

Report on food legumes of Azerbaijan

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Legume diversity

449 species belonged to 60 genre of *Fabaceae* (*Leguminosae*) are spread in Azerbaijan, 241 out of which belongs to forages (53.67%) and 208 species (46.33%) are used for food and other purposes. By manner of life, woods make up 2.23% of existing species, shrubs – 12.47%, annuals – 25%, two-years – 1,3% and perennials constitute majority (59.02%) of remaining part. Among them species of chickpea (*Cicer* L.), lentil (*Lens* L.), faba bean (*Vicia faba* L.), haricot (*Phaseolus* L.), pea (*Pisum* L.), peanut (*Arachis* L.), vetch (*Lathyrus* L.) and other genera have been cultivated since ancient times and their wild species are widely spread all over the country. Wild species of pulses including 17 species of vetch, 40 species of sweet pea are frequently to be found in Azerbaijan. According to statistical records of 2006 the total area under leguminous crops was 26.3 thousand ha.

Legume improving organizations

Research Institute of Crop Husbandry (RICH) and Research Institute of Vegetable Growing (RIVG) were the principal institutes dealing with collection, conservation, investigation and improvement of leguminous crops in Azerbaijan until 2003. Establishment of Genetic Resources Institute (GRI) under Azerbaijan National Academy of Sciences (ANAS) and later on creation of National Gene Bank at the Institute with medium-term and long-term storage facilities has fostered scientific and organizational activities taken towards plant genetic resources including genetic resources of leguminous crops. In addition to above mentioned 3 institutes studies on genetic resources of leguminous crops are also carried out at the Bio-resources Institute (NBI) of Nakhchivan Division of ANAS, Azerbaijan Agricultural Academy (AAA) (Ganja) etc.

Collecting activities

National gene pool of leguminous crops is enriched by periodical expeditions, individual initiatives and material exchange activities. About 63 accessions of food legumes (mainly wild forms) were collected during International Expedition held in 2004 with participation of Australian and Syrian (ICARDA) scientists, whereas within local expeditions for 2004-2007 years collaborators of “Cereals and leguminous crops” and “Bio-ecology” laboratories of GRI collected about 200 accessions of rare and endangered species and landraces. In addition a new distribution areals for some pulses were identified as the result of exploration during mentioned expeditions. For example, new populations of *Astragalus falcatus* Lam., *Cicer anatolicum* L., *Lens orientalis* Boiss. were identified in Nakhchivan Autonomous Republic. Furthermore, relevant activities are being taken towards repatriation of legume accessions of Azerbaijan origin maintained in different world gene banks and ensuring their conservation in National Gene Bank.

Basic collections on leguminous crops

Collections existing in the Republic contain 759 accessions belonging to legume species and varieties. The largest ones are legume collections of “Cereals and leguminous crops” laboratory of GRI (336) and corresponding collections of Research Institute of Crop Husbandry (RICH) (300), Research Institute of Vegetable Growing (RIVG), and Agricultural Academy of Azerbaijan (AAA). The table below provides information on species, status and origin of plant accessions available in these 4 collections:

Taxon name	Plant name	Status of the accession	Geographical origin	No	Holding
<i>Cicer arietinum</i>	Chickpea	La, W	Azerbaijan	57	GRI
		RM	Syria	140	RICH
		La, W	Azerbaijan	45	RICH
<i>Lathyrus hirsutus</i>	Winter pea	LA	Azerbaijan	2	GRI
<i>Lathyrus sativus</i>	Grass pea (White pea)	LA, W	Azerbaijan	29	GRI
		AC	Azerbaijan	8	GRI
		LA, W	Azerbaijan	18	RICH
<i>Lathyrus ssp.</i>	Peavine, Vetchling	LA, W	Azerbaijan	12	GRI
<i>Lens culinaris</i>	Lentil	AC	Azerbaijan	4	NBI

