

The Grain Legume collection in the Slovak Republic

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Since the last report presented in 2001 in Krakow (Debre and Horňáková 2001), only few things can be added.

Collection

All activities with conservation of plant genetic resources in Slovak Republic are coordinated by the RIPP Piešťany, within the framework of the National Programme for Conservation of Plant Genetic Resources for Food and Agriculture. This National Programme registered as per December 2006 together 28 758 accessions (Benediková 2007). The size of the grain legume collection held at RIPP has reached 4 181 accessions of *Phaseolus*, *Pisum*, *Glycine*, *Lens*, *Cicer*, *Lathyrus*, *Lupinus* and *Vicia*. With the terminated of breeding programmes in other Slovakian institutions, the Slovak collection of grain legume is at present only on the Research Institute in Piešťany. The collection of grain legume in the Slovak Republic consists of domestic and foreign materials. Tables 1 shows the composition of the Slovak grain legume collection.

Table 1. Grain legumes accessions held by the Genebank of Slovakia (December 2006)

| Species | No. of accessions | % of total | Base collection | Active collection | Working collection |
|-----------------------------------|-------------------|------------|-----------------|-------------------|--------------------|
| <i>Phaseolus</i> spp. | 1680 | 40,2 | 420 | 1221 | 821 |
| <i>Lens esculenta</i> | 345 | 8,3 | 6 | 233 | 325 |
| <i>Glycine max</i> | 619 | 14,8 | 60 | 499 | 120 |
| <i>Lathyrus sativus</i> | 270 | 6,5 | 2 | 48 | 222 |
| <i>Cicer arietinum</i> | 445 | 10,6 | 4 | 188 | 257 |
| <i>Lupinus</i> spp. | 133 | 3,2 | 0 | 48 | 85 |
| <i>Pisum</i> spp. | 568 | 13,6 | 359 | 522 | 0 |
| <i>Vicia faba</i> | 58 | 1,4 | 27 | 58 | 0 |
| <i>Vicia</i> spp. (other species) | 63 | 1,5 | 60 | 63 | 0 |
| Total | 4181 | 100 | 938 | 2880 | 1830 |

The collection of Bean (*Phaseolus*) consists mostly of landraces (1271) where major part of collection is created by Slovak landraces (1092). Research carried out on germplasm evaluation and characterization. Soybean (*Glycine*), the collection consists mostly of commercial varieties, but also included several landraces and old breeder's materials. The collection of pea (*Pisum*) consists mainly of materials: *P. sativum* and *P. arvense*. The cultivars form the greater part of the collection and consists of dry peas for animal feed and peas for human consumption. Most of the cultivars are European origin while a limited number is obtained from other continents. Faba bean (*Vicia faba*) this small collection consists of 58 accessions of the cultivated species *V. faba*. There are 20 landraces in the collection; largely from Europe (14) and 5 accessions from the country of origin are not known. Only 1 landrace from Slovakia is found in the collection, it's the old Slovak landrace 'Velkozrnný'. The faba bean collection includes 25 cultivars. The accessions

are mainly from Europe. Seven accessions belong to the population type 'research material'. Lupin (*Lupinus*) collection includes 133 accessions of the species *L. albus*, *L. luteus* and *L. angustifolius*. In the collection there are 47 landraces from Slovak region. Lentil (*Lens*) material consists mainly from commercial varieties and breeding material of the former foundation from Europe. The largest part of collection of Chickpea (*Cicer*) mainly consists from commercial varieties, landraces (3) and collecting expedition from Slovakia (7). Collection of *Lathyrus* mainly consists from materials originated from expedition from Slovakia (47).

Main activities

Collection and collecting expedition in several regions of Slovakia

Multiplication and evaluation

Conservation

Documentation

Utilisation

We have no experiences concerning the on-farm conservation, but we plan to develop this kind of activity in the future. There is currently no in situ conservation of genetic resources of grain legume in our region. At present we don't develop any genetic stock for scientific purposes. DNA molecular markers were used for characterization, differentiation, identification and profiling of genotypes of common bean (*Phaseolus vulgaris* L.). 17 microsatellite loci were analyzed in 174 common bean accessions (87 cultivars, 87 landraces). 75 alleles in 17 microsatellite loci were detected, of which 12 microsatellite loci were polymorphic only (2-18 alleles per loci). The highest numbers of alleles per loci were detected in dinucleotide microsatellites with AT repetitive motif. In average 4.4 alleles per loci were detected. The diversity index was calculated (0.100-0.902), the polymorphic information content (0.097-0.896) and the probability of identity (0.011-0.814) for each of all polymorphic microsatellite markers (Šajgalík 2005). SSR profiles of 67 soybean genotypes of various origins had been detected by 188 alleles at the 18 SSR loci. From 4 to 21 alleles were found at each of these loci (average 10.4 per locus) and the gene diversity averaged 0.71. Differentiation of all 67 genotypes each from others had been successful by using of even only 6 of SSR markers (Sat001, Satt005, Satt038, Satt173, Satt177, Satt534) with gene diversity from 0.66 to 0.89. The cumulated probability of obtaining identical soybean SSR profile was 1.11×10^{-9} which confirms a high potential of SSRs for differentiation of soybean accessions in collection of soybean (Hudcovicová, Kraic, 2003).

