

Current status of the national grain legumes collection in Albania.

Ndoc Faslia¹, Agim Canko², Sokrat Jani³ and Liri Miho³

¹Ministry of Agriculture, Food and Consumer Protection (MAFCP), Tirana, Albania;

²Agricultural Technology Transfer Center (ATTC), Fushe-Kruje, Albania;

³Agricultural Technology Transfer Center (ATTC), Lushnja, Albania.

Introduction

Since 1963, the collecting, evaluation and conservation of grain legumes plant accessions (at first landraces and old cultivars, later importing cultivars from European countries) in the Agricultural Research Institute (ARI) of Lushnja has been organized by the Agriculture Ministry, with a clear plan to select and to produce of commercial seeds for daily needs of agricultural cooperatives. Until end of '80 years of past century about 180 accessions of dray beans (*Phaseolus vulgaris* L.) were collected, 53 of them are autochthon landraces and old cultivars.

During half time of 1990-2000 has been accomplished another project with some collecting missions, especially in the central and south-eastern regions of our country.

After this period collecting missions have been reduced, because of lack financial support.

In the 1998 has been organized the National Gene Bank (NGB), to conserve the Albanian plant genetic resources. NGB-Tirana is established and organized as a small center included in the Agriculture University of Tirana within a national network of agricultural research centers (ATTC) and individuals engaged in the conservation and utilization of plant genetic resources. Actually, in the NGB are stored and conserved all Albanian plant genetic resources of main field crops, of which about 200 accessions of legumes species.

In the other hand at the five agricultural centers (ATTC), established during 2006 based on climatic condition (after merging of agriculture research institutes), are stored working collections. In ATTC-Lushnja are stored collections of vegetables, wheat and grain legumes.

This report analyzes the recent status of the main Albanian collection of the following grain legumes plants: dry beans (*Phaseolus vulgaris* L.), big white bean or Spain bean (*Phaseolus coccineus* L.), lentil (*Lens esculentum* Gross el Germ.), and chickpea (*Cicer arietinum* L.).

Economic importance of grain legumes

Grain legumes are imported staple in many areas of the world, especially dry bean (*Phaseolus vulgaris* L.) that is a human food high in protein, phosphorus, iron, vitamin B₁, fiber, with no cholesterol.

In Albania 4.71 % of area planted is of the grain legumes, of which 97.12 % belong to four species analyzed in this report (table 1 and 2). Dry bean is the first most important crop in area occupied and production. All Albanian production is for the home market, but the possibilities are to produce much more and for exporting. Most cultivated varieties are advanced cultivars, due to their higher yields and resistance to more races of *Colletotrichum lindemuthianum*(Sacc. Et Magn) Br. Et Cav. Such varieties are cv. Shijaku, Kallmeti, etc.

Major producers are located in the lowland of west and southwest of Albania.

The purpose of the work in this time is to maintain and make available to the public high quality seed of grain legumes varieties that are produced, conditioned, and distributed as to insure proper identity and genetic purity. This process of maintaining genetic purity is done through a nationally recognized seed certification system.

In the case of dry beans some seed quality factors like seed borne diseases are as important as genetic purity.

The other dry beans producers that have planted small areas have used local varieties and populations, mostly for self-consumption in old people's households. Most of these autochthon landraces and old local cultivars are distinguished for some special features as, protein content, good taste, color, high tolerant or resistance to disease and pest, etc.

Lentil (*Lens esculentum* Gross el Germ.), chickpea (*Cicer arietinum* L.), and big white bean (*Phaseolus coccineus* L.), among grain legumes species, have a less interest for production, but always have to be in market.

The major pests of grain legumes in Albania are aphids (*Aphis spp.*), bruchid (*Bruchus pisorum*), and less spider mite (*Tetranychus spp.*). The widespread fungal and bacterial diseases are respectively Root rot (*Fusarium ssp* (Burch) Sn. Et Hn), Anthracnose (*Colletotrichum lindemuthianum*(Sacc. Et Magn) Br. Et Cav), and Halo blight (*Pseudomonas phaseolicola* (Burk.) Young et al).