		RM	Azerbaijan	4	NBI
		RM	Syria	10	NBI
		LA	Azerbaijan	2	NBI
		LA, W	Azerbaijan	49	GRI
		LA, W	Azerbaijan	25	RICH
<i>Lens ervoides</i>	Lentil	AC	Azerbaijan	2	GRI
<i>Phaseolus aureus</i>	Moong bean	AC	Azerbaijan	5	GRI
		AC, RM	Syria	20	RICH
<i>Phaseolus vulgaris</i>	Common bean	LA	Azerbaijan	8	NBI
		W	Azerbaijan	12	NBI
		LA, W	Azerbaijan	48	GRI
		LA	Azerbaijan	6	RICH
		AC, LA	Azerbaijan	10	RIVG
<i>Pisum arvense</i>	Field pea	RM	Azerbaijan	2	NBI
		RM, AC	Syria (ICARDA)	37	NBI
<i>Pisum elatius</i>	Green pea	AC	Azerbaijan	1	RICH
		LA	Azerbaijan	5	GRI
<i>Pisum sativum</i>	Pea	AC	Russia	11	GRI
		W, LA	Azerbaijan	11	GRI
		AC	Germany	1	GRI
		AC	United Kingdom	2	GRI
		AC	Japan	2	GRI
		AC	Italy	1	GRI
		AC	Russia	8	GRI
		AC	Turkey	1	GRI
		AC	USA	1	GRI
		AC	Nederland	1	GRI
		LA	Azerbaijan	6	RICH
		AC	Azerbaijan	3	RIVG
Glycine max	Soybean	AC	Syria (ICARDA)	5	NBI
		AC	Azerbaijan	6	GRI
		LA	Azerbaijan	1	NBI
<i>Vicia faba</i>	Horse bean	W, LA	Azerbaijan	17	GRI
		W	Azerbaijan	10	RICH
<i>Vicia sativa</i>	Common Vetch	LA, AC	Azerbaijan	53	GRI
		LA, AC	Azerbaijan	29	RICH
<i>Vigna sinensis</i>	Cowpea	LA, W	Azerbaijan	4	GRI
	Leguminous crops	AC, LA, W	Azerbaijan	25	AAA
Total:				759	

Accessions are subjected to genetic erosion due to in lower storage facilities. By the establishment of National Gene Bank currently plant accessions are collected in here in a centralized manner and reliable conservation of these materials is ensured.

Documentation

Central Database established at GRI contains all relevant information on plant genetic resources of food legumes driven as a result of inventory and documentation of gene pool of food legumes maintained at ex-situ collections of Azerbaijan. At present CDB contains passport data on 632 accessions belonging to 14 genera, 56 species and varieties. These accessions represent modern varieties (106), landraces (345), their wild relatives (133) and research materials (48). List of genera representing majority of accessions in database is described in the table below:

Genus	Accession number	Genus	Accession number
Phaseolus	213	Pisum	51
Vicia	110	Lens	44
Cicer	88	Vigna	30
Lathyrus	66		

Characterization/Evaluation

Evaluation of accessions available in gene pool is the main term of efficient utilization of genetic resources. Plant accessions conserved in gene pool are assessed at the laboratory of “Cereals and leguminous crops”, as well as other laboratories for bio-morphological, biochemical, physiological, technological indicators, and valuable agronomic traits and for resistance to biotic and abiotic stress factors, as a result of which suitable forms with certain donor traits are selected and recommended for utilization in crop breeding activities. For example, 8 pea, 55 chickpea, 32 lentil, 20 pisum, 8 faba bean, 21 haricot accessions were studied at Biochemistry laboratory, 15 chickpea, 25 lentil, 20 vetch, 8 faba bean, 21 haricot accessions were evaluated at Technology laboratory and 10 pisum, 9 faba bean, 10 pea, 16 haricot, 1 lentil, 10 chickpea samples were assessed at Cytogenesis laboratory during last 3 years.

