Strategy for the *Ex Situ* Conservation of *Lathyrus* (grass pea), with special reference to *Lathyrus sativus, L. cicera*, *L. ochrus*

Date: 30 October 2007

DISCLAIMER

This document, developed with the input of a large number of experts, aims to provide a framework for the efficient and effective *ex situ* conservation of globally important collections of *Lathyrus* (grass pea).

The Global Crop Diversity Trust (the Trust) provided support for this initiative and considers this document to be an important framework for guiding the allocation of its resources. However the Trust does not take responsibilities for the relevance, accuracy or completeness of the information in this document and does not commit to funding any of the priorities identified.

This strategy document (dated 30 October 2007) is expected to continue to evolve and be updated as and when circumstances change or new information becomes available.

1) Introduction

Grass pea, *Lathyrus sativus*, is widely grown as a pulse crop in South Asia and Ethiopia, and to a more limited extent in West and Central Asia. In these regions, the dry seeds are harvested and cooked in a variety of ways as a human food. The species is also widely grown for animal feed and as a forage. Because of the species' extreme tolerance to difficult environmental conditions, including both drought and water-logging, it often survives when other crops are decimated. However, in years when conditions are particularly harsh, human consumption of the crop may increase – through lack of any suitable alternative, especially for the poorest rural people – to a level at which there is a severe risk of the consumer succumbing to a neurological disorder, lathyrism, caused by the presence of a neurotoxin in the seed known as either beta-N-oxalyl-diamino-propionic acid (beta-ODAP) or beta-(N)-oxalylamino-L-alanine acid (BOAA). The toxicity results in irreversible paralysis, characterized by lack of strength in, or inability to move the lower limbs. It is particularly prevalent in some areas of Bangladesh, Ethiopia, India and Nepal, and affects more men than women.

Because of the importance of the species as a survival food for some of the poorest people in the world, yet recognizing the dangers that excessive consumption can cause, in 1991 grass pea was listed among the crops included in the multilateral system of access and benefit sharing under the International Treaty on Plant Genetic Resources for food and Agriculture (ITPGRFA).

Although there are relatively few efforts throughout the world to genetically improve grass pea, there are some important programmes that aim to improve its yield, resistance to biotic and abiotic stresses and, most importantly, to reduce the percentage, or ideally eliminate, the neurotoxin from the seed. However, local landraces and cultivars are being lost as farmers switch to alternative crops – potentially limiting the progress that can be made through genetic enhancement. Fortunately, some significant collections have already been assembled and are maintained in a number of different institutes throughout the world. This document aims to outline some of the key elements of a strategy for increasing the efficiency and effectiveness of efforts to conserve this genepool *ex situ* and for ensuring it is available for use by whoever needs it. While the strategy focuses on conserving and promoting the use of *Lathyrus sativus*, two related pulse species (*L. cicera* and *L. ochrus*), that are less widely grown but also liable to induce lathyrism, are also considered.

The strategy outlined here is just a first step and it needs to be developed further as experience is gained with its implementation and as additional knowledge and genetic resources become available.

1.1 The strategy development process

The strategy outlined here has been developed following extensive consultations with many stakeholders concerned with the conservation and use of the genetic diversity of *Lathyrus*. Inputs have been received from a very wide

variety of sources and it is not possible to mention them all here. However the following, in particular, have had a major role in preparing this document: G. C. Hawtin, (Global Crop Diversity Trust), B. Laliberté, (Global Crop Diversity Trust), J. Kanopka (ICARDA) and P. Mathur (Bioversity International). In addition Bonnie Furman (ICARDA), Ali Shehade (ICARDA) and Ola Westengen (Global Crop Diversity Trust) have all made an invaluable input.

The first consultations on the development of this conservation strategy for *Lathyrus* (as well as for other food legumes) took place at a special seminar held during the Fourth International Food Legume Research Conference, in New Delhi, India, in October 2005. Eighteen people from eleven institutions participated. Subsequently, in April 2006, a questionnaire (see format in Annex 1) was distributed to the curators of 36 genebanks in 36 countries (see Annex 2) to seek comprehensive information on the status of *Lathyrus* collections.

To complement the information from the relatively low response, information was gathered directly at the consultation meeting in Aleppo in February 2007 and incorporated into the tables presented in Sections 2-7.

The major event in the development of this strategy was a workshop that took place at ICARDA in Aleppo, Syria from 19–22 February 2007, entitled: "Global Collaborative *Ex Situ* Conservation Strategies for Food Legumes (chickpea, lentil, faba bean and grass pea)". Annex 3 lists the workshop participants and the annotated agenda is given in Annex 4. A simplified questionnaire was distributed to participants and others in advance of the meeting (see Annex 5)., and the data were collated and verified at the workshop. Participants addressed a wide range of issues relating to increasing the efficiency and effectiveness of *ex situ* conservation and for strengthening links to actual and potential users of the germplasm. Following the workshop, further information was received from a number of genebanks – both those represented at the workshop itself, as well as several that had not been present in Aleppo but were identified there as potentially having significant collections of *Lathyrus*. Data from all these sources have been combined and are presented in Sections 2 to 7.

In addition to the process listed above, additional sources of information consulted in drafting this strategy included:

- *Lathyrus* Genetic Resources in Asia, Proceedings of a Regional Workshop, Raipur, India, 1995, edited by R.K. Arora, P.N.Mathur, K.W. Riley and Y. Adham. IPGRI, 1996
- *Lathyrus* Genetic Resources Network, Proceedings of a IPGRI-ICARDA-ICAR Regional Working Group meeting, New Delhi, India, edited by P.N. Mathur, V. Ramanatha Rao and R.K. Arora. IPGRI, 1998
- Grass pea. *Lathyrus sativus* L. by C. Campbell, IPK/IPGRI, 1997
- *Lathyrus* Germplasm Collections Directory, complied by P.N. Mathur, A. Alercia and C. Jain, IPGRI, 2005
- The regional crop conservation strategies for Asia, West Asia and North Africa, Central Asia, and East Africa

Various databases and information sources available on the internet including:

- The Consultative Group on International Agricultural Research (CGIAR) System-wide Information Network on Genetic Resources (SINGER) database: http://singer.grinfo.net/
- USDA – Genetic Resources Information Network (GRIN) database: http://www.ars-grin.gov/npgs/
- European PGR collection catalogue - EURISCO - http://eurisco.ecpgr.org/
- ECPGR: http://www.ecpgr.cgiar.org/databases/Crops/lathyrus.htm
- FAO – World Information and Early Warning System on PGRFA (WIEWS): http://apps3.fao.org/wiews/wiews.jsp
- Bioversity International Directory of Germplasm Collections: http://www.bioversityinternational.org/Themes/Genebanks/Germplasm_Collection_Directory/index.asp
- Central Asia and Caucasus Regional Database (available on CD, contact at ICARDA: j.konopka@cgiar.org)

A first draft of this strategy was circulated to all who had participated in the Aleppo workshop for their comments and suggestions. This document is taking into account the feedback received.

1.2 The genus *Lathyrus*

The genus *Lathyrus* comprises approximately 160 species. They are primarily native to temperate regions of the world, with approx. 52 species originating in Europe, 30 in North America, 78 in Asia, 24 in tropical East Africa, and 24 in temperate South America[1].

Lathyrus species that are grown as a pulse – i.e. that are harvested as a dry seed for human consumption - include: *L. sativus, L. cicera*, *L. ochrus* and to a lesser extent *L. clymenum.* Another species that is occasionally grown for human consumption – but for its edible tubers rather than its seed - is *L. tuberosus*, known as the tuberous pea or earthnut pea.

Other species that are of commercial importance, especially for their ornamental value or for forage or feed, include:

- *Lathyrus aureus* (Golden Pea)
- *Lathyrus annuus* (Red Fodder Pea)
- *Lathyrus japonicus* (Sea Pea)
- *Lathyrus latifolius* (Everlasting Pea)
- *Lathyrus linifolius* (Bitter Vetch)
- *Lathyrus nervosus* (Lord Anson's Blue Pea)
- *Lathyrus nissolia* (Grass Vetchling)
- *Lathyrus odoratus* (Sweet Pea)

[1] Asmussen, Conny B; Liston, Aaron (March 1998). "Chloroplast DNA Characters, Phylogeny, and Classification of Lathyrus (Fabaceae)". *American Journal of Botany* **85** (3): 387

- *Lathyrus pratensis* (Meadow Vetchling)
- *Lathyrus sphaericus*, (Spring vetchling)
- *Lathyrus sylvestris* (Flat Pea-vine)
- *Lathyrus tingitanus* (Tangier Pea)

This strategy concentrates on the *ex situ* conservation of the three main pulse species: *Lathyrus sativus, L. cicera* and *L. ochrus*. Collections of other *Lathyrus* species, for example of *L. odoratus* (the common sweet pea)[2] for ornamental use and species of actual or potential importance as pasture or forage crops, are largely excluded from this strategy, although it is recognized that many could prove to be useful as a source of genes for the genetic improvement of the three target pulse species.

Lathyrus sativus is known in English as grass pea, blue sweet pea, chickling vetch, Indian pea, Indian vetch, or white vetch. The ILDIS database[3] list 44 different vernacular names for the species and three synonyms: *Lathyrus asiaticus* (Zalkind) Kudr., *Lathyrus sativas* L. and *Lathyrus sativus* L. subsp. *asiaticus* Zalkind[4]

L. cicera (synonym: *Lathyrus aegaeus* Davidov) lacks a common vernacular name in English, while *L. ochrus (synonym: Pisum ochrus L.)* is reportedly known as winged vetchling[5].

Additional information on grass pea, including its taxonomy, origin, properties and uses, genetic resources, breeding, ecology, agronomy and future prospects can be found in Campbell (1997)[6] and will not be repeated here.

