AGRICULTURAL RESEARCH CENTER

MINISTRY OF AGRICULTURE OF THE REPUBLIC OF AZERBAIJAN

Agricultural Research Center

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BAKU 2022

Introduction

Agricultural Research Center under the Ministry of Agriculture of the Republic of Azerbaijan was established on the bases of Research Institute for Agricultural Economics acting since 1962.

Research Institute for Agricultural Economics under the Ministry of Agriculture reformulated to Agricultural Research Center with the status of a public legal entity according to the decree of the President of the Republic of Azerbaijan, Ilham Aliyev dated 22 May 2018.

The objective of this institutional reform is to re-shape the research body with 60 years of history into a "Think Tank" to provide the necessary scientific justification and analytical base for further improvement of agricultural policy based on the requirements of the modern stage of agricultural reforms as well as the global challenges in the country.

Currently, the creation process of the Agricultural Research Center continues based on *a new mission, new principles of affairs, new positions, innovative methods, and modern technologies*.

MISSION

Creation of agro database, analysis, evaluation and forecasting, preparation of agricultural policy recommendations, programs, projects and innovative development mechanisms.

VISION

To become a "Think Tank" providing necessary scientific and analytical bases in the context of sustainable development of agricultural sector.

Principles

Speed

The process of preparation of scientific substantiations at the center is proceeding at maximum *speed* in order to provide flexible solutions in accordance with the new stage of the agricultural reforms.

Responsibility

Employees of the center are *responsible* for conducting scientific and analytical activities in order to ensure development of agriculture within their competences.

Quality

Creation of databases, conducting researches and implementation of analytical activities at the center should provide *quality* basis for decision-making in agricultural policy using innovative methods and modern technologies.

Activity

Agricultural Research Center's mission is creation of agro database, analysis, evaluation and forecasting, preparation of agricultural policy recommendations, programs, projects and innovative development mechanisms. Following the mission, an Action Plan was prepared for 2021 and the Center's activities were organized by that Plan.

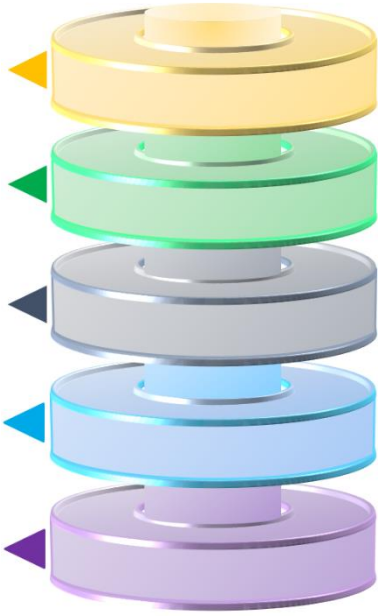
In general, the Center's activities are grouped under 5 directions:

- Creation of databases
- Monitoring and Evaluation
- Diagnostics and Analysis
- Scientific researches
- Doctoral Education

1. Creation of databases

5 subgroup databases are being created in the Center: Electronical Agricultural Information System, Agricultural Statistics Database, Farm Data Monitoring System, Price Database of Agricultural Products, Geographical Database.

- Electronical Agricultural Information System
- Agricultural Statistics Database
- Farm Data Monitoring System
- Price Database of Agricultural Products
- Geographical Database



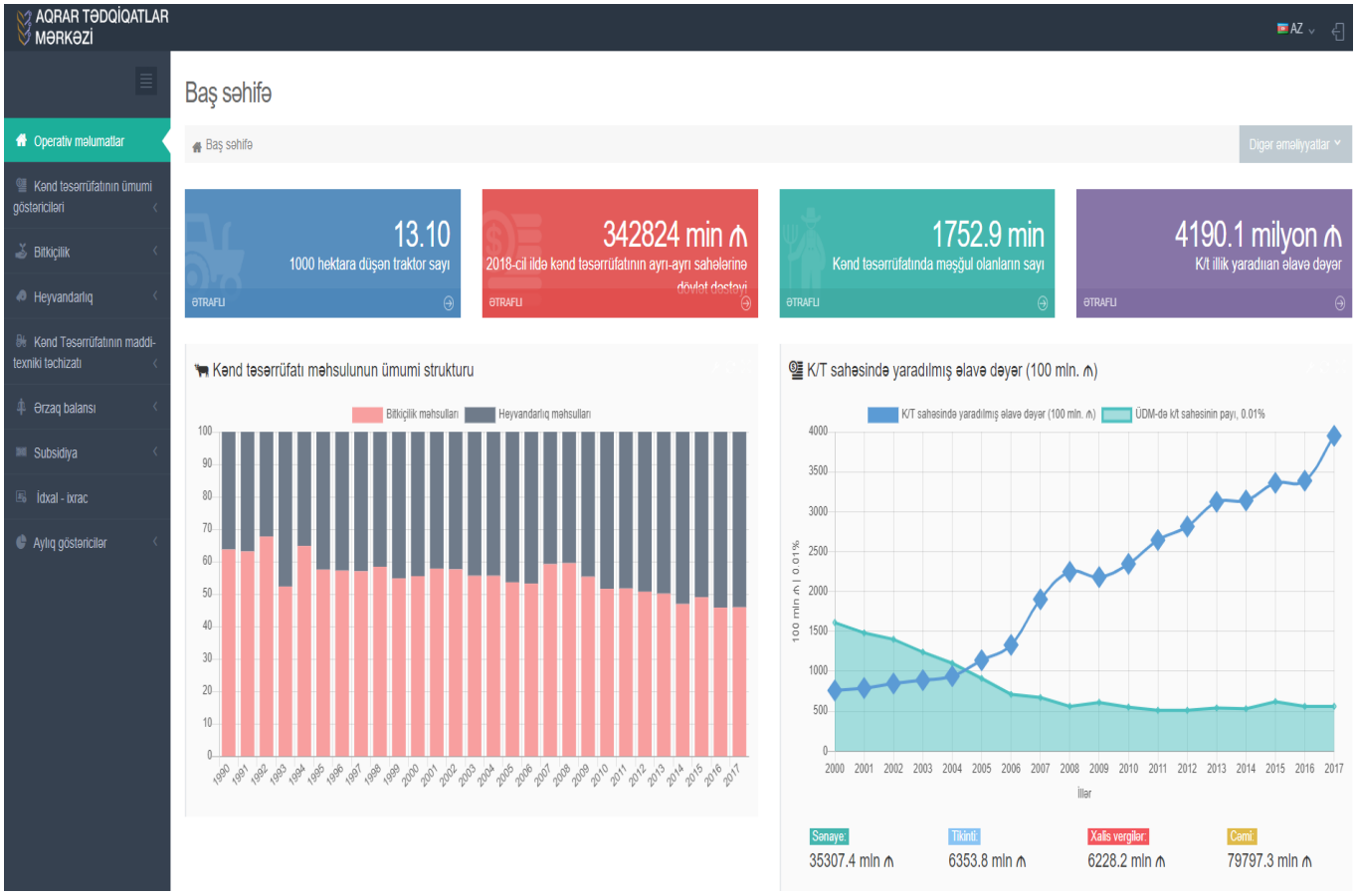
Electronical Agricultural Information System (EAIS) - is a unique system which includes basic principles of the Ministry of Agriculture (proximity to farmers, transparent and effective management, and application of innovations), provides integration with internal and external systems, and creation of a wide range database for agricultural sector.