Food legumes improvement activities

In the framework on Competitive Grant program 12 projects on food legumes were implemented during 2001-2006. Special attention in these projects was paid to the

involving of farmers to crop improvement and testing activities. Genetic improvement and enrichment activities were carried out on pea-nut, bean, vetch, lentil and chickpea at RICH and on bean, chickpea, and so on at RIVG. Recently 2 chickpea varieties (Nail and Narmin), a haricot variety (AzNIIZ 352) created at RICH and 2 haricot varieties (Zulalli, Sevinj) released at RIVG were recognized (zoned). Conservation of pulse genetic resources of through highly organized characterization activities, free transfer of information to users has increased utilization of these resources in creating of new varieties.

Cooperation programs (collaborative projects)

GRI is closely cooperated with relevant international organizations, including ICARDA who has world mandate on improvement of most leguminous crops to provide more effective conservation and improvement activities of legumes. Collaborative activities on studying of lentil biodiversity of different origin are being carried out together with ICARDA since 2004. In the framework of these activities member of the working group of leguminous crops Sevda Babayeva has been at ICARDA for the period of 2 months where has been involved in field characterization of lentil accessions of Central Asian and South Caucasus origin. In 2006 S.Babayeva together with other 2 researchers took part in training courses at biotechnology laboratory of ICARDA to gain theoretical and practical habits on molecular marker – AFLP and SSR analyses that widely used in biodiversity studies. Take into account the actuality of pulse virus disease in Azerbaijan a scientific visit of virologist Dr. Safaa Kumari from ICARDA was organized in the summer of 2007. During the visit Dr. S.Kumari trained young scientists from GRI on identifying viral diseases of lentil and chickpea in laboratory condition by Tissue-blot immunoassay (TBIA) methods. During evaluating process and expeditions to the most pulse cultivated regions of Azerbaijan viral diseases were explored and *Luteo* group of viruses were found to be the most dangerous for these regions.

Main constraints and perspectives

Increasing of demand to high nutritional and protein rich foods on one hand and degradation of agro-ecosystems, increasing of stress factor effects and global climate changes on another hand demands creation of high productive, amino-acid rich and more tolerant varieties to abiotic and biotic stress factors. Solution of these constraints requires conservation of local gene in *ex situ* collections, as well as selection of donor forms. Periodical collecting missions in order to enrich collections, regenerate accessions and to study state of plant diversity will be continued in future. For organization of these purposes, however for providing laboratories with modern equipments financial resources and trained staff are needed. The activities described below as well as enhancement of international collaboration are among planned actions:

- Collecting of legume crops and its wild relatives spared in Azerbaijan, as well as organization of expeditions covering all regions of Republic to study current state;
- Training of personnel on most modern and important sphere of science; organization of abroad and in-country training courses by involving specialists outside the country;
- Organization of international expedition to study immunological state of leguminous crops in agro-ecosystems;
- Establishment of data base containing evaluation data of leguminous crops and distribution of information among users.

References

- Akparov Z.İ. 2005. Breeding of grain-leguminous plants. Proceeding of Agricultural Scientific Research Institute, Baku, V. XXI, pp. 55-58.
- Aliyev J.A., Akparov Z.İ., Mammadov H.İ. 2004. Cultivating of Arachis. "Sciences", Baku, 29 p.
- Aliyev J.A., Akparov Z.İ. 2002. Plant Genetic Resources of Azerbaijan. Pp. 57-68 in Proceedings of Azerbaijan National Academy of Sciences, "Sciences", Baku, N1-6.
- Akparov Z.İ., Mammadov A.T. 2007. Main exploration strategies on PGR. Journal of Azerbaijan Agrarian Scienceses, Baku, N1-3:120-124.
- Mirzoev R.S., Amirov L.A., Akparov Z.I. 2005. The study of cheak pea World Genefund. Jornal of Scientific works of Research Institute of Agriculture, V.XXI