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Collection of the common bean landraces (*Phaseolus vulgaris* L.) in Kosovo

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Abstract

Plant genetic resources represent the national wealth and heritage. They are base of food security and play a key role in the development of new varieties and improving of the existing ones. In Kosovo common bean cultivation history is long ago, although there is no evidence of when cultivation begun for the first time. The purpose of this research was presentation of the results regarding the collection, inventorying, regeneration and evaluation of common bean landraces in Kosovo. As working methods used for this research were collection missions during 2009-2015, meetings with farmers and experts of agriculture, inside and outside of the Kosovo's territory, with the aim of identifying and collection of common bean landraces with high genetic value. While their regeneration and evaluation for specific traits, was carried out in the experimental field of the Faculty of Agriculture and Veterinary, based on the descriptors proposed by IBPGR. All collected and evaluated accessions then are placed in long-term storage in the Gene Bank of Kosovo for Plant Resources. Now the fund of Gene Bank includes about 70 accessions of common bean landraces, originating from all over the territory of Kosovo and beyond.

Key words: Phaseolus vulgaris, landraces, collection, evaluation, characterization

1. Introduction

The common bean (Phaseolus vulgaris L.) is an herbaceous plant that grown around the world for food as dry (seeds) or fresh (green pods), and one of the most important crops in agricultural, economic and nutritional aspect. It is an annual diploid plant (2n = 2x = 22), and mostly self-pollinated, while in a low percentage as cross-pollinated [3]. Among the domesticated plant species, *Phaseolus vulgaris* L., is the most important source of protein for human nutrition [1], [2]. Over a period of 7000 years common bean (*Phaseolus vulgaris* L.) evolved from a wild plant into one of the main crops legumes. The domestication of wild bean occurred in the regions of Middle America and the Andes of South America independently [4] providing two main genetic groups within the cultivated forms [5]. The first description of beans in the European Herbals was done by Fuchs (1542-1543) [6], while the first bean accessions believed are introduced in Europe by Mesoamerica after Columbus arrived in Central America in 1492 and Cortes arrived in Mexico in 1518, while Pizarro during expeditions in Peru in 1528, enabled the introduction of Andean beans [7].

Common bean landraces usually have local names. They have special traits (early or late maturation), ability to adapt to local climatic conditions and agricultural practices, and resistance or tolerance to pests and diseases [8]. As a result, they show a high stability and average production in agricultural systems with lower inputs. Local populations (landraces) are characterized by large polymorphism which results from introduction, spontaneous formation process and long-term selection by human [9]. Therefore, in order to increase the genetic diversity available for breeding programs many authors began to study the local population, landraces respectively [10], [11], [12].

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Most of the genetic variability of this species in the world is saved and stored *ex situ*, outside the centers of origin, in gene banks [13]. Maintaining of this diversity in the collections is essential to develop and support breeding programs. However, lack of information about these genetic resources is one of the main reasons for its low using by breeders [14].

2. The Common bean diversity in Kosovo

In Albanian territories in general the common bean is known as plants with high nutritional values. For this reason the cultivation and its use has taken an early important treatment. In this regard the cultivation and selection of common bean has begun quite early in Albanian areas. Literature data show that collection of local populations of common bean in Albania began in 1962 by the Agricultural Research Institute (ARI) in Lushnja. These cultivars were named based on the areas or villages where they distribution was wider. While, the breeding selection work in ARI-Lushnje, led to the selection and recommendation for the production of some cultivars such as Shijak, Çaush (semi-determinate type) and Kallmet, Limonka (determinate type) [15].

In Kosovo also, common bean grown in alsmost of the territory, as monoculture, in association or in rotation with other crops in a surface area about 7.505 ha with an average yield 0.9 tonnes/ha, while the annual consumption is 11.53 kg/capita. The great value for human nutrition, compared with other vegetables, ranks the common bean in the first place [16].

So far, in Kosovo is unknown for any cultivar created by any institutions or individuals, while cultivated forms are mainly local population or landraces, created for centuries as a result of cultivation and traditions practices by farmers. Rarely could be found any foreign introduced cultivar. This indicated by the fact that in the market, but at some farmers also, such cultivars still keep the names of the regions of germplasm origin e.g. “Fasule e Pejës”, “Fasule e Tetovës”, but there are also names according to the way of cultivation e.g. “Fsule e Vadës” (meaning beans under irrigation).

Although the existing germplasm potential of common bean in Kosovo is quite high, large areas are still unexplored and underutilized. The level and distribution of genetic variation of local bean populations is still unknown, but of great interest in the planning of breeding programs [17]. This increases the need for undertaking activities and strategies to study and better known the degree of genetic diversity of this species in Kosovo. Therefore this is a modest research and institutional approach to add, evaluate, improve and sustainably use of these resources.

