

Report of a Working Group on Grain Legumes

Fourth Meeting, 16-17 November 2007, Lisbon, Portugal
L. Maggioni and E. Lipman, *editors*



European
Cooperative
Programme
for Plant
Genetic
Resources



ECP/GR

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Bioversity International is an independent international scientific organization that seeks to improve the well-being of present and future generations of people by enhancing conservation and the deployment of agricultural biodiversity on farms and in forests. It is one of 15 centres supported by the Consultative Group on International Agricultural Research (CGIAR), an association of public and private members who support efforts to mobilize cutting-edge science to reduce hunger and poverty, improve human nutrition and health, and protect the environment. Bioversity has its headquarters in Maccaresse, near Rome, Italy, with offices in more than 20 other countries worldwide. The organization operates through four programmes: Diversity for Livelihoods, Understanding and Managing Biodiversity, Global Partnerships, and Commodities for Livelihoods.

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The European Cooperative Programme for Plant Genetic Resources (ECPGR) is a collaborative programme among most European countries aimed at facilitating the long-term conservation and the increased utilization of plant genetic resources in Europe. The Programme, which is entirely financed by the member countries, is overseen by a Steering Committee composed of National Coordinators nominated by the participating countries and a number of relevant international bodies. Bioversity International provides the Coordinating Secretariat. The Programme operates through nine networks in which activities are carried out through a number of permanent working groups or through ad hoc actions. The ECPGR networks deal with either groups of crops (cereals; forages; fruit; oil and protein crops; sugar, starch and fibre crops; vegetables) or general themes related to plant genetic resources (documentation and information; *in situ* and on-farm conservation; inter-regional cooperation). Members of the working groups and other scientists from participating countries carry out an agreed workplan with their own resources as inputs in kind to the Programme.

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Green pods of *Pisum sativum* L. and honey bee visiting flower of forage pea (*Pisum sativum* L.), courtesy of © G. Duc, INRA-Dijon, France. Diversity of *Vicia faba* seed colours, courtesy of © P. Marget, INRA-Dijon, France.

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SUMMARY OF THE MEETING

Introduction

Opening and welcome address

Mike Ambrose, Chair of the Working Group on Grain Legumes of the European Cooperative Programme for Plant Genetic Resources (ECPGR), welcomed the participants to its fourth meeting, organized at the Congress Centre of Lisbon, Portugal, as a satellite meeting to the Sixth European Conference on Grain Legumes. He was pleased to see members and observers from the Conference. He also announced the detailed programme of the meeting, which has the following objectives:

- Provide a forum for interaction between members
- Review progress and outputs of the workplan for Phase VII
- Identify uncompleted items of the workplan and how these might be fulfilled
- Inter-regional cooperation – new initiatives or links
- Discuss an invitation from the Global Crop Diversity Trust
- Identify priorities for proposals for submission for funding in Phase VIII of ECPGR.

G rard Duc, Vice-Chair, speaking of plant genetic resources, expressed the need to build a bridge between the genomic approach on one side and the genetic resources collections on the other. He regarded this as the challenge of this meeting, i.e. the aim should be to build such a bridge as fast as possible.

ECPGR and the Working Group on Grain Legumes

The Chair's report

(Mike Ambrose)

Workshop on Conservation, Management and Regeneration Methods for Grain Legume Genetic Resources

This workshop was organized by Mar a Jos  Suso, Margarita Vishnyakova, Alvaro Ramos, Mike Ambrose and G rard Duc in Valladolid, Spain, on 22-23 September 2005.

The organizers initiated an online survey of current practices in Grain Legume germplasm regeneration, assisted by the ECPGR Secretariat prior to the meeting. The objectives were the following:

- Identify key issues and areas for further work
- Disseminate findings and records of discussions
- Develop collaborative research proposals and joint experiments
- Develop, promote or refine protocols as required.

The executive report of the meeting is available from the Grain Legumes Working Group's Web page (http://www.ecpgr.cgiar.org/workgroups/grain_legumes/grain_legumes.htm).

The following key points were summarized as the main conclusions of the meeting:

- Cross-tabulation of questionnaire results and a revised summary are still outstanding;
- Major gaps in knowledge of breeding systems of many grain legume species were identified and evidence gathering is required;

- Guidelines for regeneration protocols are required (they should be practical, Web-based and be based on actual experiences);
- There is a need to raise awareness of the importance of biodiversity among insect pollinators;
- Awareness of the complementarity between *in situ* and on-farm conservation for allogamous species was increased.

Links with the EU Grain Legumes Integrated Project (GLIP)

It has been a very successful exercise to mobilize the Working Group (WG) to provide material to the project. A supply of *Pisum* germplasm was supplied to the project, with 2000 samples from eight European collections.

In return, GLIP provided some support for the ECPGR Satellite Meeting, including a budget for the registration fees of some participants, a meeting room and lunch on the first day.

Network Coordinating Group (NCG) Meeting (May 2006, Paris)

This meeting responded to issues raised at the meeting of all Network Coordinating Groups (March 2006, Bonn, Germany) and discussed the progress of the workplan, the initiative for A European Genebank Integrated System (AEGIS), the European Internet Search Catalogue (EURISCO), inter-regional cooperation and *in situ* and on-farm activities. Planning of a workplan for Phase VIII also started.

Collaboration with the Global Crop Diversity Trust

M. Ambrose and two other members attended a meeting to develop a Global Conservation Strategy for chickpea, lentil, grass pea and faba bean in February 2007.

Collaboration with the project AEGRO (An Integrated European *In situ* Management Work Plan: Implementing Genetic Reserves and On-Farm Concepts)

M. Ambrose attended a meeting of AEGRO. Although grain legumes are not included in the project, lessons can be learned from this exercise and the Group will have chances to maintain a close relationship with AEGRO in the near future.

