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**MINISTRSTVO ZA IZOBRAŽEVANJE,
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EVROPSKA UNIJA
EVROPSKI SKLAD ZA
REGIONALNI RAZVOJ
NALOŽBA V VAŠO PRIHODNOST

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KMETIJSKI INŠTITUT SLOVENIJE

AGRICULTURAL INSTITUTE OF SLOVENIA



izr. prof. dr. / Assoc. prof. dr. **Andrej Simončič**
 direktor Kmetijskega inštituta Slovenije /
 Director of the Agricultural Institute of Slovenia

Javni raziskovalni zavod, ustanovljen leta 1898, je najstarejši med sorodnimi inštituti v Sloveniji. Je neprofitna državna ustanova z opredeljenimi dejavnostmi v smislu javne službe. Sedanja ustanoviteljica, vlada Republike Slovenije, uveljavlja svoje ustanoviteljske pravice preko

»Kmetijski inštitut Slovenije je vodilna raziskovalna institucija na področju kmetijstva v Sloveniji. Celovito se ukvarja s problematiko sodobnega kmetijstva ter širi svoje delovanje na področje ekologije in varstva okolja.«

»Agricultural Institute of Slovenia is the leading agricultural research institution in Slovenia. It comprehensively covers the entire scope of modern agriculture and has also expanded into ecology and environmental protection.«

A public research institute founded in 1898, it is the oldest institution of its kind in Slovenia. It is a non-profit state institution rendering a public service. The founder, the Government of the Republic of Slovenia, exercises its founder rights through three ministries: the Ministry of Education,

treh ministrstev: Ministrstva za izobraževanje, znanost in šport, Ministrstva za kmetijstvo, gozdarstvo in prehrano ter Ministrstva za okolje in prostor.

Na inštitutu v okviru registrirane dejavnosti opravljajo temeljne, uporabne in razvojne raziskave, z zakoni opredeljene strokovne naloge, laboratorijske ter infrastrukturne storitve, nadzor in preverjanje kakovosti kmetijskih pridelkov ter izdelkov, ki se uporabljajo v kmetijstvu, svetovanje, usposabljanje in podiplomsko izobraževanje raziskovalcev ter objavljane spoznanj in rezultatov raziskovalnega, strokovnega ter kontrolnega dela.

Science and Sport, the Ministry of Agriculture, Forestry and Food, and the Ministry of the Environment and Spatial Planning.

The Institute is registered for the performance of the following activities: basic, applied, and developmental research; expert tasks determined by law; laboratory and infrastructure services; supervision and control of the quality of agricultural products and products used in agriculture; consultancy; training and postgraduate education of researchers; and the publication of the findings and results of its research, expert, and control tasks.

Področja delovanja:

- poljedelstvo in zelenjadarstvo s semenarstvom,
- genetika, žlahtnjenje, vzdrževalna selekcija in genske banke v kmetijstvu,
- živinoreja (govedoreja, prašičereja, čebelarstvo),
- sadjarstvo, vinogradništvo in vinarstvo,
- varstvo rastlin,
- kontrola rodovitnosti in kakovost kmetijskih zemljišč,
- ekologija kmetijskega prostora,
- raba in varstvo tal,
- kmetijska tehnika in energetika,
- analize tal, mineralnih in organskih gnojil, živalske krme, medu, ostankov pesticidov in fitofarmaceutskih sredstev,
- analize vina, mošta in žganih pijač ter
- ekonomika kmetijstva.

Areas of work:

- Crop and seed science and vegetable production;
- Genetics, breeding, maintenance breeding, and gene banks for food and agriculture;
- Animal production (cattle production, pig production, apiculture);
- Fruit growing, viticulture, and oenology;
- Plant protection;
- Control of the fertility and quality of agricultural land;
- Agricultural ecology;
- Soil use and protection;
- Agricultural engineering and energy production;
- Analysis of soil, mineral, and organic fertilisers, animal feed, honey, pesticide residues, and pesticides;
- Analysis of wine, must, and spirits;
- Agriculture economics.

Struktura financiranja inštituta: ustanoviteljske obveznosti 10–20 %, projekti, raziskave in strokovne naloge 60–70 %, trženje blaga in storitev 20 %.

The financial structure: foundation financing 10-20 %, projects, research and expert tasks 60-70 %, selling of goods and services 20 %.

Zaradi prilagajanja sodobnim potrebam razvoja je Kmetijski inštitut Slovenije leta 2013 ustanovil Oddelek za kmetijsko ekologijo in naravne vire ter samostojno Službo za uradno potrjevanje semenskega in sadilnega materiala kmetijskih rastlin. S pripojitvijo Centra za razvoj kmetijstva in podeželja Jable ter ustanovitvijo Infrastrukturnega centra pa je pridobil dodatne kapacitete za razvoj in prenos sodobnih tehnologij v kmetijsko prakso. Delo poteka v okviru devetih oddelkov in je močno prepleteno med seboj.

In response to the latest development trends, in 2013 the Agricultural Institute established the Department of Agricultural Ecology and Natural Resources, and an independent Service for Official Certification of Seed and Plant Propagation Material. After merging with the Jable Centre for Agricultural and Rural Development and the establishment of the Jablje Infrastructure Centre, the Institute acquired additional capacities with regard to the development and transfer of cutting-edge technologies into agricultural practice. The work is carried out in nine closely interconnected departments.

Raziskovalno in strokovno delo večinoma poteka v sodobno opremljenih laboratorijih na inštitutu ter na poskusnih poljih in nasadih v okolici Ljubljane.

- Poskusni sadovnjak na Brdu pri Lukovici
- Infrastrukturni center Jablje
- Poskusni center za krompir Moste pri Komendi in selekcijsko polje v Lahovčah
- Selekcijsko-poskusna postaja za čebele v Seničnem pri Golniku
- Kolekcijsko-poskusni nasad ameriških borovnic na Drenovem Griču

Sodelovanje z gospodarstvom, prenos znanja in tehnologij v prakso, zaščita intelektualne lastnine ter ozaveščanje javnosti so aktivnosti, ki jih na inštitutu izvaja Pisarna za prenos tehnologij z namenom prispevati k razvoju slovenskega kmetijstva.

Danes se Kmetijski inštitut Slovenije uvršča med pet največjih inštitutov v slovenskem raziskovalnem prostoru. Zaposluje 191 delavcev, med temi 84 raziskovalcev, ki so vpeti v štiri nacionalne raziskovalne programe, od katerih so nosilci treh: Trajnostno kmetijstvo, Agrobiodiverziteta in Infrastrukturni program.

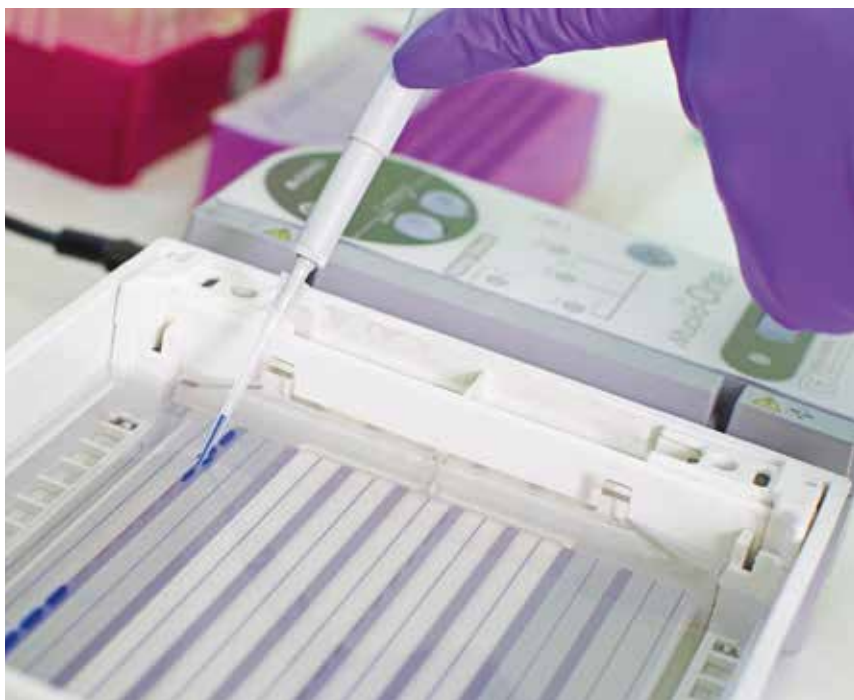
Most of the research and expert work is performed in modern laboratories at the Institute or on experimental fields and plantations on the outskirts of Ljubljana:

- The experimental orchard at Brdo pri Lukovici;*
- The Jablje Infrastructure Centre;*
- The experimental potato centre in Moste pri Komendi and the experimental field in Lahovče;*
- The apicultural selection and experimental station in Senično pri Golniku;*
- The collection and experimental plantation of highbush blueberry in Drenov Grič.*

Cooperation with the industry, the transfer of know-how and technology into practice, intellectual property protection and raising public awareness are activities carried out by Institute's Technology Transfer Office to contribute to the development of Slovenian agriculture.

The Agricultural Institute ranks among the five largest research institutions in Slovenia. It employs a staff of 191, among them 84 researchers who participate in four national research programmes, in three of which they are the lead partners: Sustainable Agriculture, Agrobiodiversity, and the Infrastructure Programme.





V podporo raziskovalnemu delu delujeta na inštitutu knjižnica in INDOK z več kot 33.000 knjižnimi enotami strokovne literature, dostopne tudi zunanjim uporabnikom.

Kmetijski inštitut Slovenije ima vzpostavljen in ustrezno vzdrževan sistem vodenja kakovosti, ki izpolnjuje zahteve standarda ISO 9001. Semenski laboratorij, ki deluje v okviru Službe za uradno potrjevanje, je akreditirani član International ISTA – Seed Testing Association. Centralni laboratorij (s podenotama Agrokemijski laboratorij in Enološki laboratorij) je akreditiran pri Slovenski akreditaciji. Status laboratorija zagotavlja neodvisnost in nepristranskost rezultatov. Posamezne enote so pridobile certifikate Dobra kmetijska praksa (GAP), Dobra eksperimentalna praksa (GEP) in Dobra laboratorijska praksa (GLP) ter certifikate za integrirano in ekološko pridelavo sadja.

Znanstveno in strokovno odličnost na področju kmetijskih ter sorodnih ved inštitut krepi z vlaganjem v znanje in raziskovalne kapacitete. Sodeluje z mnogimi domačimi ter uglednimi inštitucijami iz Evrope, pa tudi izven, predvsem iz ZDA, Kitajske, Brazilije in Južnoafriške republike. Težišče mednarodnega sodelovanja je vključevanje v evropske projekte, pri katerih je izkazal uspešnost tudi v vlogi koordinatorja pri projektih FP7 in Obzorja 2020.



The researchers have at their disposal a library and an information and documentation centre with over 33,000 units of specialised literature, which is also accessible to external users.

The Agricultural Institute of Slovenia maintains a quality management system that complies with the ISO 9001 standard. The Seed Laboratory, which is under the auspices of the Official Certification Service, is an accredited member of the International Seed Testing Association – ISTA. The Central Laboratory (including its subunits, the Agrochemical Laboratory and the Oenology Laboratory) is nationally accredited. Its status ensures that the results are independent and unbiased. Individual units have acquired the following certificates: Good Agricultural Practice (GAP), Good Experimental Practice (GEP), and Good Laboratory Practice (GLP), as well as certificates for integrated and ecological fruit production.

The Institute enhances scientific and professional excellence in agricultural and related sciences by investing in know-how and research capabilities. It cooperates with many domestic institutions and renowned institutions in Europe and beyond, in particular in the US, China, Brazil, and the Republic of South Africa. International cooperation is centred on European projects, in which the Institute has also excelled as project coordinator in FP7, and in Horizon 2020 projects.



ODDELEK ZA POLJEDELSTVO, VRTNARSTVO, GENETIKO IN ŽLAHTNENJE *CROP SCIENCE DEPARTMENT*

Raziskovalno delo poteka na področjih genetike, žlahtnje-nja, fiziologije in tehnologije pridelovanja poljščin, krmnih rastlin ter vrtnin, medtem ko strokovno delo obsega predvsem področja žlahtnjenja novih sort poljščin in vrtnin, genske banke, preskušanja in rajonizacije novih sort kmetijskih rastlin, vrtnarskega središča ter koordinacije dela petih vrtnarskih postaj v Sloveniji. Strokovne naloge s teh področij, ki jih izvajajo v sodelovanju z Ministrstvom za kmetijstvo, gozdarstvo in prehrano (MKGP), imajo značaj javne službe. Na oddelku je na voljo ustrezna raziskovalna infrastruktura (genetski laboratorij in laboratorij za tkivne kulture ter rastlinjak), medtem ko so preskusna polja del Infrastrukturnega centra Jabolje.

Raziskave

Raziskovalno delo je smiselno razdeljeno na pet področij: genetika in fiziologija kmetijskih rastlin, genski viri in bi-odiverziteta, žlahtnjenje, nove tehnike, tehnologije in metode za raziskave v kmetijstvu ter tehnologije in sistemi pridelave kmetijskih rastlin. Delo poteka v Laboratoriju za genetiko in fiziologijo rastlin, Laboratoriju za tkivne kulture, genski viri pa so shranjeni v Centralni hladilnici Slovenske rastlinske genske banke na Kmetijskem inštitutu Slovenije. Rezultati raziskav lahko omogočijo slovenskim pridelovalcem hrane nadaljnji razvoj in večjo konkurenčnost.

