

INVESTIGATION OF GENETIC DIVERSITY OF LOCAL FORMS OF VEGETABLE CROPS IN THE REPUBLIC OF MOLDOVA

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Abstract. Problem of plant genetic resources conservation still remains one of the most challenging in the system of measures for nature protection in all countries worldwide. In the Republic of Moldova *ex situ* conservation of plant agrobiodiversity is implemented in the Centre for Plant Genetic Resources where collections of cultivated plants are maintained and include those collected in the territory of Moldova as well as obtained from various Gene Banks and foreign specialized institutions. Gene bank of the Centre for Plant Genetic Resources is responsible for conservation of germplasm of Moldova and owing to international cooperation it contributes to the conservation of the world biodiversity. This institution performs complex studies aimed at inventorying, collection, investigations, documenting and conservation of plant genetic resources. By virtue of international project “The South East European Solanaceae Germplasm Collection, Conservation and Sustainable Use” expeditions were conducted for inventorying and collection of local forms of vegetable crops in various districts of the Republic of Moldova and allowed to replenish existent collections with new accessions, some of which can be used as source material for selection.

Keywords: plant genetic resources, agrobiodiversity, tomato, breeding.

Rezumat. Investigații privind diversitatea genetică a formelor locale de culturi legumicole în Republica Moldova. Problema conservării resurselor genetice vegetale rămâne a fi și în continuare una din cele mai actuale în sistemul de procedee ale ocrotirii naturii în toate țările lumii. În Republica Moldova conservarea *ex situ* a agrobiodiversității vegetale se efectuează la Centrul de Resurse Genetice Vegetale, unde sunt depozitate colecțiile plantelor de cultură colectate pe teritoriul Moldovei, precum și achiziționate din diferite Bănci de Gene și instituții de profil de peste hotare. Banca de Gene a Centrului de Resurse Genetice Vegetale este responsabilă de conservarea germoplasmei vegetale din Moldova și, prin colaborare internațională, contribuie la asigurarea păstrării resurselor genetice vegetale mondiale. La instituția nominalizată se efectuează investigații complexe privind inventarierea, colectarea, evaluarea, documentarea și conservarea resurselor genetice vegetale. Grație proiectului internațional “The South East European Solanaceae Germplasm Collection, Conservation and Sustainable Use” au fost efectuate misiuni de inventariere și colectare a formelor locale de plante legumicole din diferite regiuni ale Republicii Moldova, fapt ce a permis completarea colecțiilor existente cu mostre noi, unele din ele ar putea fi utilizate ca material inițial în ameliorare.

Cuvinte cheie: resurse genetice vegetale, agrobiodiversitate, tomate, ameliorare.

INTRODUCTION

The question of plant genetic resources conservation still remains one of the most challenging in the system of measures for nature protection in all countries worldwide (BACCHETTA *et al.*, 2005; CORLAȚEANU & GANEA, 2008; GANEA, 2006; JACOTĂ, 2008; KHRAPALOVA, 2006; NUEZ *et al.*, 2005; REABCIUN, 2006). The primary goal of the Strategy of Agrobiodiversity Conservation in Moldova relies on the maintenance of sustainable social and economic development of the country through restoration, conservation and sustainable use of biodiversity. There are two ways for the conservation of plant genetic resources, which include *in situ* and *ex situ*. The former involves conservation of genetic diversity in their native habitats where they formed and developed (wild relatives of crop plants) or **on farm** (local forms of agricultural plants) as the components of agricultural systems. The latter method involves conservation of genetic material outside the natural distribution range, mainly in gene banks in the form of conservation of seeds, DNA, vegetative organs and in living field collections.

The Centre for Plant Genetic Resources is the main institution in the Republic of Moldova performing *ex situ* conservation of crop plant accessions and their wild relatives of different origin. The Centre cooperates with various profile institutions in the territory of the country and abroad. Through participation in international projects and European initiatives in the sphere of biodiversity protection the Centre makes certain contribution to this area of research.

In the Republic of Moldova, tomato (*Lycopersicon esculentum* MILL.), pepper (*Capsicum annum* L.), and eggplant (*Solanum melongena* L.) are the most important among the vegetable crops belonging to the Solanaceae family. Their wide prevalence among total agriculture crops in both Moldova and many countries of the world is explained by their ecologic plasticity, i.e. their capacity to grow and bear fruit in different climatic zones, enhanced producing capacity, multiple fruit utilization, their high biological value and gustatory quality.

