Obtaining F1 hybrids and varieties at the main vegetable species cultivated in protected areas: tomatoes, peppers, aubergines, cucumbers, early cabbage.

GENERAL OBJECTIVE 3: Development of new products, practices, processes and technologies integrated into horticultural production

• Project Coordinator: Vegetable Research and Development Station BUZĂU
• Partner 1: Vegetable and Floriculture Research and Development Institute Vidra
• Partner 2: Vegetable Research and Development Station BACĂU
• Partner 3: Vegetable Research and Development Station IERNUT
• Partner 4: Research and Development for Horticultural Products Marketing Institute Horting
PHASE I/2015
Documentation and biological material acquisition for each studied species. Studies on top marketed biological material

Genetically stabilized lines evaluated and proposed to be studied in the project by V.R.D.S. Buzau

Of the 300 tomato lines proposed for the study, 32 lines are self prunning, 15 semidetermined and 253 lines with indetermined growth.
Regarding the aubergine lines, 40 genotypes with distinct characteristics were retained.
In the case of cucumber, the genotypes are structured on 3 groups depending on the type of fruit: cornichon-12 fruit, semi-long fruit - 4 lines and long fruit - 4 lines.
To achieve the objectives of the project, 10 genotypes of cabbage have been identified and are to be subjected to intensive breeding.
Partner 2, V.R.D.S. Bacau made a study on inventory of existing genetic resources for the main vegetable species.
"In vitro" multiplication and propagation methods are applicable to any plant species.
Activity 1.3. The control hybrids for all species studied and procurement of seed material

- Project Coordinator, V.R.D.S. Buzau
- For tomatoes, a large number of hybrids were taken into consideration, of which the main characteristics required by the cultivator were the Belfast F1 hybrid and the one meeting the consumer requirements was the Romanian hybrid Siriana F1.
- For the group of sweet peppers, leadership conditions brought together the Romanian Yellow Superior variety and the Barbie F1 hybrid, the kapia pepper, the Cosmin variety and the Atris F1 hybrid, and for the bell pepper the Cornel variety and the Bihar hybrid.
- For the hot chilli pepper group it was chosen Sahem F1 hybrid cultivar is currently considered the market leader.
- For cucumbers, the selected control hybrid is Ekol F1 and for the cabbage group, Reactor F1.
ICDLF VIDRA, Partner 1 chose 60 tomato genotypes, of which 23 genotypes to obtain new varieties and hybrids for protected areas were retained. Genotypes with undetermined port were mainly retained.

There were four genotypes (three lines perspective and one variety): L 27, L45, L 10 and the Barsan variety.

Partner 3, S.C.D.L. Iernut will study the Pontica variety, which was approved in 1988 under the name of Dacia and re-enriched in 2009, and Romec 554 j, which was approved in 1984 and re-enriched in 2010.

In addition to these varieties, we studied two more tomato lines from local populations in our area.

For cultivation of cucumbers the cultivar Ierprem approved in 2008 is cultivated.

For the early cabbage species, a local population from the area of Cipău under the code name L-Anca will be studied.

Activity 1.4. Determination of observations to be made throughout the research period

S.C.D.L. Buzau elaborated specific observation sheets for all the species involved in the project;

For cucumber and cabbage species, special observation files will be prepared according to UPOV descriptors.
Activity II.1 Grouping of genetic material by species, types of growth and culture media

Project Coordinator, S.C.D.L. Buzau organizes the genetic material for further study on work fields and types of growth. A number of 58 lines for tomatoes, 72 lines for peppers, 26 lines for aubergines, 12 cucumber families, and some early genotypes and cabbage semis have been retained.

Partner 1, I.C.D.L.F. Vidra, 12 genotypes were selected for tomatoes and four genotypes (three lines and a variety).

Partner 2, S.C.D.L. Bacau, after detailed documentation, has shown that genetic cell variability is generated in the cell and tissue culture.

Partner 3, S.C.D.L. Iernut, in order to obtain the initial breeding material, studied the most important features of the collection of germplasm useful for tomato and pepper species.
Activity III.1 Separation of the collected material from the point of view of genetic stability

Project Coordinator, S.C.D.L. Buzau organizes the genetic material on categories of stability: segregating, advanced or stable in tomato, pepper, eggplant, cucumber. For the tomato species, the lines to be studied during the project are: 26 C, 26 H, 27 E, 28, 80 A, 101, 165 A, 313, 524 A, 548, 2000 A. The following lines were selected from the aubergine collection: L 10, L 20, L 24, L 29 A, L 29 B, L 33.

