Original scientific paper
Originalan naučni rad
UDK: 635.1/.8-123.4-167
DOI: 10.7251/AGREN1301097K

University of Banjaluka, Faculty of Agriculture
Agro-knowledge Journal

Inventorying and Collecting Local Genetic Resources from Vegetable Crops for Their Conservation and Targeted Use

Liliya Krasteva[1], Stefan Neykov[1], Nikolaya Velcheva[1], Petar Chavdarov[1]
Zhan Yun[2], Guo Mu[2], Yordan Tsvetkov[2]

[1]*Institute of Plant Genetic Resources, Sadovo, Bulgaria*
[2]*Heilongjiang Academy of Agricultural Sciences - Harbin, Republic of China*

Abstract

Inventory and collection of local plant genetic resources from Bulgarian and Chinese flora was carried out by implementing the bilateral research project between Bulgaria and China, with the focus on their preservation and targeted use. During the years 2011 and 2012 several expeditions in rural areas of South Bulgaria were conducted. The inventory of the areas was performed using a GPS system. The National collection was enriched with 134 local vegetable accessions and 98 valuable genotypes originating from China. Collected materials are listed in the National Register PHYTO'2000, according to international descriptors of FAO, ECP/GR and Biodiversity International. The accessions are included in the survey and stored in the National Genebank.

Key words: local vegetable accessions, collection, documentation, evaluation, conservation

Introduction

One of the ecological approaches to safety nutrition is to collect and use local plant resources that have survived through the centuries. The research programme within the IPGR, Sadovo focuses on conservation of existing biodiversity. Germplasm management includes collection of genetic resources, study and sustainable conservation of plant diversity (Bettencourt and Konopka, 1990; Engels and Visser, 2008). A positive aspect in germplasm documentation is the implementation of new information technologies with an overview of successful maintenance of *ex situ* collections.

In the last two decades the importance of the conservation of genetic resources and the role of *on farm* conservation in home gardens has been evaluated as

a repository of agro biodiversity (Krasteva, 2007; Galluzzi et al., 2010). Many studies conducted in different countries show that local farmers traditionally store specific genetic varieties. They all represent different materials for direct use in the regions of origin and some of them are donor sources for selection and conducting research.

Through the project implementation and bilateral cooperation, Bulgaria and China are conducting a research programme for inventorying and collecting local genetic resources of vegetable crops from Bulgarian and Chinese flora with the focus on their preservation and targeted use.

The aim of the study is collection and conservation of valuable local vegetable accessions from Bulgaria and China as well as their sustainable preservation in the National Genebank.

Materials and methods

The subject of this research is local plant genetic diversity of vegetable crops.

During the period 2011-2012 in several expeditions conducted in Bulgaria and China, vegetable crops collections in IPGR were enriched and seed accessions were deposited in the National Genebank.

Seed collecting was conducted in accordance with methods for collection and storage of germplasm developed by Krasteva (1989), which are consistent with the European Programme for PGR (Maggioni, 2004). Inventory of the accessions was carried out using a GPS system that included latitude, longitude and altitude of the place of origin.

The accessions have been listed in the National Register PHYTO'2000. Available passport information has been introduced in accordance with international descriptors of FAO, ECP/GR and Biodiversity International for documentation of plant genetic resources.

Results and discussion

Enrichment of local germplasm

Expeditions in Bulgaria enriched the collections with plant germplasm from 134 vegetable accessions.

Routes for inventory of agricultural areas in Southern Bulgaria (Fig. 1) were established. Accessions were collected from five areas: Smolyan, Plovdiv, Pazardzhik, Stara Zagora and Sliven and from 38 villages.

A valueable collection of 53 local bean (*Phaseolus vulgaris* L.) accessions from mountainous areas was created. This type of beans typically develops successfully and gives fruit only in the collecting region, and these accessions represent unique germplasm for the breeding programmes. Considering the above, this is very valuable information for specific agro-climatic characteristics of the growing region for further tests and use of resources. The studied areas and farms are suitable for on farm conservation.