2) Overview of *Lathyrus* collections

Section 1 above describes the process for developing this strategy. Some of the main data assembled are presented in Tables 1-9 which lists the major collections of *Lathyrus sativus* (as well as *L. cicera* and *L. ochrus*) held at institutions throughout the world. It provides information with on:

- total number of *Lathyrus* accessions
- the number of accessions of each of *L. sativus, L. ochrus* and *L. cicera*
- the percentage of landraces
- the percentage of wild relatives

[2] The seed company "Seeds-by-size" in UK, for example, lists approx. 630 different varieties of sweet pea (*Lathyrus odoratus)* for sale as well as 22 other annual and 20 perennial ornamental *Lathyrus* species.
[3] The International Legume Database and Information Service ILDIS: http://www.ildis.org/
[4] Citations for the synonyms are a) Allkin, R. et al. (1986) Vicieae Database Project, Southampton Univ. and b) Roskov Yu. R. (2005) Editorial scrutiny: Northern Eurasia data Import (unpubl.)
[5] Polunin, O. (1969) Flowers of Europe. Oxford University Press
[6] Campbell, Clayton G. (1997) Grass pea. *Lathyrus sativus* L. Promoting the conservation and use of underutilized and neglected crops. 18. Institute of Plant Genetics and Crop Plant Research, Gatersleben/International Plant Genetic Resources Institute, Rome, Italy. 91pp.

- the percentage originating in the country concerned
- the percentage of the collection formally duplicated,
- the nature of the storage facilities (long- and/or short-term)
- whether the data management is computerized, with or without web access
- whether there are passport and/or characterization data available
- the extent of regeneration requirements
- whether the host country has ratified the International treaty on PGRFA

The sections 2.2 to 2.6 provide a brief overview and analysis of this data.

2.1 Analysis of information from the regional conservation strategies

During 2005 and 2006 with support from the Global Crop Diversity Trust, conservation strategies for the long-term conservation and availability of plant genetic resources have been developed in almost all of the regions. The regional approach is to identify key *ex situ* collections of globally important crops (of Annex 1 of the ITPGRFA) on a region-by-region basis and to complement the global crop conservation strategies, prioritizing collections on a crop-by-crop basis at the global level. However, in these regional strategies, *Lathyrus* and other food legumes were given lower regional priorities compared to crops such as cereals (rice, wheat, maize, barley, sorghum etc.) and other staple crops such as banana, coconut, yam, potato, and cassava.

Europe, West Asia, North Africa, South Asia and Eastern Africa recognized the crop as being of secondary importance (especially for forage use). In South Asia it ranked 22nd of the top 24 highest priority crops and in Ethiopia 19th of the 21 highest priority crops. In the rest of the world it was ranked as being of only negligible or no priority at the regional level.

In spite of this, it is important to give attention to the conservation of the genetic diversity of *Lathyrus* at the global level for at least the following reasons:

1) the crop is important locally in many of the harshest agro-environments - especially in South Asia and Ethiopia
2) in those areas where it is grown, it is an important crop for the poorest of the poor
3) it takes on special importance in drought years when it may be one of the few crops that survives, a characteristic that is likely to become more important in many regions as a result of climate change
4) the scourge of lathyrism needs to be addressed as a matter of some urgency – with the breeding of zero or very-low neurotoxin varieties being the most promising solution, requiring access to suitable genetic resources
5) there are few large collections and several small but key collections to be integrated into a global system
6) the crop has been identified as an important crop for which there is a high degree of international inter-dependence with respect to its genetic resources. As such it is included in the multilateral system of access and

benefit sharing under the International Treaty and collections are thus readily accessible for conservation and use.

2.2 Size and composition of collections

Table 1 lists the main collections of *Lathyrus* around the world, together with an indication of the composition of each collection in terms on the percentages of accessions of wild relatives, landraces and breeding materials (breeders advanced lines etc.), as well as the percentage of the collection that originated in the country concerned.

Table 1. *Lathyrus* collections: content

No	Country	Genebank / institutes	TOTAL No of *acces.*	Wild rela-tives	Land-races	Breed-ing material	Origin – collected in country
1.	GLOBAL	ICARDA	3239	45%	54%	0.1%	17%
2.	France	Universite de Pau, IBEAS	4477				34%
3.	India	NBPGR	2619	3%	85%		94%
4.	Bangladesh ***	GRC Bangladesh Agric. Res. Inst.	1841				
5.	Chile	Centro Reg. de Inv. Carillanca	1424				
6.	Australia ***	Australian Temp. Field Crops Coll.	986	28%	39%	19%	
7.	Russia ***	VIR	848	43%	30%	18%	40%
8.	Canada	PGRC, Canada	840	10%	90%		
9.	USA	Western Regional Plant Introduction Station, USDA, Pullman, Washington	669				7%
10.	Ethiopia ***	BCRI	588	2%	75%	25%	98%
11.	Germany***	IPK	568	40%			5%
12.	Spain ***	Fernando Franco Jubete	543				
13.	Algeria	Institute National Agronomique	437				
14.	Hungary ***	Research Centre for Agrobotany	394	1%	22%		20%
15.	Spain ***	INIA	377		100%		89%
16.	Bulgaria***	Institute for PGR "K.Malkov"	368				
17.	Turkey	AARI	363	94%			100%
18.	Nepal***	Nepal Agricultural Research Council	164	0	100%	0%	100%
19.	Armenia ***	Institute of Botany, National Academy of Sciences of Armenia	157				
20.	Pakistan	Plant genetic Resources Institute	130				
21.	Portugal***	Genebank,, Braga	199	5%	30%		45%
22.	China	CAAS	80				100%
23.	Azerbaijan ***	Genetic Resource Institute, National Academy of Science	66				

No	Country	Genebank / institutes	TOTAL No of *acces.*	Wild rela-tives	Land-races	Breed-ing material	Origin – collected in country
24.	Czech Republic ***	Research Institute of Crop Production	52				
25.	Greece ***	Greek Genebank, Agricultural Center of Mecedonia and Thrace	47				
26.	Slovakia ***	Research Institute of Plant Production	47				
27.	Cyprus ***	Agricultural Research Institute	31				
28.	Poland ***	PGR Laboratory, Research Institute of Vegetable Crops	10				
		TOTAL	**21227**				

* - From ECPGR/Pau database
** - From EURISCO database
*** - from accession-level data sent to ICARDA in April 2007

Although this breakdown is not available for all collections listed, it is clear that the collections maintained by the University of Pau in France (4,477 accessions) and ICARDA in Syria (3,239 accessions) are by far the largest, with the Indian, Bangladeshi and Russian collections coming next with 2,619, 2,432 and 1,835 accessions respectively. Nearly all (98%) of the material held by NBPGR in India and 40% of the material held in Russia are reported to be of national origin. Many other collections also report high levels of indigenous material including Ethiopia (98% of 588 accessions), Nepal, (100% of 164 accessions), Portugal (100% of 256 accessions) Spain (89% of 377 accessions) and Turkey (100% of 363 accessions).

Table 2 gives a breakdown of the collections in terms of species. The two largest collections (France and ICARDA) both comprise about 50% *L. sativus.* The collections in the main grass pea producing countries all have high percentages of *L. sativus*: those in Bangladesh, Ethiopia, India and Nepal all comprise at least 70% *L. sativus*.

Table 2. *Lathyrus* collections: species composition

	Country	Genebank / institutes	No of acc. - Sativus	No of acc. - Ochrus	No of acc. - Cicera	TOTAL No of acc. - ALL *Lathyrus*
1.	GLOBAL	ICARDA	1660	137	208	3239
2.	France	Universite de Pau, IBEAS	2382	0	789	4477
3.	India	NBPGR	2561	0	1	2619
4.	Bangladesh ***	GRC Bangladesh Agric. Res. Inst.	1841	0	0	1841
5.	Chile	Centro Reg. de Inv. Carillanca				1424
6.	Australia***	Aus. Temp. Field Crops Coll.	592	51	302	985
7.	Russia ***	VIR	632	21	195	848
8.	Canada	PGRC, Canada	781	0	0	840

	Country	Genebank / institutes	No of acc. - Sativus	No of acc. - Ochrus	No of acc. - Cicera	TOTAL No of acc. - ALL *Lathyrus*
9.	USA	Western Regional Plant Introduction Station, USDA, Pullman, Washigton	242	25	33	669
10.	Ethiopia***	BCRI	435	151	0	588
11.	Germany***	IPK	254	48	266	568
12.	Spain *	Fernando Franco Jubete	108	0	328	543
13.	Algeria	Institute National Agronomique	10	0	16	437
14.	Hungary***	Research Centre for Agrobotany	296	3	58	394
15.	Spain***	INIA	157	7	179	377
16.	Bulgaria***	Institute for PGR "K.Malkov"	213	38	44	368
17.	Turkey	AARI	22	0	35	363
18.	Greece *	Greek Genebank, Agricultural Center of Mecedonia and Thrace	208	0	112	320
19.	Portugal	Genebank, Braga	168	15	16	199
20.	Nepal***	Nepal Agricultural Research Council	164	0	0	164
21.	Armenia ***	Institute of Botany, National Academy of Sciences of Armenia	3	0	154	157
22.	Pakistan	Plant genetic Resources Institute	11	0	0	130
23.	China	CAAS				80
24.	Azerbaijan ***	Genetic Resource Institute, National Academy of Science	29	0	37	66
25.	Czech Republic	Research Institute of Crop Production	3	0	0	52
26.	Slovakia **	Research Institute of Plant Production	47	0	0	47
27.	Cyprus *	Agricultural Research Institute	44	0	0	44
28.	Cyprus **	Agricultural Research Institute	19	12	0	31
29.	Poland **	Plant genetic Resource Laboratory, Research Institute of Vegetable Crops	16	0	0	16
		TOTAL				**21103**

* - From ECPGR/Pau database
** - From EURISCO database
*** - from accession-level data sent to ICARDA in April 2007

2.3 Storage facilities

Table 3 shows the collections that are maintained in long-term facilities, i.e. in cold storage at -18°C. It can be seen that the largest collections are mostly maintained under long-term storage conditions.

