Ways for financial support and self-support of horticultural science in the Institute of Field and vegetable crops in Novi Sad - Republic of Serbia.
IFVCNS is Linking basic research with applied research, farmers and the market for more than 75 years.
Establishment

- Institute was established in 1938 as a non-profit government organization.

- Today we are the largest Institute overseen by the Ministry of Education and Science of the Republic of Serbia.
Organizational structure

**Research and development units:**

- Small grains
- Corn
- Oil crops
- Sugar beet
- Forage crops
- Vegetables
- Soybean
- Biotechnology
- Organic production & biodiversity
- Seed testing laboratory
- Soil and agroecology laboratory
Biotechnology Department

- Application of the latest methods in plant biotechnology
- Detection of major genes and QTLs for agronomic traits and marker-assisted selection (MAS)
- Validation of markers and QTL detected in our breeding material and ecological conditions
- DNA fingerprinting
Ministry - Coordinating body

Svilajnac

Selenča

Valjevo

Leskovac

Research center
Novi Sad

Extension Service

Agricultural incubators
Sources of finance

Seed business and services

Ministry of Education and Science, Serbia

Ministry of Agriculture, Trade, Forestry and Water Management, Serbia

Secretariat for Science and Technological Development, AP Vojvodina

Secretariat for Agriculture, Forestry and Water Management, AP Vojvodina
International sales of:

- breeders’ seed
- joint hybrids
- production under license

Commercial production in the world at 

\[ \approx 6,100,000 \text{ ha} \]

of which

In 31 countries at \(3,400,000\) ha,

in Serbia at \(2,700,000\) ha
Staff structure

academic titles

- BSc: 10%
- MSc: 30%
- PhD: 60%
Researchers by academic titles

- Research Trainee: 5%
- Principal Research Fellow: 28%
- Senior Research Associate: 17%
- Research Associate: 13%
- Research Assistant: 37%
- Research Trainee: 5%
Age structure of researchers
Acceptance of Staff policy – young researchers
Areas of research

- Genetic resources
- Genetics
- Breeding
- Plant physiology
- Molecular biology
- Chemistry and technology
- Seed production and processing
- Cultural practices
- Agroecology and environment protection
Genetic resources

- collection tours and *in situ* conservation
- improvement and maintenance of *ex situ* collections
- maintenance, characterization and evaluation of samples
- pre-breeding activities
- exchange of germplasm
Genetics

- research of agronomically important traits of plants
- biometric analysis and $G \times E$ interaction
- linking conventional and molecular genetics
- practical aspects of mutagenesis
- citogenetic and *interspecies* hybridization
Breeding

- breeding of field and vegetable crops for human and animal nutrition and other purposes
- breeding for improved plant architecture and yield, improved protein and oil contents, other bioactive components, and other quality parameters
- developing new approaches to open-pollinated and inbred plants
- feasibility and effectiveness of cross-breeding techniques
- improving existing methods of mass, individual and pedigree selection
Breeding

- breeding and testing of hybrid populations
- establishing a network of preliminary and comparative field trials
- assessment of general and specific combining abilities of inbred lines
- new uses for the most important crops
- reintroduction of neglected species
- organic breeding
- experimental GM breeding (closed systems)
- registration, protection and patenting newly developed lines, varieties and hybrids in Serbia and abroad
Cultivars registered in the past 10 years
Plant physiology

- various *in vitro* techniques
- reproduction of genotypes by micropropagation
- genotype reaction to stress conditions
- embryo culture
- somatic hybridization
- callusogenesis
Molecular Biology

- determination of genetic diversity
- marker assisted selection – MAS
- determination of favorable alleles and haplotypes
- quantitative trait loci – QTL
- development of genomics and other related approaches ("omics era")
- DNA profiling of breeding materials and varieties
Chemistry and Technology

- distillation and extraction of medicinal and aromatic plants
- development and validation of rapid methods for quality determination
- technological properties and nutritional value
- alternative plant species for the production of alcohol and malt
- qualitative properties of oil and protein plants
- chemical analysis of finished products
Seed production and processing

- determination and maintenance of genetic purity of varieties by biotechnological methods
- development of optimal seed production and processing methods
- seed quality
- maintenance of genotypes and vegetative multiplication
- determination of optimal spatial and temporal isolation in the production of parent lines of F1 hybrids
- improvement of seed processing in order to enforce seed quality and environmental protection
- production of certified organic seeds
Cultural practices

- determination of optimum cultural practices for each new variety and hybrid - varietal agrotechnics
- analysis of new hybrids and varieties in multilocation small- and large-plot trials - pre-registration tests
- impact of previous crop and impact on subsequent crop
- optimization of sowing date and crop density
- defining irrigation parameters
- evaluation of harvest methods aimed at reducing harvest losses
- testing varieties and hybrids for application in conventional and sustainable agriculture
Agroecology and environment protection.

