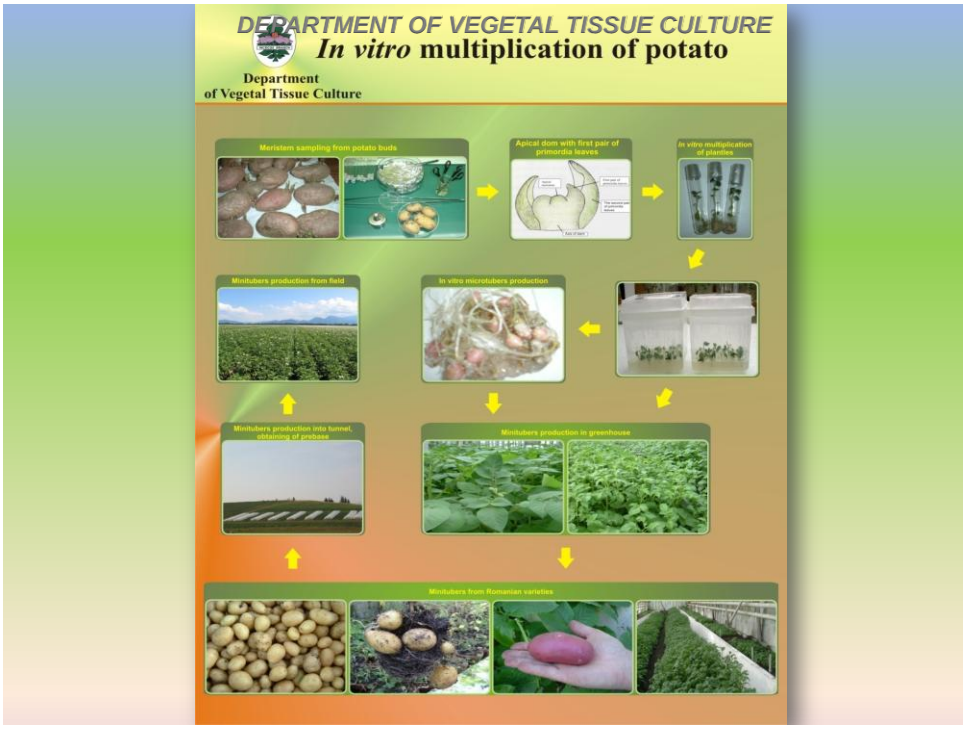


I. Research objectives

- increasing the efficiency of the National System for Seed Potato Production;

- promoting Romanian varieties by producing high-value clonal material;

- improving methods and techniques.



II.Tackle problems

-*in vitro* getting of a free pathogens material, by meristem cultures (than testing by DAS-ELISA);

-rapid micropropagation of the most valuable Romanian varieties;

-production of potato microtubers and identification of the best growing conditions;

-*in vitro* microtubers (> 10 mm, >1g);

-obtaining a corresponding planting material, from biological and phytosanitary point of view (microtubers), for obtain constant and quality productions (modernized method);

-improvement of the methodology, to get plants with torerance at hydric stress by *in vitro* selection;

-identification of genotypes tolerant to the thermo-hydric stress, in greenhouse conditions;

-*in vitro* establishment of germplasm collection;

-implementation of minitubers production technology, on industrial substrates;

-initiation of researches to identify the variability, using PCR analysis techniques.

III. Projects

3.1. Projects funded through NUCLEU

3.1.1. PN 09-20-01-04 (2009 – May 2012)

Efficiency of the national system of seed potato production by reducing the period to obtain clonal material, using rapid multiplication and generalization of the "insect- proof" system.

Source of funding: NASR Bucharest (150.000 Euro)

Objective:

- improving the quality of seed potato, using microtubers and minitubers.

Result:

- healthy microtubers and minitubers from four Romanian varieties (15.000 microplants/year, 3.000 microtubers/year and 15.000 minitubers/year).



