FINAL REPORT

I	**The Name of the Institution to be evaluated**	INCDCSZ (National Institute of Research and Development for Potato and Sugar Beet)
II	**Evaluation Period**	27 – 28 April 2012
III	**Members of the Team**	
	1st Evaluator information	
A	**Name, Surname**	**Serge HAMON**
B	**Affiliation**	*Institut Français de Recherche pour le Développement, Montpellier, France*
	2nd Evaluator information	
A	**Name, Surname**	**Elena PAOLETTI**
B	**Affiliation**	*Institute Plant Protection, CNR, Firenze, Italy*
	3rd Evaluator information	
A	**Name, Surname**	**Ladislav PAULE**
B	**Affiliation**	*Faculty of Forestry-Zvolen, Slovakia*
	4th Evaluator information	
A	**Name, Surname**	**Daniel Ioan PĂCURAR**
B	**Affiliation**	*Umea Plant Science Center, Umea, Sweden*
	5th evaluator information	
A	**Name, Surname**	**Ram REIFEN**
B	**Affiliation**	*The Hebrew University of Jerusalem, Israel*

The team has evaluated INCDCSZ (National Institute of Research and Development for Potato and Sugar Beet) on the basis of the self-evaluation documents, presentations by the scientific director and the team leaders and also visits to laboratories and facilities. Two days were spent in Brasov.

The main strengths of INCDCSZ resulted to be:

- A consolidated expertise in potato breeding, this is the only reference institution of Romania;
- An international research partner in the field of potato breeding ;
- An expertise also in technology for sugar beet, cereals and medicinal plants;
- Good genetic resources, knowledge and management;
- Lots of implications for rural economy and agriculture ;
- An administrative organization running without complains.

The main weaknesses are:

- The current infrastructure is mostly made up by buildings and land;
- INCDCSZ is mostly a supplier of plant material;
- There is no start up or spin-offs available;
- Too many personnel are dedicated to field and commercial activities;
- The level of science is relatively low as the Institute is mostly technical. The institutional web site was not updated "published papers – under construction";
- The lack of molecular marker approach in breeding programs as well as the development of genomics research for studying plant adaptation is going to be a major problem for the next future;
- INCDCSZ is in between a scientific research institution and a private company, and unfortunately is not competitive at either level.

JUSTIFICATIONS OF MARKS

C1: Quality of R&D activities and their results (3.4)

INCDCSZ has an important role in developing potato cultivars for Romania and as consultant for the Ministries. INCDCSZ has a consolidated expertise in potato breeding; this is the only reference institution of Romania. Nevertheless, the Institute has a weak international dimension even if they have apparently good collaboration.

- There is a good potential to improve Romanian agriculture by improving technology, breeding methods and identifying novel medicinal plants and uses.
- Over the evaluated period, INCDCSZ developed 9 national patents, none abroad, 7 about potato cultivars and 2 about *in-vitro* cultivation techniques. A main holdback limitation to international patenting of cultivars is the competition with rich European private companies.
- They identify themselves as suppliers of high class biological material (clonal material, foundation seed and animal hybrids) according to the GD 1882/2005 and Law 45/2009 art. 32. Given the fact this is one of their major aims this amount of patents is satisfactory but too much effort is devoted to commercial activity. The commission understands this is related to self-financing and targets established by AASF and MARD but has a negative effect on the scientific part of the Institute.
- At present, there is no start up or spin-offs available. However, there is a potential for transforming the commercial activities into spin-offs.

- The dissemination activities are at a medium - high level: 70 scientific papers (i.e. 2.8 per researcher), participation to 33 national and 19 international meetings, annual demonstration fields, attendance at national 21 exhibitions, dissemination by media, scientific and technical support to MADR, scientific and technical support to students, excellent knowledge transfer to farmers.
- The lack of molecular marker approach in the breeding program (i.e. MAS selection) will be really a problem to be competitive in the next decade. In the same way, there is no project including modern approaches involving genomics and this is now a must particularly when adaptation to climate change is involved.
- Consequently, INCDCSZ has a major problem with publications: only 8 AIS papers published (0.32 per researcher) and the Institute is unknown for ISI Web of Knowledge. Citations are not shown, and thus it is hard to evaluate the international impact of these papers. Two books were published in Romania (one in English), plus three book chapters.

