

The Ministry of Agriculture of the Republic of Kazakhstan
Non-commercial JSC "National Agrarian Science and Educational Centre"

«S.Seiffulin Kazakh Agrotechnical Research University» JSC



Catalog of completed scientific and technical developments for 2022-2024



Astana, 2025



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“Development of enriched feed using highly nutritious, easily digestible and natural plant components to obtain high-quality and safe quail products ”

Program/Project Manager - PhD ., acting associate professor Zhanabaeva D.K.

Source and amount of funding for the program/project - competition of the State Fund of the Ministry of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 74,909.97 thousand tenge

Goal - Development of enriched feed using highly nutritious, easily digestible and natural plant components to obtain high-quality and safe quail products with scientific justification for their effective use.

Field of study - Veterinary medicine, poultry farming. Directions: veterinary sanitation, quail farming .

The results of the program/project - depending on the age of the quails, the following were developed:

- **Start** - food for quails (0-14 days)
- **Grower** – feed growth (15-45 days)
- **Finish** - (feed for meat quails)
- **Layer** - (feed for egg-laying quails)

Potential consumers – quail farmers , agricultural producers.

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“Molecular SNP marking of bread wheat using *the TaGW* , *TaGS* and *Rht* genes for coarse grain size and resistance to lodging”

Program/Project Manager – PhD , Zotova L.P.

Source and amount of funding for the program/project – competition of the State Fund of the Municipal Educational Institution of the Ministry of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 73,000.0 thousand tenge

Goal - Development of highly promising molecular SNP markers for studying the genetic diversity of hybrid populations of bread wheat and increasing its productivity by increasing the weight of 1000 grains and resistance to lodging.

Field of study - Agriculture and forestry. Directions: Selection and seed production of agricultural crops.

Program/project results – 1. Creation of large-grain short-stem soft wheat samples:

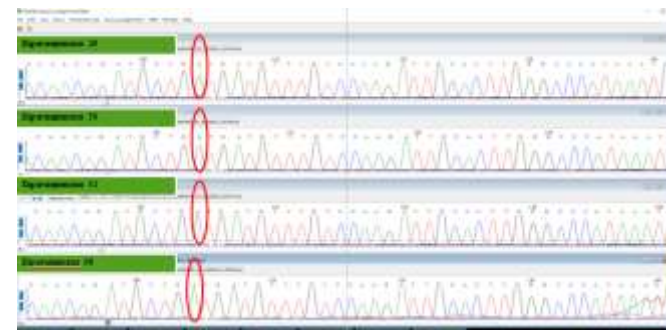
- crossings of tall domestic samples with short-stemmed varieties of foreign selection were carried out;
- Promising short-stem hybrids of spring soft wheat have been created.

- 2. Development of effective molecular markers:

- Rht) and the 1000 grain weight trait (TaGW2, TaGW6 and TaGW8), as well as the grain size trait (TaGS5) were sequenced ;
- analysis of genes was carried out in varieties of Chinese (Xn-02, Xn-08, Xn-10) and domestic selection (Karagandinskaya 22, 29, 30, 31, Karabalykskaya 90);
- Based on the sequencing results, the primary structures of SNP markers were developed.

Potential consumers - RGU "State Commission for Variety Testing of Agricultural Crops" of the Ministry of Agriculture of the Republic of Kazakhstan, Breeding Experimental Stations of the Republic of Kazakhstan, agricultural producers.

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“Search for biologically active substances and their use in agriculture”

Program/project manager – Ph.D., associate professor Ibataev Zh.A.

Source and amount of funding for the program/project – competition for the State Fund of the Municipal Educational Institution of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 75,000.0 thousand tenge

The goal is to study the composition of Kazakhstani plants, isolate active components and study the possibility of their use for the treatment and prevention of agricultural crops.

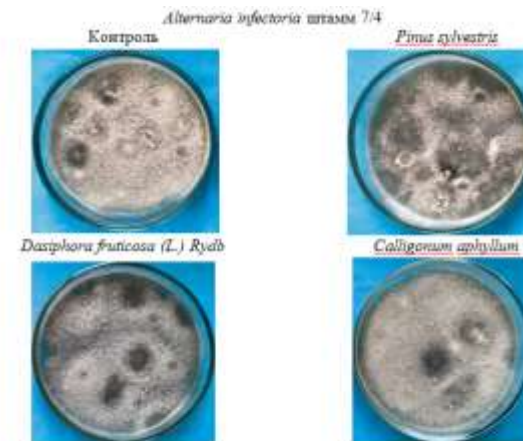
Field of study - Pharmacognosy. Directions: phytochemistry , plant protection.