2.1 Collection Missions

In 2007, based on an agreement signed by CBM (the Swedish Biodiversity Center) and the University of Pristina, Gene Bank of Kosovo for Plant Resources was established. The goal of founding of this institution was the inventorying, collection, conservation and utalization of plant genetic resources of Kosovo for research purposes and food security. Within this, the organizing of collection missions began in order to collect plant genetic material and enrichment genetic fund of GBK. Among the crops that will be dedicated to a particular interest in this context, was the common bean also. For this purpose, since 2009 began the collection activities for collecting the bean landraces and these activities are continuous even now, in the most part of the territory of Kosovo.

Prior to initiating the collection missions in the field, the regions and localities of the rich diversity of common bean were identified, mainly based on the data and contacts with farmers and growers. Then, the visits to such location were organized in order to collect the seed of the targeted populations.

2.2 Collected Material and its status

For each collected sample was registered the passport data of the collection sample, which included the name of the farmer, the way of cultivation, population species, origin of seed, time duration-history of cultivation, as well as geographical location i.e. longitude, latitude and altidue, using the

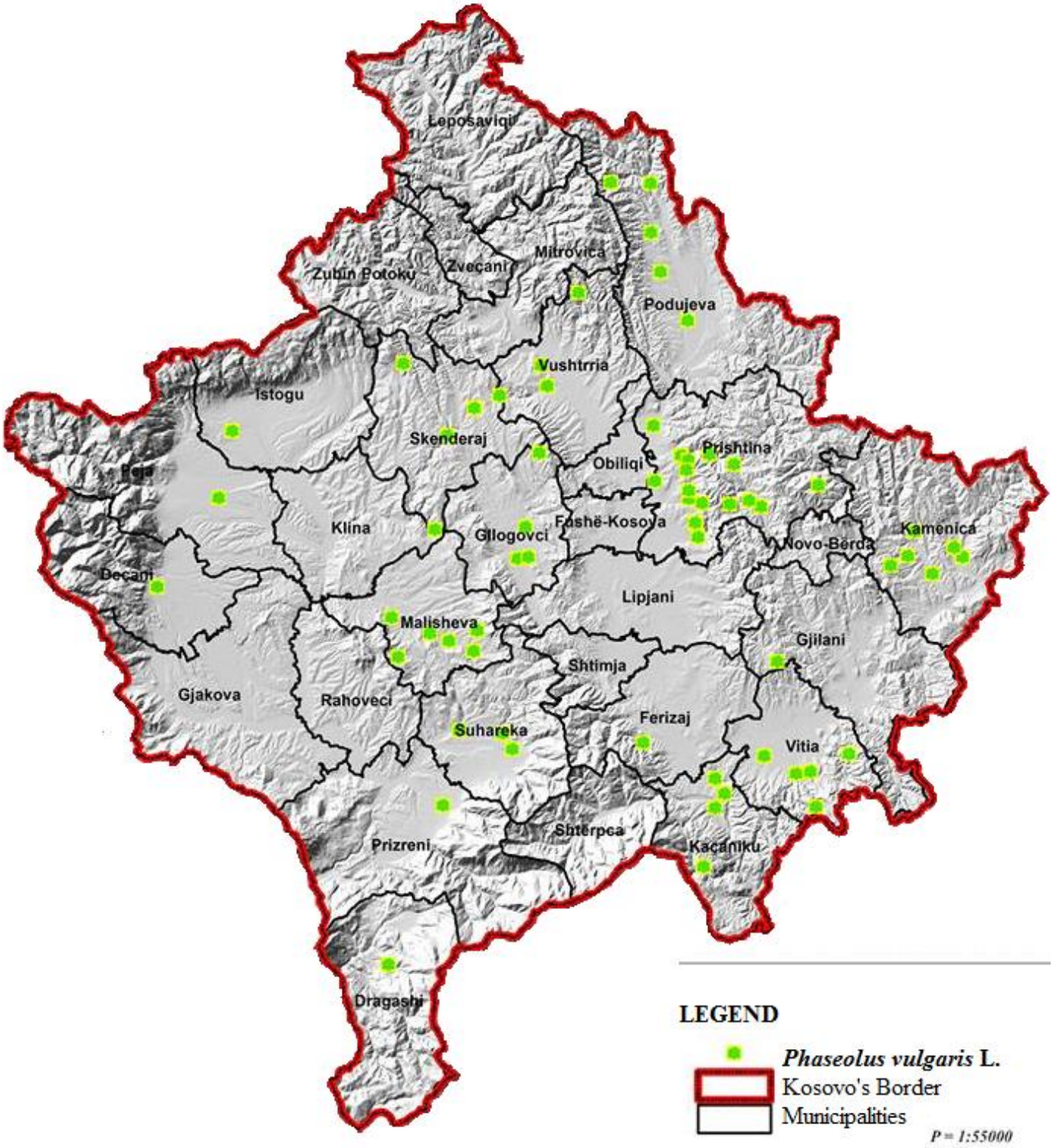

Figure 1. Different localities in Kosovo where the germplasm of common bean landraces is collected.