EAIS is a transparent and operational management tool, which primarily includes the development of business processes covering all phases of government support measures for agricultural producers. Currently, approximately 600,000 subjects, including farmers, suppliers and service providers, are registered in the EAIS database.

In 2021, the improvement of EAIS was continued and the following works were implemented:

- An Electronic Accountability System was developed to ensure access to relevant reports of the EAIS database by ministries and institutions;
- GIS reports were prepared, technical support was provided for satellite monitoring;
- The "Payment" module has been developed and integrated with the bank to send all subsidies directly to bank payments through EAIS;
- The "Selection" module was developed in order to organize the electronic monitoring process of farmers who applied for subsidies through EAIS, and the implementation of the "Monitoring" module was started;
- "Family Peasant Farming" module was developed and put into operation, farmers were trained on the working principle of the module;
- In order to register greenhouses, cold storages and grain elevators operating in the country in EAIS and to regularly enter information about these institutions into the system, the "Grain elevator, cold storage and greenhouses" module was developed, trainings were held on the working principle of the module;
- The "Sowing declaration" module has been improved, the "Repeat planting" sub-module has been prepared and made available to farmers, relevant work has been done to process seed planting declarations for the 2020-2021 crop years;
- Animal Health Centers and veterinarians have been integrated into the system;
- Improvements were made to the beekeeper panel;
- The process of integration with the Agrarian Insurance Fund has been started;
- In order to ensure the mapping of crop declarations, updates have been made to the relevant module, the manual mapping method has been improved and a geolocation mapping form has been added.

Agricultural Statistics Database. All statistical data related to Azerbaijan's agriculture are systematized in this database.



The development of reports covering agricultural statistics, as well as operational data on agricultural production, import, and export of agricultural and food products, statistical data on subsidies gathering from different sources in the field of agriculture was continued by the Agricultural Research Center in 2021.

In addition to agricultural statistical data, the databases on subsidies and other state support data, as well as the data collection, structuring, and preparation of visual reports on the activities of the Ministry of Agriculture and subordinate agencies, the distribution of the data to the AgroData statistical portal was continued.

Improvements were made to the http://agrodata.az/ portal, which was created in order to obtain information related to the agricultural sector from a single source, the user interface was updated, and the indicators for the agricultural sector were continued to be updated.

In addition to the general indicators of agriculture, the portal also includes indicators related to cultivated areas and production volume in individual fields by years and regions.

Certain information is presented in a visualized form. Depending on the purpose of use and the user's goal, there is a search system with both a direct search and a multifunctional filter.

Various data loading functions have been added to the system in a selected form.

Work is ongoing to improve the portal as a single source that fully covers all statistical information and to ensure user comfort.

Farm Data Monitoring System (FDMS). Indicators characterizing the impact of the agricultural policy implemented in any country on the activities of agricultural producers are a system of important indicators for evaluating the efficiency of this policy.

Farm Data Monitoring System *(Farm Accountancy Data Network*, **FADN**) which is used at the level of the European Union, is an important data base for the Common Agricultural Policy of the European Union and acts as a necessary tool for decision-making in this field.

FDMS in Azerbaijan was launched as part of a project of the Food and Agriculture Organization of the United Nations (FAO) for the first time in the Commonwealth of Independent States (CIS), as part of this project, Agricultural Research Center was designated as responsible executive body. Pilot surveys were conducted on farms in several regions as initial experience. Since 2015, FDMS data collection processes cover all regions of the country.

Sampling is based on the EAIS database in order to identify farms to be included in the FDMS survey. The farms in this database were divided into five strata according to the cultivated areas and the type of plants planted, and a stratified random sampling method was applied. The sample size in the sample is 1% of the number of subsidized farms. Thus, for the collection of data on FDMS, sampling is done among farms from all groups.

In order to further improve the FDMS in accordance with FADN standards within the Twinning project of the European Union, the specialists of the Agricultural Research Center were trained by international experts, and the formed databases were evaluated.

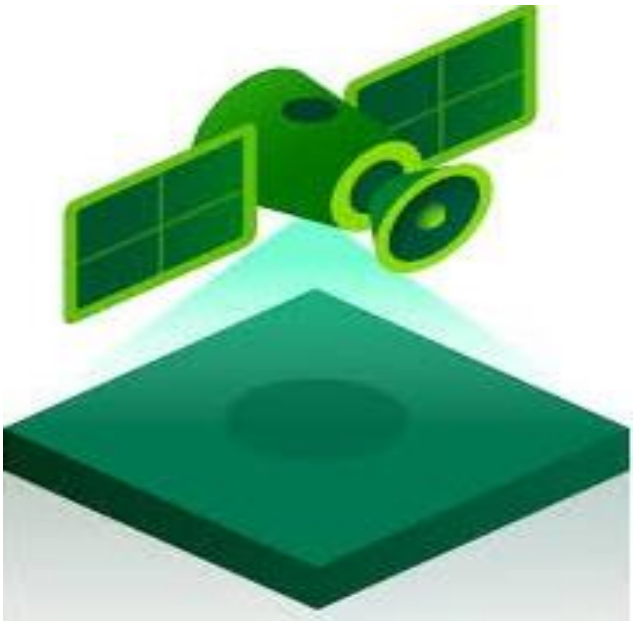
Currently, there are reports covering the years 2015-2020 in the FDMS database of the Agricultural Research Center, which are widely used in conducting research and preparing analytical materials at the Center. Based on the results of 2021, 5,000 farms were selected and surveyed based on the EAIS database in order to conduct surveys among farmers.