Table 1. Area of cultivation (ha) of grain legumes in Albania

Nr	Description	Years			
		2000	2004	2005	2006
1	Dry bean(<i>Phaseolus vulgaris</i>)	22 500	17 200	16 100	15 100
2	Big white beans(<i>Phaseolus coccineus</i>)	300	400	300	200
3	Chickpea (<i>Cicer arietinum</i>)	70	80	85	85
4	Lentil (<i>Lens esculentum</i>)	25	20	15	15
	Total	22 900	17 700	16 500	15 400

Table 2. Area of cultivation (ha) and production (tons) of dry beans in Albania.
(Source:MAFCP-2007)

Nr	Description	Years			
		2000	2004	2005	2006
1	Area, ha	22 500	17 200	16 100	15 100
2	Production, in tons	25 200	22 400	23 600	24 300

Status of collections

The active preservation of genetic variability of local cultivars (old varieties and landraces) plays an important role in crop improvement and food production. A clear understanding of genetic resources is an important key for their practical conservation and utilization.

The conservation work concerning legumes crops from the grain legumes group was conducted in the ex-Agricultural Research Institute in Lushnja, now named Agriculture Technology Transfer Center (ATTC) of Lushnja.

Albania has a small collection of legumes, of which 133 are autochthon grain legumes accessions stored and conserved parallel in NGB-Tirana and ATTC-Lushnja.

These are not available for distribution, haven't enough seeds.

The Department of seeds of ATTC holds a working collection, which before has been widely used in basic research and education. This grain legumes working collection includes 430 accessions. The largest group is dry beans (*Phaseolus vulgaris* L.) with 403 accessions (95 landraces, 88 cultivars and 220 breeder's lines) as the most important (mainly they are white bean accessions), following by lentil (*Lens esculentum* Gross el Germ.) with 16 accessions (5 landraces and 11 cultivars), chickpea (*Cicer arietinum* L.) with 10 accessions (4 landraces and 6 cultivars), and big white bean (*Phaseolus coccineus* L.) with 1 accession (1 landrace), table 3. The accessions collected are originated from 7 countries and FAO, plus anonyms (Table 4).

After 2005, agricultural research funding was severely reduced, leading to a decrease in some activities related to collecting, study and regeneration of grain legumes genetic resources. Even, as a result of merging of the agriculture research institutes, the breeding improvement for creation of new cultivars, for some time will be stopped.

Table 3. Number of accessions per grain legumes species stored in the ATTC-Lushnja.

(A-Landraces and old cultivars; B-Advanced cultivars; C- Breeder's lines).

Nr	Name	Nr. of accessions								
		Total			Albanian			Foreign		
		A	B	C	A ⁽¹⁾	B	C	A	B	C
1	Dry beans (<i>Phaseolus vulgaris</i> L.)	95	88	220	95	15	13	-	73	207
2	Lentil (<i>Lens esculentum</i>)	5	11	-	5	-	-	-	11	-
3	Chickpea (<i>Cicer arietinum</i>)	4	6	-	4	-	-	-	6	-
4	Big white bean (<i>Phaseolus coccineus</i>)	1	-	-	1	-	-	-	-	-
	Total (430)	105	105	220	105	15	13	-	90	207

⁽¹⁾ Landrace and old cultivars

Table 4. Origin countries of foreign dry bean accessions.

Nr	Country of origin	Nr. of accessions		
		Total	Cultivar	Lines
1	American	108	22	86
2	Italy	38	27	11
3	Greece	10	10	-
4	Bulgaria	5	5	-
5	China	5	5	-
6	Rumania	3	3	-
7	Denmark	1	1	-
8	FAO	67	-	67
9	Anonyms	43	-	43
	Total	280	73	207

Storage and regeneration

The seed samples are deposited and conserved in short-term storage at + 6°C and 30% RH in a cooling room, whereas the seed samples of accessions originated from Albania (autochthon populations, old varieties and breeder's lines) are transferred for safety-duplication in NGB-Tirana and stored in freezers at -20°C.

We would like to have a possibility for "black-boxes" of Albanian accessions in other European gene banks.

After harvest the seed samples are thoroughly dried before they are packed in paper bags. In the last year are prepared to use plastic cans. It is done according to international standards (Painting, et al, 1993).

