COLLECTING AND ASSESSMENT OF GENETIC DIVERSITY CONSERVED *ON FARM* IN REPUBLIC OF MOLDOVA

COLECTAREA ŞI EVALUAREA DIVERSITĂŢII GENETICE CONSERVATE *ON FARM* ÎN REPUBLICA MOLDOVA

BATÎR RUSU Diana[1] *, MÎRZAN Oana[2]
*Corresponding author e-mail: dia_sv@yahoo.com

Abstract. *The need to collect plant genetic resources of some crops with importance in a healthy nutrition of the population is of major interest to our institution. The link between agriculture and food security is vital and of strategic importance to any country. In this equation, access and use of a rich genetic background, with known properties, is a condition, almost mandatory, which will allow a quick adaptation to the changes and trends that appear in the agro-food sector. Within this collecting mission, 15 rural communities, with a certain degree of isolation along the Prut River were explored, diversified from the pedoclimatic, altitudinal and agricultural systems point of view. It were targeted individual households of farmers with limited financial resources, who practice a low input agriculture. It were identified traditional varieties of vegetables and it were collected 116 local varieties, comprising 30 species, which will be able to be used in breeding programs or direct cultivation by farmers.All these local landraces with a great genetic variability were collected from local farmers, who prefer and grow them in their gardens due to the multiple uses in food and the adaptation to biotic and abiotic stress factors, in the context of current climate changes.*
Keywords: *genetic resources, genetic variability, genetic pool, local varieties.*

Rezumat. *Necesitatea colectării resurselor genetice vegetale cu importanță într-o nutriție sănătoasă a populației este de interes major pentru instituția noastră. Legătura dintre agricultură şi securitatea alimentară este una vitală şi de importanţă strategică pentru orice ţară. În această ecuaţie, accesul şi utilizarea unui fond genetic bogat, cu însuşiri cunoscute, este o condiţie, aproape obligatorie, care va permite o adaptare rapidă la schimbările și tendințele care apar în sectorul agro-alimentar. În cadrul acestei misiuni de colectare au fost explorate 15 comunități rurale cu un anumit grad de izolare aflate de-a lungul Prutului, diversificate din punct de vedere pedoclimatic, altitudinal și al sistemului agricol practicat. Au fost vizate gospodării individuale ale agricultorilor cu resurse materiale limitate, care practică o agricultură de subzistență. S-au identificat varietăți tradiționale de legume și s-au colectat 116 populații locale, care aparțin la 30 de specii, pentru a putea fi utilizate în ameliorare și cultivare directă. Toate aceste varietăți locale au fost colectate direct de la fermierii locali, care le preferă și le cresc în grădinile lor datorită multiplelor utilizări în alimentație și adaptării la factorii de stres biotic*

[1]Suceava Gene bank, Romania
[2]Agricultural and Research Development Station, Secuieni, Romania

și abiotic, în contextul schimbărilor climatice actuale.
Cuvinte cheie: *resurse genetice, variabilitate genetică, fond genetic, varietăți locale.*