Future plans

This meeting will need to define activities to be prioritized by the Network for Phase VIII.

The Group will need to review its priorities more frequently in the future, to be sure to make the best of available opportunities.

The Chair aimed to run an efficient and friendly meeting, encouraged all participants to voice their views and comments, and intended to promote discussion and to arrive at constructive and achievable objectives.

Report on work of Ad hoc Task Force, Conservation and Regeneration of Grain Legumes

María José Suso presented the results of an international survey on the State of the Art of Grain Legume Management in genebanks. This was carried out by María José Suso, Margarita Vishnyakova, Alvaro Ramos, Mike Ambrose and Gérard Duc, assisted by the ECPGR Secretariat. The questionnaire was sent to 73 experts and received 31 responses, representing the curators of about 180 000 grain legume accessions. The questionnaire revealed that the deterioration or decrease of viability of accessions is the main reason leading to regeneration in 26% of the cases. In many cases, the percentage of accessions in urgent need of regeneration is around 20%, while the average interval between two successive regenerations is 8.5 years. Frequent limiting factors are the isolation tools for

allogamous species and manpower. The differential response of different pollinators in quality and amount of seed produced has been seriously underestimated. The available sources of information on the subject tend to generalize rather than to address the variability of systems operating within a genus or species, and information on the crops with little breeding history is lacking.

Proposals for future action include: collation of specific data by species and location based on actual experiences; evaluation of the mating system by using standardized experiments; development of a list of new associated floral descriptor traits. A holistic approach is recommended for the management of germplasm, involving the pollination mechanisms and pollinator agents.

Update on ECPGR

Lorenzo Maggioni, ECPGR Coordinator, briefed the Group about the latest decisions of the ECPGR Steering Committee at its Tenth Meeting (Riga, Latvia, September 2006) and explained the criteria foreseen for the allocation of Network budgets during Phase VIII of ECPGR (2009-2013), including the need for the Networks to prepare project proposals with activities and outputs. He also updated the Group on the progress of "A European Genebank Integrated System" (AEGIS) and on recent international developments: Standard Material Transfer Agreement of the International Treaty; EC Regulation (Gen Res) 870/2004; Seventh Framework Programme (<http://cordis.europa.eu/fp7/>); Global Crop Diversity Trust (donation by the Gates Foundation of US\$ 37.5 million); and the Svalbard Seed Vault.

Collaboration with the Global Crop Diversity Trust

Mike Ambrose mentioned the Global Conservation Strategy Meeting for chickpea, lentil, grass pea and faba bean, which he was invited to attend on 19-22 February 2007 in Aleppo, Syria. The outcome takes the form of Global Strategies and specific actions to target problems of regeneration/safety-duplication and knowledge gaps. It costs a lot to put strategy meetings together, therefore he thought that The Trust will be unlikely to take a dynamic approach to modifying the existing strategies. As a result of the meeting, key *ex situ* collections essential to the global community were identified, with unique or specialist material. Work will be done to ensure safety-duplication in International Collections (including Svalbard). The importance was acknowledged of maintaining species-specific focus in the strategy. Insufficient knowledge of global resources was recognized and the importance of networking and coordination was underlined.

The chickpea, lentil, faba bean and grass pea strategies were initiated in October 2005 and discussions took place at the Fourth International Food Legume Research Conference (IFLRC-IV), 18-22 October 2005, in New Delhi, India. A survey of collections, content and status of conservation was undertaken in April-May 2006. A Strategy Advisory Group Meeting took place on 19-22 February 2007 in Aleppo, Syria. The grass pea strategy is available for download, while the chickpea, lentil and faba bean strategies will be completed by December 2007.¹ The process is funded by the Grains Research and Development Corporation (GRDC), Australia.

For the future, The Trust is not looking to coordinate actively beyond the publication of Global Crop Strategies. The Consultative Group on International Agricultural Research (CGIAR) collections are of high strategic relevance and key to future coordination. ECPGR is seen as a key regional programme for engaging with the revision of strategy and the coordination of possible projects/activities.

¹ See <http://www.croptrust.org/main/identifyingneed.php?itemid=513>

The following recommendations were made to the Grain Legumes WG:

- Suggest formal contact with The Trust's Executive Director following the meeting to express support for the Global Strategies;
- Initiate further revision and collation of the data to provide a more comprehensive overview;
- Identify gaps in the data which could be filled;
- Communicate with other networks on the future actions identified within the strategy;
- Be prepared to collaborate on project proposals for relevant calls.

It was also specified that The Trust is directly communicating with this WG, asking to collate within the WG what actions are recommended.

International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) and associated Standard Material Transfer Agreement (SMTA)

M. Ambrose summarized the process leading to the international adoption of the International Treaty on Plant Genetic Resources for Food and Agriculture. He also summarized the key features of the Standard Material Transfer Agreement, including rights and obligations of the providers and recipients of plant genetic material.

He informed the Group that the John Innes Centre (JIC) will adopt the SMTA by the end of the year.

Crop by crop progress review

(Chaired by Alvaro Ramos)

Phaseolus and Vigna

Phaseolus and Vigna Databases

(Wolfgang Kainz, representing Klemens Mechtler)

The local database program for both Central Crop Databases (CCDBs) is MS-Access 2003, while Oracle 8.1.6 is used for presentation on the Internet.

For the establishment of the **Vigna Database** (<http://www.genbank.at/vigna>) 23 institutes were approached in 18 countries, including Israel and Morocco.