C2: Human resources quality (3.4)

- Total was 185 in 2007 and 130 in 2011. The scientific staff is very limited (15 Researchers, 6 Research assistants and 7.5 lab assistants). Only 11% are researchers, this is a very low ratio compared to other institutions such as for example INRA (France) where this ratio is 21%.
- The average age is above the critical threshold of 45 years: however, it was reduced from 49 to 46 years since 2007 to 2011- Target 45 years in 2015.
- It seems that too much of the personnel are dedicated to field and commercial activities.
- Only one PhD student is identified on a total of 60 students. This is really too low as the standard average is commonly 1.5 PhD per scientific staff.
- Despite long term (4) and medium term (6) training have been realized in countries like Belgium, Spain and Netherlands, we suggest that young scientists should be encouraged to have training periods in foreign top-quality laboratories rather than only attending conferences abroad.

C3: Quality of infrastructure and its rate of exploitation (3.6)

- The infrastructure is mostly made up by buildings and land.
- Currently, there is a modest availability of scientific instrumentation, which is not enough used, and is a serious limit for being competitive at an international level.
- Although they spent more than 1 M€ in infrastructures, there are still problems with the equipment. The commission hopes this will be resolved at the end of the year when the main building will be modernized. Assuming that they will follow a structured plan it will enable them to have good equipment and infrastructure at the end of the year.
- A plan for infrastructural development is needed with more space devoted for new biotechnologies such as genomics and bio-informatics.

C4: Management and efficiency and quality of the research environment (4.0)

- They have successfully introduced some best practices recommended by World Bank.
- Until 2011, the best performers were awarded by increasing the salaries. There are also other motivational procedures (training, participation to conferences). An assessment of the individual performances is regularly carried out and translated into a financial reward.
- Good collaboration among the personnel.

- No complain about the administrative procedures or about administrative efficiency.
- According to the GD 1882/2005 all members of the Scientific Council must be from the Institute. The commission estimates that for improving the transparency of decisions, it is recommended that the Scientific Council will also include external (not- NIRDPSB) members, selected among top-level scientists at the international level. This will also help the quality of science.

C5: Quality and credibility of the institutional developmental plan (2.8)

- INCDCSZ operates at the national level in response to some needs of Romanian agriculture.
- They are in between a scientific research institution and a private company, and unfortunately are not competitive at either level. Until Romania will not develop private companies to provide high-quality plant material, activities, however, are very helpful to Romanian society.
- Informal national and international collaborations are in progress (i.e. Presidence of EAPR between 2005 and 2008) but very few international projects have been carried out.
- It is recommended to limit the number of plant species the Institute work on and focus on potato and to change the institute name into Institute for Agricultural Science in Upland Regions. The commission encourages INCDCSZ to organize one of the next world potato conference (2015 or 2018).

- Except 2009 characterized by a substantial WB-MAKIS budget (1104.50 K€) the budget has regularly decreased between 2008 and 2011. The international funding remains low and the budget is mostly supported by the internal funding. The commission suggests that securing a core funding would help to streamline the focus on science rather than on technical and commercial activities.

- The development directions are coherent with the present expertise of the institute, but a serious brainstorming would be necessary to move from practical agriculture to theoretical and applied agricultural science.
- The scientific quality of the institutional development plan is not strong enough and a long-term recovery plan should be reformulated.
- Scientists must pay a particular attention to the publication of their research in international journals such as Euphytica, Crop Science, Theoretical and Applied Genetics,…
- The recruitment policy is currently driven by the accessibility of projects (funds). It is mostly addressed to young scientists but they have to increase the number of PhD students in their teams.

TEAM E1 - BREEDING POTATO AND SEED PRODUCTION

R&D activity

The team has a long term expertise in classical potato breeding with some results are transferred in new cultivars. This is the most well performing team in patenting new cultivars. The virology lab is very active.

They have published only two ISI papers and 7 papers in journals indexed in other European databases.

Good total budget (25% from commercial activities and the rest from projects).

Human Resources

The team leadership misses a scientifically-sound strategy.
The team includes 9 persons with higher education out of which 3 are young researchers.
All researchers had training in Romania and abroad.
The staff size is adequate for the Institute.

The main weakness of the team is his lack of capacity to integrate new tools to support breeding programs (i.e. MAS selection). This point should be addressed as the main priority.

Infrastructure

Excellent field germoplasm collection.

Breeding results are immediately intergrated into production throught the seed production. This will be supported by the new hydroponic facilities.

Overall poor research infrastructure but will renewed at the end of the year. Virology lab is well equipped (mostly ELISA).

Management & Research Environment

The head of the team is a well known and an experienced potato breeder.