All the environmental factors are impossible to control in conditions of free field for agricultural crops, including vegetable ones, that is why special emphasis has been presently placed on the improvement of breeding methods, while the basic genetic/breeding problem consists in the combination of two principal characters – high potential of productivity and resistance of plants to uncontrolled environmental factors. The success of the breeding of vegetable crops (tomato, eggplant and pepper) greatly depends on their biological value. The breeding work starts with initial material and, namely with that perfectly corresponding to the breeding objectives. The initial material may be of two categories: existent or basic material and the material developed by a breeder through different methods based on the existent material. The basic material is stored in collections in the form of local varieties, the bred varieties provided

by other countries, species, subspecies, cultivated and spontaneous varieties, special material in the form of lines, mutants, hybrids.

The local varieties (native, local populations) have developed in specific pedoclimatic conditions for a long period of time, natural selection and practical empiric selection made by cultivators acting in this case. Therefore, local varieties are characterized, first of all, by a good adaptation to the conditions in which they have developed, being resistant to different environmental factors (frost, drought, diseases, etc.). Secondly, local varieties have a high degree of heterogeneity, which explains their high ecologic plasticity. Though local varieties are generally inferior to the varieties employed in modern agriculture for productivity, some biotypes with superior performances regarding producing capacity, quality, earliness due to their heterogeneity can be found. Therefore, a careful collection, evaluation and conservation of local varieties are demanding so that this precious material be saved and employed as initial material in breeding.

The objective of investigations was to collect local forms of vegetable crops in various rural settlements, their conservation and documentation.

MATERIAL AND METHODS

Centre for Plant Genetic Resources performs complex studies aimed at inventorying, collecting, evaluation, documenting and conservation of plant genetic resources. By virtue of international project “The South East European Solanaceae Germplasm Collection, Conservation and Sustainable Use” expeditions were conducted for inventorying and collection of local forms of vegetable crops in various districts of the Republic of Moldova. Table 1 shows the diversity of local forms of vegetable crops from settlements located in the Southern, Central and Northern areas of Moldova.

Table 1. Diversity of local vegetable specimens from Moldova.
 Tabel 1. Biodiversitatea formelor locale de legume din Moldova.

	Tarakliya	Ciadrî-Lunga	Rîşcani	Edineţ	Orhei	Criuleni	Anenii Noi	Drochia	Străşeni	Nisporeni	Ungheni	Donduşeni	Călăraşi	Soroca
Tomato	4	4	4	3	14	6	10	9	3	17	4	7	2	4
Pepper	14	3	3	-	10	13	4	-	4	8	2	2	1	-
Eggplant	3	-	1	-	1	-	1	-	-	2	2	-	-	-
Squash	-	-	1	2	-	-	-	4	2	1	5	-	-	-
Vegetable marrow	-	3	2	-	-	-	-	3	1	-	-	2	-	-
Water-melon	-	-	1	-	7	-	-	2	-	1	6	6	-	-
Melon	-	-	1	-	2	-	-	4	-	1	2	4	-	1
Onion	-	2	-	2	2	-	-	9	1	3	1	3	-	1
Small radish	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Summer-and-winter radish	-	1	-	-	-	-	-	1	-	-	1	-	-	-
Cabbage	-	2	-	-	-	-	-	-	-	1	-	1	-	-
Beet	3	-	-	-	-	-	-	6	-	-	1	5	-	1
Dill	-	1	1	-	-	-	-	1	-	1	1	2	-	-
Parsley	-	2	-	-	-	-	-	3	-	2	1	3	-	-
Kidney-bean	-	-	9	7	-	-	-	21	3	8	3	14	-	15
Cucumber	1	-	-2	-	-	-	-	3	-	2	1	2	-	-
Carrot	-	4	-	-	-	-	-	2	-	-	-	4	-	-
Garlic	-	-	-	1	1	-	-	1	-	1	1	2	-	-
Celery	-	-	-	-	-	-1	-	1	-	-	1	1	-	-
Peas	-	-	-	-	-	-	-	1	-	-	-	2	-	-
Sorrel	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Leeks	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Parsnip	-	-	-	-	-	-	-	3	-	-	-	-	-	-
Lovage	-	-	-	-	-	-	-	1	-	-	-	-	-	-