Results of the program/project - the composition of a number of plants growing in the territories of Kazakhstan was studied:

- ash content and elemental composition were determined;
- the composition of essential oils was isolated and determined;
- developed a test system to determine microbiological and fungicidal activity ;
- Work is underway to isolate the active components of the extracts.

Potential consumers – scientific institutes, laboratories.

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Проявление антифунгальной активности растительных экстрактов на грибах





“Development of an experimental energy complex based on a modernized boiler plant using biofuel”

Program/project manager - Ph.D., Associate Professor, Bakhtiyar B.T.

Source and amount of funding for the program/project - competition for the State Fund of the Municipal Educational Institution of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 64,078.54 thousand tenge

The goal is to develop an experimental energy complex for the production of thermal energy from biomass or animal waste, consisting of a biofuel production site, a biogas synthesis plant, a heat generator - a new type of hot water boiler for the generation of thermal energy, running on biogas and allowing for efficient waste processing

Field of study - Alternative energy and technologies: renewable energy sources, nuclear and hydrogen energy, other energy sources

Program/project results – An installation with auxiliary tanks and an experimental hot water boiler for thermal energy up to 0.43 MW

Potential consumers:

- environmental departments of the Republic of Kazakhstan;
- energy sector enterprises, farms;
- Universities training specialists in the specialty “Heat Engineering”;
- design bureaus of enterprises of the Ministry of Energy of the Republic of Kazakhstan and scientific organizations.

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“Research and construction of ultra-wideband multi-antenna wireless information transmission between interfaces”

Program/Project Manager - PhD , Assoc . Professor Serikov Tansaule Gabdymanapovich

Source and amount of funding for the program/project – competition of the Global Fund of the Ministry of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 75 744 , 38 thousand tenge

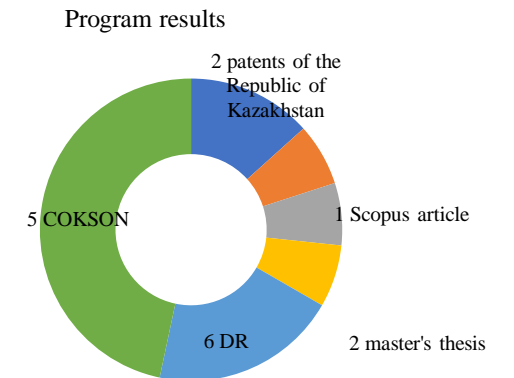
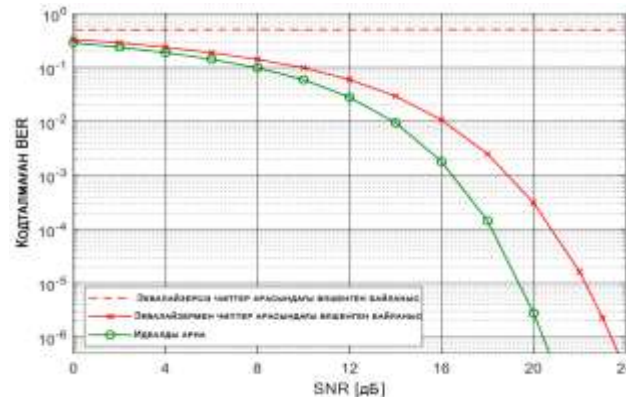
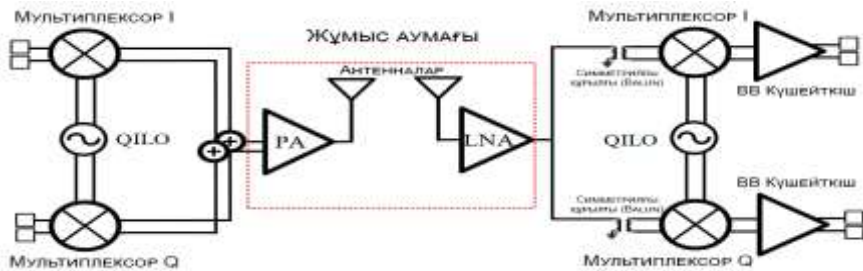
Objective - Research the establishment of wireless communication between interfaces at high speed and high throughput using nanoantennas and create an optimal mathematical model for the correct expression of the wireless internal channel.

