

Agricultural Institute of Slovenia

LJUBLJANA 2021





Agricultural Institute of Slovenia

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Presentation of the Agricultural Institute of Slovenia

The Agricultural Institute of Slovenia is a multi-disciplinary research institution in the field of agriculture. Through its R&D, expert, and advisory work, it contributes to the comprehensive resolution of the problems of modern agriculture and, for this purpose, is expanding its activities into the areas of ecology and environmental protection. The Institute trains experts with a high level of methodological and professional skills to address sustainable challenges such as ensuring the production of quality food and the authenticity of products, while preserving biodiversity, adapting to climate change, and caring for natural resources.



Prof. Dr Andrej Simončič, Director



»The mission of the Agricultural Institute of Slovenia is to contribute to the development of the agricultural sector in the broadest sense.«



120

*More than 120 years of
tradition*

14

departments

220

employees

The Agricultural Institute of Slovenia (Kmetijski inštitut Slovenije – KIS; **hereinafter: KIS**) has more than 120 years of tradition, and is the oldest of its kind in Slovenia. From its foundation to the present time, it has operated in eight countries over different historical periods and has been led by 16 Directors. It was given its current name in 1954 and was registered as a research and scientific institution in 1958. Since 1996 it has been a public research institution. It is a national non-profit institution rendering a public service. The Institute in its current form as a public research institution was founded by the Republic of Slovenia, while the founding rights and obligations are implemented by the Government of the Republic of Slovenia, which does so through the representation of the Ministry of Education, Science and Sport (MESS), the Ministry of Agriculture, Forestry and Food (MAFF), and the Ministry of the Environment and Spatial Planning (MESP) by means of representatives in its management board. Its activity lies under the formal responsibility of the MESS.

KIS performs basic, applied, and developmental research, expert tasks determined by law, laboratory and infrastructural services, the commercial production and processing of agricultural products, supervision and control of the quality of agricultural products and products used in agriculture, and advisory services; it publishes the findings and results of its research and expert and control tasks, and also participates in the training and post-graduate education of researchers. As an active partner therein, it cooperates with related institutes and other organisations in Slovenia and abroad, and is actively involved in the international research area.

Fields of activity

- agriculture and vegetable cultivation in connection with seed science;
- genetics, breeding, maintenance breeding, and gene banks in agriculture;
- livestock production (cattle production, pig production, apiculture);
- fruit growing, viticulture, and wine production;
- plant protection;
- control of the fertility and quality of farmland;
- agricultural ecology;
- soil use and protection;
- agricultural engineering and energy production;
- analysis of soil, mineral and organic fertilisers, animal feed, honey, and pesticide residues;
- analysis of wine, must, and spirits; and
- agriculture economics.

The Agricultural Institute of Slovenia in 2020 in figures

Number of employees as of 31 December 2020	220
Researchers	85
of which early-stage researchers	10
Researchers involved in the teaching process	18
Research programmes	3
Infrastructure programme	1
Projects (34 of which KIS participates in as the coordinator and 64 as a partner)	98
Share of revenue from commercial activities	23.37%
Revenue – total	EUR 10.7 million



Organisation

Departments

The work of the Institute is organised in thirteen departments in addition to the Service for Official Certification of Seed and Plant Propagation Material as an independent unit. Most of the research and expert work is performed in modern laboratories in Ljubljana, where the Institute's management board is also based, as well as on experimental fields and plantations: at the seat of the Jablje Infrastructure Centre (420 ha of cultivated fields, of which 50 ha are intended for research), the Selection and Experimental Centre for Potato in Moste pri Komendi, the Experimental Orchard in Brdo pri Lukovici (16 ha), and the Apicultural Selection and Experimental Station in Senično pri Golniku. A great deal of work is also carried out on agricultural land throughout Slovenia.

The Scientific Council of the Agricultural Institute of Slovenia discusses issues and gives opinions on scientific and expert work, and is responsible for the development of research and expert work.