The research carried out by the Department encompasses the genetics, breeding, physiology, and technology of crops, fodder plants, and vegetables, while the expert work focuses primarily on the breeding of new varieties of crops and vegetables, the gene bank, the testing and scientific categorisation of new plant varieties, the horticultural centre, and coordination of the operation of five horticultural research stations in Slovenia. The applied activities in these fields, carried out in cooperation with the Ministry of Agriculture, Forestry and Food, are performed as a public service. The Department has appropriate research infrastructure (a laboratory for genetics and physiology, a tissue culture laboratory, and a greenhouse), while the experimental fields are a part of the Jabolje Infrastructure Centre.

Research

The Institute's research covers the following five areas: crop genetics and physiology; genetic resources and biodiversity; breeding; new techniques, technologies, and methods in agricultural research; and crop production technologies and systems. The research is carried out at the Plant Genetics and Physiology Laboratory and the Tissue Culture Laboratory. The genetic resources are stored at the Central Cryogenic Storage of the Institute's Slovenian Plant Gene Bank. The research results assist Slovenian food producers in pursuing continuous development and persevering in the competitive international environment.

Na inštitutu ima žlahtnjenje kmetijskih rastlin dolgoletno tradicijo. Od leta 1947 so vzgojili več kot 40 novih sort krompirja, trav, detelj, fižola, zelja in pšenice. Pri vzgoji novih sort namenjajo največji poudarek odpornosti proti boleznim in škodljivcem, večji kakovosti ter prilagodljivosti slovenskim pridelovalnim razmeram. Genska banka kmetijskih rastlin na Kmetijskem inštitutu Slovenije, ki primarno služi ohranjanju slovenskih sort in genskih virov avtohtonih rastlin ter ekotipov kulturnih rastlin, pri mnogih vrstah predstavlja bogat vir genov za potrebe žlahtnjenja. Znotraj posameznih zbirk kmetijskih rastlin, ki jih hranijo, izvajajo raziskave na področju populacijske genetike. Te vključujejo proučevanje frekvenc in toka alelov znotraj avtohtonih kulturnih rastlin in z njihovimi divjimi sorodniki. Raziskave predstavljajo osnovo za nadaljnje delo na področju soobstoja različnih načinov pridelave z vključevanjem gensko spremenjenih rastlin, tradicionalne ali ekološke pridelave.

Skupina za poljedelstvo in vrtnarstvo se posveča široki problematiki razvoja in uvajanja novih tehnologij pridelave zelenjadnic, poljščin ter krmnih rastlin s travništvom. Vedno več časa namenjajo spremljanju kakovosti pridelkov ter primernosti za skladiščenje in uporabo. V zadnjih letih je bil eden od poudarkov soobstoj različnih načinov pridelave.

Crop breeding has a long tradition at the Institute. Since 1947 over 40 new varieties of potato, grass, clover, beans, cabbage, and wheat have been cultivated. The breeding of new varieties emphasises resistance to disease and pests, quality improvement, and adaptation to the growing conditions in Slovenia. The Plant Gene Bank at the Agricultural Institute of Slovenia, which is primarily intended to preserve Slovenian varieties and the gene resources of native plants and the ecotypes of cultivated plants, is a rich genetic source for breeding many species. Population genetics studies are carried out on the individual collections stored in the Slovenian plant gene bank. These include studying allele frequency and genetic drift within native cultivated plants, as well as gene flow with wild relatives. Such research provides a basis for subsequent work on the coexistence of different production methods with the inclusion of genetically modified plants, in traditional or ecological production.

The crop science team deals with the development and introduction of new technologies for the production of vegetable crops, field crops, and grass fodder. An increasing amount of time is dedicated to monitoring the quality of products and their suitability for storage and use. In recent years, one of the focal points has been the coexistence of different production methods.

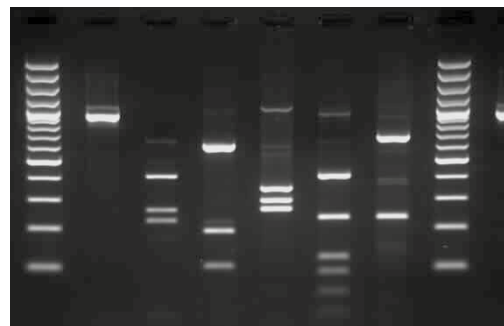


Poudarek novejših raziskav je predvsem na odpornosti rastlin na biotski in abiotski stres na ravni fenotipa, DNK, proteinov in metabolitov ter na proučevanju interakcij med genotipom rastlin in okoljem. S poudarjenim interdisciplinarnim in celovitim pristopom k raziskovalnemu delu iščejo odgovore na kompleksna vprašanja trajnostnega, družbeno-ekonomskega in kulturnega razvoja Slovenije.

More recent research is focused on plant resistance to biotic and abiotic stress at the level of phenotype, DNA, protein, and metabolite, and the study of interactions between plant genotype and the environment. The emphasis is given to the interdisciplinary and holistic approach to find answers to the complex issues of Slovenia's sustainable socioeconomic and cultural development.

Zaradi vedno večjega vpliva podnebnih sprememb na kmetijstvo in pridelovanje hrane, je proučevanje možnosti prilagajanja tehnologij kmetijske pridelave spremenjenim pridelovalnim razmeram nujna in pomembna usmeritev raziskav.

Due to the increasing impact of climate change on agriculture and food production, studying the possibilities for adapting agricultural technologies to the altered growing conditions is a necessary and crucial research aim.



Strokovno delo

Strokovne naloge s področja varstva in registracije sort rastlin ter semenarstva, posebnega preizkušanja sort poljščin in zelenjadnic ter žlahtnjenja in genske banke potekajo po pooblastilu in naročilu MKGP. Naloge imajo značaj javne službe, financira jih MKGP oziroma Uprava Republike Slovenije za varno hrano, veterinarstvo in varstvo rastlin in se izvajajo na temelju javnega pooblastila.

Oddelek je nosilec strokovnih nalog s področij: rastlinske genske banke, žlahtnjenja kmetijskih rastlin (krompir, ajda, krmne rastline, fižol), registracije sort rastlin in semenarstva (preskušanje sort v postopku vpisa v sortno listo, preverjanje vzdrževanja sort za obnovo vpisa in preverjanje pogojev za vpis vrtničarskih ter ohranjevalnih sort, hranjenje uradnih standardnih vzorcev semenskega materiala zavarovanih sort in sort, vpisanih v slovensko sortno listo, naknadna kontrola kakovosti uradno potrjenega semenskega materiala kmetijskih rastlin in nadzor semenskega materiala na trgu) ter posebnega

Expert work

The expert tasks regarding the protection and registration of plant varieties, seed science, special testing of field crops and vegetables, breeding, and the gene bank are carried out under authorisation granted by the Ministry of Agriculture, Forestry and Food. These tasks are rendered as a public service and financed by the Administration of the Republic of Slovenia for Food Safety, Veterinary and Plant Protection on the basis of public authorisation.

The Department is authorised to carry out expert tasks in the following fields: the plant gene bank, crop breeding (potato, buckwheat, fodder crops, beans), the registration of plant varieties and seed science (the testing of varieties as part of the procedure for registration in the list of varieties; verification of the maintenance of varieties for the extension of a registration and verification of the conditions for the registration of amateur and conservation varieties; the preservation of official standard samples of the seed units of protected varieties and varieties

preizkušanja sort za opisno sorto listo (poljščine, zelenjadnice, naloge vrtnarskih centrov in postaj, sadne rastline, vinska trta, oljke).

Storitve

Za zunanje naročnike nudijo preskušanje sort in hibridov ter uporabne vrednosti poljščin in zelenjadnic. V sodelovanju s Službo za uradno potrjevanje v genetskem laboratoriju preverjajo in identificirajo vrste ter sorte kmetijskih rastlin in določajo prisotnost gensko spremenjenih organizmov. Laboratorij je član evropske mreže laboratorijev za določanje gensko spremenjenih organizmov ENGL (European Network of GMO Laboratories). Vključeni so v svetovanje in organizirajo različna strokovna srečanja ter izobraževanja.

registered in the national list of varieties; post-control of the quality of officially certified seed units of crops; and control of seed units on the market), and special testing of varieties for the descriptive list of varieties (field crops, vegetable crops, the tasks of horticulture centres and stations, fruit varieties, grapevine, olive trees).

Services

The Department offers commercial testing of varieties and hybrids and of the value of field and vegetable crops. In cooperation with the Official Certification Service, the gene laboratory verifies and identifies crop species and varieties, and analyses the presence of genetically modified organisms. The laboratory is a member of the European Network of GMO Laboratories – ENGL. It provides consultancy services and organises professional events and training courses.



Kmetijski inštitut Slovenije koordinira nacionalni program SRGB – Slovenska rastlinska genska banka. Naloga in poslanstvo programa sta zbiranje, vrednotenje, evidentiranje, hranjenje in razmnoževanje slovenskih avtohtonih genskih virov kmetijskih rastlin ter njihovih divjih sorodnikov. V genski banki na Kmetijskem inštitutu Slovenije so shranjene slovenske sorte, linije in kloni kmetijskih rastlin ter ekotipi travniških in drugih avtohtonih rastlin, pomembnih za kmetijstvo, na način, ki omogoča pristope *ex situ*, *in vivo* ter *in vitro*. Najdragocenejši vir v vsaki genski banki predstavljajo avtohtone – domače sorte ali populacije, ki predstavljajo s svojo genetsko raznolikostjo in prilagodljivostjo danim talnim in podnebnim razmeram dragocen vir za žlahtnjenje, hkrati pa pomemben narodov zaklad, ki ga je treba ohraniti.

*The Agricultural Institute of Slovenia coordinates the national SPGB programme – the Slovenian Plant Gene Bank. The mission of the programme is to collect, evaluate, record, preserve, and propagate the gene resources of native crops and their wild relatives. The gene bank at the Agricultural Institute keeps Slovenian varieties, lines, and clones of crops, and ecotypes of grassland and other native plants important to agriculture, allowing *ex situ*, *in vivo*, and *in vitro* approaches. The most precious resource of any gene bank is its native varieties or populations, whose genetic diversity and adaptation to the soil and climatic conditions makes them an invaluable source for breeding. They also represent a national treasure that must be preserved.*



INFRASTRUKTURNI CENTER JABLJE *JABLJE INFRASTRUCTURE CENTRE*

S pridružitvijo Centra za razvoj kmetijstva in podeželja KPC Jable ter ustanovitvijo oddelka Infrastrukturni center Jablje si je Kmetijski inštitut Slovenije utrdil sloves osrednje znanstveno-raziskovalne in strokovne institucije na področju kmetijstva v Sloveniji, ki uspešno uvaja in prenaša nova znanstvena spoznanja v kmetijsko prakso. Bližina Ljubljane omogoča lažjo uporabo infrastrukture in zemljišč za poskuse vsem oddelkom Kmetijskega inštituta Slovenije ter ostalim strokovnim, znanstvenim in izobraževalnim institucijam.

Oddelek obdeluje dobrih 420 ha zemljišč, od katerih je tretjina težjih tal, dve tretjini pa lahkah peščenih tal. Del celotnega kompleksa se nahaja na najožjem vodovarstvenem območju. Na Infrastrukturnem centru Jablje izvajajo in nudijo podporo strokovno-raziskovalnemu in znanstveno-raziskovalnemu delu, vzdržujejo in pridelujejo semena slovenskih avtohtonih sort kmetijskih rastlin ter pridelujejo žita. Za Kmetijski inštitut Slovenije kot tudi za druge institucije, ki delujejo na področju raziskovanja, izobraževanja in svetovanja v kmetijstvu (Biotehniška fakulteta Univerze v Ljubljani, Fakulteta za kmetijstvo in biotehniške vede Univerze v Mariboru, Kmetijsko gozdarska zbornica Slovenije, srednješolski kmetijski centri), predstavlja Infrastrukturni center Jablje nenadomestljivo

Having founded the Jablje Infrastructure Centre after absorbing the Jable Centre for Agricultural and Rural Development KPC, the Agricultural Institute of Slovenia reaffirmed its reputation as the central scientific, research, and expert agricultural institution in Slovenia, an institution that successfully introduces and transfers new scientific know-how into agricultural practice. The proximity of Ljubljana facilitates the use of the infrastructure and land for experiments by all departments of the Agricultural Institute of Slovenia and other professional, scientific, and educational institutions.

The Centre cultivates 420 ha of land, of which a third has heavier soil and a two-thirds light sandy soil; a part of the land complex is located within a drinking water protection zone. The Jablje Infrastructure Centre performs and provides support for expert and scientific research, maintenance breeding, produces seed of own varieties of agricultural crops and commercial cereals. For the Agricultural Institute of Slovenia as well as other institutions working in agricultural research, education and consultancy (the Biotechnical Faculty of the University of Ljubljana, the Faculty of Agriculture and Life Sciences of Maribor University, the Chamber of Agriculture and Forestry of Slovenia, secondary school agricultural centres), the

infrastrukturo na področju kmetijstva in varstva okolja. Omogoča kakovostno raziskovalno, pedagoško, svetovalno in demonstracijsko delo pri praktičnem usposabljanju dijakov, študentov ter ostalega kmetijskega strokovnega osebja. Z organizacijo dnevov odprtih vrat (vrtnarstvo, travništvo) in izobraževanj skrbijo za prenos novih spoznanj širšemu krogu uporabnikov.