Field of study - Engineering and technology. Directions: Electrical engineering, electronics, information technology. Communication.

Program/project results - An analysis of the current state of development of ultra-wideband multi-antenna wireless information transmission between interfaces was carried out and a model of technical requirements (TT) for inter-chip communication technology was developed. Review article in 1 periodical, international scientific cooperation has been established with leading universities in the world, i.e. senior researcher exchanged experience in the field of scientific exchange, submitted an application to the Patent Bureau of Kazakhstan, completed 6 graduation projects.

Potential consumers – Modern and promising technologies and software and hardware in telecommunication systems and communication networks. Telecom operators.

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Research, development of a set of designs and creation of an experimental sample of an automatically controlled sailing wind power plant with a swinging working body

Program/project manager - Doctor of Technical Sciences, Professor Sholanov K.S.

Source and amount of funding for the program/project – competition of the Global Fund of the Ministry of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 63,842.089 thousand tenge

Goal - Research and development of a set of designs and creation of an experimental sample of an automated small sail wind power plant with a swinging working body, using technology, technical and hardware means for effectively converting wind energy into electrical energy when wind speed changes over a wide range, starting from 2.5 m/s, regardless of the direction and nature of changes in wind speed.

Region Research – Energy. Renewable energy.

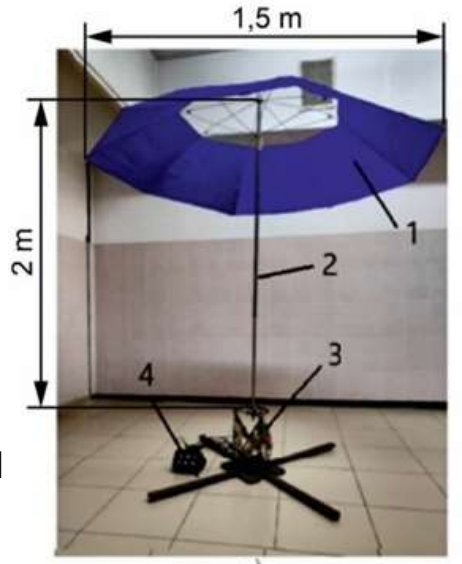
The results of the program/project are scientific and technical documentation and a prototype of an autonomous, automatically controlled small sail wind power plant with a power of 5 kW. Scientific publications in international ranking journals.

Potential consumers are the population of areas remote from power supply networks, peasant farms and owners of individual buildings.

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- 1- sail; 1-sail
- 2- mast; 2- mast;
- 3 – upper platform manipulator; 3-parallel manipulator
- 4 – six actuators ; 4- ammeter
- 5 – amplitude limiter;
- 6- manipulator base

Assembly drawing of a sailing wind farm Laboratory model





ИССЛЕДОВАНИЕ ДЕМОГРАФИЧЕСКИХ И МИГРАЦИОННЫХ ПРОЦЕССОВ В СЕВЕРНЫХ РЕГИОНАХ РЕСПУБЛИКИ КАЗАХСТАН: ВЫЯВЛЕНИЕ И АНАЛИЗ ОСНОВОПОЛАГАЮЩИХ ФАКТОРОВ, И РАЗРАБОТКА МЕТОДОВ ИХ РЕГУЛИРОВАНИЯ

Руководитель программы/проекта - к.э.н., ассоциированный профессор, Бодаухан Кайрат

Источник и сумма финансирования программы/проекта – Конкурс на ГФ по научным и (или) научно-техническим проектам на 2022-2024 годы (МОН РК)

Цель - Комплексное исследование демографических и миграционных процессов в стране в разрезе отдельных регионов, выявление основных тенденций и значимых факторов, изучение степени факторов на демографические и миграционные процессы, прогнозирование ключевых показателей и разработка научно-обоснованных рекомендаций для демографической политики, обеспечивающей сбалансированный прирост населения в разрезе регионов, регулирования миграции населения.

