearance, color) were evaluated by tasters. According to this, the recipe with 400 grams of melon puree, 300 grams of cream, 175 grams of sugar, 50 grams of egg yolk, 75 grams of milk powder, and 1 gram of vanilla was considered the best.

The results of studies of microbiological indicators of Melon-ice cream:

Index	Norm according to SanPiN 2.3.2.1078-01	Research results
		Melon ice cream
E. coli group. (coliforms)	Not allowed	Not detected
MAFAM	$1 * 10^5$	165
Pathogenic, including *Salmonella*	Not allowed	Not detected
Staphylococcus aureus	Not allowed	Not detected
Listeria monocytogenes	Not allowed	Not detected

**MAFAM - the number of mesophilic, aerobic and facultatively anaerobic microorganisms*

6 MAKING DIFFERENT PRODUCTS FROM MELON

Also, the technologies for obtaining "Melon powder" and "Melon sticks (dried)" from melons were studied. 100-150 grams of powder or 150-220 grams of sticks can be produced from 1 kg of raw materials. Optimum temperatures and time indicators were determined during the production process. The amount of vitamins in the products is preserved up to 80% without loss.

Melon sticks

Melon powder

Co-funded by the European Union

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Technology of preparing tablet from tomatoes

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Rakhimova Gulkhayo Gulomjon kizi

PREPARED FOR THE "INTRA-PROJECT CONFERENCE" OF THE ECAMPUZ PROJECT, CO-FUNDED BY THE EUROPEAN UNION

Design of the scientific work

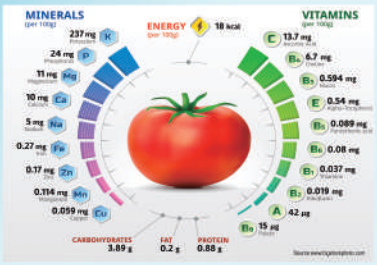
The purpose of the scientific work: Food and concentrate industry, production of export-oriented products (options: tomato+bell pepper, tomato+bell pepper +spices)

Tasks: To introduce the technology of product production in our country to replace the import and to start the production of exportable products

Nutritional content

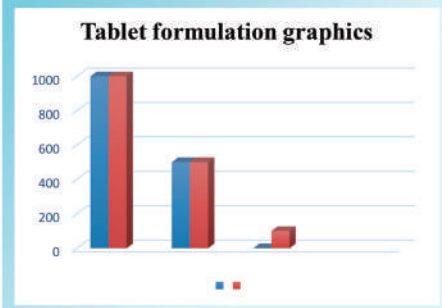
Fresh tomatoes are an ideal healthy food to quickly replenish the loss of minerals. Tomatoes contain potassium, which is good for the heart; magnesium - helps the body adapt to the weather; iron - recommended for anemia; zinc - necessary for the growth of skin cells; calcium - strengthens bones and phosphorus - participates in metabolic processes.

There are many vitamins in tomatoes - **B1, B2, B3, B6, B9,** but the most important is vitamin C. Lycopene in the composition - reduces the risk of developing cardiovascular diseases.



Recipe for the production of tomato tablets

№	Name	Tomato (kg)	Bell pepper (kg)	Spices (kg)
1	First of recipe	1000	500	0
2	Second of recipe	1000	500	100

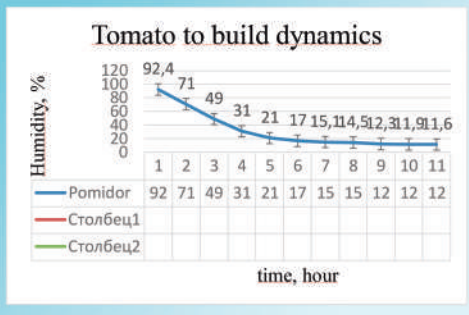


Based on the given graphs and analysis, the first recipe will be put into production.