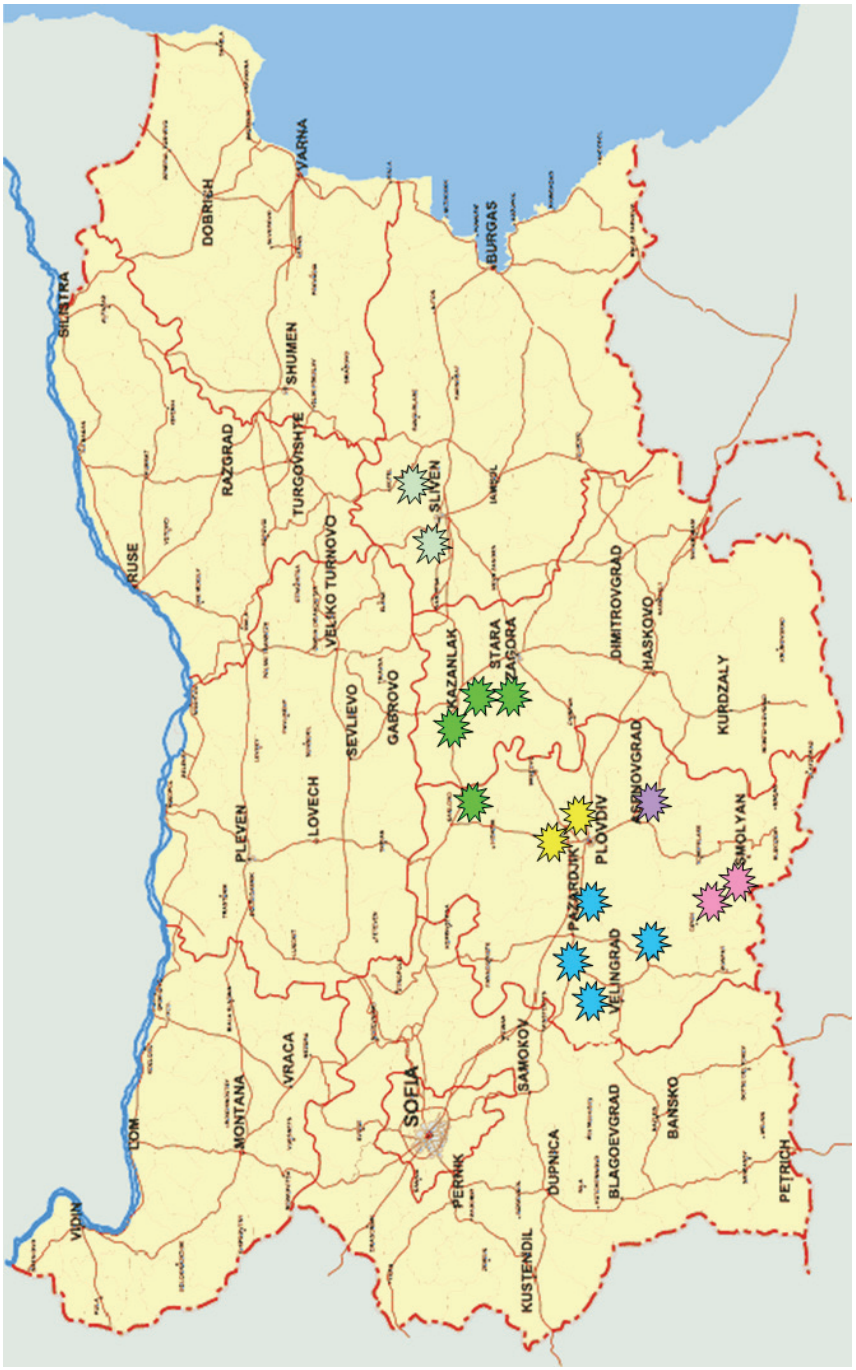

Fig. 1. Regions in South Bulgaria which were inventoried for local vegetable accessions under the project
Regioni u južnoj Bugarskoj u kojima je izvršen popis lokalnih prinova povrća u okviru projekta

Larger collections also include 46 onion accessions (*Allium cepa* L.) and 23 pepper genotypes (*Capsicum annuum* L.) with different areas of use, these also being the most significant vegetables in traditional Bulgarian cuisine. (Fig. 2, 3)