Along with the FDMS surveys, the Agricultural Research Center regularly conducts surveys on farmers' access to resources and market access, as well as conducting value chain analyzes across different sectors. Starting from 2021, CATI (Computer Telephone Surveys - Computer-Assisted Telephone Interviewing) and CAPI (Tablet System Survey - Computer-Assisted Personal Interviewing) systems have been implemented by the Center in order to improve the process of conducting surveys and data collection. This system ensures the transparency and quality of the surveys, allowing them to be conducted fully within the standards of research ethics.

In this framework, surveys are conducted every year among farmers on the topic "Study of the current situation regarding access to the market and supply of production resources of agricultural producers" (there is already a database for the years 2017-2021).

In addition, surveys and in-depth interviews were conducted among producers, traders and processors in order to diagnose the sunflower value chain in 2021.

Geographical Database. Geographic Information Systems (GIS) is an information system that provides collection, processing, storage, transmission, cartographic and visual presentation of spatially coordinated information.



The “AgroGIS” geodatabase of the Ministry of Agriculture is managed by Agricultural Research Center. The structure of this database includes the results of photo interpretation on orthophoto maps for actual use of agricultural lands, as well as the land of other designated lands, category-changed lands, lands of economic and administrative regions, administrative-territorial units and municipalities, lands of subordinate bodies of the Ministry of Agriculture, buildings, spatial and non-spatial data on perennial plantings and greenhouses, all watersheds, as well as statistics of orthophoto maps and a digital model of relief and non-spatial data.

In 2021, the following works related to the Geographical Information database were carried out in the Center:

- Standards have been prepared for the integrated acquisition of land area data on the AgroGIS web portal, and shapfiles to be used on the portal have been prepared.
- Using ArcGIS software, a database containing relief, soil and climate data of the country, as well as phenological data on each of the agricultural crops was created. This software enables the preparation of appropriate maps by identifying suitable, less suitable and unfavorable areas for planting agricultural crops.
- Based on the software, assessments were made for different regions and crops. In addition, a potential specialization map of areas more suitable for the cultivation of hazelnuts and pomegranates in Karabakh and Eastern Zangazur regions was prepared ***(Figure 1 and Figure 2)***.

Figure 1. Areas suitable for the hazelnut plant in the liberated regions

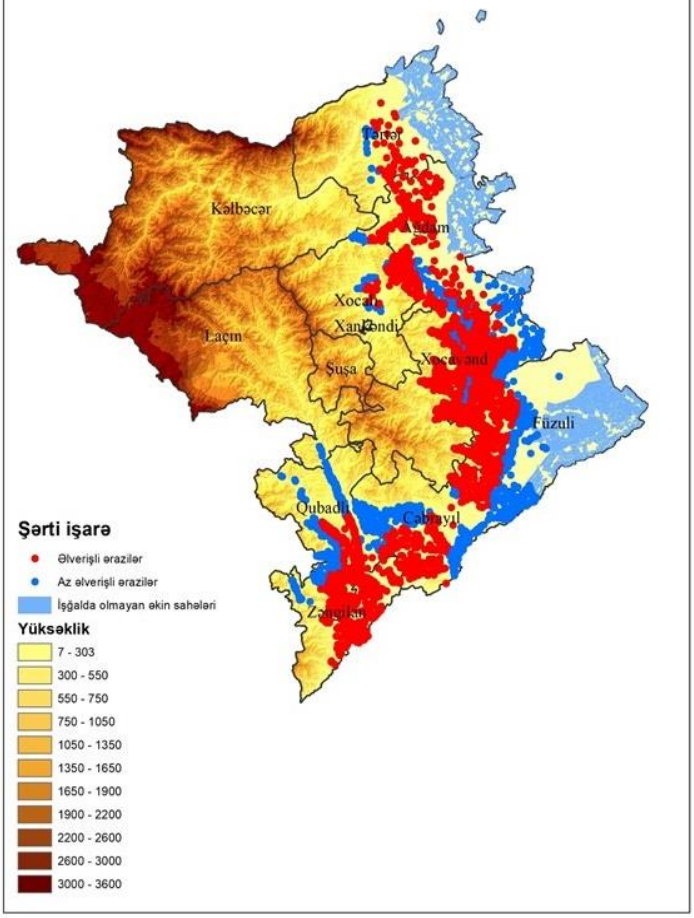
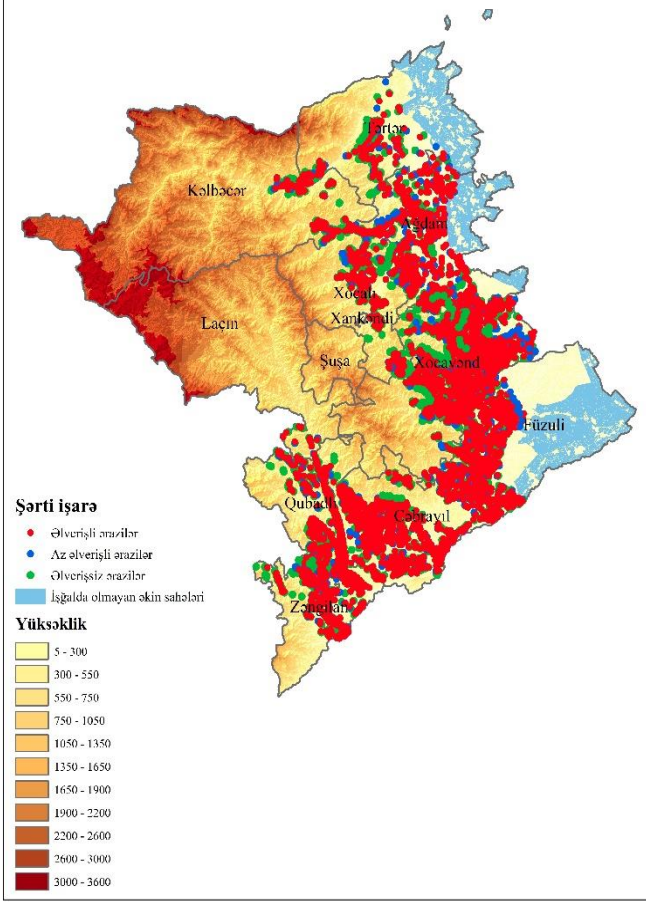