Infrastrukturni center Jablje sestavljata dva pododdelka: Center za raziskave in poskusništvo ter Center za prenos tehnologij.

Center za raziskave in poskusništvo oskrbuje poskusna polja, namenjena znanstveno-raziskovalnemu in strokovnemu delu. Večina raziskav je povezana s programi strokovnih nalog s področja varstva in registracije sort rastlin ter semenarstva in posebnega preizkušanja sort za opisno sortno listo ter žlahtnjenja. Nudijo tudi podporo nacionalnemu programu Slovenska rastlinska genska banka.

Jablje Infrastructure Centre provides indispensable infrastructure for agriculture and environmental protection. It provides the conditions for quality research, teaching, consultancy, and demonstrational work in the practical training of students and other agriculture professionals. The Centre organises open door days (horticulture, grassland production), demonstrations, and courses in order to transfer new know-how to a broad user base.

The Jablje Infrastructure Centre has two subunits: the Centre for Research and Trials and the Centre for Technology Transfer.

The Centre for Research and Trials tends experimental fields dedicated to scientific research and expert work. The majority of the studies are associated with expert tasks concerning the protection and registration of plant varieties, crop science, special testing of varieties for the descriptive list of varieties and plant breeding. They also provide support for the national Slovenian Plant Gene Bank programme.



Del aktivnosti infrastrukturnega centra predstavlja skrb za Mednarodni trajni poskus z organskim dušikom IOSDV (Internationale organische Stickstoff – Dauerdüngungsversuche) za poljščine in krmne rastline v Jabljah ter Rakičanu.

One of the more important activities of the Infrastructure Centre is the management of the International Organic Nitrogen Long-Term Fertilisation Experiment (IOSDV) for field crops and forages in Jablje and Rakičan.

Večina polj, ki jih obdeluje Center za prenos tehnologij, je namenjena semenski pridelavi poljščin, del pa demonstracijam prenosa novih strokovnih spoznanj in tehnologij v prakso: na področjih tehnologije pridelave, semenarstva, živinoreje, varstva rastlin in kmetijske tehnike. Center je eden pomembnejših pridelovalcev in vzdrževalcev avtohtonih slovenskih sort kmetijskih rastlin (trave, detelje, žita, oljnice, proso, ajda, krompir in zelenjadnice), ki so bile požlahtnjene na Kmetijskem inštitutu Slovenije. Poleg semen pridelujejo tudi kakovostna krušna in krmna žita, koruzo ter druge kmetijske rastline. V okviru Centra za prenos tehnologij skrbijo za čredo krav molznic (95 GVŽ). K hlevu je pripojena tudi poskusna mikrobioplinska naprava skupne nazivne moči 7 kW, ki je namenjena okoljevarstvenim raziskavam.

Raziskave

Na Infrastrukturnem centru Jablje sledijo najsodobnejšim trendom in uvajajo nove tehnologije v kmetijski panogi. Nedavno so zgradili sodobna plastenjaka, ki nudita optimalne pogoje za raziskave in vzgojo brezvirusnega materiala v zaprtih prostorih, raziskave pa bodo širili predvsem na področju zelenjadarstva, v smeri raziskav pridelovanja v zaprtih prostorih.

Z načrtovano izgradnjo namakalnega sistema, ki bo sofinanciran s strani evropskih sredstev, bo infrastrukturni center pridobil vso potrebno infrastrukturo za izvajanje najzahtevnejših raziskav (npr. proučevanje vplivov namakanja na podtalnico in okolje, preizkušanje različnih namakalnih tehnik in sistemov, fertilizacijske raziskave itd.). S tem bo imel pogoje za znanstveno-raziskovalno delo na področju namakanja v Sloveniji in v tem delu Evrope.

Storitve

Prodajna ponudba obsega semena rastlin, vzgojenih na Kmetijskem inštitutu Slovenije: krmne rastline (inkarnatka Inkara, mnogocvetna ljuljka KPC Laška in KIS Draga, ozimna krmna ogrščica Starška ...), žita in zelenjadnice (ajda Čebelica, oves Noni, proso Sonček, solata Ljubljanska ledenka ...), krompir (Bistra, KIS Sora, KIS Kokra, KIS Mura, KIS Krka, KIS Vipava, KIS Slavnik ...), semena ozimnih žit, kakovostna krušna in krmna žita ter koruzo.

Most of the fields operated by the Centre for Technology Transfer are set aside for field crop seed production, while a part is used for demonstrations of the transfer of new know-how and technologies into practice in the areas of production technology, crop science, animal production, plant protection, and agricultural techniques. The Centre is one of the most important producers and maintenance breeders of Slovenian field and vegetable crop varieties (grasses, clovers, cereals, millet, buckwheat, potato, oil and vegetable crops) bred at the Agricultural Institute of Slovenia. In addition to seed production, it also produces cereals of bread-making quality, animal feed cereals, maize, and other crops. The Centre for Technology Transfer also maintains a herd of dairy cows (95 head). Adjacent to the stable is an experimental 7 kW micro biogas plant dedicated to environmental research.

Research

The Jablje Infrastructure Centre follows the latest trends and introduces new agricultural technologies. It recently constructed two cutting-edge plastic greenhouses that provide optimal conditions for research into and the breeding of virus-free materials in enclosed spaces. The research expand to vegetable growing systems in enclosed spaces.

The planned construction of an irrigation system, which will be co-financed by EU funds, will provide the Centre with all the infrastructure needed to carry out the most complex research (e.g. study of the impact of irrigation on groundwater and the environment, testing of various irrigation techniques and systems, fertirrigation), creating conditions for scientific research of irrigation in Slovenia and Europe wide.

Services

On the commercial side, the Centre markets seeds of varieties bred at the Agricultural Institute of Slovenia: fodder crops (e.g. crimson clover Inkara, Italian rye-grass KPC Laška and KIS Draga, swede Starška), cereals and vegetables (e.g. buckwheat Čebelica, oats Noni, millet Sonček, lettuce Ljubljanska ledenka), potatoes (e.g. Bistra, KIS Sora, KIS Kokra, KIS Mura, KIS Krka, KIS Vipava, KIS Slavnik), and cereals of bread-making quality, for animal feed, and maize.

Projekt Inštitutski vrt za izobraževalne namene

Na lokaciji Infrastrukturnega centra Jablje so v letu 2015 uredili vzorčni vrt, na katerem bodo pridelovali avtohtone, tradicionalne in udomačene sorte kmetijskih rastlin; v prvi fazi zelenjadnice in nekatere poljščine (sladka in pop corn koruza) ter krmne rastline (bob, fižol, soja). V drugi fazi bo razširjen z jagodičevjem in nato še s sadjem. Cilj je na sodoben in interaktiven način prikazati pridelovanje vrtnin, od osnovne zasnove vrta (izbira primernega zemljišča, postopek vzorčenja tal, odmera zemlje) in priprave zemlje (prekopavanje, osnovno gnojenje,) do načrtovanja gredic, izbora primernih rastlin, nege ter varstva rastlin pred boleznimi in škodljivci.

The educational project Institute Garden

A sample garden was established in 2015 at the Jablje Infrastructure Centre to cultivate autochthonous, traditional, and domesticated crop varieties. The first phase involved the planting of vegetable plants, selected field crops (sweet corn and popcorn) and legumes (broad beans, kidney beans, soy). In the second phase, the garden will be expanded first with berries and then with fruit trees. The aim is to present vegetable production in gardens in a contemporary and interactive way, from garden layout (the selection of appropriate land, soil sampling, and parcelling) and soil preparation (tilling, basic fertilising), to bed planning, the selection of appropriate plants, growing, and the protection of plants from diseases and pests.





ODDELEK ZA ŽIVINOREJO *ANIMAL PRODUCTION DEPARTMENT*

Delo je usmerjeno pretežno na področje govedoreje, prašičereje in čebelarstva. Vsebinski poudarek je predvsem na kakovosti živalskih proizvodov, varovanju okolja, prilagajanju živinoreje klimatskim spremembam, gospodarni rabi naravnih virov, trajnostnim vidikom živinoreje in njeni konkurenčnosti ter razvoju spletnih orodij za podporo menedžmenta na kmetijah.

Infrastrukturno podporo raziskovalnemu in razvojnemu delu nudijo v okviru oddelka tudi raziskovalni laboratoriji: Laboratorij za prehrano živali, Laboratorij za kakovost mesa, Laboratorij za NIR-spektroskopijo, Čebelarski laboratorij in Poskusni center za čebelarstvo v Seničnem z mrežo opazovalnih postaj. Oddelek vodi tudi nacionalno Centralno podatkovno zbirko Govedo.

Raziskave

Na področju govedoreje raziskujejo interakcije genotip okolje, vročinski stres pri molznicah, klavno kakovost in kakovost mesa bikov ter dolgoživost krav. Ukvarjajo se z napovedovanjem plemenskih vrednosti, genomsko selekcijo in modeliranjem laktacijskih krivulj.

The Department deals with cattle production, pig production, and apiculture. The emphasis is on the quality of animal products, the protection of the environment, the adaptation of animal production to climate change, economic use of natural resources, sustainable aspects of animal production and the competitiveness thereof, and the development of online tools for farm management.

Additional infrastructure support for the research and development activities is provided by the following research laboratories: the Animal Nutrition Laboratory, the Laboratory for Meat Quality Analysis, the Laboratory for NIR Spectroscopy, the Apiary Laboratory, and the Experimental Centre for Apiculture in Senično with a network of corresponding monitoring stations. The Department also manages the national central database for cattle (CPZ Govedo).

Research

Cattle production research includes studies on genotype-environment interaction, the heat stress of dairy cows, slaughter quality and bull meat quality, and the longevity of cows. The researchers furthermore carry out forecasting of breeding value, genome selection, and the modelling of lactation curves.

Raziskave na področju prašičereje so usmerjene v proučevanje pitovnih lastnosti, kakovosti klavnih trupov ter kakovosti mesa in mesnih izdelkov. Pri tem proučujejo vplive različnih sistemov reje, prehrane, pasem, ravnanja z živalmi, klavnimi in predklavnimi postopki ter pogoji predelave, in sicer s fiziološkega, kemijskega, proteomskega ter genetskega vidika.

Na področju čebelarstva proučujejo tehnologije čebelarjenja, prehrano čebel in delovanje okolja na čebelje družine. Raziskujejo vzajemno delovanje pesticidov in okužb z različnimi patogeni ter drugih dejavnikov, ki vplivajo na dolgoživost čebel. Ugotavljajo okoljske vplive, naravno odpornost čebel in različne oblike postopkov zatiranja na razvoj ter preživetje varoj, kakor tudi na pogostnost okužb z virusi.

Raziskave na področju prehrane prežvekovalcev in krme so usmerjene v proučevanje kakovosti voluminozne krme, s poudarkom na izkoriščanju energije in beljakovin ter gospodarni rabi lokalnih virov. Posebno pozornost posvečajo krmnim rastlinam, prilagojenim sušnim razmeram, pa tudi krmi, ki so jo prizadele neugodne vremenske razmere, kot so suša, toča in poplave. Posodablajo nacionalne krmne standarde in razvijajo metode ocenjevanja krme.

Pig production research focuses on studying fattening properties, the quality of slaughter carcasses, and the quality of meat and meat products. The impacts of different rearing systems, fodder, breeds, animal treatment, slaughter and pre-slaughter procedures, and processing conditions are studied from physiological, chemical, proteomic, and genetic aspects.

Apiculture research focuses on beekeeping technologies, bee feed, and the impact of the environment on the general state and the development of bee colonies. Studies focus on the interactions between pesticides, infections with pathogens, as well as other factors affecting bee longevity. The researchers consider environmental impacts, determine levels of natural resistance of bees, and evaluate the efficiency of different treatment procedures for varroa management from the aspect of survival of varroa mites, and the frequency of accompanying viral infections.

Research in the field of animal nutrition and feedstuffs is focused on studying the quality of forages with an emphasis on energy and protein use, and the economic use of local resources. Special emphasis is placed on drought-tolerant fodder plants and fodder affected by adverse weather conditions, such as drought, hail, and flooding. The Department upgrades national feeding standards and develops forage assessment methods.





Strokovno delo

Strokovno delo v govedoreji se nanaša na vzdrževanje in razvijanje informacijskega sistema ter vodenja nacionalne Centralne podatkovne zbirke Govedo. Na nacionalni ravni izvajajo naloge na področju kontrole prireje mleka in mesa, zbirajo podatke za potrebe rodovništva, selekcije in plodnosti, jih interpretirajo ter pripravljajo podatke za nacionalne obračune plemenskih vrednosti. Vodijo rodovniške knjige za posamezne pasme in izdajajo zootehniške dokumente.