The Scientific Council:

- **Prof. Dr Marjeta Čandek-Potokar**, President;
- **Prof. Dr Andrej Simončič**, Director of KIS;
- **Dr Barbara Gerič Stare**;
- **Assoc. Prof. Dr Borut Vrščaj**;
- **Dr Kristina Ugrinovič**;
- **Dr Špela Velikonja Bolta**;
- **Tomaž Cunder**.

Leadership and management

- Director: **Prof. Dr Andrej Simončič**

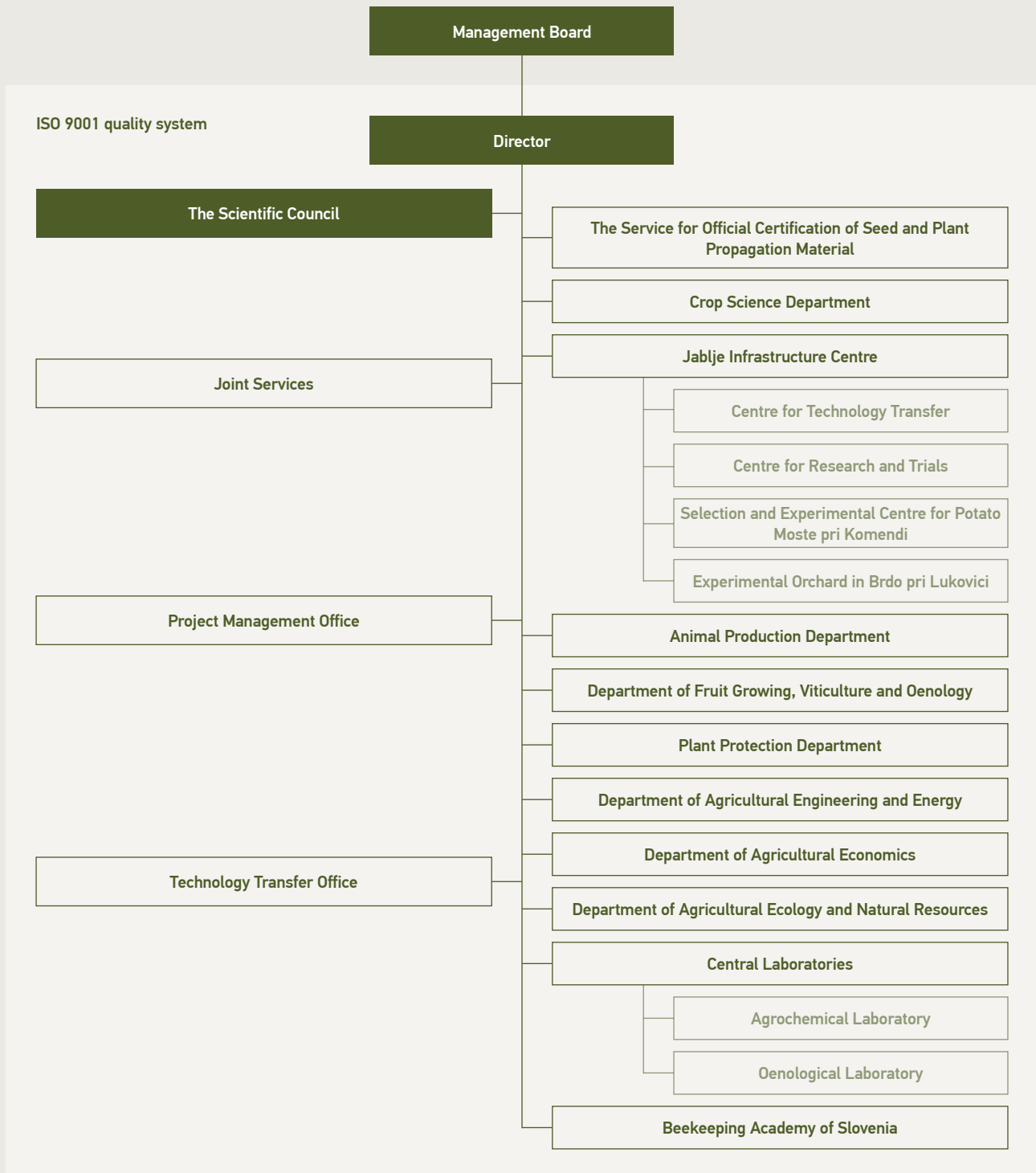
The composition of the management board (in the 2018–2022 term):