Область исследования - Исследования в области социальных и гуманитарных наук; Актуальные проблемы социальной модернизации: демография, миграция, качество человеческих ресурсов, качество жизни и социальное неравенство, проблемы занятости и безработицы, научная организация, нормирование и безопасность труда

Результаты программы/проекта - систематизация и анализ академической литературы, нормативно-правовых актов РК, сбор первичных данных на основе социологических опросов, фокус групп, интервью; выявление и анализ социально-экономических, культурных, психологических, историко-географических, климатических факторов, влияющих на демографические и миграционные настроения населения; Сотрудничество и совместная работа с депутатами Мажилиса РК; Подготовка рекомендаций по усовершенствованию демографической и аграрной политики РК для депутатов Сената РК; Опубликованы: 2 статьи в рецензируемых зарубежных журналах, входящий в базу Scopus, 7 статьи в журналах, рекомендованных КОКСОН МВОН РК, 3 статьи в журнале, входящих в базу РИНЦ, 8 тезисы докладов на материалах международных конференций

Потенциальные потребители – Правительство, АСПИИР, местные исполнительные органы

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“Development of technology for producing effective cathode material for creating competitive sodium-ion batteries”

Program/Project Manager – Doctor of Physical and Mathematical Sciences, Professor Nogai A.S.

Source and amount of project financing – competition of the Global Fund of the Ministry of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 78,000.0 thousand tenge

The goal is to develop a technology for producing effective cathode material, including nanomaterial, capable of increasing the capacitive and specific energy parameters of existing scientific research batteries to the level of LIBs .

Field of study - Energy. Directions: cathode materials, nanotechnology, nanomaterials.

Project results - Technologies have been developed for producing effective cathode materials using the following methods: solid-phase synthesis; hot pressing; melt method under the influence of optical and IR radiation.

Published: 1 article in a journal included in the KOKSON database; 2 articles in journals included in the Scopus database ; 1 article in a journal included in the Scopus and WoS database ; 3 articles in proceedings of international conferences.

A conceptual model of competitive NIA will be created by improving the efficiency of the cathode material.

Technologies will be developed for producing effective cathode materials, including composite ones for scientific research using methods: exposure to optical and microwave radiation.

Potential consumers – energy, electronics, instrument making.

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" Development of interdisciplinary research ability of students in the implementation of synergetic education in higher education "

Project Manager - Doctor of Pedagogical Sciences, Professor Mukushev B.A.

Source and amount of funding for the program/project - competition of the Global Fund of the Ministry of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 61,191.375 thousand tenge

The goal is to design the content of synergetic education at a university, designed to study the fundamentals of the theory of self-organization in the context of implementing the integration of various disciplines and to develop an educational environment for preparing students for interdisciplinary research activities.

Field of study - Research in education and science.

Project results - 1. a concept of synergetic education has been created, aimed at developing interdisciplinary research abilities among future university specialists.

2. an elective special course entitled "Synergetics - an interdisciplinary scientific theory" was introduced into the educational process of the university;

3. "Student's scientific circle" was opened: "Computer modeling of socio-natural systems"

4. a textbook and study guide have been created;

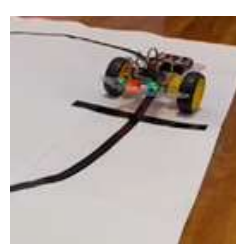
5. devices, technical equipment and computer programs have been created based on the identification of synergistic effects in physico-chemical, biological, economic and social processes;

6. 2 patents and 2 copyright certificates were received for scientific products on synergetic research.

7. 6 articles were published in journals included in the KOKSNVO list

Potential consumers – Higher educational institutions of the Republic of Kazakhstan.

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“Highly efficient wind generator using a multi-rotor system”

Program/project manager – PhD , Khabdullin A.B.

Source and amount of funding for the program/project - competition of the Global Fund of the Ministry of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 71,658.51 thousand tenge

Goal - Development of a highly efficient wind generator using a multi-rotor system in a built environment, where the direction of wind flow will be modulated to enhance the wind flow itself multi-rotor wind generator with horizontal axes.

Field of study - applied Directions: Electrical power and mechanical engineering; Alternative energy and technologies: renewable energy sources, nuclear and hydrogen energy, other energy sources.