The Database contains data on about 4200 accessions, received from 5 institutes. On the other hand, EURISCO contains data from 17 institutes, although the total number of accessions is about the same, since several institutes are holding fewer than 10 accessions each.

Regarding the **Phaseolus Database** (<http://www.genbank.at/phaseolus>), 34 institutes from 27 countries were approached and 31 838 records were received. Even after the last meeting of the Grain Legumes WG (July 2001, Kraków) and the call for data sent out in 2003, passport data of some countries are still missing in the CCDB, but are available from EURISCO.

Characterization data for five additional descriptors are included for ca. 1000 records (3%).

It seems that the three characterization descriptors agreed at the first meeting of the Working Group (July 1995, Copenhagen) (Plant type, Seed colour and Seed size) are not sufficient in themselves to identify the accessions since they are environment dependent. There are also problems with the definition of the colours (e.g. difference between bluish lilac and reddish violet is difficult to determine) and the colours also change with the length of time in storage.

As a first step to improving the information provided by the Database, it began to be expanded to include photographs documenting different stages of the mature/immature pods, seeds, and their sizes and colours. The photo is named after the accession number with the extension .jpg (e.g. BVAL-610515.jpg), so that a link can easily be handled within the Database; 412 photos are already available. By clicking on the thumbnail the photo can be enlarged to present a green, a green-ripe and a dry pod as well as to show the seeds from the side view and from the hilum side.

Overall 40 institutes are maintaining *Phaseolus* but only 24 so far present data in the *Phaseolus* Database (25 in EURISCO).

It is recommended that more data be sent both to EURISCO and the CCDBs by the National Focal Points. The role and position of the CCDBs in future should be defined more clearly.

The functions should be more user-friendly but the layout of the Grain legumes CCDBs should be – as far as possible – equal or at least similar one to the other.

***Phaseolus* Cambridge collection**

Emergency measures to regenerate important material from the collection previously maintained at the University of Cambridge, United Kingdom, were coordinated by members of the Working Group. This was done with mixed success and the current situation is that Italian institutions in Bologna and Viterbo have multiplied about 400 accessions and the seed obtained was split into two batches, which were sent to the Austrian Agency for Health and Food Safety (AGES), Linz, Austria and to Warwick HRI, Wellesbourne, UK, for long-term conservation.

Vicia faba

(Gérard Duc)

There were no big changes in the *Vicia faba* Database since the last meeting in Kraków in 2001, with 12 500 entries. Passport data will be available shortly on the ECPGR Web site (http://www.ecpgr.cgiar.org/databases/Crops/vicia_faba.htm).

The task force survey (2005) identified 4500 additional entries in European *ex situ* collections, indicating that European *ex situ* collections host 50% of the world resources of *Vicia faba*. These should if possible be added to the Database. Other plans include the identification of duplicates and complementation with phenotypic data. Help will be needed from the Working Group to accomplish these tasks.

Collections are mostly kept by public institutions. Accessions are regenerated at a rate of 12% each year (17% need urgent regeneration). In order to prevent the genetic lines from intercrossing, regenerations are expensive, but some collections are maintained under open-pollination.

In other cases, attempts are made to control outcrossing with male sterility. Some initiatives are going into the building of mass reservoirs. Some orphan collections have been detected. Often there is no safety-duplication.

Priorities have been defined as follows:

- Need to concentrate on composite, reference and core collections, with phenotypic and genotypic data: the FababeanGRIC project (see below, page 15) is addressing this point. These collections will have a high value for association genetics and “ecotilling” strategies, which require material of guaranteed genotypes. Mapping populations have been built in several laboratories.
- Simple sequence repeat (SSR) markers are under development by the Generation Challenge Program (International Center for Agricultural Research in the Dry Areas (ICARDA) / Instituto de Agricultura Sostenible–Consejo Superior de Investigaciones

Científicas (IAS–CSIC)-Córdoba, Spain / Institut National de la Recherche Agronomique (INRA)-Dijon, France).

- New avenues of research: role of *Vicia faba* in biodiversity (i.e. pollinating insects) and need for assessing its environmental benefits in different cropping systems.
- Organization of safety-duplicates.

Brief information on *Vicia faba* from the national programmes

- **Austria (Austrian Agency for Health and Food Safety (AGES), Linz)**

86 accessions maintained *ex situ* with passport and phenotypic data.

- **Azerbaijan (Genetic Resources Institute, Azerbaijan National Academy of Sciences (GRI, ANAS), Baku)**

27 accessions maintained *ex situ* and characterized (8 with seed composition data).

- **Bulgaria (Institute for Plant Genetic Resources (IPGR), Sadovo)**

692 accessions maintained *ex situ*, with passport and phenotypic data. Collection of local landraces is a priority.

- **Czech Republic (AGRITEC, Šumperk)**

391 accessions, mostly cultivars and breeding lines, with passport data, 118 with phenotypic data.

- **France (National Institute for Agronomic Research (INRA) – Legume Research Unit (UMR LEG), Dijon)**

The Rennes collection has been included in the Dijon collection. There are 2000 accessions, regenerated in insect-proof cages (10%/year). A reduced collection of 996 accessions has been defined on the basis of passport and phenotypic data. Genotyping with SSR was initiated in collaboration with ICARDA (Generation Challenge Program). A new database (LegumBase) has been built (<http://www.inra.fr/legumbase>). Pool populations including male sterility were created.

- **Germany (Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Gatersleben)**

1920 accessions (50% landraces and traditional cultivars of *Vicia* sp.), 9% regenerated per year; documented with the Genebank Information System (GBIS) and the documentation system for plant genetic resources in Germany (PGRDEU).