- **Mateja Tilia**, President, on the proposal of the ministry responsible for research;
- **Lidija Lipič Berlec**, member, on the proposal of the ministry responsible for agriculture, forestry, and food;
- **Irena Anica Oven**, member, on the proposal of the ministry responsible for the environment and spatial planning;
- **Jana Erjavec**, representative of users or interested parties;
- **Prof. Dr Franc Štampar**, representative of users or interested parties;
- **Anton Jagodic**, representative of users or interested parties;
- **Prof. Dr Marjeta Čandek-Potokar**, KIS employee representative.

Employees

The human resources policy of the Institute pursues two objectives: staffing in line with its financial capabilities and the hiring of staff with competencies that supplement or expand its existing activities. The number of employees has increased significantly in the last 10 years. As of the 110th anniversary of its operations in 2008, the Institute employed 150 workers. It took only another 10 years to add 50 employees, as in 2019 the number of employees already exceeded 200. In 2020, 53% of the 220 workers were women and 47% men. The same ratio is also recorded between female and male researchers. There are currently 85 Researchers employed, 53 of whom hold a PhD and 14 an MSc.

KIS Organisational scheme 2021





In 2021 the following were registered in the List of Varieties of the Republic of Slovenia: a variety of the common bean (*Phaseolus vulgaris* L.) with the approved name **KIS Amand**, and conservation varieties of sorghum (*Sorghum bicolor* (L.) Moench) with the approved name **Gorički** and garden poppy (*Papaver somniferum* L.) with the approved name **Matija**. KIS is currently in the process of obtaining an **EU patent** for the invention “Procedure and system for selective spraying of fruit trees adapted to the fruiting condition of fruit trees” (EP 3 804518 A1).

Quality

KIS has confirmed its commitment to quality over the last two decades by obtaining and maintaining certificates from different quality management schemes and systems. The accreditations and certificates obtained confirm its capacity to carry out the relevant activities and ensure the quality of crops.

KIS Quality Certificates

Area/Activity	Quality Standard or Scheme	Certificate	Year Granted
Agricultural Institute of Slovenia	SIST EN ISO 9001:2015	SIQ, certificate No. Q-1120	2007
Central Laboratories	SIST EN ISO/IEC17025:2017	Slovenian Accreditation, Accreditation No. LP-020	2002
Seed Laboratory	ISTA 2018	International Seed Testing Association (ISTA) Accreditation	2001
Plant Protection Department	Good Experimental Practice	DEP (GEP) U3433-11/2016/8	2012
Experimental Orchard in Brdo pri Lukovici	Good Agricultural Practice	GLOBAL G.A.P. 00050-TPHFL-0002	2010
Experimental Orchard in Brdo pri Lukovici	Selected Quality Slovenia	For fruit production: apples 143-IK-2018	2018
Agricultural Institute of Slovenia	ORGANIC	Certificate No. 41821; For fruit production: apples (39 varieties) and crops: wheat, field pea, alfalfa and buckwheat (1 variety each) and maize (2 varieties)	2021



Fields of science

addressed by the Institute in its activities are the following: the natural sciences, biotechnology, life sciences, and technology.

Research activity

The Agricultural Institute of Slovenia ranks among the five largest research institutes in Slovenia.

The research activities of the Institute are related to the fields of agriculture, ecology, and environmental protection. The researchers at the Institute have at their disposal the Institute's Library and the Information and Documentation Centre, with over 37,000 units of specialised literature. The direct effects of research work are, in practice, demonstrated in cooperation with companies, with the socio-economic relevance confirmed by the involvement of researchers in teaching at Slovenian universities. Scientific knowledge is the starting point for further development and expert work and the transfer into practice thereof in the local area and beyond. The upgrading and dissemination of knowledge and the integration of such content into national and international programmes and projects are extremely important for the development of science in the broader sense.