Table 3. *Lathyrus* collections: storage facilities

	Country	Genebank / institutes	TOTAL acc. - ALL *Lathyrus*	Facilities - Long-term
1.	GLOBAL	ICARDA	3239	Yes
2.	France	Universite de Pau, IBEAS	4477	
3.	India	NBPGR	2619	Yes
4.	Bangladesh	GRC Bangladesh Agric. Res. Inst.	2432	
5.	Russia	VIR	1835	Yes
6.	Chile	Centro Reg. de Inv. Carillanca	1424	
7.	Australia	Australian Temp. Field Crops Coll.	1368	Yes
8.	Canada	PGRC	840	Yes
9.	USA	Western Regional Plant Introduction Station, USDA, Pullman, Washington	669	Yes
10.	Ethiopia	BCRI	588	Yes
11.	Spain *	Fernando Franco Jubete	543	Yes
12.	Germany	IPK	482	Yes
13.	Algeria	Institute National Agronomique	437	
14.	Hungary	Research Centre for Agrobotany	394	Yes
15.	Spain	INIA	377	Yes
16.	Bulgaria	Institute for PGR "K.Malkov"	368	
17.	Turkey	AARI	363	Yes
18.	Greece *	Greek Genebank, Agricultural Center of Mecedonia and Thrace	320	
19.	Portugal *	Genebank,, Braga	199	Yes
20.	Nepal	Nepal Agricultural Research Council	164	
21.	Pakistan	Plant genetic Resources Institute	130	Yes
22.	Armenia **	Institute of Botany, National Academy of Sciences of Armenia	85	
23.	China	CAAS	80	Yes
24.	Czech Republic	Research Institute of Crop Production	52	
25.	Slovakia **	Research Institute of Plant Production	47	
26.	Cyprus *	Agricultural Research Institute	44	No
27.	Azerbaijan **	Genetic Resource Institute, National Academy of Science	41	
28.	Cyprus **	Agricultural Research Institute	31	No
29.	Poland **	PGR Laboratory, Research Institute of Vegetable Crops	16	
		TOTAL	**22881**	

* - From ECPGR/Pau database
** - From EURISCO database

2.4 Regeneration needs

Table 4 indicates the current status of regeneration of various collections in terms of the number and percentage of accessions 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.

Table 4. *Lathyrus* collections: regeneration needs

No	Country	Genebank / institutes	TOTAL No of acc. - ALL Lathyrus	% of access. for regene-ration
1.	GLOBAL	ICARDA	3239	5
2.	Algeria	Institute National Agronomique	437	50
3.	Australia	Australian Temp. Field Crops Coll.	1368	60
4.	Bangladesh	GRC Bangladesh Agric. Res. Inst.	2432	75
5.	Bulgaria	Institute for PGR "K.Malkov"	368	0
6.	Canada	PGRC	840	5
7.	Chile	Centro Reg. de Inv. Carillanca	1424	50
8.	China	CAAS	80	100
9.	Cyprus		31	
10.	Czech Republic		52	
11.	Ethiopia	BCRI	588	1.5
12.	France	Universite de Pau, IBEAS	4477	0
13.	Germany	IPK	482	0
14.	Greece		320	
15.	Hungary	Research Centre for Agrobotany	394	35
16.	India	NBPGR	2619	0
17.	Morocco			
18.	Nepal	Nepal Agricultural Research Council	164	100
19.	Portugal	Genebank,, Braga	199	30
20.	Russia	VIR	1835	50
21.	Spain	INIA	377	11
22.	Spain	Fernando Franco Jubete	543	???
23.	Turkey	AARI	363	20

2.5 Safety duplication

The workshop in Aleppo agreed that all unique materials should be safety duplicated, ideally in a genebank in a second country. ICARDA will take a lead on working with collections holders to ensure their materials are adequately duplicated. Both ICARDA and NBPGR (India) expressed a willingness to provide facilities for safety duplication and it is likely that other institutions would also be prepared to offer such facilities of so requested.

It was also agreed that in addition to normal safety duplication in a "conventional" genebank, a second level of safety duplication is highly desirable. It was agreed that the Svalbard Global Seed Vault would be a highly appropriate location for such a second level safety-net. To achieve this, the following was proposed:

1. ICARDA will send 100% of its collection to Svalbard
2. Material in other reference collections but that is not in the ICARDA collection should be identified and safety-duplicated in Svalbard
3. Other materials that are not already duplicated in reference collections should be supported for duplication in both a reference collection (ideally at ICARDA) as well as in Svalbard
4. SANPGR is willing to facilitate/coordinate safety duplication activities for South Asian collections and ICARDA for collections in Central Asia, WANA, E. Asia and elsewhere.

Table 5 summarizes the information available on the status of safety duplication. While more information is still needed not only on the extent but also the location of materials duplicated for safety purposes, it is apparent that many important collections are inadequately duplicated and are thus potentially at risk.

Table 5. *Lathyrus* collections: duplication

no	Country	Genebank / institutes	TOTAL No ALL *Lathyrus*	% of collection duplicated
1.	GLOBAL	ICARDA	3239	87%
2.	France	Universite de Pau, IBEAS	4477	
3.	India	NBPGR	2619	7%
4.	Bangladesh	GRC Bangladesh Agric. Res. Inst.	2432	
5.	Russia	VIR	1835	70%
6.	Chile	Centro Reg. de Inv. Carillanca	1424	
7.	Australia	Australian Temp. Field Crops Coll.	1368	3%
8.	Canada	PGRC	840	90%
9.	USA	Western Regional Plant Introduction Station, USDSA, Pullman, Washington	669	0%
10.	Ethiopia	BCRI	588	0%
11.	Spain	Fernando Franco Jubete	543	
12.	Germany	IPK	482	20%
13.	Algeria	Institute National Agronomique	437	
14.	Hungary	Research Centre for Agrobotany	394	100%
15.	Spain	INIA	377	16%
16.	Bulgaria	Institute for PGR "K.Malkov"	368	5%
17.	Turkey	AARI	363	6%
18.	Greece	Greek Genebank, Agricultural Center of Mecedonia and Thrace	320	95%
19.	Portugal	Genebank, Braga	199	90%
20.	Nepal	Nepal Agricultural Research Council	164	55%
21.	Pakistan	Plant genetic Resources Institute	130	
22.	Armenia	Institute of Botany, National Academy of Sciences of Armenia	85	
23.	China	CAAS	80	100%
24.	Czech Republic	Research Institute of Crop Production	52	54%
25.	Slovakia	Research Institute of Plant Production	47	87%
26.	Cyprus	Agricultural Research Institute	44	
27.	Azerbaijan	Genetic Resource Institute, National Academy of Science	41	
28.	Cyprus	Agricultural Research Institute	31	100%
29.	Poland	PGR Laboratory, Research Institute of Vegetable Crops	16	63%

2.6 Information and documentation systems

Table 6 summarizes the available information on the status of the collections with respect to passport and characterization/evaluation data, whether or not the data are held electronically and whether they can be accessed via the internet. Of the collections included in the table, only seven have accession-

level data that are accessible via the internet, and of these the only one in a developing country is the ICARDA collection maintained in Syria.

Table 6. *Lathyrus* collections: documentation

No	Country	Genebank / institutes	Info compu-terised	Passport data	Charact / evaluation data	Web access
1.	GLOBAL	ICARDA	Yes	Yes	Yes (9%)	Yes
2.	Algeria	Institute National Agronomique	No	Yes	Yes	No
3.	Armenia	Institute of Botany, National Academy of Sciences of Armenia				
4.	Australia	Australian Temp. Field Crops Coll.	Yes	Yes	Yes	Yes
5.	Azerbaijan	Genetic Resource Institute, National Academy of Science				
6.	Bangladesh	GRC Bangladesh Agric. Res. Inst.	Yes	Yes (76%)	Yes (9%)	No
7.	Bulgaria	Institute for PGR "K.Malkov"				
8.	Canada	PGRC	Yes	Yes	Yes	Yes
9.	Chile	Centro Reg. de Inv. Carillanca				
10.	China	CAAS	Yes	Yes	Yes	
11.	Cyprus	Agricultural Research Institute	Yes	Yes	No	No
12.	Czech Republic					
13.	Ethiopia	BCRI		Yes	Yes	No
14.	France	Universite de Pau, IBEAS	Yes	Yes	No	Yes
15.	Germany	IPK	Yes	Yes	No	Yes
16.	Hungary	Research Centre for Agrobotany	Yes	Yes	No	No
17.	India	NBPGR	Yes	Yes	Yes	No
18.	Nepal	Nepal Agricultural Research Council	Yes	Yes	No	No
19.	Pakistan	Plant Genetic Resources Institute	Yes	Yes	Yes	No
20.	Poland	Plant genetic Resource Laboratory, Research Institute of Vegetable Crops				
21.	Portugal	Genebank, Braga	Yes	Yes	Yes (48%)	No
22.	Russia	VIR	Yes	Yes	Yes	No
23.	Slovakia	Research Institute of Plant Production				
24.	Spain	INIA	Yes	Yes	Yes	No
25.	Turkey	AARI	Yes	Yes		Yes
26.	USA	Western regional Plant Introduction Station, USDA, Pullman, Washigton	Yes	Yes	No	Yes

It was proposed at the Aleppo Workshop that Bioversity International and ICARDA take a joint lead on the global management of information and databases on *Lathyrus*, with Bioversity continuing to concentrate on building up the South Asia regional database, and for ICARDA to tie this in with its own database and those of other collections (reference and others) in the WANA region and elsewhere, so as to develop a crop registry as the central feature of truly integrated global information system for *Lathyrus*. Special attention needs to be paid to geo-referencing the data.

Priority should be given to obtaining and making available reliable data on ODAP levels – with special attention given to identifying accessions with very low or zero OADP.