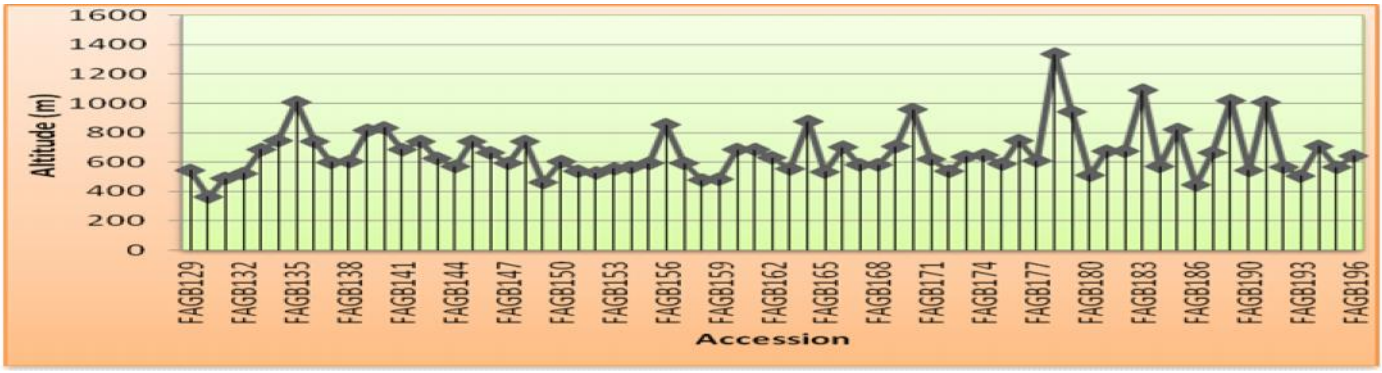

Figure 2. Scope of collected landraces by altitude

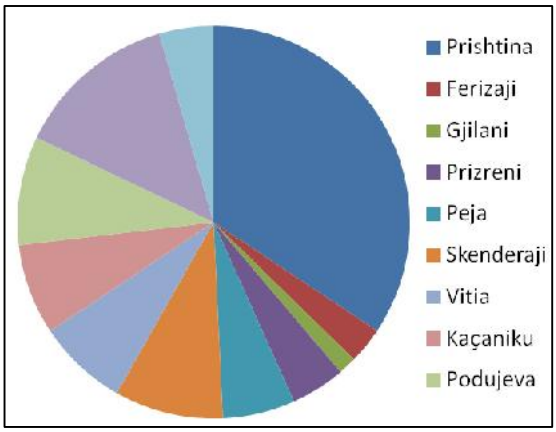

Figure 3. The main regions involved in missions

Figure 4. Seed viability testing in laboratory

Garmin GPS device. All these data are recorded on a separate form for each collection, which then was used to create the database of accessions in storage.

The collected material is then brought into GBK which has undergone a preliminary inventory, in which case each of the samples is set a separate code-name that represents the accession code in storage. Before entering in storage, samples are carefully cleaned from waste and other non-viable seeds, and then were dryied if it was necessary. Previously each sample was tested for viability. Finally viabile seed samples, with the optimal moisture value for storage is divided into two identical samples, one of which is placed in short-term storage (+3 to +5°C) and the other in the long-term storage (-18 to -25°C). To avoid the possible impact of conservation environment, samples were placed in aluminium bags or plastic jars and sealed hermetically.

During the the collection missions organized so far, is managed to collect about 70 different of common bean accessions, almost from all parts and regions of Kosovo (Figure 1). Collected samples belong to different geographic areas and different latitudes and longitudes (42°- 43°N and 20°-21°E) and at different altitudes (from 365m to 1335m) (Fig. 2). This is done in order to ensure as higher possible degree of genetic diversity inclusion, because it is known that different geographical areas offer different agro-ecological conditions, but also the traditions of plants growing and cultivation are different (Fig 3).

3. Documentation

The data on common bean collections were gathered from breeders. Passport/collecting and storage data have already been documented and computerized. The regeneration, evaluation and characterization of some accessions are mainly conducted at the Experimental Didactic Farm of the Faculty of Agriculture and Veterinary. Accessions evaluation and characterization has been done according to IPGRI descriptor [18], including morphological and agronomic traits, disease resistance and reaction to stress conditions. A computerized database is created based on the obtained data.

4. Conclusion

Based on the research results and literature data could be concluded that the common bean is a legume with a potential value in nutritional aspect and economic as well. The way and cultivation traditions in Kosovo make it a plant with wide diversity in genetic and environmental aspect.

According to the investigation results could be seen that there are a lot of localities that have a rich diversity of common bean which have not yet been explored. Therefore, there is a need to collect the diversity of dry bean in those localities, because a lot of people are leaving their old settlements for the urban areas, and these landraces will be lost forever.

Therefore, we need to have a chance to undertak some collecting missions on these localities to get as much as possible diversity of the common bean before it is lost. On the other hand, the facts express the importance of these materials not only for conservation, but also for their use in breeding programs and need for their improvement.

Therefore, the collection of such bean landraces with so high diversity in our country constitutes a priority in the scientific aspect, as well as in the term of conservation of national plant heritage.

5. Acknowledgment

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