Researchers participate in four national programmes: Sustainable Agriculture, Agrobiodiversity, and the Infrastructure Programme (of which they are the coordinators), as well as Agro-food and Natural Resources Economics, in which they participate as one of the four partner institutions.

The Sustainable Agriculture Research Programme implements research to support the competitive and environmentally sustainable production of high-quality and healthy food of animal and plant origin. The knowledge and experience of the researchers involved in the programme enable complex problems of agriculture to be resolved through an interdisciplinary approach and holistic treatment. The programme has two pillars, with the technological pillar focusing on pro-

duction productivity and the quality of different agricultural (food) products. The second pillar focuses on the environmental aspects and impacts of agricultural activity on the environment and the conservation of natural resources.

Research into the interactions between cultivated plants, harmful organisms, and the environment, as well as improvement of the characteristics of varieties and technological approaches to crop production, is implemented within the framework of the Agrobiodiversity programme. Research combines the basic fields of genetics, population genetics, biochemistry and plant physiology, including the examination of harmful organisms and practical needs for the development of technologies in agriculture, integrated plant protection, environmental protection, and the production of quality and safe food.

The Infrastructure Programme provides infrastructural support to research programmes, projects, and expert and advisory services carried out at KIS and institutions with related activities. The Infrastructure Programme offers technological support in carrying out tasks in the fields of variety testing and seed science, plant health, livestock production, the gene bank of agricultural plants, crop breeding, and the quality of agricultural products and ecology. The Infrastructure Programme plays a major role in the activities carried out by KIS researchers for industry, local communities, NGOs, and business associations, as well as in the popularisation of science.



The “Agro-food and Natural Resources Economics” research programme brings together members of all research organisations in Slovenia scientifically involved in agricultural economics. The aim of the research is to deepen knowledge of the economic processes and effects of the changed situation in the fields of agriculture, the food industry, rural development, and natural resource management. The research results support decision-making leading towards greater competitiveness, efficiency, and environmental sustainability, and thus towards strategic objectives (smart, sustainable, and inclusive growth).

Research areas

- Plant genetics, breeding, and physiology** (new varieties of agricultural plants for higher crop quality and adaptation to the production conditions in Slovenia; different technological and technical approaches, breeding and modern genetic technologies for the detection and integration of new genes into adapted genetic backgrounds; plant resistance to abiotic and biotic stress; the development of effective and environmentally friendly methods for controlling economically significant harmful organisms, and faster adaptation to climate change through studies of the genetic structure of populations and an understanding of ecological and evolutionary processes; the quality of agricultural products and food, depending on genetic and environmental factors and production methods; the preservation of biodiversity through interactions between genotype and the environment; the collection of over 3,500 crop gene resources in the KIS gene bank).
- Crop production** (the development of precision agriculture (the mapping of agricultural land and crops, GPS technology, IT solutions for the exchange, processing, and use of information, etc.); modern technologies and different technical approaches to the production of fruit, vegetables, field crops, and fodder plants with grassland production in the event of extreme weather phenomena and changing climatic conditions (drought, inundation, hail, frost, temperature fluctuations, etc.; the coexistence of different forms of production (traditional, integrated, organic)).
- Fruit growing, viticulture, and wine production and oenology** (the selection of Slovenian grapevine clones and the introduction of new varieties of grapevine, apples, berries, and persimmon; maintenance of the database of isotopic ratios for Slovenian wines with geographical origin; research in the field of fruit growing (technology, the ecophysiology of fruit plants, the influence of soil and soil micro-organisms on fruit plants); viticulture and wine production research (technology: oxygen management, optimising maceration, harvesting time; wine chemistry and the microbiology of wine: the selection of naturally present yeasts; pesticide residues; the impact of wine consumption on human health); modern analytics in wine production (polyphenols, aromatic compounds and the precursors thereof, a metabolomic approach).
- Plant protection** (the comprehensive treatment of topics related to pests (i.e. viruses, nematodes, mites, insect pests, as well as weeds, bacteria, and fungi); the effects of climate change on pests (more favourable conditions for disease and pest development, the introduction of new diseases and pests); interactions between pests and crops and other biotic and abiotic factors (the use of molecular biology and bioinformatics); non-invasive detection of pests (including weeds, bacteria, and fungi) and diagnostic methods (remote sensing – multi- and hyperspectral imaging); integrated pest management; nature-based methods of plant protection and risk reduction in the use of pesticides); sources of resistance in related plants; the management of pest resistance).
- The agricultural environment and use of natural resources – soil** (the research and evaluation of the agricultural and environmental quality of soil (drought, productivity, suitability, pollution); sustainable use of farmland and the maintenance of soil fertility; the impacts of agriculture on the environment (groundwater and surface water quality, the balance of the greenhouse gas emissions and sinks of farmland); the biodiversity of agricultural areas; the quality and pollution of the soil in urban environments (gardening, risks from contaminated soil); information systems (web-based GIS applications, land and agri-environment databases); geoinformatics, digital soil mapping, GIS-modelling in the agri-environment).
- Agricultural economics** (monitoring and analysis of the situation in agriculture – the Report on the State of Agriculture in Slovenia; the assessment of production costs in agriculture – the Model Calculations by individual agricultural product; monitoring and analysis of agricultural policy and development measures; the development of modern methods of economic analysis in agriculture; rural development issues – structural change and regional development).
- Agricultural engineering and energy production** (the energy efficiency of agricultural machinery and agricultural process engineering in food production and processing; alternative energy sources in agriculture (biogas, biomethane, vegetable oils, solar energy, the development of micro oil mills, the development of biogas plants); the optimisation of working processes and mechanical engineering for soil treatment, sowing, irrigation, fertilisation, and plant protection; the safe use of agricultural machinery).