- **Portugal (National Institute of Biological Resources, (INRB, I.P.))**

788 accessions, mostly landraces maintained *ex situ*.

- **Slovak Republic (Slovak Agricultural Research Centre, Research Institute of Plant Production (SARC-RIPP), Piešťany)**

58 accessions (20 landraces, 25 cultivars). Passport data available from EURISCO.

- **Turkey (Aegean Agricultural Research Institute (AARI), Izmir)**

373 accessions maintained *ex situ*. 31 landraces were recently collected. 100 genotypes were phenotyped in nurseries in 2004. An ongoing breeding programme includes yield trials on 15 lines. Ongoing plans for genotyping.

Discussion

Syika Angelova asked whether breeding lines should be kept under long-term conservation.

G. Duc thought that the final product of the breeding could be maintained if possible, but it would not be possible to maintain all the material generated during the breeding process. In France, mass reservoirs are maintained.

M. Ambrose offered help from the UK for phenotyping accessions.

Alvaro Ramos reminded the Group that all the knowledge created through the Valladolid workshop on regeneration should be taken into account.

Cicer

(Graça Pereira)

In a presentation prepared by Graça Pereira, M.M. Tavares de Sousa and Isabel Duarte, it was stated that the European **Cicer Database** was established in 1995, and changes occurring between 2002 and 2007 were presented. The composition of the collections per country and information on specific collections was given. The Database should be updated by the manager, either to incorporate the information that countries send or to download already existing information from EURISCO.

Three countries informed the Group that safety-duplication had not been undertaken; partial safety-duplication was made within Portugal, and no information was available from other countries. This situation should be improved.

The collections from Albania, Bulgaria and Portugal need urgent regeneration.

Breeding programmes are going on in Bulgaria, Portugal and Turkey. In Portugal, the National Plant Breeding Station (Estação Nacional de Melhoramento de Plantas, ENMP) in Elvas is undertaking adaptation studies of material from different environmental regions, which could be of national interest. For grain legume crops, the most important limiting factors of production are attacks from severe diseases and drought during spring. Studies are taking place at ENMP to understand the physiological and morphological plant mechanisms to avoid drought. Similarly, since the beginning of the 1990s tolerant lines are being selected against *Ascochyta* blight, starting from local material combined with exotic lines. Five highly tolerant lines against *Fusarium oxysporum* f.sp. *ciceris* have been selected.

Discussion

A. Ramos highlighted the point that institutes where there is no breeding programme need help from international organizations for urgent regeneration, also to demonstrate to governments that this is an important activity.

Lens

(Nüket Atikyilmaz)

A presentation provided by Lerzan Gül Aykas reported that the **Lens Database** was established at the Aegean Agricultural Research Institute (AARI, Izmir, Turkey). A first survey was made in 1997, aimed at identifying the existing collections of *Lens* spp. in Europe. A second survey was carried out in 2001 to update available information on the collections. Finally, the Database was made available online on the IPGRI (now Bioversity International) server in May 2002. Unfortunately, since 1997, very few European countries have added data to the *Lens* Database and no additional contribution was received. Therefore, since the last meeting of the Working Group on Grain Legumes in Poland (2001), there been no significant changes. At present, The ECPGR *Lens* Database contains a total of 4681 records from 8 countries. Three of the biggest collections (Russian Federation, Turkey and Spain) hold about 88.5% of the total number of accessions. The structure of the Database was organized according to the FAO/IPGRI *Multi-crop Passport Descriptors*. Data for a minimum of

18 passport descriptors were requested. The data from eight countries represent seven lentil species (*Lens culinaris* (4579 accessions), *L. ervoides* (19); *L. lamottei* (5); *L. montbretii* (5); *L. nigricans* (38); *L. odemensis* (9) and *L. orientalis* (4)), and *Lens* sp. (22). Analysis of data shows that *Lens* accessions originate from approximately 66 countries, while the country of origin of 579 accessions is unknown. Due to incompleteness of data, it was not possible to identify the duplicate accessions. It was emphasized that donor numbers and donor institute should be completed if this information is available. The *Lens* Database is planned to be updated according to the FAO/IPGRI *Multi-crop Passport Descriptors* and will be converted to the EURISCO descriptors with additional information in 2008.

The report on the *Lens* Database was uploaded on the Web after the meeting (http://www.ecpgr.cgiar.org/Workgroups/grain_legumes/Index_CountryReps.htm).

Discussion

G. Duc explained that data from France were not sent since the collection is very small.

Lupinus

No update was available on *Lupinus*.

Pisum

Mike Ambrose stated that many new germplasm resources were being developed, including mutants and other populations. A complete report would be provided later.

Glycine

(*Margarita Vishnyakova*)

The ECPGR ***Glycine* Database** was started in 1998 and it includes passport data from 8 countries, 9 institutes, with a total of 11 000 entries. Attempts are being made to update the DB. Some large collections are still missing, such as the data from Bulgaria (900 accessions). It is however possible to download these data from EURISCO. Most entries are from the N.I. Vavilov Research Institute of Plant Industry (VIR, St. Petersburg, Russian Federation) (>6000 accessions). The largest world collections are in the USA (18 000) and China (12 000). Europe is not the main continent where soybean is grown. The potential for the further growth of the DB is high. The DB is available from the ECPGR Web site (<http://www.ecpgr.cgiar.org/databases/crops/glycine.htm>). The management of the DB is time-consuming and it is currently difficult to carry it out properly. The current DB manager should also be re-nominated.

Discussion

S. Angelova said that there are some difficulties in Bulgaria to manage the documentation of soybean accessions.

M. Ambrose asked M. Vishnyakova to contact her colleagues and verify whether the DB can be maintained at VIR or not and then inform the Group accordingly.