Technology of tomato tablet

First, tomato samples are washed and prepared for the experiment. They are ground to 0.5 mm of the same weight and thickness, and the dry residue of one sample is determined in a SESH 3-M drying cabinet. The initial moisture results obtained are shown in the table below. The second pair of samples is dried in the "Memert-30-1060" drying cabinet at 65C and is considered ready when no juice is released when squeezed by hand. The dried tomato pulp is cooled and passed through a sieve. Then the tomato pulp is crushed and sent for pressing. The finished product is packed

Tomato to build dynamics



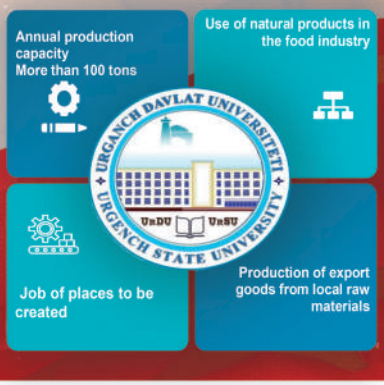
Fruit types	Initial humidity, %	Construction humidity, %	Construction time, hour
Tomato	92.4	11.6	11

Chemical analysis of tomato and dried tomato

1	Protein	0.8 grams
2	Oils	0.20 grams
3	Carbohydrate	3.89 grams
4	Mass fraction of moisture	93.5 %
5	Energy value	20-30 Kcal

1	Protein	0.3 grams
2	Oils	4.4 grams
3	Carbohydrate	4.7 grams
4	Mass fraction of moisture	8-12 %
5	Energy value	70.4 Kcal

Expected result



Co-funded by the European Union

Title of the research: Gluten-free products. Features and methods of research using a texture analyzer

AUTHOR: ZARINA KARIMOVA
ORGANIZATION NAME: TASHKENT INSTITUTE OF CHEMICAL TECHNOLOGY

Co-funded by the European Union

PREPARED FOR THE "INTRA-PROJECT CONFERENCE" OF THE ECAMPUZ PROJECT, CO-FUNDED BY THE EUROPEAN UNION

INTRODUCTION

The market for gluten-free products has seen significant growth in recent years, driven by an increase in the number of people suffering from celiac disease and other gluten intolerances. According to the World Health Organization, about 1% of the world's population has celiac disease, and a significant proportion of people exhibit symptoms of gluten sensitivity, making gluten-free products especially popular.

OBJECTIVE

The purpose of this study is to develop gluten-free products with improved textural and sensory characteristics based on composite mixtures of rice, corn and millet flours with the addition of psyllium and fermented quinoa.

METHODOLOGY

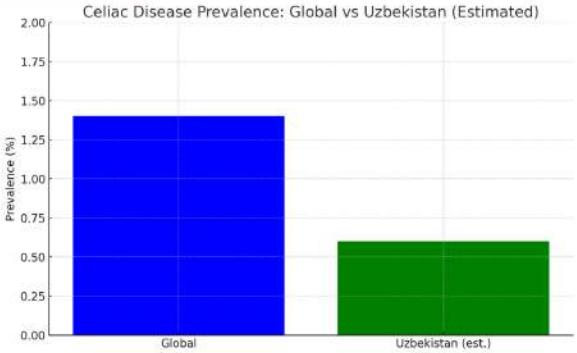
The following ingredients were used to produce gluten-free baked goods: rice flour, corn flour, millet flour, psyllium (Plantago ovata), fermented quinoa. The control group was bread made from 100% wheat flour without the addition of psyllium.
A TA.XT Plus texture meter (Stable Micro Systems, UK) was used to measure the textural properties of baked goods. Parameters such as hardness, elasticity, stickiness and moisture retention in the finished products were measured.
The sensory evaluation was carried out by a trained expert panel of 10 people who rated the products on a 9-point scale based on the following criteria: taste, texture, aroma, appearance.
As part of the study, moisture, protein, fat and carbohydrate content in finished products was analyzed.

RESULTS/FINDINGS

The results of texturemetric analysis showed that the addition of psyllium and fermented quinoa significantly improved the softness and elasticity of gluten-free products. Products infused with psyllium have also demonstrated improved moisture retention, which increases the shelf life of finished products.

Organoleptic analysis showed that baked goods containing psyllium and fermented cereals have a more pleasant taste and aroma, closer to traditional products.

CHARTS/GRAPHS



As of 2024, the global prevalence of celiac disease is approximately 1.4% based on blood tests, and around 0.7% when confirmed via biopsy (World Population Review)(Celiac Disease Foundation). In Uzbekistan, there is limited specific data on celiac disease prevalence; however, Central Asia typically sees slightly lower rates compared to Western nations. The broader region, including parts of Asia, reports a prevalence of around 0.6%

ANALYSIS

Our results are consistent with studies by others that have shown that the use of psyllium and fermented components has a positive effect on the texture of gluten-free products. For example, a study by Coda et al. (2021) demonstrated that fermentation of pseudocereals such as quinoa and amaranth improves the textural characteristics of gluten-free products, increasing their elasticity and increasing shelf life.