Involvement in domestic and international programmes and projects

In 2020, KIS participated in 98 projects, of which it coordinated 34; projects from the *Horizon 2020* programmes: **ECOBREED** (Increasing the Efficiency and Competitiveness of Organic Crop Breeding), the *INTERREG Programme: DINALPCONNECT* (The Transboundary Ecological Connectivity of the Alps and Dinaric Mountains), and **ACQUAVITIS** (Innovative Solutions for the Efficient Use of Water in Cross-border Viticulture); the European Innovation Partnership **Pilot Project Pokljuka** (Restoration of Biodiversity on Degraded Cross-Country Skiing Tracks on Pokljuka); the *EEA and Norway Grants Fund for Regional Cooperation* project **BeeConSel** (Joint Effort for Honey Bee Conservation and Selection) and the *European Food Safety Authority* project **NemDetect** (Early Detection of Quarantine Nematodes in Potatoes Using Remote Sensing).

KIS projects in 2020:	98
of which KIS as coordinator	34
KIS as partner	64
Projects of the Slovenian Research Agency (ARRS):	19
Basic research projects	2
Applied research projects	4
Post-doctoral research projects	1
International projects funded by the ARRS	5
Bilateral projects	7
Targeted research projects:	21
of which KIS as the coordinator	8
KIS as a partner	13
European projects and other international projects:	24
Horizon 2020 projects	9
INTERREG projects	5
COST projects	3
Other international projects	7
Research projects using European Structural and Investment Funds:	34
Projects funded by the European Regional Development Fund (ERDF)	7
Projects funded by the European Agricultural Fund for Rural Development (EAFRD)	27

- Livestock production – cattle production, pig production, and apiculture** (animal genetics and genomics, and breeding: research of the adaptability of animals to the environment, the introduction of new traits and methods of selection based on genomic information, the prediction of breeding values, the examination of the characteristics of indigenous breeds; animal nutrition: the efficiency of the digestion of proteins and energy in animals, feed additives in animal nutrition, the quality of forage, rapid methods for the nutritional evaluation of feedstuffs, the utilisation of bee foraging; the quality of animal products: research on the nutritional and technological quality of milk, meat, and meat products (in terms of rearing systems, nutrition, animal welfare, breed, slaughter and pre-slaughter operations, and processing conditions), sensoric analyses of honey; rearing systems, animal health, and welfare: intensive and extensive rearing methods, heat stress, animal longevity, udder health, alternatives to pig castration; selection methods and implementation of breeding programs for honeybees, the impact of diet on the development of honeybee colonies; the impact of biopesticides on honeybees as non-target organisms, honey yield as a function of the environment; the impact of livestock production on the environment: emissions of greenhouse gases and air pollutants, the burdening of agricultural land with livestock manure; information support: the management of databases and the development of information technologies for the purposes of rearing, providing advice, and supporting agricultural policy makers).