Arachis

(*Syika Angelova*)

A presentation provided by Stanko Georgiev informed the Group that, according to decisions taken at the ECPGR ad hoc meeting on *Arachis* held in Plovdiv, Bulgaria in November 2002, the IPGR-Sadovo, Bulgaria was selected as the managing institute for the European ***Arachis* Database**. Unfortunately, up to now Bulgaria had received no data from the other four partner countries that participated in the meeting and the only information available is on the status of the Bulgarian groundnut collection.

In 2007 the collection contains a total of 722 accessions, including 379 in long-term conservation and 343 in medium-term conservation and in a working collection. Local varieties and breeders' lines constitute 40% of the collection and those of foreign origin represent 60%.

The main part of the groundnut working collection (80%) consists of breeders' lines created through hybridization.

The results of field investigations demonstrate that more than 25% of breeders' lines have very good productivity and exceed the standard 'Kalina' average by 15-30% in the yield of pods. They also possess combined resistance to fungal diseases caused by *Phylosticta arachidis*, *Fusarium* spp., *Alternaria alternata*, *Cercospora arachidicola*, *Oidium arachidis* and *Verticillium albo-atrum*. The size of the seeds of the new Bulgarian groundnut breeding lines exceeds those of the 'Kalina' variety and can be used as the initial material for creating more promising varieties.

S. Angelova informed the Group that Stanko Georgiev had retired and two young researchers were now continuing his work on groundnut.

Other issues

***Vicia sativa* complex**

It was noted that no report was made of the "*Vicia sativa* complex" Database. The ECPGR Database on *Vicia* spp. is maintained by the Institute of Plant Genetics, Bari, Italy (<http://www.ecpgr.cgiar.org/databases/Crops/Vicia.htm>).

Safety-duplication needs and offers

A quick survey was made in the Group about institutions looking for safety-duplication and offers for safety-duplication:

- Institute needing support for safety-duplication: INRA-Dijon for *Vicia faba*.
- Institute offering space for safety-duplication: Banco Português de Germoplasma Vegetal (BPGM), Braga, Portugal.

S. Kratovalieva informed the Group that Macedonia (FYR) is safety-duplicating all the national collection in the Svalbard Seed Vault (approximately 650 accessions).

Regeneration needs

M. Ambrose asked the Group what were the needs for urgent regeneration, apart from Albania and Georgia, which were already listed. The WG could then forward the requests to the Global Crop Diversity Trust for possible funding

M. Veloso said that she would like to regenerate the Portuguese *Vicia faba* collection in the fields of the National Plant Breeding Station (ENMP) of Elvas. That regeneration will be carried out by ENMP with the technical advice of a Spanish colleague who is a specialist in *V. faba* germplasm multiplication.

G. Duc suggested the regeneration of well identified genotypes to be used for association genetics strategies. A composite collection of homozygote lines for specific genes should be defined on the basis of the European collection and it should be maintained and protected against intercrossing.

M.J. Suso advised that an inbred collection was already available at ICARDA.

G. Duc agreed that the Group should take into account the variability of the ICARDA collection, without duplicating the effort, but he also thought that the variability that is present in European landraces is not represented elsewhere (for example the small-seeded faba bean).

M. Ambrose thought that this initiative could be feasible for the ECPGR WG and asked for offers to join the effort. He offered to regenerate 10-15 accessions at the John Innes Centre, Norwich.

A. Carboni was able to offer facilities for regeneration at the Research Centre for Industrial Crops of the Agriculture Research Council (Consiglio per la Ricerca e la Sperimentazione in Agricoltura, Centro di Ricerca per le Colture Industriali, CRA-CIN), Bologna.

It was clarified that there are two distinct objectives, one being the production of homozygote genotypes to reveal genes, the other being the maintenance of original populations in their heterozygous condition, to supply populations for organic farming, climate change, functional crops, etc.

M.J. Suso warned the meeting that regeneration methods for maintaining the level of heterozygosity and heterogeneity of landraces by using open-pollination conditions is becoming increasingly important to face global climate change. Climate changes exacerbate concerns about the interaction of insect pollinators and plant pollination. Global warming could disrupt the timing of pollination with serious negative impacts to both plants and pollinators. By using open-pollination conditions for legumes' regeneration not only the within-crop genetic interactions (heterozygosity and heterogeneity) but beneficial ecological interactions (plant-pollinator) would be preserved. Thus, during regeneration, issues such as wild biodiversity (for instance bees and bumble bees pollinators) in the agro-ecological system where the legume populations grow should not be neglected and should be monitored.

M. Ambrose concluded that this initiative should be further developed and included in the future plans of the Working Group.

National reports

The status of national grain legume collections was presented by S. Angelova (Bulgaria), A. Carboni (Italy), S. Kratovalieva (Macedonia FYR) and M. Vasić (Serbia).

Country reports were provided by the representatives of Albania, Austria, Azerbaijan, Bulgaria, Czech Republic, France, Germany, Italy, Macedonia FYR, Portugal, Serbia, Slovakia and Turkey.

Available reports were uploaded on the Web after the meeting (http://www.ecpgr.cgiar.org/Workgroups/grain_legumes/Index_CountryReps.htm).

***In situ* and on-farm conservation**

In situ conservation of crop wild relatives of grain legumes and oil crops in Bulgaria

(*Syika Angelova*)

The most important habitats and plant communities were recorded during seven collecting missions carried out in the last five years. Floristic regions including sites with high diversity of grain legume and oil crop wild relatives were the following: Strandja-Sakar Mountains, Rhodopi Mountains, South Dobrudza, Tracian Plain and Black Sea. Data were recorded including ecological, geographical and taxonomic information. The most representative genera (in terms of the number of species) in the wild flora of Bulgaria are *Vicia*, *Lathyrus*, *Brassica* and *Linum*. Species of genera *Lupinus*, *Cicer*, *Pisum* and *Lens* were identified in one or two floristic regions and some of them were represented by single plants.