Program/project results - A mathematical model has been developed for the digital implementation of the functions of a multi-rotor device wind generator :

- An algorithm has been developed for the program for converting the functional protection circuit to digital logic using the MATLAB Simulink software package .;
- A digital implementation program has been developed for the function of reversing wind flow amplifiers ;
- wind flow amplifier is justified .

Based on research results, it was found that automatic control of the proposed panel structures allows increasing power by 25%.

Potential consumers - Ministry of Energy of the Republic of Kazakhstan, akimats of cities and regions, industrial enterprises..

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" Creation of early ripening soybean source material with high productive and adaptive potential using molecular breeding methods for the conditions of Northern Kazakhstan "

Program/Project Manager – Candidate of Agricultural Sciences , Kipshakbaeva G.A.

Source and amount of funding for the program/project - competition of the Global Fund of the Ministry of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 78,000.0 thousand tenge

The goal is to study and create new early ripening forms of soybeans using traditional selection methods and molecular analysis for the conditions of Northern Kazakhstan

Field of study - Selection of agricultural crops. Direction: selection and seed production of agricultural crops

Results of the program/project - **an extensive gene pool of soybeans of various origins** has been created to study and identify sources of economically valuable traits for use in practical selection in the creation of new soybean varieties for the conditions of Northern Kazakhstan;

- when creating new source material adapted for specific conditions, taking into account the growing season of plants (early ripening forms), traditional selection methods and new MAS selection methods are used.
- publication of 2 articles in peer-reviewed scientific publications indexed in the Science Citation Index Expanded of the Web of Science database and 2 articles in a peer-reviewed domestic publication recommended by KOKSON.

Potential consumers are research institutes and stations.

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“Development of a biologically active additive BIO-AP with the production of a complex of micronutrients based on plant raw materials for the enrichment of food products”

Program/ Project Manager – PhD, Makangali K.K.

Source and amount of funding for the program/project - competition of the Global Fund of the Ministry of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 74,336.16 thousand tenge

Goal - development biologically active supplements BIO-AP with receiving complexes micronutrients manufactured from natural vegetable raw materials (purslane (*Portulaca oleracea*), berries serviceberry (*Amelanchier*), for enrichment and promotion efficiency products healthy food .

Field of study – Food industry . Directions: Processing and storage of agricultural products and raw materials.

Program/ project results – Technology for obtaining biologically active supplements from vegetable raw materials (purslane (*Portulaca oleracea*), berries Serviceberry (*Amelanchier*) . The data obtained show that dietary supplements based on purslane have high antioxidant properties that have a positive effect on finished meat products. The results showed that the methanol extract of the purslane variety exhibits strong antioxidant reducing capacity: FRAP of 43.5 ± 1.0 mg GAE/ g dry matter. Antioxidants are very important for human health because they reduce the risk of free radical damage to cells. Antioxidant activity (DPPH) studies have been conducted. The results were compared with ascorbic acid, a good correlation was observed between the radical scavenging activity of DPPH and TPC ($R^2=0.782$), and furthermore, a reasonable correlation was observed between DPPH and TFC ($R^2=0.996$). In addition, it has a balanced fatty acid composition, which has a beneficial effect on the finished product.

Ongoing project, final results will be at the end of 2024

Potential consumers - food industry , meat processing enterprises.

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“Development of technology for processing sludge and “green” waste from urban areas into organic fertilizer using domestic biological products”

Project leader - Doctor of Biological Sciences, Professor Nauanova A.P.

Source and amount of funding for the program/project - competition of the Global Fund of the Ministry of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 63,857,045 thousand tenge

Goal - To develop a technology for the integrated processing of sludge from the city water supply system and city “green” waste into organic fertilizer using new and domestic biological products of our own production. To create biological products based on strains isolated from sludge sediments. Screening of biological products for the efficiency of processing waste mixtures, studying the effect of fertilizers on the growth of ornamental plants and lawn crops

Field of study - Rational use of water resources, flora and fauna, ecology.

Project results - Microbiological analysis of sludge and plant residues was carried out on five solid nutrient media. 45 strains of microorganisms were isolated from waste

- Screening of strains was carried out to assess the possibility and intensity of growth and reproduction of microorganisms on the compost mass
- The species composition of 18 strains of microorganisms was determined by sequencing the 16SrRNA locus
- The cellulolytic , nitrogenase , catalase , protease activity of microorganisms was assessed
- Parameters for cultivating microorganisms on a fermenter have been worked out
- On the basis of the State Enterprise “Astana Su Arnasy ”, a trial processing of 16 tons of dewatered sludge was organized and carried out
- A chemical analysis of the composition of compost from sludge was carried out for the content of moisture, nitrogen, phosphorus, potassium, sulfur, carbon, heavy metals and organic matter
- Published 1 article in a peer-reviewed foreign scientific publication, which has a CiteScore percentile in the Scopus database of 44, 1 article in a domestic publication recommended by COXON, 2 articles in an international conference and 1 practical recommendation

Potential consumers – urban wastewater treatment plants, gardening farms, landscaping companies.

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" "Representation of the concept "Tort tulik" in Kazakh linguistic cognition"

Project manager - Doctor of Philology, Acting Professor Imanberdiev S.K.

The source and amount of funding for the program/project is the competition of the Global Fund of the Ministry of Education and Science of the Republic of Kazakhstan for 2022-2024, the amount is 25,818 , 60 thousand tenge .

The goal is to determine the national essence based on the names of domestic animals in Kazakh folklore, works of art, paremia, and toponymy. Comparing the linguistic data of the Turkic peoples, including the Kazakhs, diachronic and synchronic classification of information about the development of livestock breeding of nomadic peoples, development of scientific justification, systematization, determination of the distribution area.

Field of study - Linguistics. Directions: cognitive linguistics, onomastics, linguoculturology , sociolinguistics.

Project results - the meaning, etymology and scope of cognitive use of biotoponyms derived from the name of domestic animals have been identified;

- by studying “veiled” biotoponyms, formed from the name of domestic animals, the cognitive function in the sphere of use, revealed the basic information contained in biotoponyms necessary in the development of agriculture;
- paremia, taboos and euphemisms containing the names of domestic animals have been studied;
- a Directory in pictures “Kazakhstan biotonym of derin salaga ykpaly” was created;
- the dictionary “Tort tulik ataulary” will be developed;
- the monograph “Kazak tildik tanymdagy “Tort tulik” concept ory” will be prepared for publication.

Potential consumers – philologists, lexicographers, onomasts .

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“Development of an effective power supply system for autonomous consumers based on wind power plants of special design”

Project manager - Dean of the Faculty of Energy, Ph.D., Associate Professor S.S. Isenov.

Source and amount of project financing - competition of the Global Fund of the Ministry of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 74,621 , 19 thousand tenge.

The goal of the project is to develop an effective power supply system for autonomous consumers based on a wind power plant of a special design with increased electrical energy production.

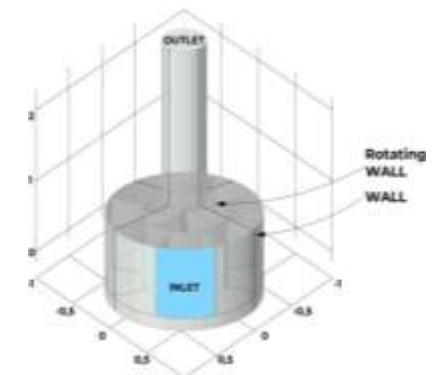
The object of the study is the process of converting the energy of wind flow into mechanical energy, by counter-rotating two wind wheels, and into electrical energy in a generator, with an armature and an inductor rotating in opposite directions.

Field of study - Energy. Directions: alternative energy and technologies: renewable energy sources, nuclear and hydrogen energy, other energy sources.

The results of the project will allow optimizing the parameters of the wind power plant, the size of the wind wheels, their relative position, as well as the power of the generator depending on the expected wind speed. The proposed solutions will allow maximum use of the potential energy of the wind flow.

Potential consumers - small and medium-sized farms, laboratories.

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" Development of adaptive techniques for increasing the productivity and drought resistance of bread wheat in the arid conditions of Central and Northern Kazakhstan using mathematical modeling "

Program/Project Manager – Candidate of Agricultural Sciences , Amantaev B.O.

