REPORT OF THE EXPERT COMMISSION FOR EVALUATION OF QUALITY AND EFFICIENCY OF SCIENTIFIC AND PROFESSIONAL WORK

AGRICULTURAL INSTITUTE OSIJEK

Evaluation performed on the 10th and 11th July, 2007 in Osijek.

The National Council for Science of the Republic of Croatia appointed the Expert Commission for evaluation of quality and efficiency of scientific and professional work of the Agricultural institute Osijek on 27th February 2007. The members of the Commission are as follows:

Prof. Dr. Sc. Marija Ivezic, Faculty of Agriculture in Osijek, Josip Juraj Strossmayer University in Osijek, Croatia

Prof. Dr. Imre Kádár, Magyar Tudományos Akadémia Talajtani és Agrokémikai Kutató Intézete, Budapest, Hungary

Em. O. Univ. Prof. Dr. Peter Ruckenbauer, University for Life Sciences, Institute for Crop Production and Plant Breeding, Vienna, Austria

The Commission visited the Agricultural institute Osijek on 10th and 11th July 2007.

The Commission reports on the basis of a pre-delivered self-evaluation of the Institute, a discussion with the director Dr.sc. Josip Kovačević and a discussion with the heads of different departments of the Agricultural Institute Osijek. The Commission took a tour of the cabinets, laboratories and experimental fields, and had a discussion with the junior researchers and employees of the Agricultural Institute Osijek. All necessary information and documents were at our disposal during the visit to the Institute.

The self-evaluation of the Agricultural Institute Osijek was made in May 2007 and written on the Report form for evaluation for scientific institutions of the National Council for Science on 61 pages of text and contains the following information: 1. General information about the scientific organization, 2. Potential, and 3. Scientific and expert activities and academic reputation. In addition to the Form, a development strategy with short-term and long-term plans of the Agricultural Institute Osijek was presented.

I. General information

The Agricultural Institute Osijek is a scientific institution with a long tradition of scientific and professional work with the purpose of improving agricultural production. It was established on the foundations of the Economic Experimental Station founded in 1878 by the Slavonian Economic Association in Osijek. The Association grew into the Department of Agricultural Chemistry in 1916, whose successor is today's Agricultural Institute Osijek working under this name since 16th July 1956. Today the Institute has great influence on the development of agriculture in the Slavonija and Baranja region, the Republic of Croatia and on international scientific and professional co-operation. Today the Agricultural Institute Osijek is a public institution owned by the Republic of Croatia and is responsible to the Ministry of Science, Education and Sports (MZOŠ). The Institute is registered in the Register of Researchers of the Ministry under the number 0073/1995 in the bio-technical sciences area.

The areas of work of the Agricultural Institute Osijek are research and experimental development in technical and technological sciences in the area of agriculture (code 73102). These areas include primarily scientific and developmental research in breeding, genetics and seed production of agricultural plants. The mission is to accomplish scientific and developmental programs of strategic importance for the Republic of Croatia by actively taking part in higher education and by establishing a quality scientific infrastructure for building a society of knowledge. The strategic goal of the Agricultural Institute Osijek is to become a centre of excellence in plant genetics, plant breeding, seed production and seedling production, which is why the Institute is further developing its professional and material structure as well as its organizational form.

Structure

The bodies of the Agricultural Institute Osijek are: Managing Council, Director, Scientific Council, Scientific Committee and Expert Board. Scientific research and expert work of the Agricultural Institute Osijek is being handled by the following departments established at the Institute:

- Department for Breeding and Genetics of Small Grain Cereals,
- Department for Maize Breeding and Genetics,
- Department for Industrial Plants Breeding and Genetics,
- Department for Fodder Plants Breeding and Genetics,
- Department for Fruit-growing,
- Department for Seed Production,
- Department for Agricultural Techniques and Soil Improvement,
- Department - Agrochemical Laboratory
- Department for Basic Seed Production

(in addition, this Department has been established for the purposes of doing more efficient scientific work and research at the Institute, as a utility service unit to other organizational units of the Institute).

The Agricultural Institute Osijek has been registered in the Register of Laboratories for quality control of agricultural seed with the right to test grain, maize hybrids, grass seed and fodder crops, industrial plants, herbs and plants of all seed categories used for medicinal purposes (Ministry for Agriculture, Forestry and Water Management). The Agricultural Institute Osijek has clearance from the Ministry of Agriculture, Forestry and Water Management to do physio-chemical testing of fodder as a licensed laboratory.

Infrastructure

Total surface size of all departments is 2.127,45 m^2, while the total size of the library is 362,28 m^2. The total number of computers at the Agricultural Institute Osijek is 99, out of which 82 are desktop computers and 17 laptops. There is a large number of equipment worth more than 100.000,00 kn/per unit at the Institute, which mostly served for carrying out the field experiments. The Agricultural Institute Osijek has more than 700 ha of agricultural land out of which 400 ha are arable and the rest is suspected to be mine fields.