Interesting traits relating to plant vigour, growth habit, earliness and others were detected. Cold tolerance is present in common vetch (*Vicia incisa* and *V. angustifolia*) and grass pea (*Lathyrus cicera*), drought and disease resistance in common vetch (*Vicia angustifolia*) and lupin (*Lupinus angustifolius*).

The genebank is looking for partnership opportunities to explore possibilities for the use of crop wild relatives in Bulgaria. At present there are no breeding programmes in Bulgaria for *Lupinus* and *Lathyrus*. Interest towards these crops is however growing for use in organic agriculture in regions with acidic soils and high altitude. The lupin is not a traditional crop for Bulgaria but it has been used there for a long time.

An Integrated European In situ Management Work Plan: Implementing Genetic Reserves and On Farm Concepts (AEGRO)

(Mike Ambrose)

AEGRO is a project funded by the EC under Regulation 870/2004. This 4-year project (2007-2010) is coordinated by the Julius Kühn Institute - Federal Research Centre for Cultivated Plants, Quedlinburg, Germany. The project is at the interface between *in situ* and *ex situ* conservation, with the aim of developing protocols for integration. Specific objectives are the following:

- Development of *in situ* management workplans for crop wild relatives (CWRs) and landrace conservation;
- Recommendation of sites suited to the establishment of genetic reserves for selected model crops (*Avena*, *Beta*, *Brassica*, *Prunus*);
- Description of the organizational, legal and technical framework conditions for genetic reserves in the project partner countries;
- Development of procedures required to establish multi-CWR-species sites to allow maximum use of the recommended sites;
- Development of technical guidelines and quality standards for genetic reserves;
- Development of database tools required for population management and monitoring and integration of these tools in existing information systems;
- Finally and most important, elaboration of a methodology for generation of the aforementioned strategies based on existing generic methodologies and experiences extracted from the four crop and landrace studies;
- The promotion of the development of National CWR and landrace conservation strategies within the EU member states as components of an integrated EU strategy is the overarching goal of this project.

The project is open to collaboration and the Grain Legumes WG will need to maintain sufficient contacts and to receive inputs from this project. The project has a challenging programme of putting together methodologies and doing the methodological work also on behalf of other crop groups that are not represented among the project partners.

Optimizing the utilization of collections – The point of view of the breeder and of the research scientist

M. Ambrose opened a discussion on the utilization of collections. Large datasets are developing and it is necessary to make the link between the material and its use.

M.J. Suso stressed the point that too much emphasis is put on introgression approaches (transfer of highly heritable qualitative traits that are governed by one or few genes), and that breeders also need to develop incorporation approaches (development of new, genetically broad adapted populations with wide variation and acceptable performance

level). Analysis of breeding pools led to the realization that new sources of genes for pest and disease resistance are needed in order to avoid crop vulnerability. However, two things should be taken into account: firstly, heterozygosity and heterogeneity are potential buffering mechanisms against unpredictable stresses. Secondly, it has been demonstrated that heterozygosity and heterogeneity are associated with decreased crop vulnerability. Consequently, more emphasis needs to be put on an increased level of heterozygosity and heterogeneity accomplished by developing diverse populations utilizing a wide range of genotype mixtures and improved landraces.

G. Duc brought examples of relationships with breeders. In France small groups of breeders agreed to collaborate with the public sector for maintenance. They are convinced of the value of populations for recurrent selection programmes and agreed to build populations in collaboration with the public sector. As a second example, a small private company agreed to share the conservation work and contribute to the renewal of the lupin collection.

A. Carboni stated that in Italy state company breeders receive funds from small commercial companies for phenotyping. Breeders are promoting landraces since there is a new market for them.

M. Ambrose reported that in the UK there is demand from breeders for material that has gone through pre-breeding in the case of pea, while, differently from France, there is no active collaboration between private and public sectors for grain legumes, but only for cereals.

M. Ambrose said that the factors which attract funds in legume research are related to food and nitrogen fixation. However, breeders are only interested in yield (resistance to drought, virus, etc.), and never in nitrogen fixation.

M.J. Suso mentioned that another important element of legume crops is the ecological service of supporting pollinators. There is a trend in sustainable agriculture for environmental objectives to be incorporated into plant breeding objectives. Breeders are encouraged to develop breeding approaches that strive to integrate food production into the healthy functioning of agro-ecosystems. In the particular case of legumes, this approach could help to preserve and enhance bee fauna by providing suitable floral resources within the crops themselves. In parallel, legume breeding for sustainable agriculture is linked to the development of non-food services such as environmental services. Legumes are visited by a great number of social, eusocial and solitary bees. Foraging places and nesting sites for solitary and social bees are some of the ecological services provided for legumes in sustainable agriculture. The provision of floral resources within the crop for supporting beneficial insect pollinator populations could be a promising strategy to enhance the environmental function of legumes.

G. Duc informed the Group that marker-assisted selection could be the means to ensure a link between the collections and the interests of the breeders. In France, a marker within a gene was developed to detect trypsin inhibitor in pea. There is a small company that has already adopted this screening technique.