Figure 2. Areas suitable for the pomegranate plant in the liberated regions

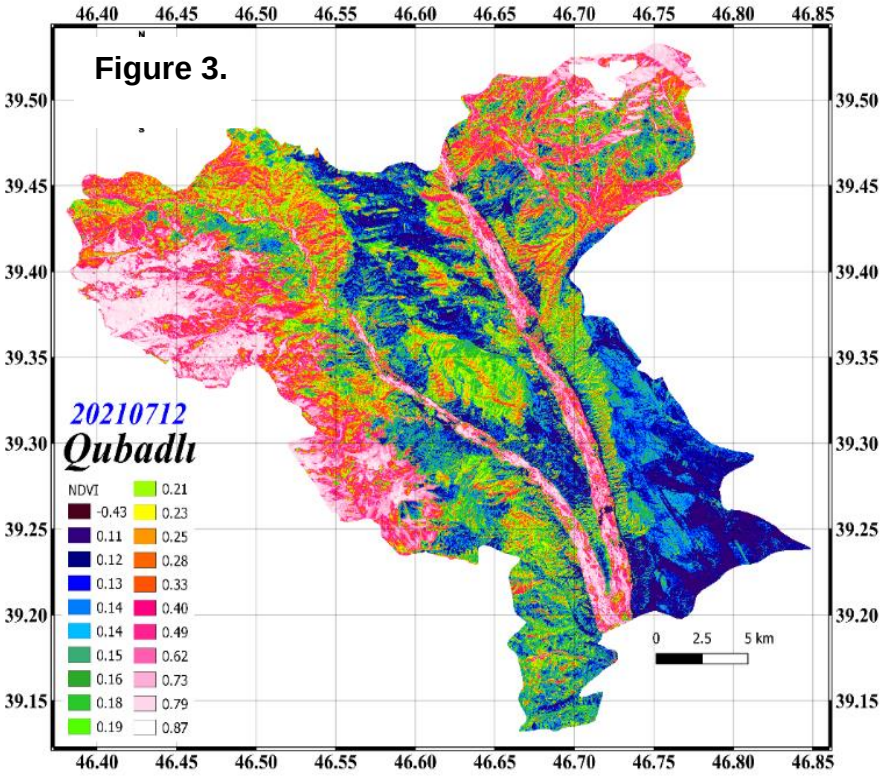


- Mapping of the infrastructure of Karabakh and Eastern Zangazur region (planting areas, perennial plantings, roads, hydrological objects) was provided, based on the results of soil analysis, the process of updating soil map data and preparing soil maps for various purposes was carried out.

- In Karabakh and Eastern Zangazur region (on the example of Gubadli region), a survey of agricultural fields was carried out using Remote Sensing technology. "LANDSAT" satellite data were used at five-year intervals between 1985 and 2021, the borders of existing and currently used agricultural areas were determined and maps were constructed ***(Figure 3)***.

- Also, soil moisture index (SMI) was calculated through satellite monitoring. In addition, a classification of cultivated areas (CropMap) was prepared using "SENTINEL2" optical data in the region. Maps of vegetation index (NDVI), water index (NDWI) and biophysical parameters (FCover, FAPAR, LAI) were drawn up in Gubadli region.

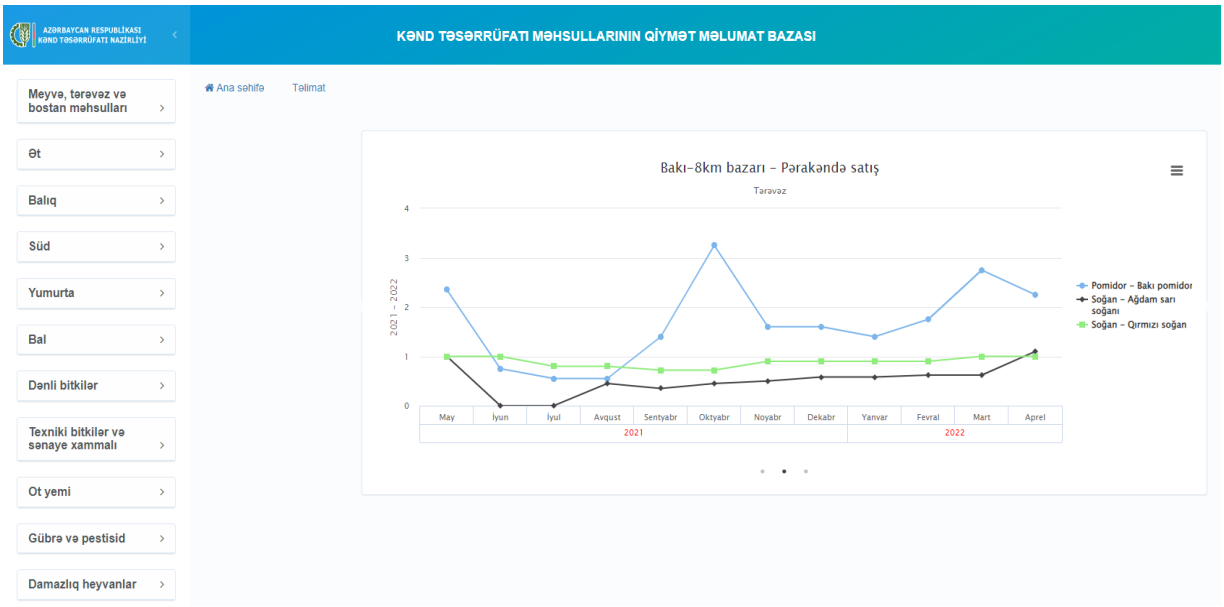
Figure 3.



- Using "Remote Sensing" technology, data on surface temperature anomalies and seasonal climate changes were obtained based on "SENTINEL3" satellite data for 2021 across the country.

- Satellite monitoring of declared autumn and perennial crops was carried out across the country, as a result of the monitoring, planted and unplanted areas were determined, and problem areas were identified.

Price Database of Agricultural Products. In 2015, the Ministry of Agriculture, together with the Food and Agriculture Organization of the United Nations (FAO), created an information portal on agricultural prices, which was subsequently updated by the Ministry of Agriculture and created as Electronic Price Information Portal on agriculture www.agrarbazar.az.



Field sales, wholesale and retail prices of all agricultural products are collected in the database. From 2021, fish, as well as cranberries, cherries, etc., will be added to the portal as a new product, wholesale and retail prices of several varieties of fruits are included.