During the last five years a sum of 2.738.548 kn has been invested into scientific equipment, with the Institute itself investing 1.320.776 kn of that sum. The means for scientific equipment acquisition were co-financed by the Ministry of Science, Education and Sports, paying 1.418.772 kn. The finances necessary for the maintenance, repair and development of the Institute have been provided by the Institute itself by selling goods and services on the market. The laboratory equipment is being used by the scientists of the Institute for the purposes of achieving project goals. The equipment can also be used by other institutions in higher education and research facilities (Faculty of Agriculture Osijek, Faculty of Agronomy Zagreb, Faculty of Food Processing Technology Osijek etc.).

Human resources

Out of 147 full-time employees, 20 are being financed by the Ministry of Science, Education and Sports, while others are paid by the Institute. The total number of employees in scientific and research positions is 36, out of which 23 are in scientific positions such as 2 permanent scientific advisors, 7 scientific advisors, 11 senior associates and 3 scientific associates. The employees have been equally distributed in the departments of the Institute in scientific and research positions. The ratio of full-time scientists and scientists working on a limited time contract is 2:1. The number of female scientific employees has generally increased during the last couple of years, but the percentage varied across the departments from 0% to 100%.

At the moment there are 11 junior researchers at the Agricultural Institute Osijek, financed by the Ministry of Science, Education and Sports. The Institute invests a lot of money and pays attention to scientific improvement of the junior researchers in the country and abroad. They have the opportunity to attend graduate and postgraduate studies in Zagreb, Osijek and Dubrovnik. They are required to attend classes regularly and take part in breeding and genetics as well as making tests for creating new cultivars; they have to work individually in the phytopathological and DNA laboratory with the aim of scientific research, which often becomes the topic of their doctoral thesis. In addition to that, similar research studies have been planned as parts of projects and programs of the Ministry of Science, Education and Sports. The average time for obtaining a doctoral degree is 96 months. Two junior researchers take part in teaching at the Faculty of Agriculture Osijek (lectures, seminars, colloquia).

Income structure

During the last five years the total amount of the Institute's finances grew from 1.771.000,00 kn in 2002 to 2.159.000,00 kn in 2006. The budget for basic programs of the Ministry of Science, Education and Sports, for projects with other ministries and bodies of state and local government, and for maintenance expenses (salaries, travel expenses, etc.) makes up more

than 50% of the total finances of the Institute (54% in 2004 and 59 % in 2006). The salaries of the employees not covered from the budget make up about 40 %.

Co-operation

The Agricultural Institute Osijek and the J. J. Strossmayer University in Osijek signed a Cooperation contract in 2003 whereby 10 scientists from the Institute were included as course lecturers at the Faculty of Agriculture in Osijek at the undergraduate, graduate and postgraduate level. Furthermore, there are scientists included as lecturers at the Faculty of Agronomy in Mostar and in the PhD studies of molecular biosciences at the Department of Biology of the J. J. Strossmayer University in Osijek, Ruđer Bošković Institute and the University in Dubrovnik.

The Agricultural Institute Osijek is working on international scientific projects and/or collaborates with about ten scientific and educational institutions in the world, as well as on technology projects with seven international companies. The Agricultural Institute Osijek has a long-lasting scientific and professional cooperation with a great number of scientific and higher education organizations, as well as with numerous companies in the Republic of Croatia.

II. Quality and innovation of research

Based on the completed and earlier report of the Institute the following newly approved projects from the Ministry of Science, Education and Sports (MZOŠ) were presented to the Evaluation Committee and openly discussed (Table 1).

Table 1. Scientific research projects of the MZOŠ in 2007

	PROJECT LEADER	CODE	PROJECT NAME
1.	Dr. sc. Zvonimir Zdunić	073-0730463-0198	Identification of mega-environments in maize breeding
2.	Dr. sc. Antun Jambrović	073-0730463-0201	Utility of genetic divergence of related lines of maize in seed production
3.	Dr. sc. Domagoj Šimić	073-0730463-0203	Genetic analysis of mineral concentration in maize kernels
4.	Dr. sc. Ivan Brkić	073-0730463-0253	Developing and improving maize population, lines and hybrids
5.	Dr. sc. Tatjana Ledenčan	073-0730463-0256	Breeding of sweet corn for grain quality of and yield
6.	Dr. sc. Aleksandra Sudarić	073-0730489-0344	Continuous genetic improvement of soybean with modern breeding methods
7.	Dr. sc. Dario Novoselović	073-0730718-0536	Development of QTL with molecular markers for wheat quality traits