Fig. 2. Local accessions from expeditions
Lokalne prinove iz ekspedicija

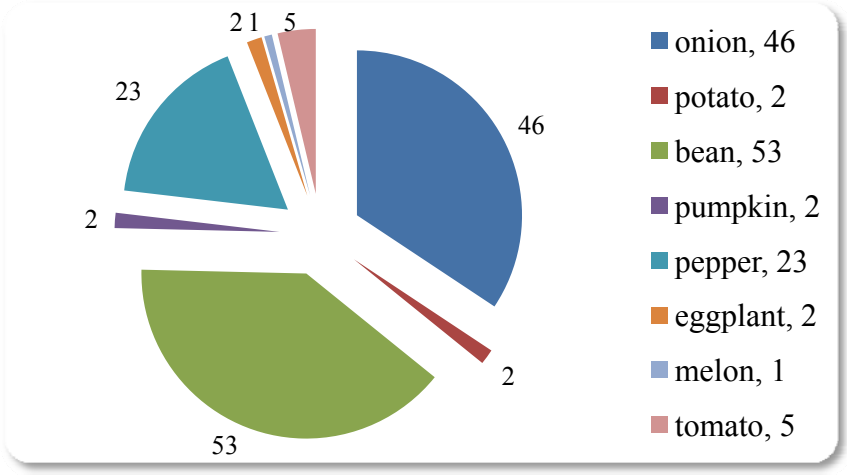

Fig.3. Number of vegetable accessions collected during expeditions in Bulgaria
Broj prinova povrća prikupljenih tokom ekspedicija u Bugarskoj

Enrichment of Chinese germplasm

Through an expedition organised by project partners in China, a total of 98 vegetable accessions were collected (Fig. 4., 5.).

A unique collection of foreign germplasm with local origin has been created. 18 Chinese cabbage genotypes (Brassica chinensis) from the town of Harbin are of particular interest.

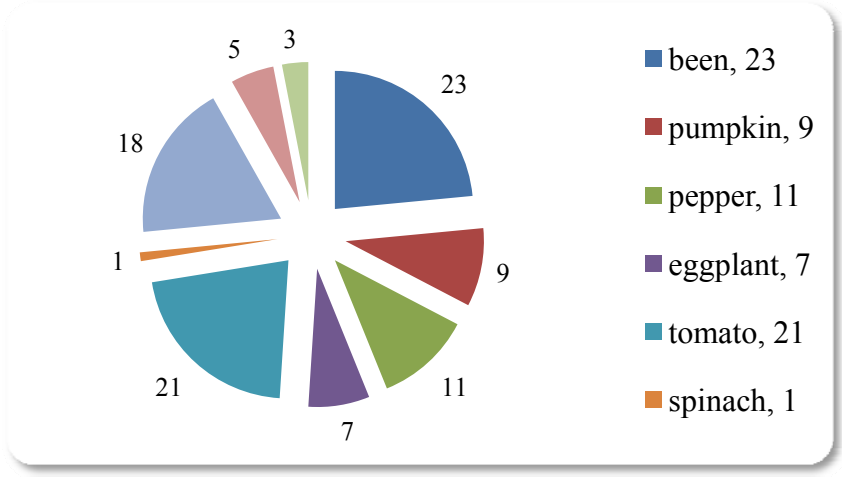

Fig.4. Accessions collected in China
Prinove sakupljene u Kini

Documentation

The materials have been listed by passport data: collecting area, place, geographical coordinates and altitude, the scientific name of the sample (taxonomy), characteristics of the genotype. The accessions are listed with catalogue numbers in the National Collection.

Fig. 5. Expedition in China
Ekspedicija u Kini

Tab. 1. Evaluation of perspective local vegetables accessions from expedition in Bulgaria
Evaluacija perspektivnih lokalnih povrtnih prinova iz ekspedicije u Bugarskoj

Pepper *Paprika*	Parameters *Parametri*						
Cat. N *Br.*	Plant height *Visina biljke* /cm/	Fruit length *Dužina ploda* /cm/	Fruit diameter *Prečnik ploda* /cm/	Thickness of pericarp *Debljina perikarpa* /cm/	Fruit weight *Težina ploda* /g/	Number of seed locules *Broj sjemenih placenti*	Number of seeds in fruit *Broj sjemena u plodu*
A8E0087	42.00	11.08	4.90	0.30	99.40	3.00	288.00
A8E0088	54.80	11.90	5.30	0.40	86.40	2.00	272.00
B1EO492	50.00	7.70	4.20	0.30	54.00	3.00	160.00
B1EO493	41.40	11.60	5.70	0.60	86.00	2.00	174.00
B1EO495	48.60	10.30	4.60	0.30	77.20	2.00	336.00
B1EO501	60.40	11.50	4.00	0.30	58.60	3.00	213.00
B1EO504	38.10	10.80	4.40	0.40	75.80	2.00	180.00
B1EO524	45.20	11.90	4.40	0.30	87.00	2.00	184.00
Tomato *Paradajz*	Parameters *Parametri*						
Cat. N *Br.*	Plant height *Visina biljke* /cm/	Number of flowers *Broj cvjetova*	Fruit length *Dužina ploda* /cm/	Fruit width *Širina ploda* /cm/	Fruit shape *Oblik ploda* /I/	Fruit weight *Težina ploda* /g/	Number of locules *Broj placenti*
B1E0502	152.00	3.80	5.62	9.18	0.61	500.00	7.80
B1E0503	154.40	2.80	5.58	7.40	0.75	337.00	6.80
B1E0505	149.80	4.80	9.00	4.70	1.92	198.20	6.00
B1E0506	151.80	5.00	7.38	8.90	0.83	358.60	7.20
B1E0523	156.40	5.20	8.00	4.80	1.70	186.00	6.1