Nevertheless, the breeding scheme does not include molecular marker strategy (QTL, SNP, Molecular maps etc…) and is far away from the international now approaches in breeding.

General Feedback

Too much attention is paid to knowledge transfer to farmers rather than to science.

The team has an excellent technical development for current new varieties (breeding of a potato line can take 14 years).

The development plan is poor and the development of new technologies for breeding and biotechnology is missing.

Team E2 - TECHNOLOGY FOR POTATO, SUGAR BEET, MEDICINAL PLANTS AND CEREALS

R&D activity

The team has a (too) broad range of activities:

The main activity is focused on elaborating studies in close collaboration with E1, to provide the best cultivation technology for the new varieties. This includes an integrated approach for crop rotation schemes, pest management, eco-physiological measurements, aphids monitoring, GIS and remote-sensing applications, etc...

An important component of their activity is providing technical advice to farmers. The team works in close collaboration with other national research institutes e.g. in multiplying the seeds of new grain cultivars.

An interest in adapting the cultivation technology for new aromatic and medicinal plants become an important issue in the frame of recommendations from The World Bank that the institute adapts its activity for the interest of upper land.

The team has published on national and international journals. However, the team did not produce any ISI papers with RIS. This is a major drawback for the team in particular and for the institute.

Human Resources

Considering the broad activity of the team size is very small.
Recruiting and instructing new staff should be considered as priority.

Infrastructure

Generally well adapted to the present needs, with the missing equipment to be purchased in the future.

Management & Research Environment

As for the other teams, the management will be done by a scientist of the upcoming generation.

General Feedback

The potential for improving the scientific level is good but a list of research priorities should be developed and the results should be published in peer-reviewed journals.

Team E3 – VEGETAL TISSUE CULTURE

R and D activity

The main activity of the Team 3 is aimed at production of tubers using classical micro-propagation methods. No research aims were shown, just technological development of micro-propagation methods.
Members of the team published 5 ISI papers in Romanian journals and one paper in a journal indexed in another database.
Two patents aimed on the improvement of technological methods are intended to submit.

Human Resources

The team has only three researchers with scientific degrees, Ph.D. in biology (RS I), a Ph.D. in horticulture (SR), a Ph.D. in agronomy (ASR) with a mean age of 39 years.
Additional three persons are employed as auxiliary staff.
The team includes two young researchers.
The team members participated in training abroad.

Infrastructure

The team possesses laboratories with classical infrastructure for micro-propagation (most of the equipment was purchased within the MAKIS project). The infrastructure will be completed by building of a biotechnological module (including "insect-proof" greenhouse) through MAKIS project.

Management and Research Activities

The main activity of the Team 3 is aimed at production of tubers using classical micro-propagation methods.
It seems, this team is just supporting one for Team 1 and 2 aimed at the multiplication of the breeding achievements and production of micro- and minitubers. The production in the period 2007–2010 varied between 10,000-15,000 microplants and minitubers, and 2,000–6,000 microtubers annually. After purchasing new equipment from MAKIS sources the production in 2011 has doubled.

By building of a biotechnological module (including "insect-proof" greenhouse) through MAKIS project, the infrastructure will enable the production of 500,000–600,000 mini-tubers by the hydroponic and aeroponic methods.

Unfortunately, main progress in these labs has been focused on improvement of micro-propagation technology and production of virus-free plants, instead of addressing the scientific questions.

Development Plan

The development plan does not address any scientific question and focus only on production and methodology.

Among the mechanisms for stimulating the appearance of new ideas, attending top-level research laboratories in universities or public institutions abroad is recommended.

General Feedback

General comment: A serious restructuring is needed in order to move from technical development to science

SPECIFIC RECOMMENDATIONS FOR THE FUTURE

The average score of INCDCSZ is 3.4 which corresponds to the higher end of the overall certification level A^{-} (2.5 – 3.5)

Publications & Dissemination

- The potential for competitive science is not properly exploited.
- Effort is mostly devoted to technical assistance and self-financing. This results into an average medium-low quality of papers.
- The participation to national/international meetings should produce peer-reviewed papers.
- More ambitious approach in publications: submit preferentially to ISI journals.
- Web portal must be improved

Budget

- Excellent capacity of attracting funds
- Too much effort dedicated to commercial activities.
- Securing an annual budget would reduce the Development activities and translate into beneficial effects on the Research activities.

Human management

- Young scientists should visit foreign top-quality laboratories for training, experimental activities.
- In particular, training abroad in molecular biology is recommended which implies long visits (>5-6 months).
- To establish clear guidelines and rules for PhD students, following international standards.