- soil genesis and classification
- soil fertility control
- improvement of polluted and infertile soil - liming, etc.
- determination of harmful substances in soil and water
- monitoring the quality of plant-based foods
- monitoring water irrigation quality
- monitoring of microbial activity
- isolation and selection of strains of microorganisms for production of microbial fertilizers - Nitragin - patented product
- use of global information systems and satellite navigation
Extension service

- direct and friendly contacts with farmers, food industry and other end-users
- close cooperation with both public and private agricultural systems and various government structures
- promotion of agriculture both in the media and in general
Scientific cooperation

<table>
<thead>
<tr>
<th>The Institute has an extensive scientific cooperation with domestic institutions:</th>
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<tbody>
<tr>
<td>Novi Sad University</td>
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<tr>
<td>Belgrade University</td>
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<tr>
<td>Megatrend University (private)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Cooperation with international institutions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Innes Centre, UK</td>
</tr>
<tr>
<td>IPK, Germany</td>
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<tr>
<td>INRA, France</td>
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<tr>
<td>University of Helsinki, Finland</td>
</tr>
<tr>
<td>Prince of Songkla University, Thailand</td>
</tr>
<tr>
<td>Joint Genomic Center (JGC), Bulgaria</td>
</tr>
<tr>
<td>Agro Bio Institute (ABI), Bulgaria</td>
</tr>
</tbody>
</table>

The Institute maintains scientific cooperation with universities and other research institutions through joint projects.
Projects

- EU FP7 Genetics and Physiology of Wheat Development to Flowering: Tools to Breed for Improved Adaptation and Yield Potential (ADAPTAWHEAT)
- EU SEE-ERA Sustainable Preservation of Indigenous South East European Legumes and Their Traditional Food and Feed Products (SEELEGUMES)
- Bilateral projects with Belarus, China, France and Slovakia
- Numerous national projects financed by the Ministry of Education and Science, Ministry of Agriculture, Trade, Forestry and Water Management of the republic of Serbia and Secretariat for Science and Technological Development, AP Vojvodina
Projects 2011-2014

1. Improvement of varieties, hybrids and technologies of sugar beet (Dr. Nevena Nagl)

2. An interdisciplinary approach to developing new varieties of soybean and improvement and seed processing (Dr. Jegor Miladinović)

3. Modern breeding of small grains for present and future needs (Dr. Nikola Hristov)

4. Development of new varieties and new technologies to improve oil production plants for different purposes (Dr. Ana Marjanović-Jeromela)

5. Increase of market importance of forage crops by breeding and seed production technology optimization (Dr. Dura Karagić)

6. Improving the production of maize and sorghum in terms of stress (Dr. Aleksandra Nastasić)

7. Status, trends and opportunities to increase the fertility of agricultural land in Vojvodina (Dr. Petar Sekulic)

8. Creation of varieties and hybrids for cultivation of vegetables in open fields and greenhouses (Dr. Jelica Gvozdanović Varga)

9. Upgrading the technologies for growing forage crops on arable land and grassland (Dr. Branko Ćupina)

10. Development of new technologies for modern and sustainable production of vegetables (Dr. Zarko Ilin)

11. Pharmacologically active substances and products based onlekovitotog aromatic plants for use in pharmacy (Dr. Zoran Zeković)

12. The study of climate change and its impact on the environment, monitoring of impacts, adaptation and mitigation (Dr. Ratko Kadović)
On Vegetable Department in Institute of Field and vegetable crops,

1- dr. Jelica Gvozdanovic-Varga
national coordinator for Allium Working Group in Republic of Serbia
in European Cooperative Programme for Genetic Resources (ECP/GR).

2- dr. Mirjana Vasić
national coordinator for Grain Legumes Working Group in Republic of
Serbia in European Cooperative Programme for Genetic Resources
(ECP/GR).