M. Ambrose added that similar markers have been developed for mildew resistance.

Inter-regional cooperation

Collaboration with the EU Grain Legumes Integrated Project (GLIP) and Technology Transfer Platform (TTP)

(Mike Ambrose)

A fruitful collaboration developed between the ECPGR Grain Legumes Working Group and the EU Sixth Framework Programme-funded Grain Legumes Integrated Project (GLIP). The

Working Group was introduced during the GLIP Technology Transfer Platform (TTP) training workshop for breeders (April 2007, Paris). As a result, high-throughput analyses of the genetic structure of pea germplasm collections in Europe were carried out. A total of 2050 accessions from Bulgaria, Czech Republic, France, the Netherlands, Poland, Portugal and Spain were provided to be analysed with 31 retrotransposon-based insertion polymorphism (RBIP) markers.

GLIP also offered financial support to enable a few Working Group members to attend the Sixth European Conference on Grain Legumes.

Collaboration with the Global Crop Diversity Trust

(Mike Ambrose)

An invitation was made by the Global Crop Diversity Trust to collate proposals for priority regeneration and safety-duplication of collections for funding over three years. This only relates to Annex I crops (i.e. chickpea, faba bean, lentil and grass pea) and only to material originating within the region and not already duplicated in a CGIAR or other international collection. Accessions should be at risk (e.g. reduced viability) and should be available on terms consistent with the International Treaty. There must also be willingness to safety-duplicate the material in an international collection. Proposals could include an element of characterization and the recording of traits, particularly of any associated with climate change. Collections at the Agricultural Research Institute Lushnje, Albania and Yurjev Institute for Plant Production Kharkiv, Ukraine have already been specifically approached by The Trust. VIR collections are also being addressed under a specific project.

Discussion

The Chair invited the Working Group members to come forward with information about material that could need urgent regeneration and therefore support from The Trust, since the requests could be compiled and submitted for funding.

A proposal from Georgia was discussed and it was recommended that it could be funded by The Trust.

A request from Ukraine could not be discussed because of lack of information

M. Veloso mentioned that the faba bean collection in Oeiras (Portugal) needs regeneration. Duplicates could be sent to the Seed Vault in Svalbard and to ICARDA. The regeneration will take place anyway, but additional funds would need to be secured.

S. Angelova said that landraces in Bulgaria are still valuable and need to be collected and regenerated.

Regeneration is necessary to allow for distribution of seeds.

The Group is supporting the application and the suggestion is that characterization is attached to it.

L. Holly declared that the financial situation was uncertain in Hungary and the genebank needed to multiply 300 accessions from different grain legumes (chickpea, cowpea, lentil and faba bean). They were planning to duplicate accessions at ICARDA. *Phaseolus coccineus* accessions need isolation spaces. The genebank may need some help from WG members.

S. Kratovalieva proposed to apply for funds for regeneration and to obtain enough seed to make the material available.

W. Kainz informed the Group that in Austria they use isolation space of 500 m with plant barriers. There would be no capacity to help other countries.

It was agreed that the NCG would compile the list of regeneration priorities for the Network and send it to the ECPGR Secretariat for delivery to The Trust.

M.J. Suso commented that some standard criteria were needed to ensure proper regeneration.

M. Ambrose concluded that the Network will collect information on how regeneration is done in the various partner institutions.

Collaboration with the European Association for Grain Legume Research (AEP)

(Alvaro Ramos Monreal)

The European Association for Grain Legume Research (www.grainlegumes.com/aep) is a multi-disciplinary platform to accompany and facilitate the progress in legumes at the EU and international scales, with the objectives of stimulating research and exploiting the results. Activities consist in scientific conferences, communication and promotion, thematic workshops and dissemination events, facilitating project setting-up and interactions, and stimulating technology transfer. The new Executive Committee for 2007-2010 is composed of Judith Burstin (INRA, France), Noel Ellis (JIC, UK), Diego Rubiales (CSIC, Spain) and Christophe Salon (INRA, France). Examples were given of the new projects where AEP has been involved. AEP is open to any collaboration. The organization will have only a small reduced budget and one employee. Next meeting will be held in Turkey in April 2010, jointly with the Food Legume Research Congress (i.e. the two main grain legume organizations together). The main emphasis will be on the importance of grain legumes for human health.

Discussion

M. Ambrose reminded the Group that AEP knows of the activity of ECPGR, since Mike and Alvaro have usually organized genetic resource sessions during the AEP meetings. Probably in 2010 we will not organize an ECPGR meeting together, since there is a need for a longer ECPGR meeting (not just a satellite), but there will still be a presence from our Group.

A. Carboni asked whether we could propose a project for characterization of a grain legume core collection.

G. Duc replied that AEP does not financially support projects itself, but is a supportive forum for ideas, collaborations, etc. However, we could do more than we did in the past and we could put a poster on the Web site of AEP to display the activities of ECPGR, as well as advertising the ECPGR Web site.

M. Ambrose specified that ECPGR can also fund meetings for project preparation.

Workplan

It was agreed to develop a PDF poster of the ECPGR Working Group activities.

Cooperation with ICARDA and China on Vicia faba genetic resources

(Gérard Duc)

A France-China bilateral cooperation is ongoing with Dr Xuxiao Zong, Institute of Genetic Resources, Chinese Academy of Agricultural Sciences (CAAS), Beijing, Coordinator of the National Network on Grain Legume Genetic Resources, and with Ms Shi-yin Bao, Yunnan Institute of Food Crops, Yunnan Academy of Agricultural Sciences (YAAS). CAAS undertakes phenotyping and genotyping (amplified fragment length polymorphism (AFLP) characterization of faba bean resources) and has established a national network for collection, evaluation of landraces and breeding. China has the largest area for production of faba bean with 324 000 ha (3t/ha), and 100 000 ha of pea (2t/ha).