In cucumbers, only two families were retained out of the total of 12 evaluated for the study. Both of them are early-horned. In the cabbage species, only two early genotypes were studied. In 2016, ICDLF VIDRA studied 16 genotypes in collection fields, belonging to 2 vegetable species, 12 tomato genotypes and 4 paprika genotypes. Observations have been made on the main plant phenophases.
TOMATO CROP/2016

L 26 C  
L 2000 A  
L 80 A  
L 28  
L 524 A  
L 101
Cultura de ardei/2016

L 12 A

L 10

L 13 A

L 14 C

L 11

L 3
P2, V.R.D.S. BACAU carried out at the same stage the testing of the experimental conditions (light, temperature), optimization of the necessary culture media for the necessary inorganic organogenesis and embryogenesis; the elaboration of technical-economic analysis documentation for tomato, pepper, cabbage.

In this project, V.R.D.S IERNUT, both tomatoes and peppers, examined comparatively the lines from the local populations, retaining for the improvement process and continuing the selection, the most valuable material from a qualitative point of view. The lines were analyzed against the control varieties with similar characteristics, aiming at obtaining new superior varieties in terms of quality, quantity, as well as tolerance to stress factors and tolerance to diseases and pests.

Evaluation of production for fresh consumption of some genotypes of tomatoes grown in protected space P4, ICDMPH HORTING- Research report - production evaluation for tomato genotypes Activity III.3 Inventory of the useful characteristics for the genetic improvement process and their analysis using chromosomal maps CP-S.C.D.L. BUZAU determined the main characteristics of the breeding process based on the chromosomal map of the tomato species
PHASE IV/2017

Setting up the work fields using genetically-engineered and selectively selected genotypes

Activity IV.1 Selection of hybrids and features monitoring that are useful for the hybridization process (homozygotting the main characters)

P1-I.C.D.L.F. VIDRA - Establishment of experimental fields with genotypes suitable for protected area of tomato, pepper, eggplant

P2-S.C.D.L. BACAU - Assessment and identification of stress factors (thermal treatments, deficiency of elements - footing) capable of inducing the occurrence of somaclonal variability; technical and economic analysis documentation for tomato, pepper, cabbage

Activity IV.2. Performing the phenological and biometric determinations and observations according to the frame sheets prepared for each species

S.C.D.L. Buzau has a rich germplasma base for all the species involved in the project: tomatoes, peppers, cucumbers, aubergines and cabbage.

In the IV / 2017 stage the tomato, pepper and eggplants were targeted at which germplasm bases were evaluated and the lines were selected for the purpose of the project.

Thus, the selected genitors were grouped according to the species as follows: (27, 28, 150 °C, 150 °C), large orange fruit (101, 548), large red pepper (4 A, 210, 313), 710 A), red pepper (150, 524 A), dark brown cherry type (306 A, 312 A), black cherry type (509, 629, 2013 A), 531 A), bovine heart type (538 C, 676).

For each species, a work sheet has been prepared according to UPOV (International Union for the Protection of New Varieties of Plants) and IPGRI (International Plant Genetic Resources Institute).

P3-S.C.D.L. Iernut - Determinations and observations according to the observation sheets prepared for each species. A long line of peppers (L-Janine) and a line of pepper (L-Sabin) derived from local populations in our area have been obtained, these lines at physiological maturity have the color of the intense red fruit.
Results obtained from testing of the combining ability

- Of the 23 stable tomato genotypes, a total of 17 passed the composite capacity test.
- General combinatorial capacity testing was performed by crossing each genotype with \( L\,1\,Bz \) and \( L\,82 \) tester genomes. Following the testing of general combinatorial capacity, 16 valuable genitors were shown to demonstrate useful genetic availability in the hybridization process.
- Project Coordinator, S.C.D.L. Buzau obtained, besides the 3 hybrids, another 3 varieties of tomatoes, eggplants and sweet peppers.
- Activity V.2. Realization of hybrid combinations between carefully chosen genitors
- They are named code: \( H1\ Bz, \ ... \ H30\ Bz \). In order to demonstrate the stability and uniformity of the genitors and the degree of compatibility between them and the uniformity of hybridization results, the hybridization process has been repeated so far.
Line 80, named ESTERA. The plant has an indetermined growth, it is destined for fresh consumption and industrialization, the fruits are oats weighing between 16-20 g, shows a small number of seeds, <20 sem / fruit.
Thus, L10 has been obtained which shows white, large fruit, distinct characteristic of the variety. It also shows a small number of seeds in the fruit. It is remarkable by the large and quality production recorded on the plant with a value of 4.1 kg.
Capsicum annuum

Among the genotypes selected from peppers, namely long (11A, 11B, 12, 92), bell (L 13A, 20A, 21, 22, 50, 75), long (3, 22, 24, 60A, 60 B, 62 A, 63 A, 68 A, 68 A, 68 B, 70 E, 70 P, 82), a single variety meeting DUS (Distinctibility, Uniformity, Stability) line 3 was obtained.
P4-I.C.D.M.P.H. Horting

At the Horting Institute in Bucharest, research is underway on the potential of F1 varieties and hybrids of Romanian and imported peppers grown in protected areas.