It was agreed at the Aleppo Workshop that the descriptors for *Lathyrus* (IPGRI 2000) were adequate and should be adopted as standard by all collection holders. It was proposed that, in addition to the passport descriptors (the FAO/IPGRI Multicrop Passport Descriptors list[7]) the most important characterization and evaluation descriptors are proposed in Table 7, and efforts should be made to record them for all accessions.

Table 7. Most important characterization and evaluation *Lathyrus* descriptors

	Descriptor
1.	Plant growth habit
2.	Flower color
3.	Seed coat color
4.	Days to 50% flowering
5.	Days to maturity
6.	Seedling vigour
7.	Plant height
8.	Number of primary branches
9.	Root nodulation at full blooming
10.	Pod number per plant
11.	Number of seeds per pod
12.	Pod dehiscence
13.	100 seed weight
14.	ODAP content
15.	Protein content
16.	Resistance to powdery mildew
17.	Resistance to downy mildew
18.	Resistance to aphids
19.	Resistance to pod borers
20.	Resistance to jassids
21.	Resistance to broomrape - orobanche
22.	Biomass – harvest index HI

2.7 Gaps in the coverage of global genetic diversity in existing collections

In order to fully and accurately assess the gaps in the genetic diversity among collections worldwide, it would first be necessary to complete the geo-referencing of all existing accessions and map this against data on the distribution of producing areas of the crop and on the distribution of wild *Lathyrus* species. However, the

[7] Downloadable at http://www.bioversityinternational.org/publications/Pdf/124.pdf

Aleppo workshop was able to identify a number of important gaps, listed in the following table:

Table 8. Possible gaps in global *ex situ* genetic diversity

Country	*L. sativus*	*L. cicera*	*L. ochrus*
Egypt	+	+	
Iraq	+	+	
Iran	+	+	
Tunisia		+	+
Greece			+
Turkey			+
Russia	Black Sea Coast and Volga-Kama region		
Iraq	Kurdish area		
Bangladesh	Syleth area (high altitude)		
India	Northeast and Eastern parts		
Ethiopia	High altitude areas, recently opened area by roads.		
Afghanistan	Northeast and Central part		
Spain	Almeria (Andalucia) and Murcia		

It may be important to collect root nodules or soil samples when collections of wild species are made in order to have access to appropriate strains of *Rhizobia*. However more information is needed on this.

3) Training

The following training needs were identified at the Aleppo Workshop as being of top priority. Leading organizations responsible for conduction such training are suggested.

Table 9. Training needs

	Area	Lead organization
1.	ODAP estimation	IGAU, India
2.	Development of core collections	Bioversity-South Asia
3.	Documentation and GIS	ICARDA and Bioversity
4.	Germplasm collecting and taxonomy	ICARDA and VIR
5.	Germplasm management particularly for Nepal and Ethiopia	ICARDA
6.	Molecular characterisation also for Nepal and Ethiopia	ICARDA
7.	Pre-breeding/germplasm enhancement	Bioversity/ICARDA/NBPGR

4) Policy Issues

As grass pea is included within the multilateral system for access and benefit-sharing under the Treaty (i.e. it is a so-called 'Annex 1 crop'), all countries that are party to the Treaty are obliged[8] to make all their *Lathyrus* genetic resources available, regardless of species, under the terms specified in the Treaty, for the genetic improvement of grass pea. The status of countries hosting collections with respect to

[8] With a few exceptions, such as for material that is under development of that is subject to pre-existing intellectual property protection

the International Treaty on PGRFA as of the end of August 2007 is given in the table in Table 10 As can be seen, only 7 of the total of 27 countries represented in the Table have not yet ratified the Treaty.

Table 10. Status of ratification of the (ITPGRFA) of the main countries maintaining *Lathyrus sativus* collections as of 31 August 2007

	Country	Ratification, acceptance, approval or accession
1.	Algeria	Yes
2.	Armenia	Yes
3.	Australia	Yes
4.	Azerbaijan	No
5.	Bangladesh	Yes
6.	Bulgaria	Yes
7.	Canada	Yes
8.	Chile	Signed but not yet ratified
9.	China	No
10.	Cyprus	Yes
11.	Czech Republic	Yes
12.	Ethiopia	Yes
13.	France	Yes
14.	Germany	Yes
15.	Greece	Yes
16.	Hungary	Yes
17.	India	Yes
18.	Morocco	Yes
19.	Nepal	No
20.	Pakistan	Yes
21.	Portugal	Yes
22.	Poland	Yes
23.	Russian Federation	No
24.	Slovakia	No
25.	Spain	Yes
26.	Spain	Yes
27.	Turkey	Yes
28.	USA	Signed but not yet ratified

It should be noted, however, that the Treaty does not specify that *Lathyrus* germplasm is to be made available under the terms of the Treaty for the improvement of *L. cicera* or *L. ochrus* for use as a pulse for human consumption, however it is to be made available under the terms of the Treaty in the case that these species are to be improved for forage purposes[9] .

Apart from the complexities of the situation regarding *Lathyrus* under the International Treaty, no major policy or technical (such as phytosanitary) impediments were identified in the Aleppo workshop with respect to the distribution of materials.

[9] The same applies to *L.ciliolatus, L.hirsutus, L.odoratus, and L.sativus* being improved for forage purposes. Forage *Lathyrus* species will be included in a separate conservation strategy, still to be developed, for the *ex situ* conservation of the genetic resources of temperate forages.

5) Partners in global *Lathyrus* conservation activities

It was recognized at the Aleppo workshop that a number of institution that may – or may not – house specific collections themselves are in a position to be able to provide support and services to the global effort to conserve *Lathyrus* genetic resources. Such services were considered important in particular with respect to characterization and evaluation of the most important traits including ODAP content, protein content, resistance to powdery and downy mildew, aphids, jassids, orobanche and pod borer. The potential role of Belgium (Ghent University), Canada (Morden, Manitoba) and India (Indira Gandhi Agricultural University, Raipur), in neurotoxin screening and breeding were especially highlighted.

5.1 Networks

In 1995, a regional workshop on "*Lathyrus* genetic resources in Asia" was organised by Bioversity International (formely known as the International Plant Genetic Resources Institute, IPGRI) and the Indira Gandhi Agricultural University (IGAU), in Raipur, India[10]. The workshop recommended, *inter alia*, the establishment of a network on *Lathyrus* genetic resources primarily focused on the countries of South Asia, West Asia and North Africa (WANA) and Ethiopia, to be coordinated by the Bioversity South Asia Office. Activities suggested for the network included:

- an assessment of the current status of germplasm collections
- documentation of existing genetic resources held by national programmes
- the creation of a germplasm database for germplasm from WANA region and Ethiopia (supported by ICARDA) and for South Asia (supported by Bioversity)
- emphasis on *L. sativus, L. cicera* and *L. ochrus*
- various collaborative activities among network members.

Following the Raipur workshop, an informal network was established, coordinated by the Bioversity South Asia Office. Work started in 1999 on the development of a *Lathyrus* germplasm collection directory that was subsequently published in 2005 by Bioversity[11]. It includes detailed information on the collections in Algeria, Australia, Bangladesh, Cyprus, Ethiopia, France, Germany, Hungary, India, Jordan, Nepal, Pakistan, Russia, Spain, and USA.

A follow-up Regional Working Group meeting was held in 1997 in New Delhi, India[12] at which it was recommended that:

- the informal network should be revitalized and renamed the "*Lathyrus* Genetic Resources Network (LGRN)", having a major emphasis on *L. sativus* but with some attention to *L. cicera* and *L. ochrus*. Other species would be included for documentation purpose only.
- priority network activities, with funding support from Bioversity and ICARDA, would include:

[10] Arora, R.K., P.N. Mathur, K.W.Rileyand Y. Adham, (eds.), 1996, Lathyrus Genetic Resources in Asia: Proceedings of a Regional Workshop, 27-29 December 1995, Indira Gandhi Agricultural University, Raipur, India. Published IPGRI South Asia office, New Delhi, India

[11] Mathur P.N., A. Alercia and C. Jain compilers,(2005) Lathyrus germplasm collections directory, International Plant Genetic Resources Institute, Rome, Italy

[12] Mathur P.N., V.Ramanatha Rao and R.K. Arora (1998) Lathyrus Genetic Resources Network: proceedings of a IPGRI-ICARA-ICAR Regional Working Group Meeting. Published by IPGRI Office for South Asia, New Delhi, India

- in addition to the *Lathyrus* germplasm directory, the development and publication of descriptors for *Lathyrus*[13]
- ICARDA to support international nurseries, to include lines with low ODAP content, improved nutritional qualities, high yield, high biomass and disease resistance
- support to be provided to national programmes for screening germplasm for low ODAP content – (support was subsequently provided to India and Bangladesh)
- various additional priority conservation, breeding, research and training activities were identified providing sufficient external funding could be secured.

It was recommended at the Aleppo workshop that participation in the *Lathyrus* Genetic Resources Network be expanded and that all countries with important collections be invited to participate and not only those in WANA and South Asia. At the moment funding is only available for some of the coordination and related activities by ICARDA and Bioversity, but not for other activities by members. It is important that mechanisms be found to help ensure the network's sustainability.

6) A strategic approach to conserving the genepool

A conceptual approach to developing a strategy for conserving the genetic diversity of a particular crop *ex situ* is described in the paper "The Role of the Global Crop Diversity Trust in Helping Ensure the Long-term Conservation and Availability of PGRFA"[14]. The concepts presented in this paper were presented and discussed at the Aleppo workshop and it was agreed that they constituted an appropriate strategic approach for conserving the *Lathyrus* genepool. This approach thus forms the basis of the strategy proposed in the following paragraphs.