Na področju prašičereje v okviru skupnega temeljnega rejskega programa ugotavljajo proizvodne sposobnosti (meritve klavnih lastnosti in tehnološke kakovosti mesa) pri prašičih iz rejskega programa ter opravljajo razvojno-raziskovalne naloge s področja omenjenega programa. Pri tem se ukvarjajo še z ocenjevanjem mesnatosti prašičev na klavni liniji ter s problematiko, povezano z uvedbo alternativ kirurške kastracije, rejo lokalnih pasem (krško-poljski prašič), kakovostjo mesnih izdelkov in razvijajo nove metode analitike mesa.

Na področju čebelarstva vodijo, koordinirajo in izvajajo selekcijo kranjske čebele, analize morfoloških lastnosti čebel in molekularne genske teste, organizirajo in izvajajo progeno testiranje matic ter vodijo Rodovnik kranjske čebele. Delo zajema tudi razvojno-informacijsko podporo napovedovalni službi medenja. Pri izvajanju nekaterih nalog sodeluje tudi Čebelarska zveza Slovenije.

Expert work

The expert work regarding cattle production revolves around the maintenance and development of the information system and the management of the central database for cattle – CPZ Govedo. At the national level, the Department carries out tasks involving the control of milk and meat production; collects and interprets data for the purposes of genealogy, selection, and fertility; and processes data for the national calculations of breeding value. It manages genealogy herdbooks for individual breeds and issues zootechnical documents.

In the area of pig production, the Department analyses pig production capabilities in the common basic breed improvement programme (measurements of slaughter properties and the technological quality of meat), and performs research and development tasks under the same programme. It also evaluates carcass conformation on the slaughter line, the introduction of alternatives to surgical castration, the rearing of local breeds (the Krško-polje pig), the quality of meat products, and the development of new methods for meat analytics.

In the area of apiculture, the Department manages, coordinates, and performs Carniola bee selection and analysis of the morphological characteristics of bees and molecular gene tests, organises and performs progeny testing of queen bees, and manages the Carniola Bee Swarm Book. Its work also includes developmental and information support for the honeydew flow forecasting service. Some

Delovanje oddelka sega tudi na področje urejanja nacionalnih evidenc toplogrednih plinov in različnih onesnažil zraka (amonijak, NO₂, hlapne organske spojine itd.) ter priprave bilance dušika in fosforja.

Storitve

Poleg strokovne podpore rejcem pri rejskem in selekcijskem delu se izvajajo tudi: NIRS-analize in ocenjevanje hranilne vrednosti krme, ocenjevanje klavne lastnosti ter kakovosti mesa prašičev, genetske analize za preverjanje porekla in odkrivanje genskih napak pri govedu (analize CVM – prirojena kompleksna vretenčna anomalija, BLAD sindromoma – odsotnost sposobnosti obrambe levkocitov ter prisotnosti gena za rdečo barvo dlake – RF; analize mikrosatelitov in preveritve porekla pri govedu), analize medu (kemijska analiza, senzorična analiza), osemenjevanje čebeljih matic, razvoj in vzdrževanje spletnih orodij za podporo menedžmentu na kmetijah, nacionalne Centralne podatkovne zbirke Govedo (CPZ Govedo), spletnega programa za računanje obrokov (Kokra) in spletnega programa za laboratorije (LabKIS).

of the tasks are carried out in cooperation with the Slovenian Beekeepers' Association.

The Department's work also extends to the management of national inventory of greenhouse gases and air pollutants (ammonia, NO₂, volatile organic compounds, etc.) and the preparation of nitrogen and phosphorous balances.

Services

In addition to providing expert support to breeders in breeding and selection, the Department also carries out the following: NIRS analysis and assessment of the nutritional value of feedstuffs, assessment of slaughter properties and pork quality, genetic analysis for verification of pedigree and the detection of genetic errors (analysis of CVM – congenital complex vertebral malformations, BLAD syndrome – bovine leukocyte adhesion deficiency, the presence of the red coat colour gene (RF), analysis of microsatellites, and verification of cattle pedigree), honey analysis (chemical and sensory analysis), insemination of queen bees, and the development and maintenance of online tools for farm management support, the national central cattle database (CPZ Govedo), the online programme for the calculation of rations (Kokra), and the online programme for laboratories (LabKIS).



Informacijski sistem GOVEDO (<http://www.govedo.si>) nudi približno 4000 govedorejcem v Sloveniji spremljanje proizvodnih lastnosti, reprodukcije in sestave mleka na ravni posameznih molznic ter na ravni kmetij. Omogoča identifikacijo nekaterih napak pri reji molznic in ponuja rešitve za izboljšanje stanja. Drugi uporabniki (svetovalci, načrtovalci politike, lokalne skupnosti, rejske organizacije, raziskovalci, študentje, dijaki, živilskopredelovalna industrija itd.) lahko dostopajo do podatkov o stanju in trendih pri priraji mleka in mesa na različnih ravneh.

The GOVEDO information system (<http://www.govedo.si>) enables approximately 4,000 cattle farmers in Slovenia to monitor production properties, reproduction, and milk composition, at the level of individual dairy cow or individual farm. It enables the identification of certain mistakes in the rearing of dairy cows and provides solutions for improvements. Other users (advisers, policy planners, local communities, breeding organisations, researchers, students, the agri-food industry, etc.) can access different levels of data on the condition and trends in milk and meat production.



ODDELEK ZA SADJARSTVO, VINOGRADNIŠTVO IN VINARSTVO *DEPARTMENT OF FRUIT GROWING, VITICULTURE, AND OENOLOGY*

Oddelek deluje v današnji organizacijski shemi od leta 2013. Poleg poslovnih prostorov in laboratorijev na sedežu inštituta v Ljubljani ima še 16,79 ha velik poskusni sadovnjak na Brdu pri Lukovici ter 2,51 ha velik poskusni nasad ameriških borovnic pri Drenovem Griču.

V oddelku se ukvarjajo s strokovnim in raziskovalnim delom ter neposredno kmetijsko pridelavo sadja (prevladuje pridelava jabolk, hrušk in jagodičja) po smernicah trajnostne pridelave, kar dokazujejo s certifikati za integrirano in ekološko pridelavo ter pridelavo v skladu z dobro kmetijsko prakso (GAP). S strokovnim in raziskovalnim delom prispevajo h kakovosti ter dvigu konkurenčnosti pridelave slovenskega sadja, grozdja in vina.

Raziskave

Raziskave na področju sadjarstva zajemajo tehnologijo in fiziologijo sadnih rastlin. V okviru vinogradništva in vinarstva raziskujejo vinogradniško in vinarsko tehnologijo, kemijo in mikrobiologijo vina, ostanke pesticidov ter proučujejo vidike zdravstvenih učinkov uživanja vina.

The Department has been operating in its current organisational form since 2013. In addition to offices and laboratories at the Institute's headquarters in Ljubljana, it has a 16.79 ha experimental orchard in Brdo pri Lukovici and a 2.51 ha experimental plantation of highbush blueberry at Drenov Grič.

The Department engages in expert work, research, and the direct production of fruit (mostly apples, pears, and berries) in accordance with sustainable production guidelines, which is confirmed by certificates for integrated and ecological production, and the Good Agricultural Practice (GAP) certificate. Its expert work and research contributes to the quality and competitiveness of the production of Slovenian fruit, grapes, and wine.

Research

Fruit growing research encompasses the technology and physiology of fruit plants. With regard to viticulture and oenology, the Department studies viticultural and oenological technology, wine chemistry, microbiology, and

Glavne raziskovalne teme na področju pečkarjev in jagodičja so regulacija rodnega nastavka pri pečkarjih, sonaravne metode gojenja in varstva ter proučevanje talnih razmer pri jagodičju. Proučujejo fiziološke procese, povezane s cvetenjem, delovanje rastnih regulatorjev, razvoj novih tehnik nanosa FFS, ekološko pridelavo sadja in trajnostne načine vnosa hranil v tla.

pesticide residue, and it examines aspects of the health effects of wine drinking. The main research topics on stone fruits and berries include the regulation of the fruiting potential of stone fruit, close-to-nature growing and protection methods, and the study of soil conditions for berries. The Department studies the physiological processes in flowering, growth regulators, the development of new techniques for the use of pesticides, ecological fruit production, and sustainable fertilisation.



Pri vinogradništvu je raziskovalno delo osredotočeno na proučevanje ampele tehničnih del na kakovost grozdja ter določanje tehnološke vrednosti novih domačih klonov vinske trte in potencialnih tujih sort za pridelavo namiznega grozdja. Del raziskovalnih nalog predstavlja tudi ampelelografsko opisovanje in ohranjanje starih, lokalno razširjenih sort vinske trte.

With regard to viticulture, the research is focused on the impact of ampelotechnical procedures on grape quality and determining the technological features of new domestic vine clones and potential foreign varieties for the production of table grapes. One part of the research involves the ampelographic description and preservation of old, locally distributed vine varieties.

Vsebinski sklopi raziskovalnega dela na področju vinarstva so proučevanje tehnoloških ukrepov na kakovost vina, določanje aromatičnih spojin, glutationa, polifenolnih spojin in negativnih spojin v vinu, izbor starterskih kultur za alkoholno fermentacijo, sledenje ostankov fitofarmaceutskih sredstev ter proučevanje vpliva vina na zdravje ljudi.

The oenology research spans study of the impact of technological procedures on wine quality; identification of aromatic compounds, glutathione, polyphenol compounds, and negative compounds in wine; the selection of starter cultures for alcohol fermentation; monitoring pesticide residue; and the examination of the impact of wine on human health.

V sadovnjaku na Brdu pri Lukovici je kolekcija več kot 400 različnih sort jablan, hrušk, nashija, češenj, sliv, lupinarjev in jagodičja. Zbirka, ki je po številu sort sadnih rastlin največja v Sloveniji, je namenjena opravljanju poskusov v okviru strokovnih nalog in raziskovalnih projektov ter predstavlja dragocen genski material. Posajenih je več kot 270 različnih sort jagodičja: selekcij in tipov jagod, malin, robid, ribeza, kosmulj, ameriških borovnic, križancev med posameznimi jagodičastimi sadnimi vrstami ter manj poznanih jagodičastih sadnih vrst, kot so aronija, goji, rakitovec, dren in šmarna hrušica.

The orchard in Brdo pri Lukovici has a collection of over 400 varieties of apples, pears, nashi, cherries, plums, nuts, and berries. The collection, boasting the largest number of fruit varieties in Slovenia, is used for experiments as part of the Institute's expert tasks as well as research projects, and represents a precious genetic resource. Over 270 varieties of berries are grown: selections and varietal types of strawberries, raspberries, blackberries, courants, highbush blueberries, hybrids of berry species, and lesser known berry species, such as chokeberry, goji, sallowthorn, dogwood, and juneberry.



Strokovno delo

Strokovno delo predstavljajo naloge Posebnega preizkušanja sort za opisno sortno listo za vinsko trto, jablano, jagodičje in kaki, naloga Selekcije in vzgoje novih sort vinske trte ter naloga Vzdrževanje podatkovne baze izotopskih razmerij za slovenska vina z geografskim poreklom. Strokovne naloge opravljajo po pooblastilu MKGP.

Storitve

Pretežni del zajema pridelava jabolk v sadovnjaku na Brdu pri Lukovici, ki jih tržijo končnim kupcem in podjetjem. Pridelujejo tudi jagodičje ter ameriške borovnice. Del storitev predstavlja še strokovno in raziskovalno delo za zunanje naročnike (podjetja, javni sektor) ter tržno izvajanje analiz grozdja in vina.

Expert work

The expert work of the Department involves special examination of varieties for the descriptive list of grapevine, apple, berry and khaki varieties; selection and breeding of new grapevine varieties; and the maintenance of the database of isotopic ratios for Slovenian wines with a protected designation of origin. The expert tasks are carried out under authorisation granted by the Ministry of Agriculture, Forestry and Food.

Services

The production of apples at the Brdo pri Lukovici orchard, which are marketed to end consumers and companies, represents the bulk of the services; berries and highbush blueberries are produced as well. The Department also provides expert and research services for commercial customers (companies, the public sector), and grape and wine analysis.



ODDELEK ZA VARSTVO RASTLIN *PLANT PROTECTION DEPARTMENT*

Aktivnosti oddelka se nanašajo na spremljanje zdravstvenega stanja rastlin in na proučevanje ter obvladovanje karantenskih ter gospodarsko pomembnih škodljivih organizmov. Delo poteka v petih diagnostičnih laboratorijih (nematološki, mikološki, bakteriološki, virološki, entomološki) in v laboratoriju za hiperspektralne analize. Veliko opazovanj in poskusov opravijo na terenu, del raziskav pa tudi v sodobnem rastlinjaku.

Raziskave

Aktivnosti so večinoma usmerjene v iskanje novih, okolju prijaznih načinov varstva rastlin, usmerjenih v zmanjševanje tveganja zaradi rabe fitofarmacevtskih pripravkov. Proučujejo strategije celostnega obvladovanja škodljivih organizmov (integrirano varstvo rastlin), metode biotičnega varstva rastlin (entomopatogene glive, ogorčice) raziskujejo pa tudi vire odpornosti v sorodnikih kmetijskih rastlin. Številne raziskave se nanašajo tudi na proučevanje zastopanosti in razširjenosti škodljivih organizmov ter njihovo klasifikacijo. Za klasifikacijo težko določljivih organizmov uporabljajo med drugim tudi molekularno črtno kodiranje.