8.	Dr. sc. Alojzije Lalić	073-0730718-0550	Genotyping and development of germplasm of winter and spring barley
9.	Dr. sc. Georg Drezner	073-0730718-0598	Development of new germplasm for quantitative traits in wheat
10.	Dr. sc. Josip Kovačević	073-0731674-0552	Physiology of stress and economic properties of different cultivars of wheat and barley
11.	Dr.sc. Vera Cesar	073-0731674-0841	Cell and tissue differentiation during plant organs development
12.	Dr.sc. Hrvoje Lepeduš	073-0731674-1673	Influence of oxidative stress on the organization and function of plant cells and tissue
13.	Dr. sc. Zorica Jurković	073-1781844-1930	Biotechnological methods in identification, selection and propagation of fruits

In addition to these 13 scientific projects of the Ministry of Science, Education and Sports, the Institute's scientists work as project leaders for several scientific and developmental projects of the Ministry of Agriculture, Forestry and Water Management, as well as the Osijek-Baranja County. Three scientists are working on bilateral projects, and ten on international projects.

All listed projects are completely complied to primary activities of the Institute. The Institute requests reports about the status of the projects, problems concerning goal achievement, necessary equipment, necessary financial means, expert training etc. from the project/program leaders through the Scientific Council and Scientific Board at least once a year. Through continued monitoring of project work, successful implementation of the program and fulfillment of contractual obligations is ensured.

It should be mentioned that the presentation of the eleven scientific novices of the Institute who are involved in these projects for the Evaluation Commission demonstrated the high level of their scientific work and their engagement.

III. Efficiency of the Agricultural Institute Osijek

At the Agricultural Institute Osijek there are 36 employees assigned as either scientist or researcher (there are 23 scientists). In the period 2002 – 2006 seven researchers obtained a master's degree and eight obtained a PhD.

Scientific publications

Since 2002 the scientists of the Institute have published more than forty scientific papers referred in the Current Contents database. Most of the publications were published in 2006, which points to a rising tendency in scientific publication. Most publications were published in Cereal Research Communications, the journal which impact factor (IF) is 1.04 (ISI Web of Science ®, 2006). Scientific publications have been published in equal numbers by scientists from all departments of the Institute. Some publications have been co-authored by scientists

from different departments. During the last five years the Institute's scientists published more than seventy publications listed in the secondary databases CAB and Agricola. Three scientific and expert books whose authors are scientists of the Institute have been published by the Institute. All published publications are in close connection to basic scientific activities of the Institute. The Agricultural Institute Osijek together with the Faculty of Agriculture of J. J. Strossmayer University in Osijek has been publishing a scientific and expert magazine Agriculture (Poljoprivreda) since 1995, which is listed in databases like CAB International and AGRICOLA.

Patents

In more than 70 years of work on plant breeding at the Institute, and on the basis of scientific work and research, a recognizable OS-germplasm of different crops of agricultural plants has been developed. The expansion of OS-cultivars production points to a great significance of OS-germplasm of wheat, barley, maize, soybeans and alfalfa in southeastern Europe. The function of the scientific work at the Institute is to create and develop the state economy. By conducting scientific and research projects and applying modern methods and knowledge, the Institute tries to create quicker, more dependable, more efficient and better results in plant breeding and agricultural production.

In the period 2002 – 2006 a total number of 110 patents have been registered in Croatia and 132 patents abroad. The patents refer to potential cultivars and hybrids (lines and experimental hybrids) registered in the country and abroad. The total number of patents protected during the same period in Croatia was 77 and 98 abroad, i. e. these are the total numbers of confirmed cultivars and hybrids in the country and abroad. The number of patents with confirmed usage in the country is 193 (number of cultivars or hybrids that are being produced in the country). These are the total numbers of patents, which means that it is possible that one and the same cultivar appears in the total as registered, protected or used patent more than once in more countries.

Scientists and other staff of the Institute often appeared in public in 2002 – 2006 (more than 200 times), published articles in newspapers and expert magazines (more than 70), organized open days, educational and motivational workshops (expert congresses, lectures, field days, days of bread more than 300 times), held lectures for agricultural producers in the form of extension and advisory services (more than 400 times).

IV. Comments and recommendations from the Evaluation Committee

Based on the completed and earlier delivered report of the Institute, on our personal visit of the Institute, on the review of the documents asked by the Commission and on the interviews we performed during our visit and details regulated by Ordinance of Ministry of Science, Education and Sports on evaluation of scientific organizations, we can primarily state that:

The Agricultural Institute Osijek, Croatia is comparable to similar organizations in the European Union and demonstrates a good efficiency and quality of the whole research work performed.

1. Research is often classified as being fundamental, strategic or applied. Applied is "near-market". A Government's prime responsibility is for basic and strategic research, which ensures that biologically based industries including agriculture and food remain internationally competitive 10 or 20 years hence. It provides an academic environment in which scientific innovation and creativity can flourish, technology transfer succeeds and global concerns are addressed.