The genepool of a crop comprises the genetic diversity contained within all unique accessions that are found within existing *ex situ* collections, together with the genetic diversity that remains to be collected and that currently remains only under *in situ* conditions or on-farm. In terms of the material that already exists within collections, there are clearly some collections that contain within them a larger percentage of the total genetic variation than others and it is on these larger and more diverse collections (Tables 1 and 2) - especially those that are well maintained (Tables 3 to 6) and readily available under the terms of the International Treaty (Table 10) - that, in general, the international community depends for the genetic variation needed for crop improvement. Such collections include not only the international collection maintained by ICARDA - the most highly distributed and used of all – but also other major collections maintained in a number of both developing and developed countries. A rational approach to conserving the genepool would see the largest efforts of the international community being devoted to supporting such collections: to ensuring they are able to achieve and maintain international conservation standards and are capable of distributing good quality seed in a timely manner.

However, large, well-maintained and highly accessible collections are not the only important ones in terms of the genetic material contained within them. Many smaller collections contain unique material that could be extremely important for the genetic

[13] IPGRI (2000) Descriptors for *Lathyrus* spp. International Plant Genetic Resources Institute, Rome, Italy.
[14] http://www.croptrust.org/main/role.php

improvement of the crop. Such collections are likely to include those that have a large number or percentage of accessions of local origin (see Table 1) and that have not already been extensively replicated within another collection. However, in cases where only a relatively small number of accessions are involved, it is hard to justify the provision of external financial and other resources for upgrading the collection, and the holding and distribution facilities, to meet international standards. In such cases, in order to ensure the materials are adequately conserved and can be distributed in a safe and timely manner, the collection holders might consider replicating all unique materials to the international collection maintained by ICARDA, or other similar large, well-maintained and internationally available collection. As there is a cost associated with any such activity (e.g. for the production of fresh seed, quality control, packaging, shipping, documentation etc.), the international community should be encouraged to consider providing the financial support needed.

In many cases the passport and other data currently available on individual collections are inadequate to gain an accurate picture of the extent of duplication within and among collections and hence to estimate the number and location of those unique accessions that it would be desirable to replicate within an international collection. Further work is needed to improve documentation on the collections and the development of a full crop registry, as suggested in paragraph 2.6 above, would greatly facilitate such an exercise.

7) Conclusions and the Way Ahead

Once this international strategy for conserving the *Lathyrus* genepool has been published and made widely available, efforts need to be stepped up to implement it. This would ideally be carried out within the context of the *Lathyrus* Genetic Resources Network, under the joint leadership of ICARDA and Bioversity International.

Special attention is needed, at least initially, to upgrading the documentation on the various collections and to creating a *Lathyrus* registry. Collections should be upgraded to meet international standards for conservation and distribution, and the international community should be called upon to support this process where needed, at least in the case of the most important collections. For other collections, the international community should be encouraged to consider providing assistance with replicating unique materials to the ICARDA – or similar – international collection. All unique materials should be duplicated for safety reasons in a second country, with a safety back-up being sent to the Svalbard Global Seed Vault.

At the same time as the database and upgrading work is proceeding, further work is needed on characterizing and evaluating the collections for key traits (see section 2.6 above) and on making the information widely available over the internet. Only through such efforts is there likely to be a significant increase in the use of collections by plant breeders and others.

Additional collecting should be undertaken, especially to fill the gaps identified in Table 8, and once new data become available it will be possible to carry out further analyses to identify additional gaps in the collections.

Training needs to be organized to meet the needs identified in Table 9, and all countries having important collection of *Lathyrus* and that have not yet ratified the International Treaty (see Table 10) should be encouraged to do so.

The strategy outlined here is not seen as static but needs to be kept under regular review and revised as new data and information become available and to meet changing needs and circumstances. The *Lathyrus* genetic resources network is the logical body to undertake such regular reviews and it should also be responsible for monitoring and supporting its implementation.

Through such efforts it is hoped that genepool of this important crop can be efficiently and effectively conserved for the benefit of current and future generations.

Annex 1 Grass Pea Conservation Strategy Survey - May 2006

1. Background

The Global Crop Diversity Trust is undertaking a series of studies to support the development of international collaborative conservation strategies for different crops. As such strategies evolve, they will provide a basis for the allocation of resources from the Trust to the most important and needy collections. This questionnaire has been developed in order to seek the advice and input of representatives of the world's major grass pea collections in the development of the grass pea conservation strategy. In particular the questionnaire aims to assess the status of grass pea conservation throughout the world.As curator of a key grass pea collection, we kindly request you to complete the sections 1-17 of the questionnaire. We estimate that his procedure may take approximately 1 hour of your time. We appreciate your patience. If there are no *ex situ* grass pea collections in your institute, please can you complete sections 16-17 only. Please return the questionnaire to Geoff Hawtin (see contact details below), no later than 19 May 2006.

Geoff Hawtin PhD, Senior Advisor, Global Crop Diversity Trust
Manor Farm House, 17 Front Street, Portesham, Dorset, DT3 4ET, UK
Phone: +44 (0) 1305 9871043 Email: geoffhawtin@hotmail.com

2. Information about your organization

3. Additional key contacts for the grass pea germplasm collection

4. Description of your organization

4.1 Please describe your organization

- 1 Governmental organization
- 1 University
- 1 Private organization
- 1 Other (please specify):_____

4.2 Is the institution in charge of the grass pea collection the legal owner of the collection?

1 YES 1 NO 4.2.1 If NO, who is the owner (including no owner identified)?

4.3 Is the grass pea collection subject to the terms and conditions of the International Treaty on Plant genetic Resources for Food and Agriculture? 1 YES 1 NO

4.3.1 If NO, is expected to become under the International Treaty in the near future?

1 YES 1 NO 4.3.1.1 If YES, indicate expected date_____

5. Overview of your grass pea collection

5.1 Please describe the main objectives of the grass pea collection (long-term conservation, working collection, breeding collection etc**.):**

5.2 Indicate the species and the respective number of accessions from the grass pea germplasm types that are included in your collection (Please write the number of accessions in brackets after each species name, e. g. *L. sativus* (30), *L. aphaca* (15), etc.)**:**

Type of grass pea germplasm	**Species name (number of accessions per species in brackets)**
Wild related species of grass pea	
Landraces	
Obsolete improved varieties	
Advanced improved varieties	
Breeding/research materials	
Inter-specific derivatives	
Unknown	
Other	

5.3 Please indicate the share (in %) from each specific type of germplasm that is AVAILABLE for distribution:

Type of grass pea germplasm (where known**)**	**% available for distribution**
Wild related species of grass pea	
Landraces	
Obsolete improved varieties	
Advanced improved varieties	
Breeding/research materials	
Inter-specific derivatives	
Unknown	
Other	

5.4 Origin of the grass pea collection: please indicate the proportion (%) of accessions on the total amount that were... *(Note: the sum should be 100 %!)*

Origin	**Proportion %**
...collected originally in your own country (national origin)	
...collected originally in your own region (regional origin)	
...introduced from a collection abroad	
...from other origin (please define the origin):	

5.5 Are there major gaps in your grass pea collection? Please indicate major gaps concerning your grass pea collection:

Species coverage of the crop: 1 YES 1 NO
Population (sample) representation per species: 1 YES 1 NO
Ecological representation of the species: 1 YES 1 NO
Other, please specify the gap concerning your grass pea collection:
5.5.1 If there are major gaps, please provide details on the plans to fill these gaps:

6. Aspects on the potential of the grass pea collection

6.1 What would you consider to be the most interesting aspects of your grass pea collection, making it unique?

6.2 Please describe the main potential/importance of your grass pea collection for use and breeding:

7. Conservation status (germplasm management)

7.1 Please indicate the proportion (in %) of the grass pea accessions maintained under different facilities: *(Note: if the same accessions are maintained under more than one storage condition the sum may exceed 100%)*	**Percentage %**
Short-term storage conditions	
Medium-term storage conditions	
Long-term storage conditions	
Other, please specify:	

7.2 Please indicate the proportion (in %) of the grass pea accessions conserved as: *(Note: if the same accessions are stored as different types of germplasm the sum may exceed 100%)*	**Percentage %**
Seeds	
Field accessions	
In vitro	
Cryopreservation	
Pollen	
DNA	
Other, please specify:	

7.3 Please describe the MAIN storage facility available for your grass pea collection:
*(If you have **more than one** facility, please use the fields for 'additional facilities' too)*

	Main Facility 1	**Additional facility 1**	**Additional facility 2**
Type of facility			
Temperature			
Relative Humidity (%)			
Packing material			

Other, please specify:			

7.4 Please mark for which activity you have established a genebank management system and/or have written procedures and protocols:

1 Acquisition (*including collecting, introduction and exchange*)
1 Regeneration
1 Characterisation
1 Storage and maintenance
1 Documentation
1 Health of germplasm
1 Distribution
1 Safety-duplication
1 Other please specify: _____

7.5 In case you have procedures and protocols, are you able to provide the Global Crop Diversity Trust with this information (i.e. provide a copy)? 1 YES 1 NO

7.6 Please describe your quality control activities, in terms of frequency, protocols/methods and actions upon results:

Activities	**Description of quality control**
Germination tests:	
Viability testing:	
Health testing:	
True-to-typeness of *in vitro* plantlets:	
Other, please specify:	

7.7 Is the grass pea collection affected by diseases that can restrict the distribution of the germplasm?

1YES 1 slightly, only few accessions 1 NO

7.7.1 If you indicated YES or slightly above, are knowledge and facilities available at your institution for eradication of these diseases? 1 YES 1 limited 1 NO

7.8 What is the normal regeneration interval to maintain the viability of the grass pea collection?

7.9 Indicate the proportion (%) of each germplasm type that requires urgent regeneration, apart from the routine regeneration:

Type of grass pea germplasm	**% of grass pea accessions with urgent regeneration need**
Wild related species	
Landraces	
Obsolete improved varieties	
Advanced improved varieties	
Breeding/research materials	
Inter-specific derivatives	
Unknown	
Other, please specify:	

7.9 Please indicate the current situation of the grass pea collection with respect to the following conditions: (*where: 1 = high/good, 2 = adequate/moderate, 3 = not sufficient/bad, NA = not applicable*)

Condition	**Current situation**	**Expected situation in 2010**
Funding for routine operations and maintenance		
Retention of trained staff		
Interest for Plant Genetic Resource Conservation by donors		
Genetic variability in the collection as needed by users/breeders		
Access to germplasm information (passport, charact., evaluation)		
Active support/feedback by users		

Condition	Current situation	Expected situation in 2010
Level of use by breeders		
Other factors (please specify):		

8. Safety duplications in other institutions

(Safety duplication: defined as the storage of a duplicate/copy of an accession in another location for safety back-up in case of loss of the original accession.)