In addition, our study confirmed the findings of Altomare et al. (2019), who showed that the addition of hydrocolloids such as psyllium significantly improves the texture and flavor of gluten-free products by increasing dough viscosity and improving its gas retention capacity.

The advantage of our work is the use of a combination of psyllium and fermented cereals, which allowed us to achieve a significant improvement in the quality of gluten-free products, both in terms of textural and organoleptic characteristics. The use of fermented quinoa improved the taste and aroma of products, which is confirmed by studies by other authors such as Martinez et al. (2021)

CONCLUSION

The results of our study showed that the use of composite mixtures containing psyllium and fermented quinoa can significantly improve the textural and organoleptic properties of gluten-free baked goods. This opens up new opportunities for the production of products that can meet the needs of consumers with celiac disease and other forms of gluten intolerance. The use of these technologies can be successfully implemented in the food industry to create competitive gluten-free products.

Co-funded by the European Union

USE THE LOCAL ADSORBENTS IN THE PURIFICATION OF VEGETABLE OILS

Sadullaeva Maftuna Shavkat kizi (a second year PhD student)
Urgench State University

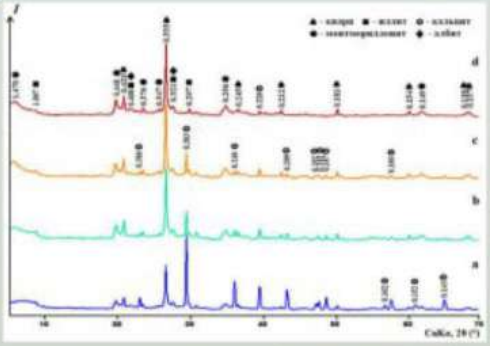
OBJECTIVE

Development of technology for bleaching distilled fatty acids using Krantau bentonite which is taken from Karakalpakistan adsorbent.

METHODOLOGY

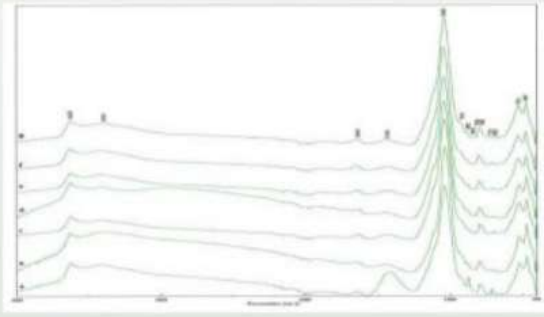
The scientific work used analyses of modern physical-chemical and physical-chemical methods (IR, High-performance liquid chromatography, DTA) and methods of statistical processing of the data obtained

RESULT



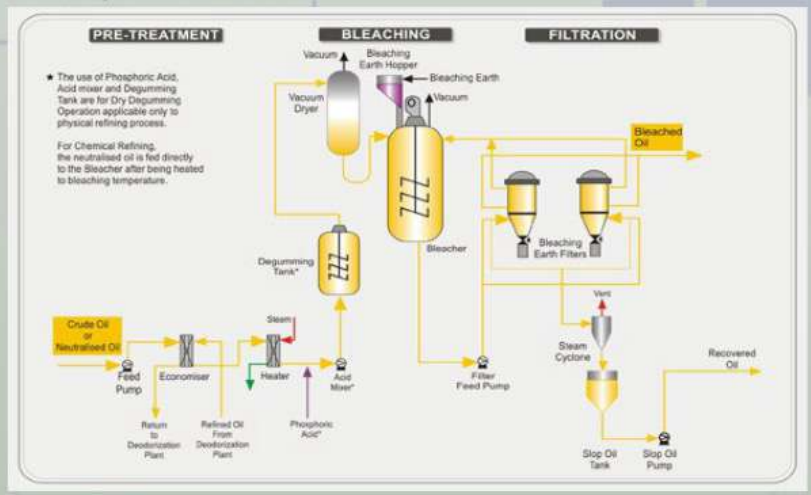
Radiographs of samples a) ex. Bent. b) 5% HCl 2h c) 10% HCl 2h d) 15% HCl 2h

RESULT



Infra red Spectra samples: (a) original bentonite; (b) 10% HCL treated for 2 hours; (C) 10% HCl treated for 4 hours; (d) 10% HCl treated for 6 hours; (e) treated for 2 hours in 10% sulfuric acid; (f) treated for 4 hours in 10% sulfuric acid; (g) treated for 6 hours in 10% sulfuric acid.