2. It appears also important that government funding should emphasize applied or adaptive research that will benefit Croatian agriculture on a relatively short time-scale. Criteria used to determine the research menu might include: the economic value resulting from the research, and other benefits like food safety, animal welfare, environmental protection, etc. The national capacity to finance adequately fundamental research across all scientific fields is limited. So, greater international cooperation in research is desirable and this must be accompanied by effective systems of dissemination.

3. Croatia is in an excellent position in terms of highly trained scientists and excellent agricultural and horticultural products. Croatian scientists have rapid and comprehensive access to the World scientific literature. To adopt these results to the particular conditions and requirements of Croatian agriculture is important. Priority shall be given for mainly applied research and any basic research that is carried out. It should be concentrated on a limited number of key research subjects and assist to develop and implement an overall national strategy for agricultural research.
   The individual farmer deserves to have a direct access to the most up-to-date scientific, technical and economic data and receive advice through direct or indirect contacts with the research center.

Summarizing our statement about the quality and efficiency of the scientists and their competence to carry out research entrusted to them, the quality of the scientific projects, organization of scientific activity is excellent.
We suggest to the National Council for Science to accept the positive report and suggest to the Minister to issue accreditation for the Agricultural Institute Osijek, to keep it on the Register and to finance it from the state budget.

Commission:

Prof. Dr. Sc. Marija Ivezic, Faculty of Agriculture in Osijek, University of Josip Juraj Strossmayer in Osijek, Croatia

Prof. Dr. Imre Kádár, Magyar Tudományos Akadémia Talajtani és Agrokémikai Kutató Intézete, Budapest, Hungary

Em. O. Univ. Prof. Dr. Peter Ruckenbauer, University for Life Sciences, Institute for Crop Production and Plant Breeding, Vienna, Austria

Osijek, July 11th, 2007

Form for evaluation of scientific organizations, to be filled by expert commission. Each of the parameters is assigned a grade ranging from A (excellent) to D (unsatisfactory).

The form is filled on the basis of analysis of the evaluation form filled by the scientific organization (SO), review of the documents asked by the commission and interviews that commission members conducted during their visit to the SO.

I. General information

Evaluation of SO compared to:	**A**	**B**	**C**	**D**	
Mission and goals	X				
Strategy and implementation of the strategic goals	X				
Compatibility of organization with strategic goals	X				
Compatibility of projects/programs with mission and strategic goals		X			
Infrastructure and equipment		X			
Human potential and staff policy		X			
Income structure		X			
Academic prestige	X				
Social influence	X				
SWOT analysis					
Other similar institutions in Croatia					YES
Other similar institutions in the EU					YES
Cooperation with other similar institutions in Croatia		X			
International cooperation		X			
Participation in university teaching (only for research institutes)		X			
Average duration of writing MA (specialist) theses		X			
Average duration of writing doctoral theses	X				
Measures implemented for emancipation of junior scientists	X				
Transfer and commercialization of knowledge	X				
Promotion of science in the public	X				
Total grade	X				

II. Quality and innovativeness of research

Evaluation of quality compared to:	**A**	**B**	**C**	**D**
Quality of research projects/programs	X			
Significance of contribution to a scientific area	X			
Scientific prestige of project/program managers	X			
Innovativeness of research		X		
Strategy of publishing scientific results*	X			
Strategy of publishing professional results*	X			
Quality of published scientific works	X			
Quality of other relevant research results		X		
Total grade of quality of research	X			

*__Explanation__: is judged according to proportion of works published in most prominent scientific (professional) magazines, taking into account specific situation within each scientific discipline

III. SO efficiency

Evaluation of efficiency compared to:	A	B	C	D
Number of defended doctoral theses	X			
Number of defended MA (specialist) theses		X		
Number of published scientific works	X			
Division of the number of published work among constituent units		X		
Number of published professional works	X			
Number of published scientific books and chapters in scientific books	X			
Other results of the similar rank		X		
Number of recognized Croatian and international patents	X			
Total efficiency grade	X			

*During evaluation of efficiency it is essential to take into account the number and structure of the scientific staff and financial means SO has at its disposal for scientific research

Comments and recommendations

Contains:

a) **concrete remarks, description of noted deficiencies and recommendations for improving organization, efficiency and quality of the work, as well as evaluation whether scientific organization in question is comparable to similar organizations in the European Union**

b) **final grade of quality and efficiency that, pursuant to Article 10 of the Ordinance on evaluation of scientific organizations of the National Council for Science, may be: excellent, good, satisfactory and unsatisfactory.**

*Grade explanation:
A: excellent
B: good
C: satisfactory
D: unsatisfactory

Commission for creating forms for the evaluation of scientific organizations

Osijek, 11th of July 2007