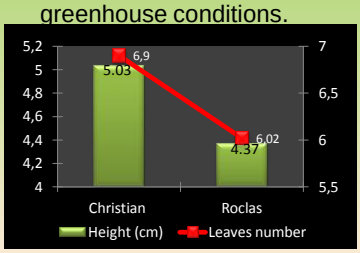
3.1.2. PN 09-20-01-02 (2010 - 2011)

Improved methodology for obtaining genotypes with resistance / tolerance to thermo-hydric stress for potato by *in vitro* selection, and identification of variations in the genetic material by PCR

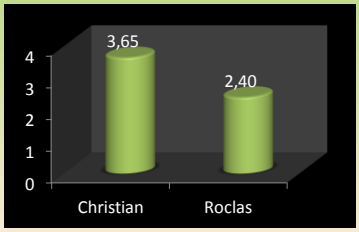
Source of funding: NASR Bucharest (40.000 Euro)

Objective:
-*in vitro* regeneration and selecting of plantlets with tolerance to hydric stress.

Results:
-identification of variability at the genetic material level, *in vitro* regenerated and selected;
- identification of genotypes with tolerance to thermo - hydric stress, in greenhouse conditions.



***In vitro* influence of hydric stress over plantlets height and leaves number**



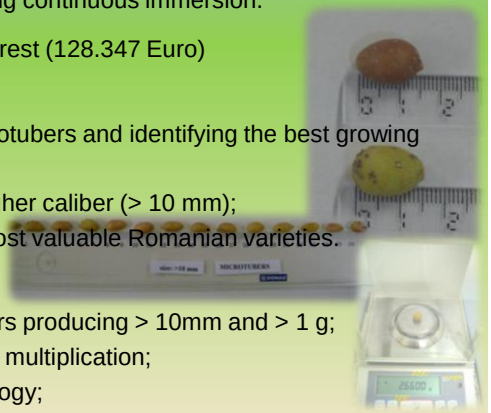
The influence of thermo - hydric stress over average number of minitubers, in greenhouse conditions

3.2. Project funded on national competition

PN II (2007-2010)
Potato production from suitable varieties for sustainable agriculture by microtubers obtained *in vitro* using continuous immersion.

Source of funding: NCPM Bucharest (128.347 Euro)

Objectives:
- *in vitro* production of potato microtubers and identifying the best growing conditions;
- *in vitro* microtubers getting of higher caliber (> 10 mm);
- rapid micropropagation of the most valuable Romanian varieties.



Results:
- experimental model of microtubers producing > 10mm and > 1 g;
- microtubers production and rapid multiplication;
- microtubers production methodology;
- improved technology of clonal material production;
- production of 5.000 microplants / variety, 2.000 microtubers / variety and 3.000 - 4.000 minitubers /variety.

3.3. Project - Partenership

„Practical stages – coordinates the student professional Promotion of students**"** partner **"Lucian Blaga" University, Sibiu,** (2008-2010) Project co-financed from European Social Fund by Sectorial Operational Programme The Human Resources Development (2007 – 2013).

Objectives:

- integration of students in research program of the Institute (theoretical and practical activities);
- advising the students in achievement of license;
- ensuring conditions of collective and individual practice at Institute.

Activities:

- integration of students into the practice activity on agricultural field (and in our department they participated in the following activities):
- *in vitro* multiplication of potato;
- planting microplants and microtubers in greenhouse;
- minitubers harvesting;
- the practice stages were for short term (3 weeks / year).

3.4. Project funded by international competitive

PNII CAPACITIES Module III, Project of bilateral Cooperation Romanian - Walloon (CRA Geambloux, Libramont) (2008-2010)

Evaluation and exploitation of potato genetic resources by creating resistan varietiest to late-blight.

Source of funding: NASR- Bucharest - Cra Wallonie Belgium (20.000 Euro)

Objective:

- creating of resistant varieties to late-blight.

Specific objective:

- *in vitro* establishment of resistant genitors to late-blight.

Results:

- *in vitro* multiplication of 10 resistant genitors to late-blight;
- production of a biological material free of diseases (300 plantlets / genitors), for breeding department, for combinations getting by classical hybridization.

3.5. Current project

PS 122 (2011 - 2014)
Raising the qualitative and quantitative performance of seed potato material from the high quality clonal material, through elaborating and improvement of technological methods and phytosanitary control.

Source of funding: MARD (75.000 Euro)

Specific objectives:
- getting of a virus free material;
- rapid multiplication of new Romanian varieties.

Expected results:
- producing of diseases free material of high quality.