8.1 Are grass pea accessions safety-duplicated in another genebank? 1 YES 1 NO

8.1.1 If YES, please specify in the table:

Name of institute maintaining your safety duplicates:	Number of accessions	Storage conditions (short, medium, long term)	Nature of the storage (e.g. black box, fully integrated in host collection, etc.)
1.			
2. ETC			

9. Institutions storing safety duplicates of grass pea in your genebank

9.1 Is there any grass pea germplasm of other collections safety-duplicated at your facilities?

1 YES 1 NO 9.1.1 If YES, please specify in the table:

Name of holder of the original collection:	Number of accessions	Storage conditions (short, medium, long term)	Nature of the storage (e.g. black box, fully integrated in host collection, etc.)
1.			
2. ETC			

10. Further issues on duplication of grass pea collection

10.1 To what extent do you consider the grass pea accessions in your collection to be unique and not duplicated extensively elsewhere (i.e. EXCLUDING safety-duplication)?

1 Fully unique
1 Mostly unique
1 Partially unique
1 Fully duplicated elsewhere

10.2 Are there any constraints to duplicating the grass pea collection elsewhere outside your country? 1 YES 1 NO 10.2.1 If YES, please specify: _____

11. Information management

11.1 Do you use an electronic information system for managing the grass pea collection (data related to storage, germination, distribution, etc.)? 1 YES 1 partly 1 NO

11.1.1 If YES, what software is used? _____

11.2 Please indicate the proportion (%) of the following types of data is: (1) documented and (2) the proportion that is available electronically:

Type of grass pea germplasm	Passport data		Characterization data		Evaluation data	
	Doc.	Electr.	Doc.	Electr.	Doc.	Electr.
Wild related species	%	%	%	%	%	%
Landraces	%	%	%	%	%	%
Obsolete improved varieties	%	%	%	%	%	%
Advanced improved varieties	%	%	%	%	%	%
Breeding/research materials	%	%	%	%	%	%
Inter-specific derivatives	%	%	%	%	%	%
Unknown	%	%	%	%	%	%
Other, specify:	%	%	%	%	%	%

11.3 In case the information on the grass pea collection is not computerised, are there plans to do so in the future?

ı No plans
ı Computerisation planned within 3 years
ı Other

11.4 Is information of the grass pea collection accessible through the Internet?

ı YES ı partly ı NO

11.4.1 If there is NO data available in the internet, do you produce a printed catalogue?

ı YES ı NO

11.4.1.1 If YES, would you be able to provide the Trust with a copy? ı YES ı NO

If YES, please include a copy to Dr Geoff Hawtin (geoffhawtin@hotmail.com) when returning the completed questionnaire!

11.5 Are data of the grass pea collection included in other databases?

National	ı YES	ı partly	ı NO
Regional	ı YES	ı partly	ı NO
International	ı YES	ı partly	ı NO

11.5.1 If YES or partly, indicate the database (e.g. SINGER, IRIS etc.):

12. Distribution and use of material

12.1 What proportion (%) of the total grass pea collection is AVAILABLE for the following distributions? Nationally: _____% Regionally: _____% Internationally: _____%

12.2 Please fill in the number of grass pea accessions DISTRIBUTED annually, and indicate the expected change over the next 3-5 years, where: + = increasing, 0 = no change, - = decrease

	Number of accessions distributed annually (average of last 3 years)	**Expected change for the next 3-5 years**
Nationally		
Regionally		
Internationally		

12.3 Do you put specific conditions or requirements for distribution of grass pea accessions? ı YES ı NO 12.3.1 If YES, please specify: _____

12.4 What is the proportion of grass pea germplasm sufficiently available in terms of QUANTITY for distribution?

Type of materials	**% of accessions sufficiently available**
Seeds:	
In vitro material:	
Cryopreserved material:	
Other, please specify:	

12.5 Is the distribution of grass pea germplasm limited because of its HEALTH status?

- Seeds: ı YES ı partly ı NO
- *In vitro* material: ı YES ı partly ı NO
- Cryopreserved material: ı YES ı partly ı NO
- Other, please specify:(_____ _____) ı YES ı partly ı NO

12.6 Do you have adequate procedures in place for...

…Phytosanitary certification? ı YES ı NO
…Packaging? ı YES ı NO
…Shipping? ı YES ı NO
…Other, please specify: (_____) ı YES ı NO

12.7 Do you keep records of the grass pea accession distribution?

(e.g. who received it, quantity, date of shipment, nature of distributed material etc.) ı YES ı NO

12.8 Please indicate the proportion (in %) of users who received grass pea germplasm from you in the past 3 years:

Type of users:	**Proportion of total distribution %**

Type of users:	Proportion of total distribution %
Farmers and Farmers' organisations	
Other genebank curators	
Academic Researchers and Students	
Domestic users	
Foreign users	
Plant breeders - public sector	
Plant breeders - private sector	
NGOs	
Others, please specify:	

12.9 Describe briefly how you inform potential users about the availability of grass pea accessions and their respective data in your collection?

12.10 Describe briefly what are the most important factors limiting the use of the grass pea material maintained in your collection?

12.11 Indicate if users have to pay money or not when they request material from you:
for **accessions**: 1 free 1 cost (in US$/accession): _____
for the **shipment**: 1 free 1 cost (in US$/accession): _____

12.12 Do you use a Material Transfer Agreement when distributing material?
1 YES 1 NO

12.13 Do you have any restrictions on who can receive grass pea materials? 1 YES 1 NO
12.13.1 If YES, please specify: _____

13. Networks of grass pea genetic resources

13.1 Do you collaborate in (a) network(s) as a grass pea collection holder? 1 YES 1 NO

13.2 If you collaborate in (a) network(s) please provide the following information of them:
*(**A**) name, (**B**) type (national, regional or worldwide), (**C**) main objectives, and (**D**) a brief description of the main reasons to participate in the network.*

A **Name of network**	**B** **Type of network** National/Regional/ Worldwide	**C** **Main objectives of the network**	**D** **Brief description of the main reasons to participate in the network**
ETC			

14. Additional crop collections maintained in your Institute: please indicate additional crops and number of accessions in the table below:

	Crop or species	**Number of accessions**	**% of wild relative species**
1.			
2.			
3.	**ECT**		

15. Major constraints: Please list the 5 major limitations you are facing in the management of the grass pea collection:

16. Question concerning institutes NOT maintaining grass pea *ex situ* collections

16.1 If your institute does not maintain an *ex situ* collection of grass pea, please indicate to the best of your knowledge, the following:

Current grass pea conservation activities:	
Institute focal person to contact for further details:	
Plans for any grass pea *ex situ* conservation:	
Any other information:	

17. Please add any further comments you may have:

Annex 2. Institutions with *Lathyrus* collections invited to respond to the survey, April 2006

No	Country	Institute's name	Email address
1.	Afghanistan	Plant Genetic Resources Unit Crop Improv. Div., Min. of Agric., Kabul	Sharif_moal_afg@yahoo.com
2.	Algeria	Institut National Agronomique (INA), Alger	aabdelguerfi@yahoo.fr
3.	Australia	CSIRO Division of Plant Industry, Institute of Plant Production and Processing, GPO Box 1600, Canberra	enquiries@csiro.au
4.	Australia	Australian Temperate Field Crops Collection, Private Bag 260, Horsham, Victoria	kevin.a.murray@dpi.vic.gov.au
5.	Australia	Australian Medicago Genetic Resources Centre, SARDI SARDI, PRC GPO Box 397 Adelaide, South Australia	pirsa.sardi@saugov.sa.gov.au
6.	Bangladesh	Genetic Resources Centre Bangladesh Agric. Research Inst. GPO Box 2235, Joydebpur, Gazipur	baridss@bttb.net.bd
7.	Bulgaria	Institute for Plant Genetic Resources "K.Malkov", Druzba 2 Sadovo, Plovdiv district	shamov@yahoo.com
8.	Chile	Centro Regional de Investigación Quilamapu, INIA Avda. Vicente Mandez 515, Chillán	hacuna@quilamapu.inia.cl
9.	Chile	Inst de Inv. Agropecuarias, Centro Regional de Investigación Carillanca Camino Cajón Vilcun Km 10, Temuco	info@carillanca.inia.cl
10.	China	Institute of Crop Germplasm Resources (CAAS), 12 Zhongguancun Nandajie Beijing	xxlu@caas.net.cn
11.	Cyprus	National (CYPARI) Genebank, Agricultural Research Institute, P.O. Box 22016, Nicosia	Athena.Della@arinet.ari.gov.cy
12.	Ethiopia	Biodiversity Conservation and Research Institute, POB 30726, Addis Ababa	aibk2002@yahoo.com
13.	Ethiopia	International Livestock Research Institute (ILRI), PO Box 5689, Addis Ababa	j.hanson@cgiar.org
14.	France	IBEAS, Lab. d'Ecologie Moleculaire Universite de Pau Ave. de l'Université, Pau	daniel.combes@univ-pau.fr
15.	Germany	Genebank, Inst. for Plant Genetics and Crop Plant Research (IPK), Corrensstrasse 3 Gatersleben	knupffer@ipk-gatersleben.de
16.	Hungary	Institute for Agrobotany Kulsomezo 15, Tápiószele	lhorvath@agrobot.rcat.hu
17.	India	National Bureau of Plant Genetic Resources, Regional Station, Akola	dikshitn@yahoo.com
18.	India	Department of Plant Breeding, Indian Institute of Pulses Research, Uttar Pradesh	root@iipr.up.nic.in
19.	India	Department of Plant Breeding and Genetics, Indira Gandhi Agricultural University, Raipur	sharmarn@yahoo.com
20.	Israel	Dept. of Botany, Institute of Life Science, Hebrew Univ. of Jerusalem, Berman Building, Givat Ram Campus, Jerusalem	ilanahs@vms.huji.ac.il
21.	Italy	CNR - Istituto di Genetica Vegetale Via G. Amendola 165/A, Bari	galasso@ibba.cnr.it
22.	Jordan	National Center for Agricultural Research and Technology Transfer, Baqa'a	Fardous@ncartt.gov.jo