INTRODUCTION

The local varieties that belong to the cultivated plants well adapted in the geographical areas of origin are useful in creation of new modern varieties and hybrids, being genetic sources of resistance to biotic/abiotic stress factors and quality, essential conditions for a sustainable agriculture (Pardey *et. al.,* 2000). Today, according to FAO statistics (Food and Agriculture Organization) (FAO, 2009), the human food security is provided by 30 plant species, which ensure 98 % of food energy or protein. The development of intensive agriculture has led to a process of genetic erosion, of a continuous decrease in genetic diversity, resulting the replacement of local varieties of cultivated plants, which benefit of a high resistance to biotic and abiotic stress factors, with improved varieties and hybrids that are more productive, but much more sensitive to diseases, pests, unfavourable climate and soil factors and often of poorer quality (Cristea, 1983). The local varieties are characterized by a great heterogeneity, are more resistant to climatic conditions, due to their properties for adapting to stress factors (drought, pests, various diseases), but they also have excellent taste qualities, as well as a nutritional value clearly superior to modern varieties (Stickland, 1998). These crops have low energy inputs, which corresponds to the concept of sustainable agriculture development (Maxim, 2010). Local varieties can occupy certain niches on the market that generate important incomes for the rural population and can stimulate, in this way, the *on farm* conservation of plat genetic resources (Pintilie *et al.*, 2014). Local populations have been used and improved, over time without the use of modern techniques for disease and pest control, being the most suitable to support an agricultural production with a good quality - price ratio, as well as a clean environment, through reducing the producer-consumer circuit (Sanchez *et al.*, 2008). In the conditions of the increased lack of interest in agriculture, the aging of the rural population, the migration of youth to the cities, as well as the expansion of agriculture based on modern industrial methods, there is also need to protect plant genetic resources which has the effect of developing a sustainable agriculture, by collecting, preserving and reutilization of traditional varieties (Negri *et al.*, 2009). Conservation of plant genetic resources in gene banks is essential for a productive and sustainable agriculture and represents a global problem for future generations. Conservation procedures involve the identification of old traditional varieties and their reintroduction into crop culture, promoting their diversity and history. In addition to the identification of local varieties, their collecting, morphological, biochemical and culinary studies, conservation and multiplication are very important (Pintilie *et al.*, 2014). *On farm* conservation, with traditional technologies, allows a sustainable management of the varieties, as they, in their natural habitat, can continue their evolutionary

processes under the pressures exerted by the environment, people and technology (Maxim, 2010). The cultivation of local varieties can contribute to *in situ* conservation and involves the establishment of interest varieties, their management and monitoring at their place of origin, in natural habitat, within the community to which they belong (Zeven, 1996). This paper draws attention to the need to collect and preserve in gene banks the plant genetic material in danger of extinction, for agriculture and food security. The sustainable conservation of indigenous vegetable germplasm is an essential condition for ensuring food security (Guillet, 2002).

MATERIAL AND METHOD

The research material was seeds samples of vegetables, from households and local markets. The collecting mission of genetic material was carried out at the level of individual households of small farmers, in local markets, traditional products fairs from the Republic of Moldova with a certain degree of isolation located along Prut River, where agriculture subsistence is practiced. The collecting mission was carried out as part of a bilateral collaboration between Suceava Gene bank, Romania and The Institute of Genetics, Physiology and Plant Protection, Republic of Moldova, being financed by the Academy of Agricultural and Forestry Sciences "Gh. Ionescu Sișești" Bucharest. The exploration, identification, collecting and documentation of the genetic material was carried out according to the protocols of Suceava Gene bank. It was explored 9 districts from Republic of Moldova, in order to collect vegetables varieties. Within the districts, collecting activities were carried out in 15 localities on the shore of Prut River, in individual households of local people, rich in local populations/old varieties. The collecting was done randomly, at a few households in each locality, taking into account the origin of genetic material, its quality and aging. The description of the collected material was made by using *on farm* descriptors provided by Suceava Gene bank, a standard sheet with information regarding the genetic material collected, but also other social or economic information's of the practiced agricultural system. Achieving the major objective of collecting genetic diversity from the explored localities involved going through several stages (activities): 1- exploring traditional areas rich in vegetables diversity in rural communities with a certain degree of isolation; 2 - visiting local traditional households; 3 - identifying local people who maintain in cultivation local populations; 4 - identifying the methods/strategies used by farmers to manage the diversity of traditional varieties, regarding the selection of seeds, their cultivation, preservation, multiplication and use; 5 - collecting of samples (fruits, seeds) from households, local markets and traditional product fairs; 6 - collecting of data from the field by completing the collecting forms and describing genetic material, according to *on farm* descriptors; 7 - recording geographical coordinates at each collecting site; 8 - awareness of local people regarding the importance of preserving, using and promoting traditional varieties.

RESULTS AND DISCUSSIONS

As part of this collecting mission, 15 rural communities with a certain degree of isolation were explored, diversified in terms of pedoclimatic, altitudinal and the agricutural system practiced. It was targeted individual households of farmers with limited financial resources, who practice a subsistence agriculture.

New traditional varieties of vegetables were identified and a number of 116 samples belonging to 30 species were collected.