IV. Self financing

36.000 Euro

- standardization of tissue culture techniques for *in vitro* micropropagation;

- getting of virus free Romanian varieties (34 Romanian varieties at NIRDPSB Brasov, ARDS Suceava, SRDP Mc. Ciuc, SRDP Tg. Secuiesc);

- *in vitro* conservation of genetic material (34 Romanian varieties, 47 foreign varieties, 10 late-blight resistant genitors, 19 wild species);

- production of minitubers on industrial substrates;

- getting of 5.000 microplants, 5.000 microtubers and 5.000 minitubers from 4 varieties Romanian required by the market.

V. Collaborations

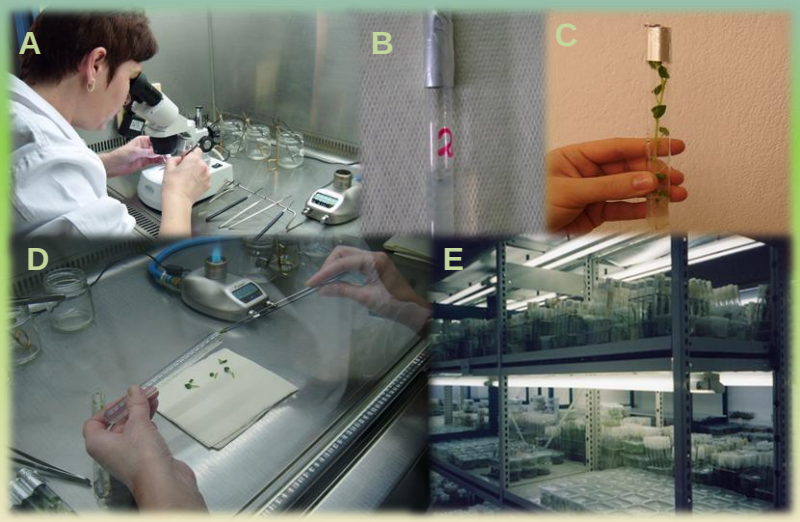
5.1. National collaborations

1. University of Agronomic Science and Veterinary Medicine – Bucharest;
2. University of Agronomic Science and Veterinary Medicine – Cluj;
3. "Lucian Blaga" University – Sibiu;
4. "Transilvania" University:
   -*in vitro* multiplication of potato;
5. ARDS Suceava;
6. SRDP Mc. Ciuc;
7. SRDP Tg. Secuiesc:
   - getting of a virus free material and multiplication of varieties;
   - microtubers production.

5.2. International collaborations

1. CRA Wallon – Geambloux, Libramont, Belgium:
   - training of young researchers;
   - reciprocal exchange of *in vitro* material;
   - 4 Romanian varieties;
   -10 genitors with resistance to light-blight, 5 varieties from Belgium;
2. NEIKER –Spanish:
   - training of young researcher;
3. WB – MAKIS:
   - infrastructures.

In vitro potato propagation



Culture initiation from meristems (A); Inoculation on test tubes with growing medium (B); Plantlets regeneration (C); Microcuttings (D); Growing of plantlets on controlled conditions (E).

In vitro microtubers production

Microtuberization using liquid medium (A, B); Microtubers harvesting (C, D); Microtubers keeping (E).

Plantlets and microtubers planted in greenhouse and tunnels

Minitubers harvesting

VI. Results (2007-2011)

6.1. Articles ISI

Number	Journals	Impact factors
1	Romanian Biotechnological Letters (2008)	0.152
2	Romanian Biotechnological Letters (2010)	0.152
3	Notulae Botanicae Horti Agrobotanici (2010)	0.436
4	Romanian Agricultural Research (2011)	0.310
5	Romanian Biotechnological Letters (2011)	0.152