The Department's activities involve the monitoring of plant health and the study and management of regulated quarantine and non-quarantine as well as economically important plant pests and diseases. The work is carried out at five diagnostic laboratories (nematology, mycology, bacteriology, virology, and entomology), and the hyperspectral imaging laboratory. A significant amount of the observation and experimental work is carried out in the field, while a part of the research is conducted in a state-of-the-art greenhouse.

Research

The research activities are mostly focused on the search for new, environmentally-friendly crop-growing technologies, including modern approaches to plant protection directed at reducing the risks related to pesticide use. The Department studies Integrated Pest Management (IPM) strategies, methods of biotic plant protection (entomopathogenic fungus, nematodes), and researches sources of resistance in crop relatives. Many studies involve examining the occurrence and distribution of harmful organisms and their classification. DNA barcoding is used for the classification of organisms that are difficult to identify.

Proučujejo bionomijo gospodarsko najpomembnejših vrst škodljivih organizmov in njihove morfološke ter genetske značilnosti. Posebno pozornost namenjajo raziskavam na področju molekularne biologije in bioinformatike, v okviru katerih se med drugim lotevajo tudi interakcijskih odnosov med škodljivimi organizmi in kmetijskimi rastlinami ter drugimi biotskimi in abiotskimi dejavniki (sušni stres in slaba prehranjenost rastlin).

Nova področja raziskav vključujejo nove detekcijske in diagnostične metode, predvsem neinvazivne, kot je hiperspektralno slikanje s kamero z veliko prostorsko natančnostjo.

The studies extend to the bionomy of the most economically harmful organisms and their morphological and genetic characteristics. Special attention is dedicated to research in molecular biology and bioinformatics, including interactions between harmful organisms and crops, and interactions with other biotic and abiotic factors (drought stress, insufficient plant nutrition).

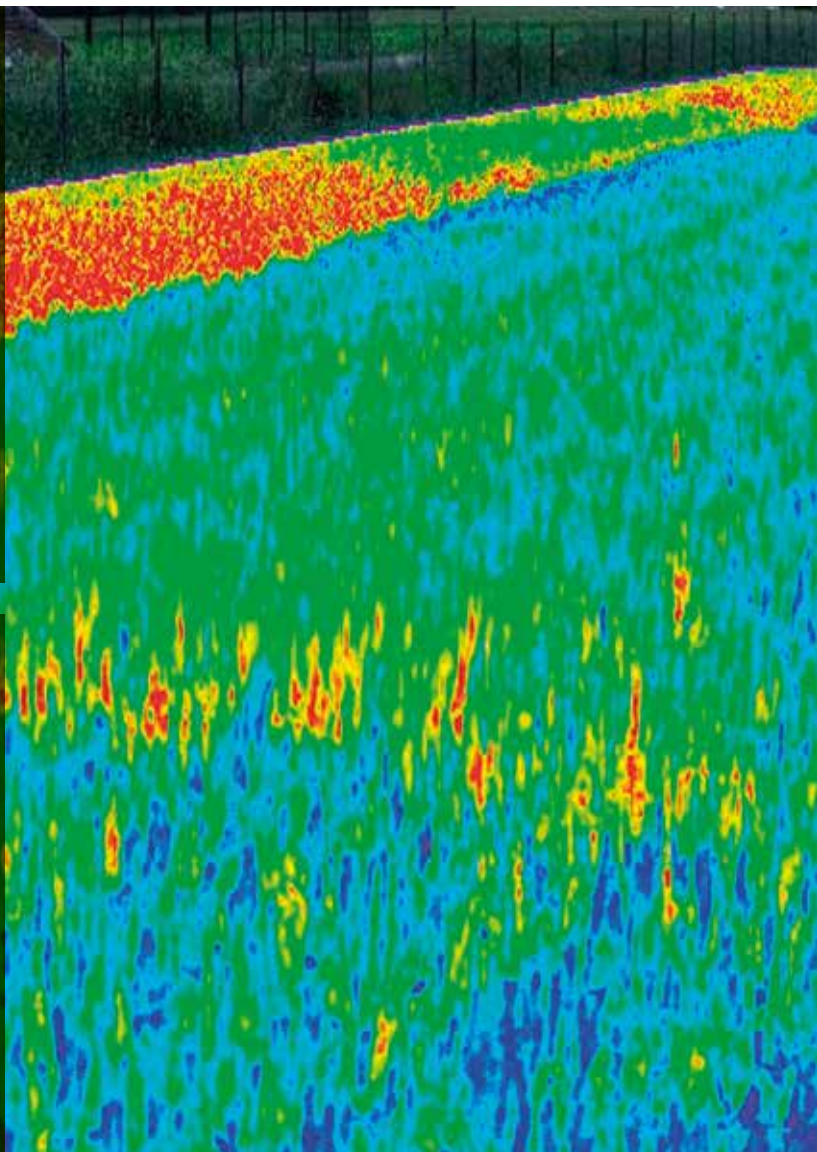
New areas of research include new detection and diagnostics methods, in particular non-invasive methods, such as hyperspectral imaging with high-resolution cameras.

Uporaba daljinskega zaznavanja in hiperspektralnega slikanja

Daljinsko zaznavanje je veda o pridobivanju podatkov o obravnavanem objektu, brez neposrednega stika, na osnovi analize lastnosti elektromagnetnega valovanja. Hiperspektralno slikanje je kombinacija digitalnega slikanja in spektroskopije. Je perspektivna neinvazivna metoda, ki omogoča razlikovanje objektov in določenih stanj objektov na podlagi analize elektromagnetnega valovanja – spektra. Z njo lahko ločimo rastline (na primer plevel ali invazivne vrste od poljščin), posamezne organe rastlin (tudi količine barvil, na primer klorofila) in določena stresna stanja rastlin, še pred izrazitimi vidnimi znaki (bolezni, prehrana, suša, poškodbe itd.).

Use of remote sensing and hyperspectral imaging

Remote sensing is the science of the acquisition of data on a subject without direct contact, based solely on an analysis of the properties of its electromagnetic profile. Hyperspectral imaging is a combination of digital imaging and spectroscopy. It is a promising non-invasive method that makes it possible to differentiate between objects and certain states thereof based on an analysis of electromagnetic radiation. It can be used to differentiate plants (e.g. between weed or invasive species and crops), individual plant organs (including the quantity of pigments, such as chlorophyll), and certain plant stress states even before visible signs appear (e.g. disease, nutrition, drought, damage).

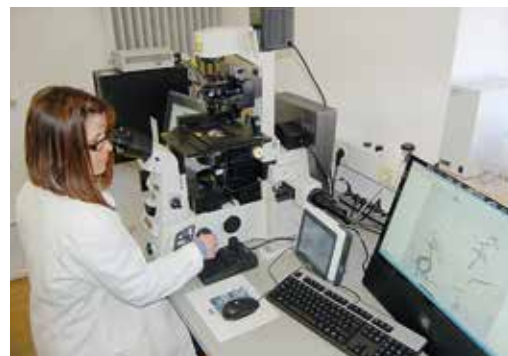


Strokovno delo

Strokovno delo obsega spremljanje pojavov škodljivih organizmov rastlin z njihovim evidentiranjem in diagnostiko. Pripravljajo ocene tveganja ter strokovne podlage za ukrepe obvladovanja škodljivih organizmov, predvsem tistih, ki so posebno nevarni za kmetijstvo, gozdarstvo in okolje.

Expert work

The expert work encompasses monitoring and recording the occurrence of plant pests and diseases and the related diagnostics. The Department prepares pest risk assessments and expert guidelines for pest management, especially for pests that pose a threat to agriculture, forestry, and the environment.



Stalna naloga oddelka je tudi opazovalno-napovedovalna dejavnost, ki nudi kmetijskim svetovalcem in pridelovalcem sprotne informacije o pojavu bolezni in škodljivcev ter načine za njihovo zatiranje. V okviru strokovnega dela izvajajo programe preiskav številnih karantenskih škodljivih organizmov, kot so na primer kitajski in azijski kozliček (*Anoplophora chinensis* in *A. glabripennis*), vrsta *Aromia bungii*, krompirjevi bolhači (*Epitrix cucumeris*, *E. similis*, *E. subcrinita*, *E. tuberosa*), sončnična stebelna vrtalka (*Strauzia longipennis*), borova ogorčica (*Bursaphelenchus xylophilus*), krompirjeve ogorčice (*Globodera rostochiensis* in *G. pallida*), vrsta *Heterodera zeae*, ogorčica korenskih šišek (*Meloidogyne ethiopica*), platanov obarvani rak (*Ceratocystis platani*), gliva *Diplocarpon mali*, gliva *Geosmithia morbida*, fitoftorna sušica vejic (*Phytophthora ramorum*) in vrsta *Phytophthora kernoviae*, hrušev ožig (*Erwinia amylovora*), krompirjeva rjava in obročkasta gniloba (*Ralstonia solanacearum* in *Clavibacter michiganensis* spp. *sepedonicus*), bakterijski ožig aktinidije

It also performs monitoring and forecasting, providing agricultural advisors and producers with current information on the occurrence of diseases and pests, and on reduction and control methods. The expert work involves research on many quarantine pests, including citrus long-horned beetle and Asian long-horned beetle (*Anoplophora chinensis* and *A. glabripennis*), red-necked long-horn beetle (*Aromia bungii*), potato flea beetles (*Epitrix cucumeris*, *E. similis*, *E. subcrinita*, *E. tuberosa*), sunflower maggot fly (*Strauzia longipennis*), pine wood nematode (*Bursaphelenchus xylophilus*), potato cyst nematodes (*Globodera rostochiensis* and *G. pallida*), corn cyst nematode (*Heterodera zeae*), root-knot nematode (*Meloidogyne ethiopica*), *Ceratocystis platani*, the fungi *Diplocarpon mali* and *Geosmithia morbida*, ramorum blight (*Phytophthora ramorum*), *Phytophthora kernoviae*, fire blight (*Erwinia amylovora*), brown rot and bacterial canker (*Ralstonia solanacearum* and *Clavibacter michiganensis* spp. *sepedonicus*), bacterial canker of kiwiwood

(*Pseudomonas syringae* pv. *actinidiae*), bakterijski ožig oljk (*Xylella fastidiosa*), *Candidatus Phytoplasma solani*, ki povzroča rdečenje koruze, fitoplazma Grapevine flavescence dorée in viroid vretenatosti krompirjevih gomoljev (PSTVd). Opravljajo laboratorijske analize prisotnosti virusov, bakterij, gliv, žuželk in rastlinsko-parazitskih ogorčic, razvijajo in vpeljujejo različne diagnostične tehnike ter vodijo zbirke protiteles, testnih rastlin in izolatov, sevov ter patotipov različnih fitopatogenih organizmov, ki so potrebne za diagnosticiranje škodljivih organizmov.

Z namenom izdelati strokovne podlage za določitev posebnih območij (okuženih, ogroženih, posebej nadzorovanih in varovanih) opravljajo naloge, povezane z geografskim informacijskim sistemom (GIS), ki je nenadomestljivo orodje pri vodenju posebnega nadzora škodljivih organizmov. Posamezne vsebine GIS dodajajo na fitosanitarni prostorski portal, kjer lahko zunanji uporabniki dostopajo do pripravljenih vsebin. Z analizami GIS izdelujejo tudi sezname pridelovalcev, ki jih je treba obvestiti o posameznem fitosanitarnem ukrepu, oziroma pomagajo fitosanitarni inšpekciji pri nadzoru in obveščanju pridelovalcev.

Storitve

Za zunanje naročnike preskušajo biološko učinkovitost fitofarmaceutskih pripravkov (certifikat o dobri eksperimentalni praksi). Vključeni so v svetovanje (telefonsko, osebno in na terenu pri pridelovalcih) ter organizirajo različna strokovna srečanja.

(*Pseudomonas syringae* pv. *actinidiae*), *bacterial blight of olives* (*Xylella fastidiosa*), *Candidatus Phytoplasma solani*, which causes maize thinning, Grapevine flavescence dorée phytoplasma, and the potato spindle tuber viroid (PSTVd). The Department conducts laboratory analysis of the presence of viruses, bacteria, fungi, insects, and plant parasitic nematodes; develops and introduces diagnostics techniques; and manages collections of antibodies, test plants and isolates, and strains and pathotypes of phytopathogenic organisms necessary for diagnostics of harmful organisms.

In an effort to create an expert basis for the determination of special areas (infected areas, endangered areas, areas under special supervision, protected areas), the Department carries out tasks associated with the geographic information system (GIS), an indispensable tool in the management of special supervision of harmful organisms. Individual GIS units are added by means of the phytosanitary spatial portal, where external users can access the prepared materials. GIS analysis is also used to compile lists of producers who need to be notified of specific phytosanitary measures, and helping the phytosanitary inspection service supervise and notify producers.

Services

For external customers, the Department tests the biological effectiveness of pesticides (and has a certificate of good experimental practice). It participates in advisory services (by telephone, personally, or on-site with the producer) and organises events for specialists.