ANALYSIS



CONCLUSION

The research and analysis carried out so far assumes that adsorbents from the Krantau mine of the Republic of Karakalpakistan can be a local raw material as a substitute for imports. This can be seen from the results of the above analysis. Futher analysis and research is underway to futher clarify this.

Prepared for the "Intra-project Conference" of the ECAMPUZ project.
Co-Funded by the European Union

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PROSPECTS OF USING NATURAL NON-CONVENTIONAL RAW MATERIALS AND SECONDARY RAW MATERIALS IN THE PRODUCTION OF BREAD OF SPECIFIC PURPOSE

AUTHOR: **Phd student**
NODIRA KURBANOVA

Co-funded by the European Union

COMPARATIVE ANALYSIS OF THE MACROELEMENT COMPOSITION OF FLOUR EXTRACTED FROM DIFFERENT MILLING SYSTEMS

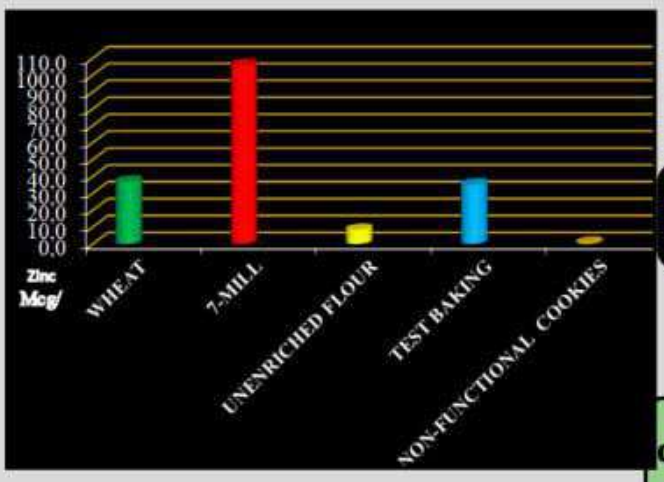
TARGET

Obtaining functional flour rich in its **own** macroelements, such as **iron (Fe) and zinc (Zn)**

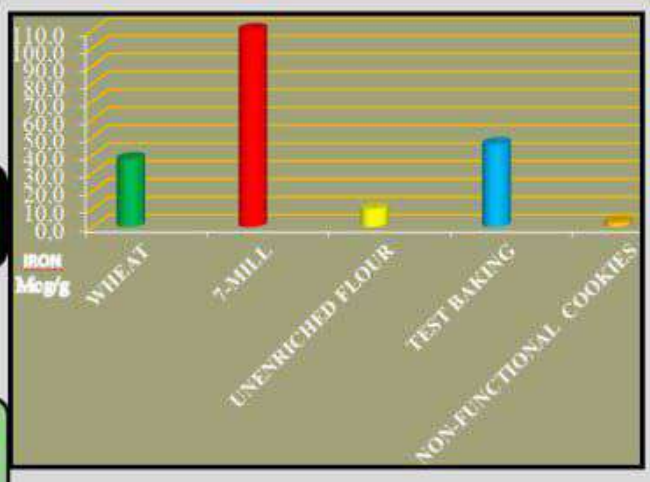
METHOD

Method: **Neutron activation**
Equipment: **Nuclear reactor VVR-SM**

To achieve the set goal, **intermediate products** from different systems of the flour mill "Galla Altegh" were selected and analyzed. **Iron** and **zinc** were found in high amounts in the samples **entering the 7-mill system** from the 4-mill system. The **first graph** shows a comparative analysis of the **zinc element** content. Further, to determine **the persistence** of **iron** and **zinc** found in the intermediate product, a **trial baking** of flour confectionery - cookies was made. When examining the finished product, it was revealed that the content of these **two macroelements** is in large quantities, in comparison with **non-functional** confectionery products. **The second graph** illustrates a comparative analysis of the **iron element** content, between wheat, an intermediate product entering the 7-mill system, unenriched flour with artificial minerals (law of the Rep. of Uz. No. 251), trial baking and non-functional confectionery products .



RESULT



CONCLUSION

We purposefully extracted the intermediate product entering the seventh milk system, which is rich in its own macroelements **iron and zinc**. They found that confectionery products made from this mixture retain a large amount of **iron and zinc.**

PREPARED WITHIN THE FRAMEWORK OF THE CONFERENCE "PROSPECTS OF USING NATURAL NON-CONVENTIONAL RAW MATERIALS AND SECONDARY RAW MATERIALS IN THE PRODUCTION OF BREAD OF SPECIFIC PURPOSE"

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