3- dr. Janko Červenski
national coordinator for Brassica Working Group in Republic of
Serbia in European Cooperative Programme for Genetic Resources
(ECP/GR). (http://www.ecpgr.cgiar.org/contacts_in_ecpgr.html)
South East European Development Network on Plant Genetic Resources (SEEDNet) – Working group for vegetable crops, SEEDNet, 119-04-82/2007-0,

**dr Mirjana Vasić** National Coordinator; Dr Janko Červenski Responsible for "on-farm" keeping, (2004-2011);

Collection, characterization and regeneration of indigenous onion (*Allium cepa L.*) and leek (*Allium porrum L.*) germplasm for further *ex-situ conservation*,

**dr Jelica Gvozdanović-Varga** - Coordinator for Institute, SEEDNet – Regional project, (25.03.2007- 25.03.2010);

South East European Solanaceae germplasm collection, conservation and sustainable use;

**dr Mirjana Vasić** Coordinator for Institute SEEDNet – Regional project, (April 2007. December 2010);

Integrated operative program (POI), (Progetto n. 1 denominato Cooperazione Tecnico Scientifica Nel Settore Agricolo del Programma Operativo Integrato (POI) Campania – Basilicata in Serbia), (25. 10. 2009-31.12.2010);
Domestic and international projects headed by Institute’s staff members

<table>
<thead>
<tr>
<th>Crop</th>
<th>Domestic</th>
<th>International</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small grains</td>
<td>21</td>
<td>11</td>
</tr>
<tr>
<td>Corn</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Oil crops</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td>Sugar beet</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>Soybean</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>Forage crops</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td><strong>Vegetables</strong></td>
<td><strong>20</strong></td>
<td><strong>5</strong></td>
</tr>
<tr>
<td>Hops</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Sorghum</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Medicinal, aromatic herbs and spices</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>Jerusalem artichoke</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td><strong>131</strong></td>
<td><strong>40</strong></td>
</tr>
</tbody>
</table>
Participation in educational activities

- The Institute participates in teaching activities at University of Novi Sad, Belgrade University and Megatrend University.
- Scientists from the Institute supervise the preparation of doctoral theses, master theses and bachelor theses.
- The Institute provides the necessary equipment, experimental fields and other facilities.
Publishing

- The Institute publishes three scientific journals:
  - **Field and Vegetable Crops Research (M 51)**
  - **Helia (M 24)**
  - **Bulletin of Alternative Plant Species** (formerly Bulletin for Hops, Sorghum and Herbs)

- The Institute issues monographs, books, conference proceedings, and manuals for production of various crops

- List of issued books and scientific publications can be seen on the website [www.nsseme.com](http://www.nsseme.com)
Books, monographs, textbooks, manuals

Several hundred publications
Pro-Sci group

Coordinator:
Prof. Dr. Mirjana Milošević

Secretary:
Tanja Vunjak-Kvaić

Legal aspects:
Sonja Luburić

Projects:
Aleksandar Mikić
Sanja Treskić

International coop:
Sanja Vasiljević
Dušica Jovičić

Management representatives:
Prof. Dr. Borislav Kobiljski, director
Dr. Ana Marjanović-Jeromela, director for science
- Groups main tasks:
  Operational support to the Institute’s scientific research and Scientific Council

- Overseeing operation system and efficiency of scientific research at the Institute

- Preparation of appropriate regulations and facilitating the specialization and training of young researchers abroad

- Finding cooperation partners in various research fields (MOU)

- The group performs all other activities related to the development of scientific thought at the Institute.
The European Charter

- Joining the **European Charter for Researchers and Code of Conduct for the Recruitment of Researchers**
- The Institute will become the first scientific and fourth educational organization to sign up - three universities have joined so far
The European Charter for researchers makes recommendations of good practice and a framework for career management of researchers stating the rights and duties of researchers and their employers and/or financiers.

The Charter defines the role and responsibility of researchers and organizations in which they work in the context of primary objectives that the relationship between them ensure successful creation, transfer, sharing and dissemination of knowledge creation.

Among other things, the Charter includes the recognition of the profession, career mobility and value.
Institute’s researchers in the Academy of Sciences

Miloje Sarić
Assoc. Serbia 1978
Member Serbia 1989

Slavko Borujević
Member Vojvodina 1979
Member Serbia 1992
Assoc. Slovakia 1999

Petar Drezgić
Member Vojvodina 1979

Relja Savić
Member Vojvodina 1981

Novica Vučić
Assoc. Vojvodina 1981
Member Vojvodina 1987

Dragan Škorić
Assoc. Serbia 2003

Rudolf Kastori
Member Vojvodina 2004
Hungary 1998

Srbislađ Denčić
Assoc. Vojvodina 2004
Agricultural Machinery

Machine park
Greenhouses
Laboratory equipment

GeneAmp PCR System 9700

ABI 3130 DNA Sequencer

ABI RT PCR 7300
1. Soil analysis
2. Water analysis (irrigation)
3. Analysis of plant material
4. Fertilizer analysis
5. Pesticide analysis
Field Day