ODDELEK ZA KMETIJSKO TEHNIKO IN ENERGETIKO *DEPARTMENT OF AGRICULTURAL ENGINEERING AND ENERGY*

Delo poteka na področju obnovljivih virov energije v kmetijstvu, racionalne rabe energije ter tehnologij za mehanizirano pridelavo in predelavo v kmetijstvu. Rezultati razvojno-raziskovalnega dela so razvite tehnologije in izdelki na področju obnovljivih virov energije, strojev za ciljno nanašanje fitofarmacevtskih sredstev ter evropski in nacionalni patenti. Sodelavci oddelka že vrsto let sodelujejo na področju razvoja ter testiranja novih strojev in naprav tudi z domačo industrijo. V sklopu oddelka se nahaja laboratorij za kmetijsko tehniko s sodobno merilno opremo za opravljanje laboratorijskih in terenskih raziskav s kmetijskimi stroji ter kmetijsko procesno tehniko.

The Department's work encompasses renewable energy sources in agriculture, efficient energy use, and technologies for mechanised agricultural production and processing. The results of the research and development work include renewable energy technologies and products, machinery for targeted application of pesticides, and European and national patents. For a number of years the staff have been cooperating with domestic industry in the development and testing of new agricultural machinery and devices. The Department also has an agricultural engineering laboratory with state-of-the-art measuring equipment for the performance of laboratory and field trials with agricultural machinery and processing technology.

Raziskave

Delo oddelka je usmerjeno v raziskave s področja učinkovite rabe energije v kmetijstvu, s poudarkom na racionalizaciji delovnih postopkov ob uporabi primerne mehanizacije in upoštevanju vse bolj strogih okoljevarstvenih zahtev (okoljski odtis kmetijstva v povezavi z uporabo kmetijskih strojev in različnih tehnologij ter ukrepi za zmanjševanje emisij toplogrednih plinov v kmetijstvu). Poudarek je na raziskavah s področja alternativnih virov energije v kmetijstvu (kot so bioplin, biometan, rastlinsko olje, trdna kmetijska biomasa za energetske namene itn.) ter tehnologijah za energijsko učinkovito in okolju prijaznejšo pridelavo ter predelavo hrane.

Strokovno delo

Rezultati sodelovanja z domačo industrijo so vidni na področju razvoja ter testiranja novih strojev in naprav, oddelek pa opravlja tudi svetovanja na področju predpisov in smernic EU o varnosti kmetijskih strojev in strojev za varstvo rastlin. V eksploatacijskem delovanju testirajo traktorje ter priključne, samovozne in druge stroje, namenjene delu v poljedelstvu, sadjarstvu, vinogradništvu, živinoreji, zelenjadarstvu itd. V sodelovanju z univerzami in različnimi srednjimi šolami organizirajo praktične vaje, študentom različnih fakultet in visokih šol pa omogočajo aktivno vključevanje v raziskovalno delo oddelka. Pomembno področje delovanja je tudi svetovanje končnim uporabnikom o izbiri, uporabi in vzdrževanju kmetijskih strojev. Na oddelku je sedež Društva kmetijske tehnike Slovenije, ki že vrsto let organizira različne strokovne seminarje ter odmeven dogodek: Slovensko srečanje ljubiteljev starodobne kmetijske tehnike v Jabljah.

Research

The Department focuses on research on efficient energy use in agriculture, with an emphasis on workflow streamlining using the most suitable machinery and taking into account the increasingly strict environmental standards (the environmental footprint of agriculture in conjunction with the use of agricultural machinery and technologies, and measures to reduce greenhouse gas emissions in agriculture). The research specifically involves alternative energy sources in agriculture (e.g. biogas, biomethane, pure plant oil, solid biomass as a source of energy) and technologies for energy efficiency and sustainable friendlier food production and processing.

Expert work

The results of cooperation with domestic industry are tangible in the development and testing of new machinery and devices, but the Department also provides advisory services regarding EU regulations and guidelines on the safety of agricultural and plant protection machinery. The Department tests tractors and tractor implements, self-propelled machinery, and other machinery for crop production, fruit growing, viticulture, livestock production, and horticulture. In cooperation with universities and secondary schools, it organises practical exercises, while also giving university students the opportunity to actively participate in the Department's research work. Another key area of work is the provision of advisory services to end users with regard to the selection, operation, and maintenance of machinery. The Department hosts the seat of the Association of Agricultural Engineering of Slovenia, which for many years has been organising seminars and a high-profile event, the Slovenian meeting of vintage agriculture machinery enthusiasts in Jablje.





Storitve

Oddelek ponuja široko paleto storitev s področja obnovljivih virov energije, učinkovite rabe energije ter tehnologij mehanizirane kmetijske pridelave in predelave. Organizirajo in vodijo tudi seminarje in tečaje za zmanjševanje porabe energije v kmetijstvu. S področja obnovljivih virov energije velja omeniti razvoj in izdelavo stiskalnic za mehansko ekstrakcijo oljnic, predelavo motorjev traktorjev in delovnih strojev na pogon na rastlinsko olje ter skupno razvojno delo na področju mikrobioplinskih naprav s podjetjem Omega Air, Ljubljana. Razvijajo in izdelujejo mikrokogeneracije na rastlinsko olje (istočasna proizvodnja električne in toplotne energije), kot tudi tehnologije za predelavo kmetijske biomase v trdna goriva (žetveni ostanki, energetske trave, hitro rastoče drevesne vrste itd.).

Podporo uporabnikom nudijo na področju meritev in svetovanja za učinkovito rabo energije s kmetijsko mehanizacijo, kmetijskih objektov ter porabe energije v živilskopredelovalni industriji. Nudijo določanje odtisa CO₂ za različne tehnologije pridelave in predelave hrane ter drugih kmetijskih produktov. V okviru tehnologij mehanizirane kmetijske pridelave in predelave nudijo storitve na področju tehnologij za osnovno in dopolnilno obdelavo tal (ugotavljanje mehanskih lastnosti tal, razvoj in preskušanje strojev za obdelavo tal), strojev za ciljno nanašanje fitofarmacevtskih sredstev (razvoj in preskušanje strojev),

Services

The Department offers a broad range of services with regard to renewable energy, efficient energy use, and technologies for mechanised agricultural production and processing. It organises seminars and courses on how to reduce energy intensity in agriculture. Another noteworthy area of work is the development and manufacturing of presses for mechanical extraction of oil from oleaginous plants, the conversions of tractor and machinery engines to pure plant oil, and joint development work with the Ljubljana company Omega Air concerning micro biogas plants. The Department develops and manufactures micro cogeneration plants running on vegetable oil (i.e. the cogeneration of electricity and heat) as well as technologies for the conversion of agricultural biomass into solid fuels (harvest remains, energy grasses, fast-growing tree species, etc.).

It provides measurement and advisory support to users regarding the efficient use of energy in agricultural machinery, farm facilities, and in the agri-food industry. It offers CO₂ footprint for different technologies for the production and processing of food and other agricultural products. In the field of mechanised agricultural production and processing technologies, the Department offers services in technologies for primary and secondary soil tillage treatment (determining the mechanical

testiranje različnih izvedb traktorjev, hribovske mehanizacije in varnostnih struktur traktorjev itn.

Laboratorij za kmetijsko tehniko in energetiko je opremljen s sodobno merilno opremo za opravljanje najzahtevnejših meritev na kmetijskih strojih in napravah ter v kmetijski procesni tehniki. Omogoča opravljanje meritev na področju mehanske ekstrakcije oljnic, pogona traktorjev in strojev na biogoriva, ugotavljanja eksploatacijskih lastnosti različnih izvedb traktorjev in priključnih strojev, mehanskih lastnosti tal, različnih kmetijskih materialov itn. V sklopu laboratorija je tudi mikrobioplinska naprava, ki omogoča raziskave s področja bioplina iz različnih kmetijskih substratov, ter proga za simuliranje delovanja traktorskega pršilnika v trajnih nasadih (sadovnjaki, vinogradi itd.) za potrebe razvojno-raziskovalnega dela s pršilniki za ciljno nanašanje fitofarmaceutskih sredstev.

properties of soil, the development and testing of tilling machinery), machinery for the application of pesticides (machinery development and testing), testing of tractor models, mountain machinery, tractor security structures, etc.

The Laboratory for Agricultural Engineering and Energy is equipped with state-of-the-art measuring devices needed to perform the most complex measurements with regard to agricultural machinery and processing technology. It performs measurements regarding the mechanical extraction of oil from oleaginous plants, biofuels for tractors and machinery, the application of different tractor models and implements, mechanical soil properties, agricultural materials, etc. The Laboratory also houses a micro biogas plant for research on biogas production from different agricultural substrates, and a test track for simulating tractor-mounted sprayers for permanent crops (orchards, vineyards), which is used for the research and development of the targeted application of pesticides.



ODDELEK ZA EKONOMIKO KMETIJSTVA DEPARTMENT OF AGRICULTURAL ECONOMICS

V skladu z dolgoročno opredeljenimi usmeritvami, je delo oddelka večinoma osredotočeno na spremljanje in analizo stanja v kmetijstvu, ocenjevanje proizvodnih stroškov v kmetijstvu, spremljanje in analizo kmetijske politike, razvoj sodobnih metod ekonomske analize v kmetijstvu ter ugotavljanje ekonomskega vidika razvoja podeželja.

Raziskave

Simulacijski modeli za usmerjanje razvoja kmetijstva že nekaj časa predstavljajo osrednje področje raziskovalnega dela na oddelku. Na njihovi osnovi se redno ocenjuje stroške in ekonomske rezultate, tako za celotno kmetijstvo kot tudi za posamezne proizvodne usmeritve in posamezne kmetijske proizvode. Kot metodološko orodje se uporabljajo tudi v drugih strokovnih in raziskovalnih projektih, v zadnjem obdobju npr. pri razvoju celovitega modela kmetijskih gospodarstev in povezanih podatkovnih zbirk za podpora pri odločanju v slovenskem kmetijstvu.

Vse od vstopa v EU zavzemajo raziskave o vplivih skupne kmetijske politike na slovensko kmetijstvo pomembno mesto, kar velja tako za analize s področja tržno cenovne politike kot tudi za analize s področja razvoja podeželja in regionalnega razvoja. Med pomembnejše teme raziskav, ki se pretežno izvajajo v okviru ciljnih raziskovalnih projektov, je treba izpostaviti predvsem presojo razvojnih možnosti slovenskega kmetijstva do leta 2020, spremljanje cen vzdolž ponudbene verige hrane in parametre trajnosti kmetijstva.

In accordance with the long-term guidelines, the Department focuses on monitoring and analysing the agricultural sector, assessing production costs in agriculture, monitoring and analysing agricultural policy, developing modern economic analysis methods in agriculture, and gauging the economic aspects of rural development.

Research

Simulation models for steering agricultural development have been the focal point of research at the Department for many years. The models are used for regular calculation of costs and economic outcomes, for the sector as a whole, as well as individual production segments and individual agricultural products. These models are used as methodological tools in other expert and research projects, one recent example being the development of a comprehensive model of agricultural holdings and associated databases to support decision-making in agriculture.

Since Slovenia joined the EU, research on the impacts of the Common Agricultural Policy on Slovenian agriculture has played a prominent role, which includes analyses of markets and prices and analyses dealing with rural and regional development. Other key topics of research, which is mostly carried out in the framework of targeted research projects, include the evaluation of the development potentials of Slovenian agriculture until 2020, the monitoring of prices throughout the food supply chain, and the parameters of the sustainability of agriculture.

Oddelek je kot partner aktivno sodeloval pri mednarodnem projektu AGRIPOLICY (6. okvirni program EU) in je nosilec samostojne teme pri projektu AGRICISTRAD (ang. Exploring The Potential For Agricultural And Biomass Trade In The Commonwealth Of Independent States) v sklopu 7. okvirnega programa EU.

The Department was a partner on the international project AGRIPOLICY (6th Framework Programme) and a lead partner on the project AGRICISTRAD (Exploring the Potential for Agricultural and Biomass Trade in the Commonwealth of Independent States) in the 7th Framework Programme.



Strokovno delo

Strokovne naloge po naročilu Ministrstva za kmetijstvo, gozdarstvo in prehrano predstavljajo največji delež strokovnega dela. V okviru naloge Spremljanje razvoja kmetijstva v Sloveniji je delo usmerjeno v tekoče ocenjevanje stroškov pridelave pomembnejših kmetijskih pridelkov (modelne kalkulacije), izdelavo bilanc proizvodnje in porabe osnovnih kmetijskih pridelkov, pripravo analize ter poročila o stanju v kmetijstvu (zeleno poročilo), spremljanje razvoja kmetijstva v območjih z omejenimi dejavniki za kmetijsko dejavnost in posamezne ekspertne storitve. Modelne kalkulacije Kmetijskega inštituta Slovenije so samostojni simulacijski modeli, ki na podlagi opredeljenih (izbranih) vhodnih tehnoloških parametrov omogočajo oceno stroškov proizvodnje pri posameznem kmetijskem pridelku. Modelne kalkulacije pri posameznem pridelku neposredno vključujejo vse stroške, ki so povezani s proizvodnjo, kar omogoča tudi neposredno primerjavo skupnih stroškov s skupnim prihodkom ter izračun različnih ekonomskih kazalcev.