- The biological material consisted of some paprika genotypes (*Capsicum anuum*), L50, L70, L91 and L94, biological creations from SCDL Buzau patrimony.
- L50 is a bell pepper.
- L70 is a slow-growing pepper.
- L91 and L94 are long peppers
Establishment of competition fields with newly obtained hybrids and control

Activity VI.1. Determination of the main characteristics for newly obtained hybrid hybrids (early age, productivity, quality, genetic resistance to diseases and pests specific to the species)? Following the research carried out in VI / 2018, partner 1, ICDLF VIDRA and partner 3, SCDL Iernut coordinated by the leader project, SCDL Buzau made determinations on the main features for new hybrids with witnesses. "In the case of tomatoes, Marissa F1 and Siriana F1 were used as witnesses in the experiment." As a result of the competition field established between the newly obtained hybrids and the hybrid hybrids, there were significant productions by the hybrid combinations H 23 and H 29, which surpassed the average of the fruits and H26, H22 and H23, as well as the average weight per fruit, have large fruits that give a high production both in qualitative and quantitative terms. eggplants, following the careful evaluation of the hybrid hybrids achieved, three of them showed the phenomenon of reproductive heterosis significantly outstripping the control hybrid involved in the experience. The resulting hybrid combinations are: L 8 ♀ x L 1 Bz ♂ = H1 Bz; L2 Bz ♀ x L 9 ♂ = H2 Bz; L 20 ♀ x L 31 ♂ = H 3 Bz. The partner 2, SCDL Bacau, carried out at this stage the determination of the variability coefficient, the characterization of the genetic, biochemical and physiological potential of the somaclones and the quantification of the morphological characters of the regenerated plants by measurements, weights, determinations of the productivity indices; characterization and evaluation of regenerants according to the frame sheets prepared for each species in tomato, pepper, cabbage.
Activity VI.2. Hybrids presentation and description

H 22 F1

- Unlimited growth;
- Early;
- Type of crop intended for: protected areas and field;
- Average fruit weight - 180 g;
- Production: 3-3.5 kg / plant.

REBECA F1 hybrid

- For cultivation in protected areas and fields;
- Average plant height: 80 cm;
- The plant does not show spikes on vegetative organs, rarely a few on sepals;
- Average fruit length: 24-30 cm;
- The hybrid has large fruits of 770-1700 g;
- It shows a small number of seeds in the fruit.
PHASE VII/2018

Dissemination of results through scientific papers and other informative materials

In order to disseminate the research results and achieve the objectives of Phase VII / 2018, partner 2, S.C.D.L. Bacau participated in 4 scientific events and published two scientific materials in specialized magazines in the field. The project manager, S.C.D.L. Buzau also participated in the International Conference on "30th International Horticultural Conglomerate" IHC 2018, Istanbul, Turkey was organized by the International Society for Horticultural Science in partnership with the Turkish Society for Horticultural Science and the Ministry of Agriculture and Forestry Turkey. The works with which he participated were in the form of a poster within the Plant Breeding section of the congress, section 21. The works were aimed at the study of the tomato and eggplants project: "Camelia Bratu, F. Stanica, C. Vinatoru, Bianca Zamfir, Elena Barcanu- New hybrids of eggplants obtained at VRDS Buzau and the evaluation of their production potential in open field and protected spaces - within IHC TURKEY 2018-12-16 August 2018? Bianca Zamfir, D. Hoza, C. Vînătoru, Camelia Bratu and Elena Barcanu - YIELD AND QUALITY EVALUATION OF PROCESSING TOMATOES CULTIVARS OBTAINED AT VRDS BUZAU ROMANIA - within IHC TURKEY 2018-12-16 August 2018.? During this stage have been approved and proposed for approval hybrids and vegetable varieties, as follows: Flaviola variety, tomato type with ovoid fruit type cherry destined for spaces protected; Andrada variety, tomato variety intended for Inima de Bou, Roial variety, Decebal pepper variety, and Rebeca F1 eggplant hybrids (the patent rulings and certificates attached to this report). the dissemination of the results was published leaflets for two varieties of vegetables obtained in the project, namely Rebeca F1 and Flaviola, also annexed to this report.
Dissemination of the results was also carried out by I.C.D.I.M.P.H. HORTING throughout the project, by researchers in the project team, scientific papers presented at scientific events, international conferences organized by the Academy of Sciences of Bulgaria (ISI Web of Thomson Reuters Indexing) and USAMV Banat "King Mihai I of Romania" in Timisoara, the Faculty of Horticulture and Forestry (index BDI, B +), two published papers and a paper in the conference volumes.

We also received a prize for the best poster by Zamfir Bianca, the project director: