

COLLECTIONS OF GRAIN LEGUMES IN PORTUGAL

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Holders

In Portugal grain legumes collections are conserved by different Genebanks/Institutions, as follows:

- a - Banco Português de Germoplasma Vegetal (BPGV) (contact: abarata@drapn.min-agricultura.pt)
- b - Instituto Nacional de Recursos Biológicos (INRB) (Oeiras, contact: mm.veloso@iniap.min-agricultura.pt)
- c - Instituto Nacional de Recursos Biológicos (INRB) (Elvas, contact: mgmpereira@gmail.com)
- d - Instituto Superior de Agronomia (ISA) (contact: nevesmartins@isa.utl.pt)
- e - Universidade dos Açores (UAçores) (contact: dlopes@notes.angra.uac.pt)
- f - Universidade da Madeira (UMA) (contact: quercus@uma.pt)
- g - Universidade de Trás-os-Montes e Alto Douro (UTAD) (contact: vcarnide@utad.pt)

Table 1 summarises the number of accessions of grain legumes collections existing in 2007 in Portugal.

The majority of these collections are formed by material collected in mainland Portugal and Azores and Madeira Islands. However, concerning the *Phaseolus* genus there is material from Spain, Angola, Cape Vert and Peru. In what refers to *Lupinus*, *Lathyrus*, *Vicia* and *Cicer* there is also material collected in Spain.

Preliminary data concerning the composition of some of the collections (in terms on the percentages of accessions of wild relatives, landraces and breeding materials) is summarised in Table 2.

Conservation and characterization

All the accessions are conserved in *ex situ* collections, under good storage conditions. Concerning the safety duplication the situation is variable according to the Institutions holders. However, all the Institutions are attempting to increase the status of safety-duplication of the Portuguese grain legumes. So, at present the safety duplication is greater than that referred by Duarte (2001), and there are accessions safety duplicated in the country and in other European genebanks.

Morphological characterization is being performed by the several Institutions according to the budget available.

Regeneration

The regeneration process is being developed by the several Institutions also according to the budget available. However, there are some collections that are currently in need of regeneration. While figures are not available for all collections it is clear that many collections have high regeneration needs which in some cases may be urgent.

Research activities

At Instituto Nacional de Recursos Biológicos (Elvas) it is being implemented a *Cicer arietinum* program, which has the following areas of research:

I) physiological and morphological evaluation of resistance behaviour in comparison with susceptible materials from ICARDA and other local germplasm; II) adaptation trials during Autumn/Winter under irrigation, and selection of the best genotypes, once good genotype performance under more unfavourable conditions for the highest yield potential lines was detected; III) selection of lines for irrigation and tolerance to main diseases, especially *Ascochyta blight*.

Phaseolus vulgaris forms the biggest collection with a total number of accessions of 3262. Several research groups are studying the genetic diversity of Portuguese common bean landraces through the utilization of SSRs (Instituto Nacional de Recursos Biológicos, Banco Português de Germoplasma Vegetal e Universidade de Trás os Montes e Alto Douro) and RAPDs (Martins et al., 2006). Biochemical characterization of the germplasm conserved at Universidade da Madeira is being performed using the phaseolin markers.

Common bean is relevant not only for its protein and aminoacids contents but also due to its value as a functional food that can provide dietary fibre and minerals. At Instituto Nacional de Recursos Biológicos (EAN) the fiber content of 40 accessions conserved are being analysed. At Instituto de Tecnologia Química e Biológica (ITQB, Oeiras) a collection of 155 accessions from the Genebank – Oeiras (Instituto Nacional de Recursos Biológicos, Oeiras), has been characterized in relation to the seed content of 8 minerals (K, P, Ca, Mg, Fe, Mn, Zn and Cu). A high degree of variability was observed in this study (Pinheiro *et al.*, submitted).

Lupinus albus has been cultivated in the Iberian Peninsula since the Roman times. It is a widespread crop in Portugal where it exists in many distinct forms as a result of adaptation to a variety of soil and climatic conditions. Variability in the seed protein fractions of a germplasm sample composed by 16 *L. albus* from different regions of Portugal were analysed in order to disclose existing genetic relationships and to obtain information useful for a breeding program (Vaz et al., 2004).

L. angustifolius L. is a Mediterranean species domesticated in the 20th century, but it is not a current crop in the areas where it is naturally distributed (circum-Mediterranean area). Morphological characterisation and molecular diversity of *L. angustifolius* (wild and domesticated accessions) from the South and Centre of Portugal were characterized through AFLP and ISSR (Talhinhas *et al.* 2006).

At Instituto Nacional de Recursos Biológicos (Oeiras) germplasm evaluation of *Lupinus cosentinii* was developed (Campos-Andrada *et al.*, 2005)

Lathyrus sativus, commonly referred as grasspea has a considerable potential for dry land-farming systems. There is an increasing interest in the conservation and utilization of *Lathyrus* genetic resources in plant improvement.

In Portugal morphological characterisation and molecular diversity of grasspea in Portugal (Portuguese collections) is being accessed, at Instituto Nacional de Recursos Biológicos (Elvas), through RAPD (Costa *et al.* submitted).

International Cooperation is being developed concerning the study of *Lathyrus sativus* resistance to powdery mildew (*Erysiphe pisi*) (Vaz-Patto *et al.*, 2006).

On farm conservation

Portugal is a country very rich in plant genetic resources and for each crop there are several landraces that, frequently, resulted from geographic isolation.

After the introduction of common bean in Europe in the 16th century, European farmers selected and maintained a multitude of landraces. The excellent adaptation of common bean to the Portuguese environmental conditions resulted in a great number of landraces that are still in use. Beans are part of the farmer's diet. The farmers still grow their own common bean stocks, maintained as a family tradition, namely for self consumption or for low scale selling in local markets. Some measures that insure the maintenance of *on farm* activities are taking place (Veloso *et al.*, 2005; Moreira *et al.*, 2007)

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Table 1. Grain legumes accessions conserved by Portuguese Genebanks/Institutions

Species	Total N° of Accessions	Accessions/holders*
<i>Cicer arietinum</i> L.	1659	252(a);123(b);1283(c);1(f)
<i>Lathyrus angulatus</i>	9	9(b)
<i>Lathyrus annus</i>	3	3(b)
<i>Lathyrus aphaca</i> L.	3	3(b)
<i>Lathyrus articulatus</i>	1	1(b)
<i>Lathyrus cicera</i> L.	16	13(b);3(c)
<i>Lathyrus clymenum</i> L.	4	4(b)
<i>Lathyrus hirsutus</i> L.	1	1(b)
<i>Lathyrus latifolius</i> L.	2	2(b)
<i>Lathyrus ochrus</i> (L.) DC.	15	1(a);10(b);4(c)
<i>Lathyrus sativus</i> L.	168	27(a);26(b);115(c)
<i>Lathyrus spaericus</i>	4	4(b)
<i>Lathyrus</i> sp	11	11(g)
<i>Lathyrus</i> spp	18	18(b)
<i>Lathyrus sylvestris</i>	1	1(g)
<i>Lathyrus tingitanus</i> L	1	1(a)
<i>Lens culinaris</i> Medikus	444	5(a);15(b);424(c)
<i>Lupinus albus</i> L.	1099	72(a);295(b);732(d)
<i>Lupinus angustifolius</i> L.	475	1(a);272(b);202(d)
<i>Lupinus bicolor</i> Lindt	4	4(b)
<i>Lupinus consentinii</i> Guss	23	23(b)
<i>Lupinus hispanicus</i> Boiss et Reut.	137	103(b);34(d)
<i>Lupinus micranthus</i> L.	10	10(b)
<i>Lupinus luteus</i> L.	421	11(a);137(d);272(b);1(e)
<i>Lupinus mutabilis</i> Sweet	674	674(d)
<i>Lupinus polyphilus</i>	2	2(b)
<i>Lupinus rothmaleri</i> Klink	34	34(b)
<i>Lupinus</i> sp	32	1(b);24(d); 7(f)
<i>Lupinus</i> spp.	390(?)	6(a);360(b)
<i>Phaseolus coccineus</i> L.	109	66(a);11(f);32(b)
<i>Phaseolus lunatus</i> L.	1	1(a)
<i>Phaseolus vulgaris</i> L.	3262	1781(a);445(f);968(b);48(e);20(g)
<i>Pisum sativum</i> L.	834	283(a);33(f);99(c);2(e);417(d)
<i>Vicia benghalensis</i>	6	6(b)
<i>Vicia multifida</i> Walbr.	1	1(a)
<i>Vicia ervilia</i> (L.) Wild	7	2(a);5(b)
<i>Vicia faba</i> L.	788	337(a);50(f);66(b);4(e);331(c)
<i>Vicia hirsuta</i>	1	1(f)
<i>Vicia monanthos</i> Viv.	29	29(b)
<i>Vicia parviflora</i>	1	1(f)
<i>Vicia</i> sp.	23	8(a);15(f)
<i>Vicia villosa</i> Roth	9	2(a);7(b)
<i>Vicia sativa</i> L.	55	13(a);1(f);41(b)
<i>Vicia</i> spp.	254	8(a);246(b)
<i>Vigna unguiculata</i> L.	247	197(a); 50(b)
<i>Vigna unguiculata</i> subsp. <i>sesquipedales</i>	6	6(a)

* a – BPGV; b – INRB (Oeiras); c – INRB (Elvas); d – ISA; e – UAçores; f – UMA; g - UTAD

Table 2. Composition of the crop collections

Species	Total n° of accessions	Wild %	Landraces %	Breeding/research material (%)	Total n° of Cultivars
<i>Cicer arietinum</i> L.	1659		37%	62%	5
<i>Lathyrus (sativus + cicera + ochrus)</i>	168	5%	30%	65%	
<i>Lens culinaris</i> L.	444		4.5%	95%	3
<i>Lupinus albus</i> L.	1099	0%	87%	8%	51
<i>Lupinus angustifolius</i>	475	82%	0%	8%	47
<i>Lupinus hispanicus</i>	137	100%			
<i>Lupinus luteus</i>	421	22%	43%	20%	65
<i>Lupinus mutabilis</i>	674			100%	
<i>Phaseolus vulgaris</i> L.	3262		100%		1
<i>Pisum sativum</i>	834		56%	42%	15
<i>Vicia faba</i> L.	788	10%	70%	19%	8