Expert work

Tasks commissioned by the Ministry of Agriculture, Forestry and Food represent the bulk of the expert work. In the framework of the programme Monitoring the Development of Agriculture in Slovenia, the work focuses on the current assessment of production costs for key agricultural products (model calculations), the preparation of balances of the production and use of basic agricultural products, preparation of analyses and reports on the state of agriculture (green reports), the monitoring of agricultural development in less favoured areas, and individual expert services. The model calculations of the Agricultural Institute of Slovenia are standalone simulation models using selected input parameters to assess production costs for individual agricultural products. The model calculations for individual products directly factor in all costs associated with production, making it possible to directly compare total costs against total incomes and calculate a variety of economic indicators.



ODDELEK ZA KMETIJSKO EKOLOGIJO IN NARAVNE VIRE *DEPARTMENT OF AGRICULTURAL ECOLOGY AND NATURAL RESOURCES*

Oddelek je nastal leta 2013, ob reorganizaciji Kmetijskega inštituta Slovenije. Namen njegove ustanovitve je bil okrepiti delo inštituta na področju trajnostne rabe kmetijskih naravnih virov (predvsem tal in vode), varovanja okolja ter upravljanja kmetijskega prostora.

Njegove glavne aktivnosti so usmerjene v raziskovalno in strokovno delo. Oddelek nudi podporo kmetijskemu gospodarstvu, pridelovalcem, državni upravi, drugim raziskovalnim ustanovam, lokalnim skupnostim, upravam narodnih parkov in zaščitene območij, javnosti ter okoljevarstvenim organizacijam in skupinam. Pomemben delež aktivnosti predstavlja tudi delo v raziskovalnih projektih Evropske unije. S tem se raziskovalci mednarodno povezujejo s tujimi raziskovalnimi inštituti, agencijami in univerzami. Člani oddelka sodelujejo v evropskih in mednarodnih organizacijah ter v različnih komisijah s področja pedologije, varstva okolja in kmetijskega prostora. K pedagoškemu delu in prenosu znanja prispevajo na petih univerzitetnih, visokošolskih in višješolskih ustanovah.

The Department was founded in 2013 as part of the reorganisation of the Agricultural Institute of Slovenia primarily in order to enhance the Institute's activities in the field of sustainable management and the protection of natural resources in agro-environments, mainly soil and groundwater.

The primary activities are research and expert work as well as consultancy services. The Department supports farmers and producers, ministries, state and local administrations, other research institutions, national parks and protected areas, the general public, individuals, and NGOs. An important part of the Department's activities is the implementation of European research projects, thus leading to good collaboration with EU research institutes, agencies, and universities. Members of the Department cooperate with European institutions, international organisations in various committees in the field of soil science, environmental protection, climate change, and sustainable agricultural production. Furthermore, by teaching, the researchers contribute to knowledge transfer at five Slovenian universities, colleges, and higher education institutions.



Pestra kadrovska sestava odraža izrazit multidisciplinaren pristop v raziskovalnem delu oddelka. S povečanimi potrebami in obsegom dela se krepi številčnost sodelavcev. Oddelek ima interni enoti: Center za tla in okolje ter Center za kmetijske ekosisteme.

Raziskave

Zajemajo kakovost tal in agro-ekosistemov, pedologijo, genezo ter kakovost tal, trajnostno rabo kmetijskih zemljišč in ohranjanje rodovitnosti tal, zmanjšanje vplivov kmetijstva na podzemne ter površinske vode, problematiko kroženja snovi, spremljanje in bilanco izpustov ter ponorov toplogrednih plinov v kmetijstvu, ohranjanje biotske pestrosti in kulturne kmetijske krajine, monitoring širjenja invazivnih rastlin in integrirano varstvo pred pleveli, ekologijo in usodo fitofarmaceutskih sredstev v agro-ekosistemi, zatiranje škodljivcev in plevelov, proučevanje ustreznosti kmetijskih tehnologij in načinov obdelave tal, analitiko tal in učinkovanje gnojil ter geo-informatiko tal in okolja, GIS-modeliranje in digitalno kartografijo tal ter razvoj GIS-spletnih tehnologij.

The diverse education of the Department's staff reflects the distinctive multi-disciplinary approach to research. Due to the growing research needs and extent of activities, the number of staff has gradually been increasing. The Department has two units, the Centre for Soil and Environmental Research and the Centre for Agricultural Ecosystems.

Research

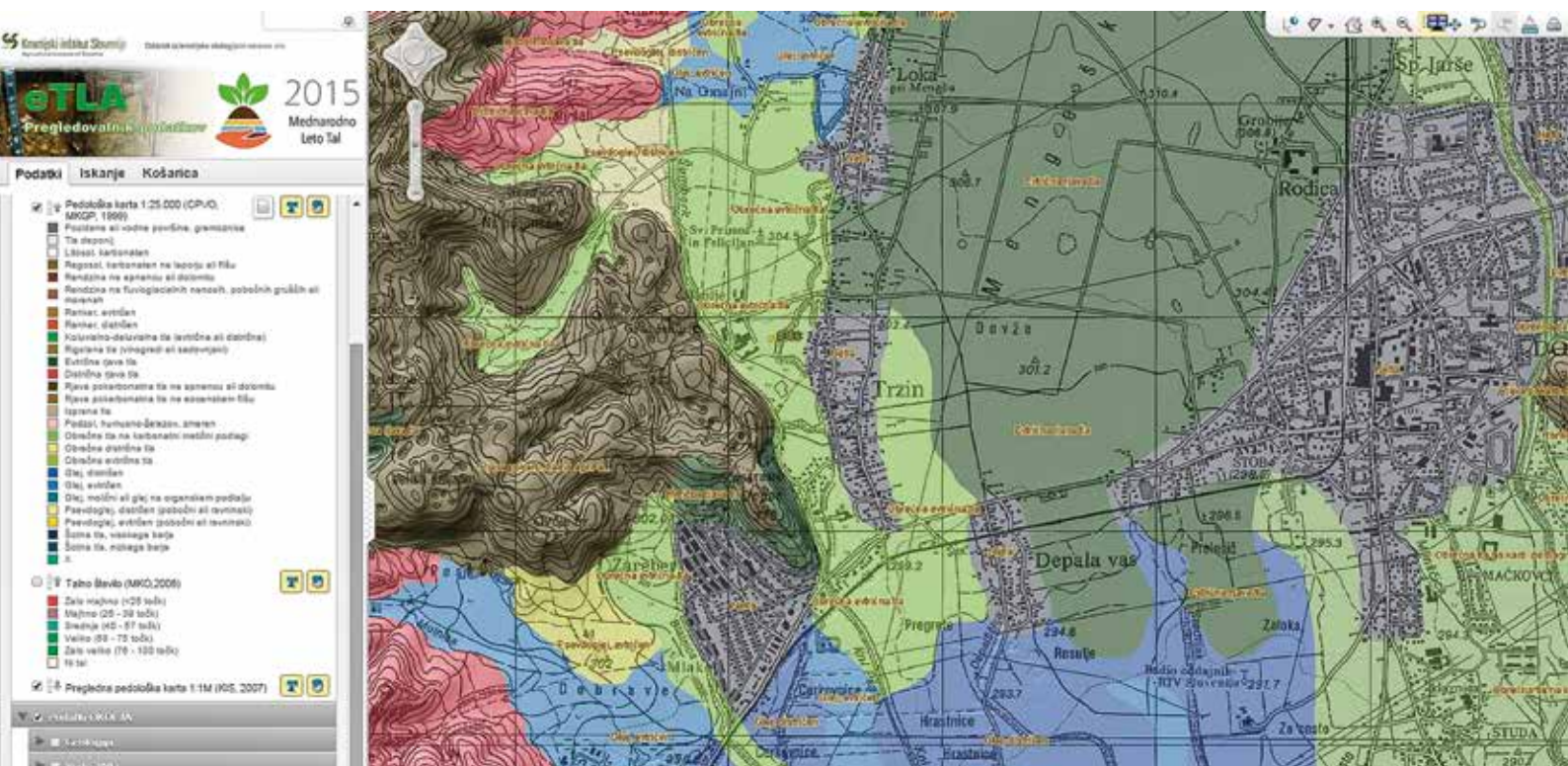
The research carried out by the Department includes soil and agro-ecosystem quality, soil science, soil genesis and quality, sustainable use of agricultural land and soil fertility conservation, the impacts of agriculture on groundwater and surface waters, nutrients and energy cycling, the monitoring of greenhouse gas emissions and sinks, biodiversity conservation, the preservation of cultural landscapes, the monitoring of invasive plants and integrated plant protection, ecology and the fate of pesticides, weed management, sustainable soil tillage techniques, fertilisation effects, soil and environmental modelling (e.g. soil-landscape modelling), soil web GIS, digital soil mapping, and the development of spatial GIS web technologies.

Strokovno delo in storitve

Za naročnike izvajajo pester nabor storitev na področju gnojenja in rodovitnosti tal (analiza založenosti tal s hranili, interpretacija in gnojilni nasveti); onesnaženosti tal (vsebnost težkih kovin in organskih onesnažil, interpretacija tveganj, nasveti); ocene bonitete in kakovosti kmetijskih zemljišč (ekspertize kakovosti tal, elaborati bonitete tal); melioracije in hidromelioracije tal (ocena sanacij HM-sistemov); priprave strokovnih podlag in metodologij vrednotenja (primernost tal, kakovost kmetijskih zemljišč); kmetijske ekologije (presoja vplivov kmetijstva na okolje); izvajanja Nitratne direktive (kmetijstvo na vodovarstvenih območjih); herbologije (spremljanje tujerodnih in invazivnih vrst, izdelava ekoloških profilov in ocen tveganj ter tehnološka navodila za zatiranje invazivnih vrst); usode FFS v okolju (preizkušanja učinkovitosti in fitotoksičnosti FFS); pedologije (pedološka kartiranja in raziskave tal, vzorčenje tal in pridelkov z vrednotenjem kakovosti ter onesnaženosti); informatike tal in kmetijskega okolja (digitalna kartografija tal, zajem podatkov tal in okolja, GIS-presoje, modeliranja in analize, razvoj talnega informacijskega sistema – eTLA); izobraževanja s področja kmetijske ekologije (FFS, pleveli, tla in pedologija, kakovost kmetijskih zemljišč ter gnojenje).

Expert work and services

A wide range of services are provided by the Department in the following fields: soil fertility and plant nutrition (the interpretation of soil analyses and fertilising advice); soil pollution (heavy metals and organic pollutants, interpretation risks, advisory services); soil quality and land evaluation (soil suitability analyses and valuation); land reclamation and hydro amelioration (the rehabilitation of HM systems); the development of land evaluation methodologies (land/soil suitability for different agricultural land uses); agricultural ecology (assessment of the environmental impact of agriculture); the EU Nitrate Directive (agriculture in groundwater protection areas); herbology (the monitoring of invasive species; ecological profiles and risk assessments of invasive species); the fate of pesticides (testing of efficacy and phyto-toxicity); soil surveying (soil mapping, soil sampling, and soil quality evaluation, soil contamination assessments); soil and environmental informatics (digital soil mapping, GIS-assessments and spatial modelling, development of the Soil Information System – eSOIL); and education in the field of agricultural ecology (pesticides, weeds, soil science, the quality of agricultural land, and fertilisation).





CENTRALNI LABORATORIJ CENTRAL LABORATORY

Centralni laboratorij Kmetijskega inštituta Slovenije je vodilni laboratorij na področju agrokemije in enologije v Sloveniji. Razdeljen je na Agrokemijski laboratorij in Eno-
loški laboratorij. V prvem izvajajo analize tal, medu in dru-
gih prehranskih izdelkov, analize krme, gnojil, sredstev za
varstvo rastlin in onesnaževal, v drugem pa fizikalno-ke-
mijske in senzorične analize vina ter žganih pijač. Poobla-
ščeni so za izdajajo odločb za promet z vinom v Sloveniji,
za nadzor uvoza vina in izdajo izvozne dokumentacije za
vino.

Laboratorij je akreditiran od leta 2002, kar zagotavlja ne-
odvisnost in nepristranskost rezultatov analiz. Od leta
2002 do 2011 je laboratorij pridobival akreditacije za po-
samezna področja (analitika vina, žganih pijač, tal, krme,
medu, ostankov pesticidov) po standardu SIST EN ISO/
IEC 17025 pri francoski akreditacijski hiši Cofrac. Akre-
ditacija Cofrac je bila leta 2012 prenesena na nacionalno
akreditacijsko telo, Slovensko akreditacijo.

Laboratorij opravlja storitve za zunanje naročnike – pride-
lovalce, strokovne inštitucije, izobraževalne organizacije,
inšpekcijske službe itd. ter nudi podporo strokovnemu in
raziskovalnemu delu drugih oddelkov inštituta.