RESULTS AND DISCUSSIONS

According to the program of project “The South East European Solanaceae Germplasm Collection, Conservation and Sustainable Use” the work group on vegetable crops of Moldova carried out work on the replenishment of gene bank with new local forms of Solanaceae and other crops (Table 1). Expeditions were performed to the central regions of Moldova (Criuleni, Străşeni, Anenii Noi, and Orhei districts), to the South (Tarakliya Ciadrî Lunga, Nisporeni) and to the North of Moldova (Ungheni, Rîşcani, Edineţ, Soroca, Donduşeni, Drochia), where the local forms of vegetable crops were not selected earlier. In Criuleni region in Hîrtopul Mic village the following forms were collected (Fig. 1): leaf parsley - 1 form, pepper - 4, tomato - 3, celery - 1. In Slobozia Duşca 2 forms of tomato were collected, one from them is of orange colour, and 3 forms of pepper were selected as well. In Zăicana 4 forms of

pepper were collected, one of them is xanthocarpous and has bitter taste, also there were collected 3 forms of tomato. In Strasheni region 16 forms of vegetables were collected (tomato - 3 forms, pepper - 4, onion - 1 form, vegetable marrow - 3, squash - 2, kidney-bean - 3 forms. In Anenii Noi region trips were performed to Mereni, Chetrosu and Maximovca villages. Four specimens of pepper, 3 forms of tomato and one form of eggplant were collected in Mereni. Five specimens of tomato (2 forms are red, one is pink and the last one is orange) were collected in **Chetrosu**. It shall be noted that in this village an interesting form of tomato was found - its shape is like a small pear of orange-to-yellow colour. Two forms were revealed in Maximovca - the one is small-fruited and the other one is pear-like of medium size.

Eight forms of tomato and 8 specimens of pepper, which have different colours and shapes, were collected from Trofim Lida, an amateur vegetable-grower from Ciocîlteni in Orhei district (Fig. 2). Two forms of tomato - brown plum-like and small-fruited and round, of medium size were found in Berezlogi village. Also one small-fruited form of yellow colour was noted. The following accessions were collected in Step Soci: pepper - 2; onion - 3; garlic - 1; tomato - 3 forms. In Brăviceni village 2 forms of melon and 6 accessions of water-melon were selected.

Interesting material of pepper was collected in Taraclia region (Fig. 3), where the pepper ranks first among vegetable crops. In this region the accessions were collected in Svetloe, Congaz and Corteni villages. Fourteen forms of pepper, 4 forms of tomato, 2 accessions of eggplant and one form of cucumber were collected. A very interesting form of pepper was found, it is dark-orange in colour. 30 accessions of diverse crops were collected in Ciadrî-Lunga and 48 in Nisporeni.

In the North of Moldova in Rîșcani district expeditions were conducted in Hiliuți, Șapte bani and Mălăești villages. The following types of vegetable crops were collected: tomato - 6 forms; water-melon - 1; squash - 2; melon - 1; dill - 1; kidney-bean - 5; eggplant - 1; pepper - 2 forms.

Three forms of tomato and 2 specimens of cucumber were collected in Edineț district in Brătușeni village. Two interesting forms of squash and one form of bean were collected in the same village from the farmer Nikolay Makaev.

Interesting forms of kidney-bean were collected in Soroka district. Calaraș Valentina from Redi Cereșnovăț transferred for conservation in Gene Bank the 11 forms of kidney-bean, which are different in shape and colour. Only 4 forms of tomato were collected in this region, two of them are very interesting in shape and colour. One is bright yellow and the other one is of crimson colour. The most of all kidney-bean forms (35 forms) were collected in Doniușăni and Drochia regions.

It shall be noted that as a result of expeditions an interesting material of vegetable crops different in colour, shape and size was collected. Pepper differs in taste from sweet, pungent flavour to very bitter. In the private sector the indeterminate forms of tomato are grown usually. The total number of collected accessions is 420.

CONCLUSIONS

1. Summarizing the data obtained as a result of conducted investigations it should be noted that among vegetable crops of Solanaceae family tomatoes and pepper are the most widely distributed in Moldova.
2. Expeditionary surveys of local forms allowed to position and collect 420 accessions.
3. Collected forms will be studied for complex valuable traits and the best of them will be proposed for inclusion in selection process as source material.