The Electronic Price Information Portal on agriculture also contains the following information:

- Supply prices of fruit, vegetable, potato and watermelon and melon products from the site of trade, wholesale, retail and processing enterprises;
- Retail prices of animal-breeding products (meat, milk, eggs, honey, fish);
- Prices purchased by milk reception centers;
- Wholesale and retail prices of meat;
- Sales prices of wool and leather for population or meat cutting stations;
- Prices of crops within seasonal sales and after seasonal wholesale;
- Prices for technical plants and other products of industrial raw materials purchased by organizations;
- Retail sale prices (grass, fertilizer, animal breeding).

Wholesale and retail prices for all types or varieties of products are collected by monitoring 6 days a week in "Baku-Meyvali" wholesale and "Baku 8th km" retail markets, taking into account low, medium and high levels, and sales prices from the field are collected weekly 2 times, it is learned directly from the producers by DAIMs. Price information is entered into the database, and on the basis of this information, *operative information bulletins* "on wholesale and retail price changes of agricultural products" are prepared daily.

2. Scientific Researches

Agricultural Research Center implements scientific justification for further improvement of agro policy in accordance with the requirements of current level of agricultural reforms of the country and global challenges.

- **In 2021 research activities were carried out on "Sustainable development problems of agriculture", "Economic issues of application of innovations in agricultural sector", "Problems of improving the agribusiness environment" and research was carried out on 8 topics. The summary of the content of the research works carried out is given below.**

Topic 1.

"Evaluation of the agricultural policy in the Republic of Azerbaijan in terms of the sustainable development principles and directions of improvement"

According to the results of the research work, the relevant literature and materials were collected and systematized a detailed explanation of the concept of sustainable development, its essence, and significance was given. The factors that generate the need for sustainable development of the agricultural sector are also identified and ways to eliminate situations that negatively affect sustainable development are indicated. The components of the three main directions of agricultural development, increasing the level of economic growth due to structural changes, the development of the non-agricultural sector in the agricultural sector, reducing the level of poverty in rural areas, were analyzed and it was determined which of them have broader advantages.

The important directions of sustainable and competitive development of the agricultural sector are comprehensively considered. The main tasks of forecasting and development in this area especially the connection of the sustainable development of the agricultural sector with the improvement of the social level of the village in the ecological environment.

Within the framework of the research work, the state policy of the Republic of Azerbaijan regarding the sustainable use of land and water resources, adaptation to climate changes in the country, as well as the work done in the field of protection of agro-biodiversity were analyzed, problems were pointed out in terms of ensuring sustainable activity, and proposals were presented to eliminate these problems. In conclusion, recommendations were put forward regarding ways to improve the state policy on sustainable development in the field of agriculture in the country.

Topic 2.

“Methodology for forecast the development of the agricultural sector, taking into account the factors of sustainable development”

In modern times, the development of agriculture is related to the provision of food security, meeting the growing demand of the population for food products, and solving the issues of using existing land, water and other resources based on the principles of sustainable development. Agricultural modeling is useful for decision-making in solving practical problems in the field of sustainable development.

There are a number of models related to this field: statistical, deterministic, stochastic, dynamic, simulation models. Through these models, it is possible to predict the possible impact of climate and technological change on the costs and productivity of the final product, and at the same time determine the risk of the impact.

As part of the research work, various models used in world practice were studied, and it was concluded that the mixed use of traditional and modern methods helps to achieve more correct results. Thus, the so-called hybrid models have a wider field of application. Classical and new forecasting methods allow the construction of forecast models with less margin of error by applying different mathematical tools depending on the goal. In this direction, concrete models were proposed for predicting the volume of agricultural products production and the level of productivity.

Topic 3.

“Integration of agriculture and processing industry into the global value chain: realization of sustainable development conditions”

At present, the food and agriculture sector is increasingly organized within the global value chains (GVC). Thus, different stages of the process of transformation of raw material into a final consumer product are located in different countries. Added value from agriculture is exported in several ways. First, through the “first way": raw agricultural products, as a rule, are exported directly as intermediate resources, and then processed by the external processing industry. Secondly, through "processing way": as a raw material is used as a resource to produce agricultural and food products, clothing and other processing products, additional value to agriculture is included in the extraction of other areas.

Studies conducted by the Organisation for Economic Co-operation and Development (OECD) have shown that (GVC) is a powerful tool for increasing the growth and employment of the sector while creating various export opportunities for the agricultural sector. Agro-food is associated with an increase in the value of the food and agriculture sector. On a large scale, the trade and agro-food sector accounts for 20-26% of the total revenues of the agricultural workforce. However, it should be noted that there are great differences between countries and spheres in this direction. In this regard, the factors affecting the participation of agri-food (GVC) and the creation of internal value-added, the determinants of participation in VAT, indicators on(GVC) were determined based on the research.

In addition, indicators based on international trade statistics, indicators based on resource-product (input-output) tables, and methodologies on the index of participation in the global value chain were investigated, the Gravity model was selected from among existing models for the analysis of export potential, and concrete options were developed regarding its structure and appropriate form. On the basis of this model, assessments were made on the hazelnut area in Azerbaijan.

Topic 4.

"Problems of development of agricultural land market in the Republic of Azerbaijan"

The main objective of the research is to examine the overall volume of the agricultural land market in the country, its dynamics, structure, the situation of demand and supply in the market, the constituent elements, sizes, location on agricultural land, as well as factors shaping the market prices. The object of the study is the land market of the country on agricultural lands and various deals.

The scientific literature published in the country and abroad on the development problems of the land market on the subject was analyzed, theoretical approaches in this field were evaluated, other relevant generalizations were made and the research methodology was developed.

The range of data necessary for the analysis of the volume and structure of the country's land market has been determined and special forms have been prepared for collecting such data from relevant sources. In accordance with the established methodology, within the framework of the study, the programs of surveys to be conducted regarding the investigation of the structure of demand and supply in the land market were prepared, and the main factors affecting activity in the land market were analyzed based on the indicators of the Farm Data Monitoring System (FDMS).

Based on the form prepared in accordance with the methodology developed within the framework of the study, a survey was conducted on the sales prices of agricultural lands across the country, based on the survey data, the average sales prices of agricultural land in administrative and economic regions were determined and the factors affecting its formation were investigated.

In the research process, the structure of the agricultural land market regulation mechanism was explained, and the approaches to support the sustainable use of land through that mechanism were analyzed. In this direction, special attention was paid to the role of land market regulation as a means of ensuring the consolidation of areas in favorable limits. First of all, it was shown that the land market needs to have tools that can stimulate the consolidation of small parcels, as well as prevent the division of existing plots into smaller parts. These instruments include the provision of concrete solutions for consolidation-oriented transactions on the regulation of the land sale market, as well as the determination of the right of preference in purchase for state agents operating in the sphere of land consolidation.

As a result of research:

- *to improve the formation and regulation of agricultural land prices;*
- *to support the sustainable use of land, including the consolidation of areas, through the market;*
- *elimination of the factors hindering the development of the agricultural land market;*
- *recommendations on improving the provision of market information were given.*

At the end of the research work, the project "Action Plan for 2022-2030 on the sustainable use of agricultural lands in the Republic of Azerbaijan" was prepared.

Topic 5.

“Directions of improvement of stimulation mechanisms aplication of agricultural innovations in the Republic of Azerbaijan”

The concept of "innovation" in world economic literature is interpreted as the opposite of the potential scientific and technological progress in real products and technologies. Innovation following international standards is defined as the result of innovative activity embodied in the form of a new or improved product introduced to the market, a new or improved technological process used in practice.

In terms of genetic improvement of plant varieties and livestock breeds with the aim of increasing productivity and economic income, classifying and conserving genetic resources for food and agriculture, diagnosing plant and animal diseases and developing vaccines, FAO considers innovation to be a wide range of technologies used in food and agriculture.

Ensuring the dynamic development of agriculture is related to the adoption of innovations in this field. The innovative development of agriculture also creates favorable opportunities for solving sustainable development issues related to activities in the agrarian field, first of all, for the protection and efficient use of land and water resources. In this regard, the wide spread of innovations in agriculture is included among the important factors of ensuring food security on a global scale, as well as the expectation of ecological balance. Agrarian innovations also play an important role in the implementation of sustainable development principles.

Currently, innovative development processes in Azerbaijan's agriculture are being accelerated. From the research conducted on the subject, it is known that at this stage, in order to create a more functional agriculture and a perfect food security system within the framework of the development strategies of the field, the implementation of appropriate measures for the development of the potential in terms of the expansion of the education and research system and the application of innovations in the agrarian field, the dissemination network of innovations it is necessary to increase the level of awareness and use of agricultural producers about the development, use of innovative technological solutions and methods. In this regard, there is a need to create an innovation environment in the agricultural sector of the country's economy, increase access to innovative techniques and technologies, and accelerate adaptation to new technologies.

Stimulating the application of innovative technologies in irrigation at the current stage, as well as the use of drones and other innovative tools through the subsidy mechanism, providing tax incentives to start-ups operating in the field, and organizing information and consulting services related to the spread of innovations have the potential to have a significant impact in the indicated areas.

From the research, it can be concluded that in the current conditions, it is appropriate to expand the scope of state support measures in terms of accelerating the innovative development of agriculture. Taking into account the relevant world experience, the main directions of actions to be implemented in this field are, first of all, support for the creation and operation of agro-innovation parks, promotion of expanding the scope of the application of Normalized Difference Vegetation Index (NDVI) technologies, in the production of agricultural products strengthening the stimulation of the use of innovative technologies that increase the efficiency of operations can be attributed.

Topic 6.

"Directions of improvement of tax and customs regulation in the agribusiness sector of the Republic of Azerbaijan"

The essence of taxation policy on agribusiness sectors, the indicators used for the evaluation of this policy and the directions of tax regulation were identified in the research work. Also, the principles and criteria of taxation were differentiated, the world experience of the tax system in the field of agriculture was investigated, the state policy of Turkey, CIS countries, the Netherlands, Italy, Israel, and Ireland on tax-customs regulation in the relevant fields, as well as tax rates on specific directions were introduced.

One of the main focuses of the study is the state policy on Value Added Tax (VAT). To this end, the essence of VAT, the socio-economic basis of its application and specific directions for individual countries were defined, VAT rates applied to fertilizer and pesticide sales were introduced.

As a result of the analysis of the situation in our country in terms of VAT payments on the concepts mentioned in the framework of the research work, it was determined that the alleviating mechanism for VAT payments in Azerbaijan was carried out in 3 directions: 1) exemption from VAT on outputs; 2) temporary VAT exemption for specific inputs, 3) VAT exemption for services.

As a result of the initial stage of the conducted research, a number of proposals were formed. These suggestions are outlined below, focusing mainly on inputs:

- *Exemption of production of mineral fertilizers, pesticides from VAT;*
- *VAT exemption of production, sale and import of organic fertilizers;*
- *Exemption of production and sale of veterinary preparations from VAT;*
- *Exemption from VAT of production, processing and sale of dairy products (part of natural milk raw materials).*

In the next stage of the research, the tax-customs policy implemented in the agricultural sector in Azerbaijan will be evaluated by making comparisons with relevant countries, and proposals will be made for the improvement of tax-customs regulation in the agricultural production and processing industries along the value chain.

Topic 7.

"Improvment of the mechanisms of the water resources use in agriculture"

In the research work, initially, the world experience related to the use of water resources, including the history of the development of irrigation of agricultural fields, the field-related experiences of individual countries, as well as theoretical and methodological issues related to the operation of irrigation systems were investigated, an exemplary scheme of irrigation system management was drawn up, water use indicators for individual countries, including degrees of water stress (degree of water stress) were presented. As a result of the research, it was determined that for the current period, the establishment of Water User Associations in the field of irrigation system management is considered the most effective and efficient method by most countries, and related practices are quite widespread.

At the next stage, such methodologies as Irrigation Management Transfer and Participatory Irrigation Management, as well as Public-Private Partnerships in the formation of water markets and irrigation management were analyzed.

The last stage of the research is devoted to the improvement of the irrigation water regulatory system in the Republic of Azerbaijan. Initially, the irrigation water resources and irrigation water usage indicators of the Republic of Azerbaijan were evaluated in the research work, and the irrigation water regulatory system in the country was analyzed in detail. Here, the history of the formation of the irrigation water regulatory system in the country, the current state of the system, the activities of water user associations (WUAs), as well as the current situation related to irrigation and issues related to environmental problems are covered.