*The Central Laboratory of the Agriculture Institute of
Slovenia is the leading agrichemical and oenological
laboratory in Slovenia. It is divided to the Agrochemical
Laboratory and the Oenological Laboratory. The former
performs analyses of soil, honey and other food products,
fodder, fertiliser, plant protection products, and contami-
nants; the latter carries out physicochemical and sensory
analyses of wine and spirits. It is authorised to issue cer-
tificates for wine trade in Slovenia and for the supervision
of wine imports or export documentation for wine.*

*The Laboratory has been accredited since 2002, which
ensures that the results of analyses are independent and
impartial. Between 2002 and 2011, the Laboratory ac-
quired accreditations in different fields (analysis of wine,
spirits, soil, fodder, honey, pesticide residue) according to
the SIST EN ISO/IEC 17025 standard of the French ac-
creditation committee Cofrac. Cofrac accreditation was
transferred in 2012 to the national accreditation body, the
Slovenian Accreditation.*

*The Laboratory performs services for external customers
such as producers, expert institutions, educational organ-
isations, and inspection services, and provides support
for the expert and research work of other departments at
the Institute.*

Enološki laboratorij

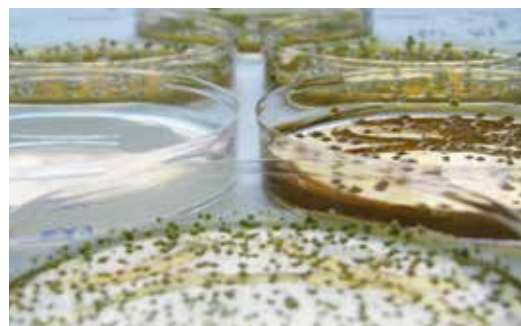
Enološki laboratorij je pooblaščen organizacija za ocenjevanje mošta, vina in drugih proizvodov iz grozdja in vina ter uradni laboratorij za ugotavljanje skladnosti žganih pijač glede kakovosti v okviru uradnega nadzora. Ponuja širok nabor analiz vina oziroma žganih pijač in je opremljen z najsodobnejšo analitsko opremo. Pooblaščen je za izdajo odločb za promet z vinom. Postopek izdaje odločb je predpisan in nadzorovan. Vključuje postopke vzorčenja, preverjanja geografskega porekla, fizikalno-kemijske analize, senzorično analizo s potrjeno komisijo pokusevalcev in končno izdajo odločbe. Z izdajo odločbe potrjujejo tudi avtentičnost vin z geografskim poreklom, pridelanih znotraj vinorodnih okolišev ali vinorodne dežele (ZGP, PGO, PTP).

Oenological Laboratory

The Oenological Laboratory is an authorised organisation for the assessment of must, wine, and other products made of grapes and wine, and it is an official laboratory for determining the conformity of spirits with quality requirements. The Laboratory offers a broad range of analyses of wine and spirits and is equipped with state-of-the-art analytical equipment. It is authorised to issue certificates for wine trade. The issuance procedure is regulated and supervised. It involves sampling procedures, verification of geographical indications, physicochemical analysis, sensory analysis with a certified commission of tasters, and finally, the certificate issuing. Certificates also confirm the authenticity of wines with a geographical indication produced in wine-growing districts or wine-growing regions (protected geographical origin, recognised geographical indication, recognised traditional denomination).



Laboratorij obenem izdaja poročila o skladnosti žganih pijač z veljavno evropsko in slovensko zakonodajo. Prav tako izvaja fizikalno-kemijska in senzorična ocenjevanja ter izdaja poročila o skladnosti za žgane pijače z geografsko označbo. Kot pomemben del analitike ponujajo v laboratoriju določevanje fizikalno-kemijske stabilnosti vina (stabilnost na beljakovine, na izločanje vinskega kamna in drugih soli, na kovine itd.) ter mikrobiološke stabilnosti vina (skupno število kvasovk, bakterij in kvasovk iz rodu *Dekkera/Brettanomyces* v vinu ali moštu, živost kvasovk v starterski kulturi, fermentacijska sposobnost itd.). Zaposleni se redno vključujejo v organizacijo strokovnih in potrošniških senzoričnih ocenjevanj vina.



The Laboratory also issues conformity reports for spirits with the applicable EU and Slovenian legislation, performs physicochemical and sensory assessments, and issues conformity reports on the compliance of spirits with geographical indications. An important part of the analytics services provided by the Laboratory is the determination of the physicochemical stability of wine (protein stability, stability of tartrate and other salts, metal stability, etc.) and the microbiological stability of wine (total number of yeasts, bacteria and yeast of the family *Dekkera/Brettanomyces* in wine or must, yeast viability in the starter culture, fermentation capacity, etc.). The staff is regularly engaged in the organisation of professional and consumer-oriented wine assessments.



Agrokemijski laboratorij

Agrokemijski laboratorij je uradni laboratorij za opravljanje laboratorijskih analiz na ostanke pesticidov v kmetijskih pridelkih v okviru uradnega nadzora, ugotavljanje skladnosti medu glede kakovosti in ostankov pesticidov v okviru uradnega nadzora medu ter opravljanje laboratorijskih analiz krme v okviru uradnega nadzora krme, zlasti glede kakovosti krme, krmnih dodatkov, ostankov pesticidov.

Hkrati je pooblaščen laboratorij za izvajanje obratovalnega monitoringa pri vnosu nevarnih snovi in rastlinskih hranil v tla, opravljanje kemijskih analiz za potrebe inšpekcijskega nadzora kakovosti mineralnih gnojil in za izvajanje določenih nalog javne službe na področju fitofarmacevtskih sredstev.

Agrokemijski laboratorij ima tudi status nacionalnega referenčnega laboratorija na področju analiz ostankov pesticidov v krmi.

Agrochemical Laboratory

The Agrochemical Laboratory is the official laboratory for analyses of pesticide residues in agricultural products, for the testing of the compliance of honey with requirements regarding quality and pesticide residues, and for analyses of animal feed, in particular regarding the quality of animal feed, feed additives, and pesticide residues.

It is also an authorised laboratory for monitoring of the input of hazardous substances and vegetable nutrients into the soil, for the performance of chemical analyses of mineral fertilisers for the purposes of inspection oversight of the quality of these products, and for the performance of certain public services in the area of plant protection products.

The Agrochemical Laboratory also has the status of a national reference laboratory for the analysis of pesticide residues in fodder.

Ponuja celovite analitske rešitve v kmetijstvu.

- Pri analizah medu določajo botanično in geografsko poreklo, izvajajo analize za opredelitev kakovosti živila in določajo organoleptične ocene vzorcev. Pomembno področje dela so analize ostankov sredstev za zatiranje čebelje bolezni varroa ter ostankov fitofarmaceutskih sredstev v medu.
- Izvajajo analize, ki so povezane z rodovitnostjo tal, onesnaženosti tal z ostanki pesticidov in s težkimi kovinami ter druge analize, povezane z rodovitnostjo tal in prehrano rastlin. Na podlagi rezultatov nudijo strokovno svetovanje za gnojenje in apnjenje tal ter izdelavo gnojilnega načrta.
- Pri krmi opravljajo analize na vse parametre, na podlagi katerih lahko prehranski strokovnjaki sestavijo uravnotežen obrok za živali. Ocenjujejo tudi energijsko in beljakovinsko vrednost krme za krave molznice, pitance ali druge domače živali.
- Analize ostankov pesticidov izvajajo na sadju, zelenjavi, v vinu, tleh, cvetnem prahu in medu.
- V sredstvih za varstvo rastlin določajo aktivno snov in fizikalne lastnosti (mokra sejalna analiza, izguba mase pri sušenju, higroskopnost, stabilnost suspenzije, nasipna masa, omočljivost itd.).
- Med ostalimi storitvami opravljajo tudi analize onesnaževal, kot so ostanki pesticidov, ostanki zdravil, kovine, mikotoksini, nitrati in nitriti.

It provides comprehensive analytical solutions in agriculture with regard to the following:

- *In the analysis of honey, it determines botanical and geographical origin, performs quality analyses, and provides organoleptic evaluation of samples. Another important area of work is the analysis of the residue of substances for the reduction of varroa mites and pesticide residues in honey.*
- *It performs analyses regarding soil fertility, the pollution of soil with pesticide residues and heavy metals, and other analyses concerning soil fertility and plant nutrition. Based on the results, it provides expert advice for soil on fertilisation and liming, and formulates fertilisation plans.*
- *For animal feed, the laboratory conducts analyses of all parameters used by nutrition experts to draw up balanced animal rations. It also evaluates the energy and protein value of animal feed for dairy cows, fattening animals, and other domestic animals.*
- *It performs analyses of pesticide residues in fruit, vegetables, wine, soil, pollen, and honey.*
- *Active ingredients and physical properties (wet sieve tests, loss of mass in drying, hygroscopy, suspensibility, bulk density, wettability, etc.).*
- *Other services include analyses of contaminants, such as pesticide residues, medicine residues, metals, microtoxins, nitrates, and nitrites.*





SLUŽBA ZA URADNO POTRJEVANJE SEMENSKEGA IN SADILNEGA MATERIALA KMETIJSKIH RASTLIN *THE SERVICE FOR OFFICIAL CERTIFICATION OF SEED AND PLANT PROPAGATION MATERIAL*

Služba za uradno potrjevanje je samostojna enota, ustanovljena v začetku leta 2013. Združuje dejavnosti, ki potekajo neodvisno od ostalih aktivnosti Kmetijskega inštituta Slovenije, in sicer:

- uradno potrjevanje oziroma certificiranje semenskega in sadilnega materiala poljščin (žita, krompir, krmne rastline, oljnice, predivnice) ter zelenjadnic,
- uradno potrjevanje materiala za vegetativno razmnoževanje sadnih rastlin, trte in hmelja,
- analizo kakovosti semena v semenskem laboratoriju z mednarodno akreditacijo ISTA,
- hranjenje standardnih vzorcev semenskega materiala za varovanih sort in sort, vpisanih v slovensko sortno listo in
- naknadno kontrolo uradno potrjenega semenskega materiala kmetijskih rastlin.

The Official Certification Service is an independent unit founded in early 2013. It performs activities that are independent of other activities of the Agricultural Institute of Slovenia:

- *official certification of seed and plant propagation material of field crops (cereals, potato, fodder plants, oleaginous plants, fibre crops and vegetable crops);*
- *official certification of vegetative propagation material of fruit plants, vines, and hops;*
- *analysis of seed quality in the Seed Testing laboratory with ISTA international accreditation;*
- *preservation of standard seed samples of protected varieties and species on the National List of Varieties;*
- *post-control of officially certified seed units of crops.*



Semenski laboratorij deluje v sklopu Službe za uradno potrjevanje in je edini slovenski laboratorij, akreditiran po mednarodni akreditaciji ISTA. Poleg analiz, ki jih izvaja v okviru rednega dela strokovnih nalog, opravlja akreditirane storitve tudi za zunanje naročnike: vzorčenje partij semena, vsebnost vlage, čistota, kalivost, seme drugih vrst rastlin v povprečnem vzorcu, absolutna masa (masa 1000 semen), biokemični tetrazol test, določanje vsebnosti gensko spremenjenih organizmov. Med ostale storitve, ki jih nudijo svojim naročnikom, sodijo še kalibriranje semena s siti (določitev frakcij), hladni test (stresni test za seme koruze pri nizki temperaturi in visoki vlagi), preverjanje sortne pristnosti in čistosti semenskega materiala, preverjanje ter identifikacija vrst in sort kmetijskih rastlin z molekulskimi metodami, izvajanje fizikalnih analiz kakovosti vzorcev krmil in vzorcev za mlevsko industrijo ter pelodne analize. Laboratorij je usposobljen tudi za superanalize kakovosti semena za potrebe inšpekcijskih služb.

The Seed Testing Laboratory of the Official Certification Service is the only Slovenian ISTA-accredited laboratory. In addition to analyses, as part of its regular expert tasks it conducts accredited services for external customers: seed sampling, moisture content, purity, germination, other seed determination, weight of thousand seeds, biochemical tetrazol test, and testing for the presence of genetically modified organisms. It also provides other services to customers, including seed calibration, cold test (stress test for maize seed at low temperature and high humidity), species and variety verification using molecular markers, physical analysis of the quality of feedingstuffs and milling industry samples, and pollen analysis. The laboratory is also equipped for super-analysis of seed quality as required by inspection services.

Služba je smiselno razdeljena na dva dela: uradno potrjevanje semenskega in sadilnega materiala kmetijskih rastlin ter semenski laboratorij, ki deloma opravlja naloge s področja uradnega potrjevanja, večinoma pa opravlja servisne storitve (npr. analize semen in pelodne analize) za zunanje naročnike.

Kot član deluje znotraj mednarodne zveze za kontrolo kakovosti semena – ISTA (International Seed Testing Association) in evropske mreže laboratorijev za določanje gensko spremenjenih organizmov – ENGL (European Network of GMO Laboratories).

Po rezultatih medlaboratorijskih testov v okviru ISTA, ki služijo preverjanju usposobljenosti laboratorijev, se semenski laboratorij redno uvršča v zelo visok kakovostni razred. Nadzor nad njegovim delom redno opravlja tudi Uprava za varno hrano, veterinarstvo in varstvo rastlin.

The Service has two divisions: one devoted to the official certification of seed and plant propagation material, and the Seed Testing Laboratory, which partially performs official certification tasks but primarily carries out services (e.g. seed and pollen analysis) for external customers.

It is a member of the International Seed Testing Association (ISTA) and the European Network of GMO Laboratories (ENGL).

According to the results of ISTA proficiency tests (inter-laboratory tests), which are used to verify the competencies of laboratories, the Seed Testing Laboratory regularly places very high in quality rankings. Its work is also regularly supervised by the Administration of the Republic of Slovenia for Food Safety, Veterinary and Plant Protection.