Regeneration is the main goal for NGB-Tirana and ATTC at this time, since several accessions need regeneration and characterization.

Regularly, each year the 1/4 - 1/5 of grain legumes collection is regenerated. During the regeneration process, international standards are followed and biological requirements of individual species are taken into account. All grain legumes accessions are regenerated in the open field. Each accession is represented by about 100 plants. Open-pollination method is commonly applied, by isolating each accession with a corridor 1.2 m apart. Rows were placed 0.7 m apart and in-row spacing was 0.15-0.2 m. It is planted with two rows wide by 10 m long per each accession.

Documentation and characterization

Data on dry bean and other grain legumes collections were gathered from breeders.

The evaluation and characterization work on grain legumes species within the framework of the National Program for Plant Genetic Resources is mainly conducted at the ex-Agricultural Research Institute (Hyso and Canko, 2001; Canko, A., et al. 2003; Canko, A., et al. 2006). Characterization has been done for all accessions of grain legumes, according to IPGRI descriptor list, slightly modified (IBPGR, 1983; Salillari et al, 2005), including morphological and agronomic traits, diseases resistance and reaction to stress conditions.

A computerized grain legumes database is not operational yet.

Collecting expeditions and research activities

The last collecting expedition has been organized during 1999 - 2003 in some areas in east and southeast regions of Albania. A total of 63 dry bean accessions were collected, including 39 seed colored accessions and 24 white beans. It has been done according to international standards (Hawhes, 1980; Guarino, 1995; Adham, 1999).

From the collected autochthon germoplasm, the dry beans are mainly used in the genetic breeding activities. Among them can be mentioned white beans. During 10 last years are used 12-13 percent of white bean accessions. The main objectives of genetic breeding activities were focused in the creating of new varieties with specific characteristics as the disease resistance, tolerance to stress conditions, etc. In ex-Agricultural Research Institute of Lushnja are created and registered four new varieties (Canko, et al, 2004).

The relations between genetic conservation, plant breeding, seed production and production need to be improved. In this context the institutional reform has to be completed (including in this process qualified staff of ex-Agricultural Research

Institutes), and the way of the barrier financial and technical overcoming which actually restrain the activities in those fields.

One part of home grain legumes varieties is not yet in collection and is under genetic erosion pressure. The activities of the NGB of Albania and ATTC-Lushnja are starting but organizational and financial problems make it impossible to launch an expedition in order to collect new accessions, especially in north and north-eastern regions. Therefore friends and colleagues are requested to send seeds of old varieties and autochthons populations.

References

- Adham, J., J. 1999. Sampling Strategies and Collection Method. Saragossa, Spain.
- Canko, A., et al. 2003. Pasurimi, studimi, rigjenerimi dhe ruajtja *ex-situ* e germoplasmës së bimëve të arave. Workshop i organizuar nga Banka Gjenetike Shqiptare në bashkëpunim me Projektin e Shërbimeve Bujqësore. Tiranë, 17 Qershor, 2003. [Collecting, characterization, evaluation, regeneration and *ex-situ* conservation of field crops germoplasm. Edition of Workshop organized by NBG-Tirana and Agricultural Services Project. June 17, 2003].
- Canko, A., R. Shehu, M. Hyso. 2004. Fasulja. Tiranë.
- Canko, A., et al. 2006. Koleksionimi dhe studimi i germoplazmes autoktone të fasules [Collecting, characterization and evaluation of autochthon accessions on dry bean]. Buletini i Shkencave Bujqësore. 1: 17-22. (Scientific Bulletin, in Albanian language, with a summary in English).
- Guarino, L., V. Ramanatha, and R. Reid. 1995. Collecting Plant Genetic Resources. UK.
- Hyso, M., and A. Canko. 2001. Koleksionimi dhe studimi i popullatave të fasules. Studime Biologjike. 5-6:370-373.
- Hawhes, J., G. 1980. Crop Genetic Resources Field Collection Manual. England.
- Painting, K., A., M. C. Perry, R. A. Dennige and W. G. Ayad. 1993. Guidebook for Genetic Resources Documentation. FAO, Rome, Italy.
- Salillari, A., et al. 2005. Resurset gjenetike të bimëve. Tiranë.