At the end of the research work, specific recommendations were put forward regarding the economic-administrative and ecological improvement directions of the country's irrigation water regulation system. These include the establishment of an electronic registration system of irrigation water use, the creation of an electronic register of WUAs, support for the formation of cooperative relations between farmers in order to effectively use land resources and irrigation water, consolidation of land, support for the formation of large farms, and provision of proportional distribution of irrigation water among farmers, as well as reducing irrigation water losses and optimizing the use of irrigation water in irrigated areas by improving the operation indicators and operation of irrigation and melioration systems, restoring and increasing soil fertility by strengthening the works on the implementation of a complex of agrotechnical and melioration measures in irrigation areas, accelerating the IMT process in the country, effective use of water resources of the territories freed from occupation of the Republic of Azerbaijan and irrigation in WUAs. The direction of application of "differentiated" irrigation water fee to fully satisfy the requirements for maintenance and maintenance is concerned.

Topic 8.

“Methodology of risk assessment in the field of agriculture”

During the research, the risks in agriculture, their essence and main characteristics, the emergence of risks, the theoretical and practical bases of risk management were investigated. As well as, the sources, scope and factors of risks, evaluation, risk management and world experience on reduction were studied.

The main sources of production risks in agriculture are air, climate change, pests, diseases, technology, genetics, machine efficiency and the quality of the materials used. At the same time, market risks are associated with issues that affect the price, quality, availability and access to the necessary products and services. Sudden changes around the world, such as weather or government decisions, can lead to sharp changes in the prices of products. Prices can vary greatly in markets where both local and global supply and demand conditions are constantly changing. Marketing risk is any market-related activity or event that causes the farmers to fluctuate in prices they buy or pay for a production product according to their products and refers to financial risks that pose a threat to the financial health of agricultural producers.

In the framework of the mentioned research work, the factors that can create risk in the field of agriculture were investigated, and the methodology for evaluating the possible threats through the PESTEL analysis was given. Also, strategies for managing risks depending on the type, as well as statistical models for risk assessment were proposed.

3. Diagnostics and Analysis

Agricultural Research Center analyzes current trends and conjuncture changes in agriculture, identifies factors affecting the current situation, predicts scenarios and makes recommendations for decision making when it is necessary.

Generally in 2021, analyzes, diagnostics and forecasting in the following directions were implemented for this purpose:

- The growth rate of the total aggregate product and value added in agriculture;
- Indicators of food self-sufficiency and import dependence;
- The conjuncture of the domestic and world market, price changes, market access and risks for agricultural products;
- Factors affecting productivity in agricultural sector;
- Economic efficiency of agricultural producers;
- Analysis of the value chain of agriculture and development of production capacity in various sectors;
- Investment needs for sustainable development of agricultural sector and food security;
- Providing farmers with production means, access to financial services and infrastructure;
- The effectiveness of regulatory events and state support in agricultural sector;
- Employment rates in agricultural sector (paid and unpaid labor, age groups, gender, migration, education indicators, etc.);
- Diagnosis of rural development.

- **The following analyses were carried out at the Center in 2021 and reports were prepared:**

  - ✓ Preparing the presentation "Agricultural Sector Development Goals for Food Security and Export: 2022-2026 & 2022-2030";
  - ✓ Preparation of the rationale for the allocation of additional funds to the agricultural sector in connection with the increase in the price of diesel fuel;
  - ✓ Preparation of proposals and economic justification for the development of milk production and processing of milk products;
  - ✓ Preparation of proposals and economic reasoning related to solving the problems of intensive dairy and poultry farms;
  - ✓ Preparation of the economic rationale for the proposal regarding the VAT exemption of the import of feed products;
  - ✓ Preparation of proposals and economic rationale for a new mechanism related to increasing food wheat production;
  - ✓ Preparation of the rationale for the application of the single cropping system in grain farming;
  - ✓ Preparation of the economic rationale for the price reduction of the impact of the increase in the price of mineral fertilizers on the production costs of farmers;
  - ✓ Economic justification of proposals for improving the mechanism of sale of purebred animals at preferential prices at the expense of the state budget;
  - ✓ Preparation of the diagnostic report of the production of agricultural products by regions;
  - ✓ Assessment of threats to national security related to agriculture and preparation of proposals for preventive measures;
  - ✓ Preparation of daily, weekly, monthly and annual overviews of global and regional markets for agricultural and food products;
  - ✓ Analyzing the agrotechnical services, as well as the fertilizer and pesticide market and preparing proposals in terms of the activities of "Agroservis" OJSC;
  - ✓ Preparation of value chain reports within the FAO project "Development of sustainable and inclusive local agro-food systems in the North-West region of Azerbaijan" (GCP/AZE/014/EC);
  - ✓ Preparation of a report on the forecasting of the export volume of fruit and vegetable products by means of transport by the end of the current year and until 2025 and the assessment of the need to increase the output capacity of road transport and border customs points;

- **91 reports, references and information reflecting relevant indicators of various sub-fields of agriculture (planted area, production volume, productivity, import-export, as well as worldwide production and trade indicators) have been prepared or updated.**

Preliminary feasibility studies have been prepared for the following areas:

- ✓ Evaluation of the economic efficiency of the "Smart Village" project to be built in Agali village of Zangilan district;
- ✓ Preparation of the rationale for the economic efficiency of the application of modern irrigation systems;
- ✓ Preparation of the technical and economic rationale for the organization of the cattle dairy-meat intensive breeding farm;
- ✓ Preparation of the technical and economic rationale for the organization of semi-intensive sheep farming;
- ✓ Preparation of the technical and economic rationale for the organization of broiler farming, taking into account the new prices of feed;
- ✓ Preparation of technical and economic rationale for the organization of sturgeon fishing;
- ✓ Preparation of the technical and economic rationale for the organization of the intensive "Lacaune" sheep farm;
- ✓ Preparation of preliminary technical and economic justification for the establishment of a wine production enterprise;
- ✓ Preparation of the preliminary technical and economic justification for the tomato paste production enterprise;
- ✓ Preparation of the technical and economic rationale for planting intensive almond, walnut, grape and olive orchards and planting clover;
- ✓ Conducting preliminary diagnostics on the assessment of the development needs of the cotton cluster;
- ✓ Preparation of preliminary technical and economic justification for the production of dried fruits.

4. Monitoring and Evaluation

Agricultural Research Center implements monitoring and evaluation of the results of agricultural policy based on the methods used in international practice.

In accordance with the Mission of the Center, the strategic goals for sustainable development of agriculture, food security and rural development, the effectiveness of state support policy for agriculture, the impact of agricultural policy on the economic activity of agricultural producers, the implementation of state programs on agricultural policy and the effectiveness of the services provided by the agencies included in the structure of the Ministry of Agriculture is monitored and evaluated.