No	Country	Institute's name	Email address
23.	Nepal	Central Plant Breeding and Biotec. Nepal Agricultural Research Council P.O. Box 1135, Khumaltar	cpdd@mos.com.np, cpdd@narc.gov.np
24.	Pakistan	Institute of Agricultural Biotechnology and Genetic Resources G-5/1, P O Box 1031, Islamabad	chair@comsats.net.pk
25.	Poland	Plant Breeding and Acclimatization Institute (IHAR), Radzikow, Blonie	postbox@ihar.edu.pl
26.	Portugal	Sector de Pastagens e Forragens Dept Past., Forrag., Proteaginosas Apartado 6, Elvas Codex	enmp.inia@mail.telepac.pt
27.	Russian Federation	N.I. Vavilov All-Russian Scientific Research Institute of Plant Industry 42, B.Morskaya Str., St. Petersburg	vir@vir.nw.ru
28.	Spain	Servicio de Investigacion Agraria Junta de Castilla y Leon Ctra. de Burgos, km 118, Apdo. 172, Valladolid	ciubaufr@jcyl.es
29.	Spain	Centro de Recursos Fitogeneticos, INIA Aut. Aragón A-2, km 36 - Apdo 1045 Alcala de Henares, Madrid	cuadra@inia.es
30.	Spain	Banco de Germoplasma,Centro de Investigacion Agraria de Albaladejito Ctra. Toledo-Cuenca km 174, Cuenca	jcuadrado@jccm.es
31.	Syria	General Commission for Scientific Agricultural Research P.O. Box 113, Douma, Damascus	gcsarpbio@mail.sy
32.	Syria	Int. Centre for Agricultural Research in Dry Areas (ICARDA), PO Box 5466, Aleppo	icarda@cgiar.org
33.	Turkey	Plant Genetic Resources Dept. Aegean Agricultural Research Inst. PO Box 9, Menemen, Izmir	AARI@EGENET.COM.TR
34.	Ukraine	Ustimovskaya Experimental Station for Plant Cultivation, Ustimovka, Globino dist., Poltava region	sluds@kot.poltava.ua
35.	United Kingdom	International Centre for Underutilised Crops University of Southampton, Highfield Southampton	rgs@soton.ac.uk
36.	USA	Western Regional Plant Introduction Station, USDA-ARS, Washington State Univ. 59 Johnson Hall,P.O.Box 646402 Pullman, WA 99164-6402	mmwelsh@wsu.edu

Annex 3. Participants List, Aleppo meeting, February 2007

Global Collaborative *Ex situ* Conservation Strategies for Food Legumes (chickpea, lentils, faba beans and grasspea)

ICARDA, Aleppo, Syria, 19-20-21-22 February 2007

No	Country	Contact information	Emails
1.	Australia	Dr. Maarten van Ginkel Principal Research Scientist, Molecular Plant Breeding, Department of Primary Industries Horsham, Victoria 3400; Australia Tel: +3-5362 0789 Fax: +3-5362 2187	maarten.vanginkel@dpi.vic.gov.au
2.	Canada	Dr. Lone Buchwaldt Plant Pathologist; Plant Gene Resources of Canada Agriculture and Agri-Food Canada 107 Science Place; Saskatoon, SK; S7N 0X2; Canada Tel:+306-956-7641 / 7610 Fax: +306-956-7246	BuchwaldtL@AGR.GC.CA
3.	China	Dr. Zong Xuxiao Institute of Crop Germplasm Resources, CAAS 12 Zhongguancun Nan Dajie, Beijing 100081; P.R. China Tel: +86-10-62186691 Fax:+86-10-62186629	zongxx@mail.caas.net.cn
4.	Egypt	Dr. Mohamed Ibrahim El-Hawary; National Gene Bank of Egypt 9 Gama'a St.; Giza P.O. Box 12629; Egypt Tel: +202-5693241 Fax:+202-5693240	info@ngb.gov.eg
5.	Ethiopia	Dr. Adugna Abdi Crop Genetic resource Conservation and Research Department; Institute of Biodiversity Conservation and Research (IBCR) P.O.Box 30726; Addis Ababa, Ethiopia Tel: +251-11-6612244 Fax:+251-11 6613722	adugnaa@yahoo.com
6.	Hungary	Dr. László Holly National Institute for Agricultural Quality Control Research Centre for Agrobotany Külsömezö 15, 2766, Tápiószele, Hungary Tel: +36-53-380070 Fax: +36-53-380072	lholly@agrobot.rcat.hu
7.	India	Dr SK Sharma ICAR, Krishi Bhawan, New Delhi-110001, India Tel: +91-11-23384773 Fax: +91-011-25842495	director@nbpgr.ernet.in mrai.icar@nic.in
8.	India	Dr. R.L. Pandey Senior Scientist (Pulses) Department of Plant Breeding and Genetics Indira Gandhi Agricultural University; Raipur 492012, Madhya Pradesh, India Tel: + 91 771 2424481/2424315 Fax: +91 771 2424532	lakhanpandey@rediffmail.com
9.	Nepal	Mr. Surendra Srivastava Leader, Grain Legumes, Rampore, Chitwan Nepal Agricultural Research Singha Darbar Plaza, P. O. Box 5459; Kathmandu, Nepal Tel: +977-1-4262663 Fax: +977-1-4262500	narced@mail.com.np
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No	Country	Contact information	Emails
11.	Portugal	Dr. Maria Manuela Veloso Departamento de Recursos Genéticos e Melhoramento Estação Agronómica Nacional Quinta do Marquês; 2784 – 505, Oeiras, Portugal Tel:+351 21 440 3500 Fax: +351 21 441 6011	MM.Veloso@iniap.min-agricultura.pt
12.	Russian Federation	Dr. Margarita Vishnakovaya N.I. Vavilov Institute of Plant Industry (VIR) Bolshaya Morskaya Street 42-44; 190000, St. Petersburg. Russian Federation Tel: +7-812-3144732 Fax: +7-812-1178762	m.vishnyakova@vir.nw.ru; ssvvss61@mail.ru
13.	Spain	Dr. Álvaro Ramos Monreal; Jefe de Medios de Producción Agrícola; Consejeria de Agricultura Ganadería; Rigoberto Cortejoso 14, 2ª planta; VALLADOLID 47014, Spain Tel: +983-418935; Fax: +983-419853	rammonal@jcyl.es
14.	Spain	Dr. María José Suso Instituto de Agricultura Sostenible (CSIC) Alameda del Obispo s/n Apartado 4084; 14080 Córdoba, Spain Tel: +34 957 499 237 Fax: +34 957 499 252	ge1susom@uco.es
15.	Turkey	Dr. Ayfer Tan Head, Department of Plant Genetic Resources Aegean Agricultural Research Institute (AARI); PO Box 9 Menemen, Izmir 35661; Turkey Tel: +90-232-8461107 Fax: +90-232-8461331	pgr@aari.gov.tr
16.	Ukraine	Dr. Victor K. Ryabchoun Yurjev Plant Production Inst. of UAAS National Centre for PGR of Ukraine; Moskovs'kyi pr. 142; Ukraine Tel: +38 -57-7797763 Fax: +38-57-7797763	bogus@is.kh.ua; leader@kharkov.ukrtel.net
17.	United Kingdom	Mr. Mike Ambrose Department of Applied Genetics John Innes Centre; Norwich Research Park, Colney Lane, Norwich NR4 7UH; United Kingdom Tel: +44-1603-450630 Fax: +44-1603 -450045	mike.ambrose@bbsrc.ac.uk
18.	ICARDA	Dr. Bonnie J. Furman Interim Unit Head Legume Germplasm Curator Genetic Resource Unit, ICARDA P.O. Box 5466, Aleppo, Syrian Arab Republic Tel: (963-21) 2225012 ext. 699 Fax: (963-21) 2213490	b.furman@cgiar.org
19.	ICARDA	Dr. Ken Street CAC PGR projects coordinator, ICARDA P.O. Box 5466, Aleppo, Syria Tel: 963 221 4434 Fax: 963 21-221-3490	k.street@cgiar.org
20.	ICARDA	Dr. Jan Valkoun Unit Head Emeritus ICARDA, P.O. Box 5466, Aleppo, Syria Tel: 963 221 4434 Fax: 963 21-221-3490	j.valkoun@iol.cz
21.	ICRISAT	Dr. C.L.L. Gowda Global Theme Leader – Crop Improvement; ICRISAT, Patancheru, Andhra Pradesh 502 324, India Tel: +91 40 30713333 Fax: +91 40 30713074	c.gowda@cgiar.org
22.	Bioversity International	Dr. Prem Mathur Bioversity International Office for South Asia, NASC Complex, Pusa Campus New Delhi 110012, INDIA Tel: +91-11-25847546 Fax:+91-11-25849899	p.mathur@cgiar.org

No	Country	Contact information	Emails
23.	Global Crop Diversity Trust	Geoff Hawtin, Senior Advisor, Global Crop Diversity Trust Manor Farm House. 17 Front Street, Portesham, Dorset, DT3 4ET, UK Tel: +44 (0)1305 871043	geoffhawtin@hotmail.com
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27.	Syria	Dr Majd Jamal Director General, GCSAR Ministry of Agric & Agrarian Reform P. O. Box 113-Douma Damascus, Syria Tel. +963-11 574 1940 Fax: +963-11 575 7992	majdjamal@scs-net.org

Annex 4. Annotated Agenda

Global Collaborative *Ex situ* Conservation Strategies for Food Legumes
(chickpea, lentil, faba bean and grasspea)
A Workshop at the International Center for Agricultural Research in the Dry Areas (ICARDA),
Aleppo, Syria, 19-22 February 2007

Objective:
To consult representatives of relevant food legumes collections on key elements of global strategies for the efficient and effective *ex situ* conservation of the genetic resources of *Cicer, Lathyrus, Lens* and *Vicia*.