Evaluation and storage

The samples are planted on an area of 2 to 5 m², depending on the crop. Evaluation, characterization and screening for main traits (morphological, ecological and agronomic) are being continuously ongoing. Evaluation period for each sample is two years. All traits are evaluated according to international descriptors lists. During the experiments, all accessions are compared with the standards. The grain legume accessions are stored in a base collection at -18°C and the active collection at 2°C after drying to 5-10 % moisture (FAO/IPGRI 1994). Generally, we store 4000 viable seeds in both collections.

Documentation

Presently 3569 conservation data of the different grain legumes are included in the information system based on the database management system Visual FoxPro. The passport and description

data of some accessions are not complete. Updating, checking and revising datasets of the passport and description data of all collections permanently ongoing. Passport data of most collections can be found only at EURISCO project web site.

Table 2. Passport a description data of grain legume collections

| Species | Passport data | Description data |
|----------------------------|---------------|------------------|
| Phaseolus spp. | 1680 | 1680 |
| Lens esculenta | 292 | 220 |
| Glycine max | 611 | 499 |
| Lathyrus sativus | 48 | 48 |
| Cicer arietinum | 190 | 190 |
| Lupinus spp. | 54 | 54 |
| Pisum spp. | 573 | * |
| Vicia faba | 58 | * |
| Vicia spp. (other species) | 63 | * |
| Total | 3569 | 2691 |

* - Joint Stock Company Horná Streda as former holder these collections had terminated breeding programme and data will be provided to national documentation system as soon as possible

Utilisation

Since 2001 Genebank of the Slovak Republic has distributed 410 accessions of grain legume to users in Slovakia and abroad. During the same period 151 accessions of *Phaseolus*, 104 accessions of *Glycine*, 103 accessions of *Cicer*, 39 accessions of *Lupinus*, 7 accessions of *Lens*, 6 accessions of *Lathyrus* were distributed. Users are supplied with maximum 200 seeds and additional information on the requested material.

Grain legume production data

Table 3. Growing area and production of grain legume

| Crop | Area harvested (ha) | | | | |
|---------------------------|---------------------|-------|------|------|-------|
| | 2002 | 2003 | 2004 | 2005 | 2006 |
| <i>Pisum sativum</i> | 4023 | 4878 | 5379 | 6076 | 5177 |
| <i>Lens culinaris</i> | 546 | 942 | 1383 | 975 | 676 |
| <i>Phaseolus vulgaris</i> | 696 | 720 | 743 | 676 | 678 |
| <i>Fodder legumes</i> | 7290 | 10019 | 7280 | 8565 | 10397 |

| Crop | Production (t) | | | | |
|-----------------------|----------------|-------|-------|-------|-------|
| | 2002 | 2003 | 2004 | 2005 | 2006 |
| <i>Pisum spp.</i> | 12160 | 8188 | 18049 | 15369 | 12403 |
| <i>Lens esculenta</i> | 617 | 880 | 1575 | 1262 | 745 |
| <i>Phaseolus spp.</i> | 781 | 753 | 630 | 632 | 539 |
| <i>Fodder legumes</i> | 16544 | 14736 | 17318 | 17573 | 19200 |

Registered varieties

Table 4. Number of registered grain legume varieties in Slovakia (2007)

| Crop | Number |
|-----------------------------------|--------|
| <i>Phaseolus</i> spp. | 60 |
| <i>Lens esculenta</i> | 3 |
| <i>Glycine max</i> | 20 |
| <i>Lathyrus sativus</i> | 1 |
| <i>Cicer arietinum</i> | 3 |
| <i>Pisum</i> spp. | 95 |
| <i>Vicia faba</i> | 14 |
| <i>Vicia</i> spp. (other species) | 9 |
| Total | 205 |

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