Source and amount of funding for the program/project - competition of the Global Fund of the Ministry of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 78,000.00 thousand tenge

Goal - Application of mathematical modeling in the development of a set of agrotechnical measures in order to increase the productivity and drought resistance of spring soft wheat in the sharply continental arid soil and climatic conditions of central and northern Kazakhstan

Field of study - Agriculture, crop production

Project results:

- Drought-resistant varieties of spring soft grass have been identified based on molecular genetic assessment.
- the optimal technological parameters for treating seeds and crops of spring soft wheat with microelements, and the optimal elements of agrotechnological methods for surface tillage of the soil have been established.
- publication of articles in peer-reviewed scientific publications indexed in the Science Citation Index Expanded of the Web of Science database and in a peer-reviewed domestic publication recommended by KOKSON.

Potential consumers - agricultural producers, farmers, research institutes.

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“Molecular genetic substantiation of the resistance of domestic and foreign potato varieties and hybrids to major viral, nematode diseases and late blight”

Program/Project Manager - PhD Beisembina B.

Source and amount of funding for the program/project - competition of the Global Fund of the Ministry of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 78,000.0 thousand tenge

The goal is to study the resistance of highly productive domestic and foreign varieties and promising breeding lines of potatoes to PVY, PVX, nematodes, late blight on the platform of molecular genetic marking, as well as using methods of artificial infection with phytopathogens .

Field of study - agricultural biotechnology, plant protection, agrobiotechnology .

Program/project results

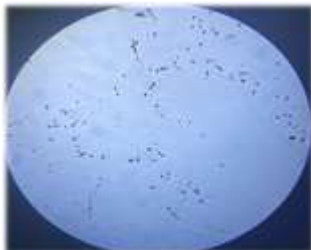
- **Application for invention No. 2023/0824.1** “ Method of plant inoculation and accumulation of Y- and X-viruses of potatoes” was submitted to the RSE “NIIS” , applicant: NJSC “KATIU named after. S. Seifullin”, authors: Beisembina B., Khasanov V.T., Sidorik A.I., Azhimakhan M.Θ. priority from 12/6/2023;

-Published an article in a peer-reviewed scientific publication ranked percentile by CiteScore in the Scopus database at least 35 (thirty-five): Azhimakhan M., Beisembina V., Kapytina A., et al. Genetic and Biological signature of Potato Virus X circulating in Kazakhstan \ Caspian Journal of Environmental Sciences. - Vol. 21, No. 5, Special Issue 2023. – P. 1151-1157. 10.22124/CJES.2023.7403 - Percentile 44. https://cjes.guilan.ac.ir/issue_884_1016.html

- An article was published in a domestic publication recommended by KOKNVO (Azhimakhan M.Θ., Beisembina B., Khasanov V.T., Hu Baigeng . Phytopathological assessment of the resistance of Chinese potato breeding lines to the main potato viruses \ Korkyt Ata atyndagy Kyzylorda University i n i n Khabarshysy . Auyl sharuashylygy Gylymdary . - No. 3-1 (66), 2023. - P. 215-224.

Potential consumers – agricultural producers , laboratories, breeders.

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“Application of DNA technologies in breeding and genetic research of millet crops in the creation of new domestic drought-resistant varieties”

Program/project manager - candidate of biological sciences, associate professor Rysbekova A.B.

Source and amount of funding for the program/project - competition of the Global Fund of the Kyrgyz Republic of the Ministry of Education and Science of the Republic of Kazakhstan for 2022-2024, amount 54,450, 670.75 thousand tenge

The goal is a comprehensive study of the gene pool of millet using DNA marker analysis, selection of source material in the breeding process and the creation of a new domestic drought-resistant variety for the steppe and dry-steppe zones of Kazakhstan.

Field of study - biotechnology, agriculture, selection and seed production.

Results of the program/project - field experiments were laid in collection and breeding nurseries in the conditions of Akmola and West Kazakhstan regions;

-selected constant lines with economically valuable traits were isolated and propagated.

- a selection of informative SSR and ISSR markers was made in accordance with the primer efficiency scale . PCR conditions were optimized for each marker. A total of 20 SSR and 17 ISSR primers were tested ;

- DNA polymorphism of millet germplasm was established ;

- a new domestic competitive drought-resistant millet variety is being prepared for transfer to the State Variety Testing in the regions of the Republic of Kazakhstan jointly selected by KazATU and ASHOS.

Potential consumers – agricultural producers, breeders.

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