Expert work is carried out within the framework of **public services, tasks under a mandate, and other expert tasks.**

Expert and advisory work

The expert work of the Agricultural Institute of Slovenia plays an important role in its operations and is equivalent, in terms of the volume of work performed, to its research work and represents approximately a third of the activity of KIS.

The tasks are primarily aimed at agriculture and environmental protection. The emphasis of expert work is on breeding agricultural plants and the selection of livestock, the conservation of agricultural gene resources, the protection of agricultural plants against diseases and pests, the testing of new agricultural practices, agricultural crop and product analytics, as well as on the official certification of seed production, seeds, and plant propagation material. The systematic monitoring of the development of Slovenian agriculture is also included in the expert work of the Institute. Most of the expert tasks are financed by the Ministry of Agriculture, Forestry and Food, and KIS has been commissioned by the Ministry of the Environment and Spatial Planning to also perform tasks associated with the prevention of water pollution, farming in water-protection areas, and the protection of farmland.

The results of the expert work are important for both agricultural practice and industry as well as for agricultural policymakers. The Institute's staff are involved in the formulation of most of the strategic and operational plans for the development of Slovenian agriculture, including the Rural Development Programme.

Public services in the field of Agriculture

The Agricultural Institute of Slovenia provides public services in the field of agriculture, financed by the Ministry of Agriculture, Forestry and Food of the Republic of Slovenia (MAFF) and the Administration for Food Safety, Veterinary Sector and Plant Protection, which operates within the framework of the MAFF:



- **Public services in the crop-growing segment:**

- in the field of **agriculture** (crop breeding – potatoes, buckwheat, fodder crops (purple clover and meadow fescue); crop introduction and the determination of the value thereof for processing; crop production technologies; and expert and technical coordination in agriculture);
- in the field of **horticulture** (vegetable breeding – grain legumes; vegetable introduction and the determination of their value for processing; vegetable production technologies; expert and technical coordination in horticulture);
- in the field of **fruit growing** (the introduction and technology of apple growing; persimmon production technology; the introduction and technology of berry production; expert and technical coordination in fruit growing);
- in the field of **viticulture** (the introduction and technology of grapevine production (as coordinator) and cooperation in tasks for selecting grapevines in the Primorska wine-growing region and selecting grapevines in the Podravje and Posavje wine-growing regions);

- **Public services in the livestock production segment:**

- in the field of **cattle production** (performing regular tasks from approved breeding programs related to maintaining the herdbooks, determining the production capacities, performing selection, monitoring reproduction, predicting of breeding values, disseminating genetic gain, and other tasks; managing the information systems and databases; researching and developing tasks in the field of the implementation of breeding programs for the needs of the Joint Basic Breeding Programme;
- in the field of **pig production**;
- in the field of **beekeeping** (managing the Original Herd-Book of the Carniolan bee *Apis mellifera carnica*, advising on the line selection, issuing zootechnical documents, performing progeny and direct testing of queen bees);

- **Public services concerning the KIS Plant Gene Bank**

- **Public services concerning plant health:**

- the observation and forecasting of harmful organisms;
- prognostic equipment; and
- the integrated protection of plants against pests.