Research plan

- The organization of in two different and independent departments (Development and Research) with separate budgets and objectives is recommended.
- A streamlining of the molecular biology labs is suggested.
- Regular assessment of R&D staff based on clear indicators should be translated into a financial reward as it was several years ago.
- To improve the transparency of decisions, it is recommended that the Scientific Council includes external (not-INCDCSZ) members, possibly top-level scientists at the international level. This would also help the quality of science.
- A clear strategy for stimulating the development of new ideas should be formulated.

Proposed certification level: A - (average mark 3.4)

As the proposed certification level is A- a recovery plan is suggested below.

A reevaluation process is suggested in three years.

RECOVERY PLAN

The Institute is carrying out very important activities for Romanian agriculture.
Unfortunately, the approach is too traditional and there is a serious risk that these activities will be no longer competitive at the international and even national level.
The present development plan is weak and must be seriously revised to allow INCDCSZ to maintain a leadership in this field.
Some basic recommendations are given below for a serious restructuring, whose success – of course – will strongly depend on the financial support from the State.

1. Improve the scientific vision

Many of the activities carried out by INCDCSZ have a formidable potential for being translated into high-quality applied agricultural science.

Too much of the effort, however, is on plant species of minor importance and on commercial activities.

Scientists must refocus their scientific aims, by selecting what is truly important for Romania and qualifying for INCDCSZ.

It is recommended to:

- Split Research and Development activities by creating a spin-off society, which can perform the commercial activities and financially contribute to INCDCSZ Research. As an alternative, INCDCSZ should be organized in two different and independent Departments (Development and Research) with separate budgets and objectives.
- Most of the focus must be on the most representative plant species, i.e. potato. This does not exclude the possibility to work on emerging topics about other species, e.g. medicinal plants (and their essential oil protection for potato).

- Scientific Council and Scientific Director should collaborate in formulating a clear strategy for stimulating the development of new experimental ideas.
- The Scientific Council should include also external (not- INCDCSZ) members, possibly top-level scientists at the international level.
- Select a young, active, competent and motivated Scientific Director, with an international-level background (minimum h-index=10), able to address and follow a scientific strategy.

- Establish clear guidelines and rules for students, following international standards, and invite them to contribute to the development of experimental ideas.
- Young scientists should spend a period in foreign top-quality laboratories for performing training and experimental activities, which will also help the development of new ideas.

- Introduce the most update scientific approaches in breeding, e.g. by accessing the potato genomic sequences that are already available, by using genetic maps, snips, QTL, etc.
- Concerning the identification of aphids, develop a fingerprinting approach to identify automatically species and populations in Romania. This kind of approach can easily produce international papers, particularly in the field of climate change.

- Concerning somaclonal variation, the use of mobile elements can help to monitor the conformity of the variety or to select new variants.
- Concerning the biological control of virus attacks, we can suggest analyzing the perturbations of nucleic acid synthesis induced by essential oils.

2. Precise agricultural systems could be used to monitor and elaborate new strategies and models and forecasts of pest attacks.

3. **Improve the scientific output**

Until now, INCDCSZ has worked mostly in developing and patenting breeding lines of potato.

Although patents are and will remain a very important output for INCDCSZ, the trend for evaluating the performance of modern science is towards cold indicators, top of which is the level of the journals selected for publishing.

Therefore, it is recommended to:

- Translate the results into international-level papers.
- Follow a more ambitious approach in publications and submit preferentially to ISI journals.
- Attending national/international meetings are always a great opportunity for developing contacts and ideas, but publishing in conference proceedings is no longer rewarding in terms of science performance.

A re-evaluation process is suggested in three years

INCDCSZ
(National Institute of Research and Development for Potato and Sugar Beet)

Proposed certification level: A – (average score 3.4)

Nr. crt.	Name, Surname	Signature
Evaluation TEAM		
1	Evaluator 1 – **Serge HAMON**	
2	Evaluator 2 – **Elena PAOLETTI**	
3	Evaluator 3 – **Ladislav PAULE**	
4	Evaluator 4 – **Daniel Ioan PĂCURAR**	
5	Evaluator 5 – **Ram REIFEN**	
Observers		
1	Coordinating Authority – **Gheorghe SIN**	
2	CCCDI Representative – **Ion PIRNĂ**	
3	ANCS Representative – **Simona MĂLUREANU**	

Proposed certification level: A –

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