Genetic material was inventoried and collected directly from the arable land, but also from the gardens, agricultural markets of 9 districts (Briceni, Edineț, Rîșcani, Glodeni, Ungheni, Nisporeni, Hîncești, Leova, Cahul), respectively 15 localities (Pererita, Tețcani, Viișoara, Corpaci, Duruitoarea Nouă, Văratec, Cobani, Glodeni, Medeleni, Bălăurești, Cotu Morii, Nemțeni, Sărata Răzeși, Sîrma, Cahul (fig. 1), the largest number of samples being collected from Viișoara, Sărata Răzeși, Glodeni, Nemțeni, Tețcani and Cobani (table 1, fig. 2). Best representative species were *Phaseolus vulgaris, Solanum lycopersicum, Capsicum annuum, Allium sativum, Cucumis melo, Cucurbita pepo* (fig. 3).

Table 1

Number of samples collected from each location

Nr. crt.	Collection locality	District	No. of samples
1.	*Pererita*	Briceni	6
2.	*Tețcani*	Briceni	10
3.	*Viișoara*	Edineț	23
4.	*Corpaci*	Edineț	4
5.	*Duruitoarea Nouă*	Rîșcani	3
6.	*Văratec*	Rîșcani	3
7.	*Cobani*	Glodeni	9
8.	*Glodeni*	Glodeni	12
9.	*Medeleni*	Ungheni	4
10.	*Bălăurești*	Nisporeni	7
11.	*Cotu Morii*	Hîncești	4
12.	*Nemțeni*	Hîncești	10
13.	*Sărata Răzeși*	Leova	12
14.	*Sîrma*	Leova	6
15.	*Cahul*	Cahul	3

Fig. 1 Geographical distribution of collecting sites of local varieties from Republic of Moldova

Fig. 2 Collecting of vegetables from a household from Viișoara village, district Edineț

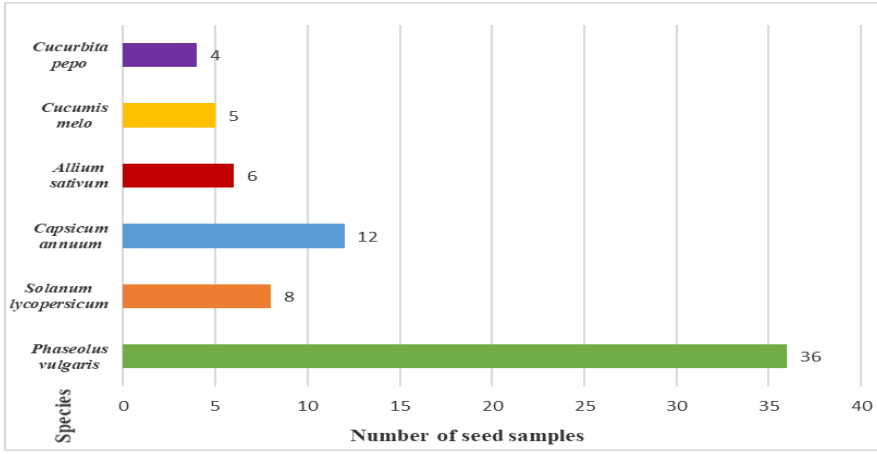

Fig. 3 The most representative species collected in Republic of Moldova

CONCLUSIONS

The specific actions of the collaboration between Romania and Republic of Moldova gave us the opportunity to collect vegetable germplasm in new locations, to interact with local people, as well as to promote the importance of local populations, old varieties in the conservation and sustainable use of agroecosystems.

The collected samples were conserved *ex situ* both in Suceava Gene bank and in the Institute of Genetics, Physiology and Plant Protection Chișinău, Republic of Moldova, most of them being multiplied by Suceava Gene bank and also by Agricultural and Research Development Station Secuieni within some research projects. All the samples are available for research, improvement or other purposes.

The *ex situ* collections managed by partner institutes have been enriched by collecting of local germplasm, as a guarantee and a genetic source for the

creation of valuable modern varieties.

The conservation of samples in gene banks will allow their use in the pre-breeding programs of vegetable species or direct cultivation in the field.

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