Information is available, if necessary, for curators and breeders in case of future research on the collections.

Study of the collections

The studies of the collections in ex situ conditions were started according to the international descriptors for the given crops.

The accessions showed very good taste and tolerance to biotic and abiotic stress factors, combined with excellent organoleptic value of the fruit and could be used in future breeding programmes for creation of new varieties or direct introduction into vegetable production (Table 1.).

Germplasm storage

Seed storage started in the National Genebank for sustainable preservation.

Conclusion

The collections of IPGR, Sadovo have been enriched with 232 valuable local vegetable accessions from Bulgarian and Chinese flora.

Areas and farms have been inventoried throughout active expeditionary activities for collecting of local germplasm.

The results indicate the presence of valuable local plant diversity, which emphasizes the need for continued collecting in other areas of the country as well.

The database created with passport information for collected samples and information about resources has been exchanged with the project partners.

Enrichment of the collections ensures the conservation of valuable germplasm in relation to global challenges, namely food supplies and climate change.

Acknowledgements

Publication of the study results was supported by a bilateral project titled "Inventory and collection of local plant genetic resources from vegetables and aromatic plants for protection and suitable use" between IPGR - Sadovo, Bulgaria and Heilongjiang Academy of Agricultural Sciences - Harbin, People's Republic of China.

References

Bettencourt, E. & Konopka, J. (1990). 4 Vegetables. *Directory of Germplasm collections*, *IBPGR*, 174-175.

Engels, J. & Visser, L. (2008). A guide to effective management of germplasm collections. *IPGR Handbooks for Genebanks №6.*

Galluzzi, G., Eyzaguirre, P. & Negri, V. (2010). Home gardens: Neglected hotspots of agro-biodiversity and cultural diversity. *Biodiversity and Conservation*, *19*(13), 3635-3654.
Krasteva, L. (1989). Collection and use of plant genetic resources for vegetables crops. *Problems about conservation of plant diversity in Bulgaria*, 75-90.
Krasteva, L. (2007). Collection and evaluation of local vegetable genetic resources in Bulgaria. *Acta Horticulturae, 729*, 73-76.
Maggioni, L. (2004). Conservation and use of vegetable genetic resources: a European perspective. *Acta Horticulturae*, *637*, 13-30.

Popis i prikupljanje lokalnih genetičkih resursa povrtnih kultura radi čuvanja i ciljane upotrebe

Liliya Krasteva[1], Stefan Neykov[1], Nikolaya Velcheva[1], Petar Chavdarov[1]
Zhan Yun[2], Guo Mu[2], Yordan Tsvetkov[2]

[1]*Institut za biljne genetičke resurse, Sadovo, Bugarska*
[2]*Heilongjiang akademija poljoprivrednih nauka, Harbin, Republika Kina*

Sažetak

U toku sprovođenja bilateralnog istraživačkog projekta između Bugarske i Kine izvršen je popis i prikupljanje lokalnih genetičkih resursa bugarske i kineske flore sa ciljem njihovog očuvanja i ciljane upotrebe. Tokom perioda 2011. i 2012. godine obavljeno je nekoliko ekspedicija u ruralnim područjima južne Bugarske. Popis je izvršen uz pomoć sistema GPS. Nacionalna kolekcija je obogaćena sa 134 lokalne prinove povrća i 98 vrijednih genotipova porijeklom iz Kine. Prikupljeni material je popisan u Nacionalnom registru PHYTO'2000 u skladu sa međunarodnim deskriptorima FAO, ECP/GR i Biodiversity International. Prinove čine dio istraživanja i čuvaju se u Nacionalnoj banci gena.

Ključne riječi: lokalne prinove povrća, kolekcija, dokumentovanje, evaluacija, čuvanje

Liliya Krasteva
E-mail address:
krasteva_ipgr@abv.bg