- **Following the Action Plan of the Center, monitoring and evaluation on the following directions were carried out in 2021:**

  - Conducting surveys within the framework of the Farm Data Monitoring System was continued;
  - Surveys were conducted within the framework of monitoring of farmers' access to the market and supply of production resources;
  - Surveys were conducted among small and medium farmers, processors and traders in order to study the needs of improving the business environment;
  - Reports on the implementation of the following state programs on agriculture adopted in 2021, as well as on the National Action Plan and other strategic policy documents have been prepared:

1. Report on the monitoring and evaluation of the implementation of the agrarian policy;

2. Report on the monitoring and evaluation of the state of implementation of the "Strategic Roadmap for the production and processing of agricultural products in the Republic of Azerbaijan" during the years 2017-2020, implemented by the Ministry of Agriculture;

3. Presentation of additional information on the implementation of development plans (action plans, measure plans, etc.) prepared for certain measures of the "Strategic Road Map for the production and processing of agricultural products in the Republic of Azerbaijan";

4. A report on the work done within the criteria selected in the 3rd Voluntary National Report to be submitted to the UN on the achievement of the Sustainable Development Goals;

5. Report on the work done in the field of supporting innovative development (including start-up activities);

6. Report on the work done within the framework of "Azerbaijan 2020: Vision of the Future Development Concept";

7. Final monitoring and evaluation of the latest state of implementation of State programs coordinated by the Ministry of Agriculture (cotton growing, cocoon growing and sericulture, tea growing, rice growing, citrus fruit growing, cooperation);

8. Collecting and summarizing reports on the work done during the first 6 months of 2021 under the "State Program for Socio-Economic Development of the Regions of the Republic of Azerbaijan in 2019-2023";

9. Within the framework of the Joint Action Plan (2020-2023) to support "Green agriculture" (Ministry of Agriculture and Ministry of Ecology and Natural Resources), participation in meetings and discussions at the level of a joint Working Group, collecting reports on the work done;

10. Preparation of information about the work done in connection with the implementation of proposals and recommendations put forward by deputies during the discussion in the Milli Majlis of the Republic of Azerbaijan;

11. In addition, 7 draft laws, state program drafts, reports, draft reports, references, etc. participated in the discussions related to the preparation of the document, opinions and suggestions were given.

5. Doctoral Education

Agricultural Research Center has a educational program for training of highly qualified personnel in agricultural economics and agricultural policy. Our policy in this program is to train mobile and concentrated researchers with high level of analytical skills, able to learn and apply modern methods of research.

The Center carries out doctoral and post doctoral programs in agricultural economics and trains highly qualified personnel in these programs.

Programs are conducted in full-time and part-time forms. During the preparatory process the topic of dissertation is determined, guidelines and methodological support are provided to students, regular discussions are held and students' activities are evaluated.

- In 2021, the Center trained 14 highly qualified personnel in the Doctor of Philosophy program, 12 in dissertation program, 14 in the Doctor of Science program, and each of them is carrying out research work on the approved topic. At the beginning of the year, to evaluate the annual activities of doctoral students, following the relevant rules, their certification was carried out by the decision of the Scientific Council of the Center No. 03 dated December 17, 2021.
- Questions and tickets for admission by specialization and doctoral program exams have been revised.
- In 2021, the initial documentation of doctoral admissions was organized, their dissertation topics and scientific supervisors were identified, considered by the Scientific Council, submitted to the Scientific Council for Economic Sciences under the Coordination Council for Scientific Research for approva.
- The admission plan for admission to doctoral programs of the Center for 2022 has been prepared and submitted accordingly. Following the plan approved by the Cabinet of Ministers of the Republic of Azerbaijan, 12 people submitted documents for admission to Doctor of Philosophy program, 2 people to the Doctor of Science program, 5 people for dissertation program. At present, the admission process is underway and the necessary work is implemented in this regard.
- In 2021, 2 doctoral students defended their dissertations under the Center's Doctor of Science program, and 3 doctoral students and dissertation students defended their dissertations under the Doctor of Philosophy program. 1 person completed their thesis work on the Doctor of Science program, 2 people completed their dissertation work on the Doctor of Philosophy program and submitted it to the preliminary discussion for defense.
- During 2021, 52 scientific articles (10 impact-factor articles, 30 of them abroad) were published by the Center's employees, doctoral students and dissertations. Among them, 18 theses (8 abroad), 7 newspaper articles, as well as 1 collective monograph were published abroad.

6. Publications. Public relations

Publications. In 2021, the scientific-practical journal entitled "Agricultural Economics" (Azerbaijanian journal of Agricultural Economics) of the Center was published once for every quarter. Scientific articles were published in 3 languages (Azerbaijani, English, Russian) in the journal. Also the webpage of the journal with an address agroeconomics.az was prepared, articles were placed on the "Google Scholar" research system.

In 2021, the indexing of the journal "Agricultural Economics" in the international bibliographic databases of scientific publications began, the journal was indexed in 4 international bibliographic databases, and all the articles of each issue were included in these databases as a whole and individually.

In line with above mentioned, a Monthly Information Bulletin reflecting the main statistical indicators related to agriculture and a Monthly Short Review concerning the world market conjuncture on agriculture and food products were prepared by the Center. Electronic versions of the Bulletin and Review are sent to influential international organizations, embassies, as well as local financial and business organizations operating in Azerbaijan.

Public Relations. In 2021, a number of works in the field of public relations were carried out in the Center. During the year, 338 articles in two languages (Azerbaijani and English) were published on the Center's https://atm.gov.az/ about the activities of the Ministry of Agriculture and ARC, as well as https://www.facebook.com/atm.gov.az social network account about the work done in the country's agrarian field, the achievements achieved, the promotion of the state policy in this field, the activities of the Ministry of Agriculture and its subordinate institutions, including the ARC.

In 2021, employees and specialists of the Center, including the leadership gave more than 100 interviews and statements on various fields of agriculture, implemented work, upcoming tasks in the periodical press, especially on television.

7. Strengthening of institutional capacity

In 2021, a number of works were carried out within the framework of organizational measures and strengthening the institutional capacity of the Agricultural Research Center. Capacity-building measures related to research, analytics, forecasting, planning, monitoring and evaluation activities, as well as software enhancement for econometric modeling, statistical analysis and databases, were continued during the year.

In order to improve the knowledge and skills of the employees, participation in trainings and seminars organized by various international and local organizations throughout the year is ensured. In 2021, the employees of the Center participated in about 90 trainings, seminars and video conferences.

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