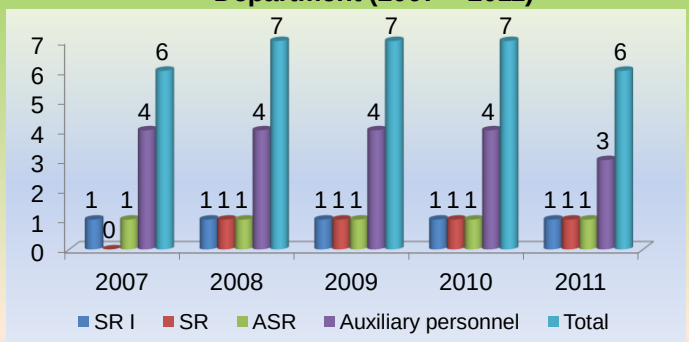
6.2. Publications and patent

Journals indexed in other international databases		1
Articles indexed in other databases	Journals indexed (CNCSIS B+)	19
	Non-indexed journals	7
Booklets		1
National Scientific Communications		18
International Scientific Communications		21
Other publications		17
Participation in exhibitions		8
The **pending patent** registered at **SOIT**: Technology modernized to obtain *in vitro* potato microtubers > 10mm and> 1g		1
Articles in press		
Articles ISI		1
Journals indexed (CNCSIS B+)		1
Other publications		2

VII. Human resources

The team consists of 3 persons with higher education, a 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. The team includes two young researchers. All researchers, have training courses in the country (Universities of Bucharest and Timisoara) and foreign countries (Belgium, Spain). The team is helped by an auxiliary professional personnel (1 technician, 2 laboratory assistants).

The dynamic of human resources on Vegetal Tissue Culture Department (2007 - 2011)



VIII. Infrastructure and equipment

For an efficient operation, a vegetal tissue culture laboratory needed adequate rooms, properly equipped to:

- nutrient media preparation;
- glassware washing and sterilization;
- storage of chemicals, glassware, nutrient media;
- *in vitro* cultures initiating and transfer;
- controlled conditions of light and temperature for *in vitro* cultures incubation.



- cabinet with vertical laminar flow
- autoclave drying chamber
- climatic incubator
- analytical balance
- binocular microscope
- centrifuge
- pH-meter
- distiller
- PCR equipment
- microbiological cabinet
- greenhouse
- tunnel





The majority has been obtained through MAKIS project, PNII.

IX. Future strategic scientific objectives and directions

- our team will be involved in new research directions, in continuing some of anterior ones and in improving the methods and efficacy of our activity.

9.1. Purposes and objectives:

- to produce high quality basic seed of different new varieties developed by the Institute and stations;
- conservative maintaining and multiplication of potato genotypes and local populations;
- regeneration on fresh media of potato collection, *in vitro* culture maintenance;
- enlargement of *in vitro* collection, maintenance by slowly growing;
- diversification of plant collection with vegetative propagation, maintenance in experimental field;
- generated of DNA fingerprints of Romanian varieties.

9.1.1. Our main activities will focus on:

- improving the methods for potato of high quality basic seed (tissue culture), micro and minitubers.

9.2. The estimated results:

- getting 500.000-600.000 minitubers / year (raising "insect-proof" module (through MAKIS project) we will approach the hydroponic and aeroponic methods).

9.3. Mechanisms for stimulating the appearance of new research directions:

- the stimulation of the appearance of new research directions is an important way to generate new approaches to achieve the main objectives of the our team in the next years;
- the **brain-storming** with researchers in SC (Scientific Council) debates and the proposal coming from research teams;
- each researcher must present in front of SC or AC the new relevant aspects he observed in **personal training** in the country or abroad;
- the new idea got from different **scientific conferences or consultative groups** on national level (research units, universities, private research companies) or on international level ;
- enhanced **cooperation with universities and stations.**

9.4. Collaborations and partnerships:

9.4.1. National level:

- research stations (SRDP Tg. Secuiesc, SRDP Mc. Ciuc, ARDS Suceava);
- universities ("Transilvania" University - Brasov, University of Agronomic Science and Veterinary Medicine – Bucharest, University of Agronomic Science and Veterinary Medicine - Cluj, "Lucian Blaga" University – Sibiu);

9.4.2. International level:

- E. U. countries (CRA Wallon-Geamblox Belgium, Spanish);
- Koreea, China.

9.5. Scientific communications and major projects:

- the scientific results will be published in national and international papers (ISI, B+, etc);
- our team will participate to the different organized symposia;
- will participate to the national and international competitions.

9.6. Recruitment:

Special attention will be paid to recruitment a personal of high level in special by laboratory development and raising of module "insect proof" (3 young specialized research and 2 auxiliary person).