Expected Outcomes:
1. Identification and assessment of key global, regional and national collections of food legumes genetic resources,
2. Identification of critical overlaps and gaps in existing collections
3. Recommendations for increased collaboration and sharing of responsibilities, leading to more effective and efficient conservation and greater utilization
4. Identification of major needs and opportunities for upgrading key collections and building the capacity managers to maintain and distribute them efficiently and effectively over the long term.

Monday 19 February

09:00 – 10:30 Chair: Dr Mahmoud Solh
1) Opening Session:
- Welcome by ICARDA DG , Dr Mahmoud Solh
- Welcome by Global Crop Diversity Trust, Dr Cary Fowler
- Introduction to participants
- Discussion and approval of agenda
- Logistical arrangements, Dr Bonnie Furman

2) Food legume genetic resources conservation in the CGIAR (B. Furman, C.L.L. Gowda, H. Upadhyaya, P. Mathur)
Overview of the work on cool season legume genetic resources conservation at ICARDA, ICRISAT, Bioversity International, and SGRP
3) Global Crop Diversity Trust (C. Fowler)
Overview of the origin and history of the Trust, its vision, goals, major achievements, etc including an introduction to the Svalbard Arctic Seed Vault.

10:30 – 11:00 Coffee

11:00 – 12:30 Chair: G. Hawtin
4) The International Treaty on PGRFA (C. Fowler)
Latest developments in the International Treaty of relevance to the meeting, including an overview of the Standard Material Transfer Agreement (SMTA)
5) Conservation Strategies – general overview (C. Fowler)
Overview of the objectives of the regional and crop strategies being supported by the Trust: the need for them, how the Trust will use them, their main elements and the process followed in their development – based on the paper "The role of the Global Crop Diversity Trust in helping ensure the long-term conservation and availability of PGRFA".

Discussion

12:30 – 13:15 Lunch 13:15 – 14:00 Tour of Genetic Resources Unit of ICARDA

14:00 – 15:30 Chair: B. Furman
6) Outcome of the Regional Strategies (B. Laliberté)
Overview of the rationale and process for developing the regional strategies, some lessons learned and the main findings relating to Cicer, Lathyrus, Lens and Vicia.
7) Food Legume Conservation Strategies (G. Hawtin)
Overview of the nature of the legume strategies, steps taken so far to develop them and the steps still needed to complete them. Note: The data and information brought by participants will be compiled during the first day for presentation on the second day.

Discussion

15:30 – 16:00 Coffee

16:00 – 17:30 Chair: C.L.L. Gowda
8) Information Systems for Food Legume Genetic Resources
- Overview of international information sources (J. Konopka)
Overview of international and internationally available national databases (including e.g. SINGER, ECP/GR, EURISCO, GRIN, ILDIS, WIEWS, CGN database, etc…) covering such aspects as the availability of accession level data on food legumes, the range of data and their suitability as a tool to help identify duplicates.
9) Focused Identification of Germplasm Strategy - FIGS (K. Street)
Overview of a project to assemble passport data on major pulse collections worldwide into a single database linked with GIS data. The primary aim is to identify subsets of the material likely to include variation for a particular constraint.

Discussion on information needs to promote effective and efficient collaborative conservation activities as well as the use of pulse genetic resources.

Dinner Reception invitation from Dr Mahmoud Solh, Qaser El Wali restaurant, hotel pick up at 19:45

Tuesday 20 February

08:30 – 09:30 Chair: B. Laliberte
10) Overview of the task to be undertaken for the next two days (G. Hawtin)
A list of topics to be addressed by each group is appended to this agenda
11) Overview presentation of the data provided by participants and other data sources (O. Westengen)

Discussion to clarify the assignments, allocation of participants to working groups on a) *Cicer* and *Lens* b) *Lathyrus* and c) *Vicia,* and appointment/approval of chairs and rapporteurs for each group

09:30 – 16:00
Working groups meet in parallel sessions to consider items 1 – 5 in the Appendix to this agenda. Coffee/lunch breaks at 10:30, 12:30 and 15:30.

16:00 – 17:30 Chair: Geoff Hawtin
12) Plenary session for working groups to report back and raise any issues and concerns

Wednesday 21 February

08:30 – 12:00
Continue working group sessions, to consider items 6 – 12 in the Appendix to this Agenda. Coffee break at 10:30

12:00 – 12:30 Chair: Geoff Hawtin
13) Plenary session (if needed) to take stock and raise any further issues and concerns

12:30 – 14:00 Lunch and tour of ICARDA laboratory facilities

14:00 – 17:30
Continue working group sessions, with a coffee break at 15:30. Sufficient time should be left at the end of the day for the Chairs/Rapporteurs to prepare their reports and recommendations.

Thursday 22 February

08:30 – 10:30 Chair: Cary Fowler
14) Report of the working group on *Cicer* and *Lens* and discussion on the proposed strategies (Chair/rapporteur of the working group) – 40 minutes
15) Report of the working group on *Lathyrus* and discussion on the proposed strategy (Chair/rapporteur of the working group) – 40 minutes
16) Report of the working group on *Vicia* and discussion on the proposed strategy (Chair/rapporteur of the working group) – 40 minutes

10:30 – 11:00 Coffee

11:00 – 12:30 Chair: Cary Fowler
General discussion of conservation strategies

12:30 – 14:00 Lunch and field tour

14:00 – 15:30 Chair: Cary Fowler
17) Continue discussion
18) Conclusions of the meeting and next steps
19) Closure (ICARDA and Trust representatives)

Appendix: Topics to be discussed in parallel sessions on days 2 and 3
With reference to *Cicer*/*Lens*, *Lathyrus* or *Vicia*:

1. Review and verify the data presented on the various collections.
   Identify:
   a. any additional collections to be included
   b. any collections that should be dropped from the table
   c. major items of missing data and how they can be filled

2. Consider the proposed criteria for a reference collection, i.e.:
   a. collections on which the world depends:
   b. substantial size and diversity
   c. generally international or regional in coverage
   d. secure - managed to international standards - and in general adequately funded
   e. readily available on request under terms of International Treaty on PGRFA
   Identify the main collections that meet these criteria.

3. Identify other significant collections, and sets of accessions within collections, taking into account criteria such as:
   a. collection size and diversity (number and origin of accessions)
   b. uniqueness of the material
   c. type of material (landraces, released cvs., wild spp. genetic stocks, etc)
   Where possible, indicate the major support needs of any such collections identified

4. Identify potential partners who are able to provide conservation services such as: characterizing or evaluating material for key characters, indexing for diseases, providing specialized assistance with regeneration or storage, providing information or germplasm distribution services, etc.
5. Identify major gaps in the total genetic diversity coverage of existing collections
6. Assess the current status of data and information systems and indicate how they could be strengthened and the data made more accessible.
7. To what extent are collections already duplicated for safety and how can the situation be improved? What standards/guidelines should apply (consider both second-country safety duplication and duplication at the Svalbard International Seed Vault
8. What are the major policy and technical impediments to a greater distribution of materials (e.g. with respect to seed quantity, seed quality, quarantine/phytosanitary arrangements, a clear policy on distribution, agreed MTA etc.) and how can they best be overcome?
9. Identify and assess the effectiveness of any networks and international cooperative programmes that exist for the crop in question. How can collaboration best be strengthened?
10. Assess the effectiveness of links to users (plant breeders and farmers). How can a greater use of the genetic materials best be promoted?
11. What are the most important training needs and how might they best be addressed?
12. Identify key next steps in further development of the strategy and its implementation.

Annex 5. Simplified survey in January 2007

Global Collaborative *Ex situ* Conservation Strategies for Food Legumes (chickpea, lentils, faba beans and grasspea)
ICARDA, Aleppo, Syria, 19-20-21-22 February 2007

Information request in preparation of the consultation meeting

Participants to the meeting should send in advance, or bring with them to Aleppo, information on the following issues relating to the collections of Cicer, Lathyrus, Lens and Vicia held in their institute and, if possible, at other institutions in their country. Ideally the data and information should be provided in electronic form.

1. The size and composition (landraces, current and obsolete cultivars, wild species, genetic stocks, etc.) of the collections.
2. The proportion of the collections that originated in a) their own country and b) their region. For material not originating nationally, which are the main countries and collections from which it originated?
3. The proportion of the collections that has been collected by the institute concerned *vs.* that obtained from other sources nationally and internationally.
4. The current status of the collections with respect to regeneration (e.g. % in need of urgent regeneration now, % in need of regeneration within the next 5 years etc...).
5. The extent to which the collections have been duplicated a) in their own country and b) abroad, and willingness to duplicate internationally (e.g. under black box arrangements including in the global arctic seed vault in Svalbard).
6. The extent (numbers of samples per year) to which the collections are distributed a) nationally and b) internationally.
7. The storage facilities available and conditions (temperature, humidity) under which the collections are held.
8. The main management practices followed in conserving and distributing the materials.
9. The documentation and information systems followed, and the availability of data and information nationally and internationally.
10. The major constraints (financial, staffing, facilities, policies, pests/diseases, etc.) to conservation, documentation and distribution (national and international), and ideas on how these constraints can be overcome - including, where possible, indicative costing.
11. Participation in relevant networking and other international activities.
12. Any other information relevant to the development of international collaborative conservation strategies