Tasks under public authority

Expert tasks performed by the Agricultural Institute of Slovenia under public authority:

- **Expert tasks performed by the Agricultural Institute of Slovenia under public authority:**

- official certification of crop and vegetable seeds and official certification of the propagation material of fruit plants, vines, and hops;
- post-control of the quality of officially certified crop seed material and the quality control of crop seed material samples taken for inspection on the market;
- the storage of official standard samples of seed material of protected varieties and varieties entered in the National List of Varieties;

- the implementation of investigative programmes regarding quarantine pests (of vines and seed potatoes);

- **Plant health tasks:**

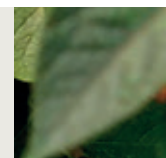
- preparation and implementation of tests to determine the presence of plant pests;
- laboratory tests;
- official and national reference laboratories;
- the provision of expert support to the Administration of the Republic of Slovenia for Food Safety, Veterinary and Plant Protection;

- **Other tasks under public authority:**

- the assessment of plant protection products;
- the assessment of substances and biocide products;
- laboratory analysis of pesticides;
- implementation of the monitoring of soil sampling with a field description as part of the implementation of soil monitoring;
- analysis of basic pedological parameters as part of soil monitoring;
- feedstuff analysis as part of the official control of feedstuff;
- analysis of wine as an authorised organisation for the assessment of must, wine, and other grape and wine products;
- analysis of spirits as a test laboratory for establishing the compliance of spirits and other alcoholic beverages.

Other expert tasks

The International Seed Testing Association (ISTA) accreditation of the Seed Laboratory (operating as part of the Service for the Official Certification of Seed and Plant Propagation Material), tasks concerning livestock production, environmental issues, fruit growing, viticulture and wine production, plant health, agricultural engineering and energy production, agricultural economics, agricultural ecology and natural resources, the tasks of the Central Laboratory, as well as the Beekeeping Academy of Slovenia, and other tasks.







Since 2021, the Institute has also offered on the market **flour** (type 500 and type 850) **produced from the wheat of the Gorolka variety**, grown in the fields of the Agricultural Institute of Slovenia in Jablje.

Commercial activities

Diverse commercial activities comprise a significant part of the activities of KIS, which are also important as they provide a significant part of the Institute's funding. The commercial activities include revenue from the sale of agricultural products and the performance of laboratory analyses, as well as the elaboration of various studies, consultancies, and measurements.

Following the connection of the Jablje Infrastructure Centre to KIS, its commercial activities have grown significantly, reaching almost 25% of total revenue.

The agricultural products offered on the market:

- fruit (apples and pears) produced at the Experimental Orchard in Brdo pri Lukovici;
- seed and ware potatoes of the Slovenian varieties KIS Blegoš, KIS Slavnik, KIS Savinja, KIS Sora, KIS Kokra, KIS Krka, and KIS Vipava, and organically produced seed of the KIS Kokra variety; all varieties are grown by the Institute as part of its breeding programme,
- the seed of spring and winter cereals (buckwheat, barley, oats, spelt, etc.),
- fodder cereals and cereals of bread-making quality (wheat, maize, barley, millet, etc.),
- fodder plant seed (Italian rye-grass, crimson clover, purple clover, rape, etc.).

Most of the seeds are produced in the fields of the Agricultural Institute of Slovenia.

KIS also offers milk and cattle (black and white bulls and breeding calves) raised at the Jablje Infrastructure Centre. In recent years, production has increased for buyers known in advance and cooperation with business has been strengthened.

The services provided by KIS to economic operators, local communities, inspection bodies, producers, and other clients as **part of commercial activities** include:

- seed sample analyses;
- feedstuff analyses;
- analyses of organic and mineral fertilisers;
- analyses of pesticides and the residues thereof;
- analyses of grapes, must, wine, and spirits;
- analyses of honey;
- genetic analyses and verifying the provenance of cattle;
- biological testing of the effectiveness of pesticides;
- soil sampling and soil measurements (i.e. of dangerous substances, nitrate-nitrogen, etc.) and analyses of the quality, suitability, and pollution of soil or land (the monitoring of soil quality and condition);
- advice on fertilisation based on chemical analyses of the soil;
- analyses of the energy consumption and operating parameters of agricultural machinery for industry, and the design and construction of plant oil processing systems;
- the development and maintenance of internet applications and agricultural databases (e.g. the LABKIS web-based application); and
- many other services concerning agriculture and the environment.



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