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Figure 1. Local forms collected in Criuleni district. / Figura 1. Forme locale colectate în raionul Criuleni (original).

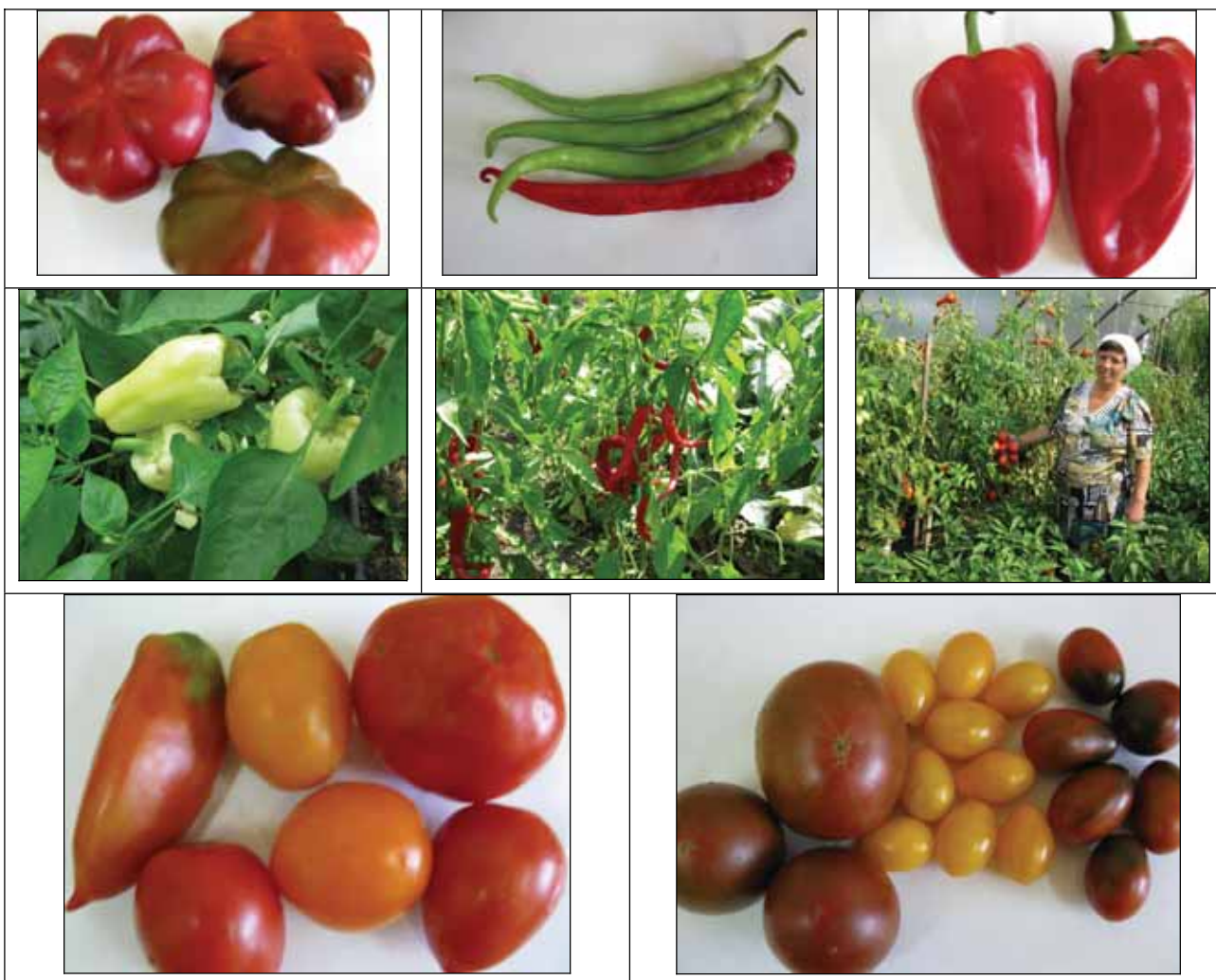


Figure 2. Local specimens collected in Orhei district. / Figura 2. Forme locale colectate în raionul Orhei (original).



Figure 3. Local forms collected in Taraclia district. / Figura 3. Forme locale colectate în raionul Taraclia (original).

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