The institute holds a collection of Yunnan landraces and undertakes a large faba bean and pea breeding programme with 300 crosses and 3000 nursery lines/year. A network of evaluation is also established. Traits of interest are yield, cold tolerance, disease resistance, protein, sugar, adaptation to cooking and cleistogamous faba bean.

The French-Chinese collaboration consists in exchanges of pea and faba bean accessions and joint evaluations for winter hardiness, disease resistance, protein content and male sterile faba bean.

A second collaborative project is ongoing with ICARDA, focusing on the “Development of a composite collection and the genotyping of faba bean”. Principal Investigators are Bonnie Furman, Michael Baum and Wafaa Choumane, ICARDA, Aleppo, with collaborators G. Duc, INRA-Dijon, France, and M.J. Suso, Instituto de Agricultura Sostenible, Córdoba, Spain. The total project budget is US\$ 35 400. Preliminary results have detected a high number of alleles per locus and showed a high level of genetic diversity identified with the SSR primers. Next steps will be to complete the characterization of the composite collection with SSRs and then to enlarge the genotyping to other collections.

Pisum Genetic Resources Consortium (PeaGRIC)

(Mike Ambrose)

Pea is not a mandate crop for CGIAR collections. In the absence of a focal point, it was decided to form a *Pisum* Genetic Resources Consortium (PeaGRIC), with the aims of creating a single portal for the *Pisum* research community, of developing an international reference collection of *Pisum* and of facilitating agronomic and molecular characterization of the reference collection.²

The consortium is open to registrations and people wishing to register should contact Mike Ambrose.

Faba bean Genetic Resources Consortium (FababeanGRIC)

(Gérard Duc)

A proposal similar to PeaGRIC is under development for faba bean. The principal reason to make such a proposal is that half of the global collections are outside Europe and it would be valuable to connect ECPGR activities with other collections. A proposed action is to build a composite collection. In this allogamous crop, priority should be given to isolating lines or populations with useful traits. Phenotyping will target seed quality for different markets (including organic and local); ecological benefits (including interactions with pollinators, disease and parasites) and energy benefits in cropping systems; impact on and adaptation to climate change; nitrogen use and water use efficiency; and adaptation to new crop management systems (i.e. intercropping, low input systems).

Genotyping will be done with common markers (SSR from the Generation Challenge Program). Another objective is the development of a reference collection. The guidelines of the Valladolid meeting should be followed for the methodology of regeneration. Research should be carried out on gene flow and interaction with pollinators. Materials adapted to breeding should be prepared, i.e. dynamic gene pools, mutant populations and core collections. A joint evaluation of the variability for some traits or genes of interest within a network of breeders should be started. Regarding documentation, a joint or interconnected database and Web site should be developed. Interactions with breeders for better use and data feedback should also be organized.

Volunteer members of the consortium are expected to join from genebanks and research institutes, from breeders, non-governmental organizations (NGOs) and associations for organic farming.

² Furman BJ, Ambrose MJ, Coyne CJ, Redden B. 2006. Formation of PeaGRIC: An international consortium to co-ordinate and utilize the genetic diversity and agro ecological distribution of major collections of *Pisum*. *Pisum Genetics* 38:32-34.

G. Duc will send a message to try to identify who are the curators who would be interested in joining the core group. This initiative is just beginning.

M. Ambrose commented that it is important to specify that single species portals are necessary, since each crop has its own issues and problems and requires specific attention.

Future workplans for the Working Group on Grain Legumes including proposals for the next funding phase

(*Gérard Duc*)

On the basis of the discussion held by the NCG during its meeting in Paris, France (May 2006), a list of possible activities for the Working Group was the following:

- Evaluation of regeneration methods
 - On-farm complementation of *ex situ* conservation
 - Pooled populations
 - Use of male sterility
 - Role of floral structure
- Development of lists of new characters and associated descriptors
- Integration of informatics
 - Facilitation of and monitoring database projects which feature grain legume germplasm as an integral feature
 - Communication between existing databases
- Development of research material
 - Recombinant inbred populations, mutant collections
- New characterization (new traits)
 - Climate change. Adaptive traits, drought, freezing, heat
 - Interaction with pollinators
 - Screening for *Aphanomyces* resistance in *Pisum*
 - Resistance/tolerance to aphids and bruchids
 - Bioenergy. Biomass and starch production, N use and water use efficiency
 - Adaptation to new crop management systems (i.e. intercropping, low input systems)
 - Traits minimizing environmental impacts
- Further characterization (classical traits)
 - Lodging in *Pisum*
 - Seed quality
 - *Orobanche* resistance
- Development of genotyping with diverse markers
- Promotion of association genetics
 - Phenotyping of core collection
 - DNA collections
 - Promotion of genotyping with anonymous markers and genes

- Participatory breeding (on-farm conservation)
- Continuously updating the Task Force survey and ECPGR Databases
- Entering the core or reference collection in projects addressing diverse traits of interest (agronomy, food, feed, biomass, industrial uses, etc.)

Discussion and planning

Group members agreed that priorities for the Group would mainly be in the area of characterization for valuable traits, especially related to climate change and disease resistance. The following activities were planned:

- **Flowering time**

This trait would be important for all legume crops and related to climate change adaptation. Collection of information on degree-days and day length, together with flowering time in different parts of Europe is something that has not been done before. It was thought that a project could be prepared for funding by the EU or The Trust.

M. Veloso, Portugal, offered to coordinate this activity on behalf of the Group.

- **Presence of pests**

It would be useful to monitor where pests are distributed at any time, since the area is changing and can be influenced by climate change. The Group could offer a monitoring service, by recording presence or absence.

M. Veloso, Portugal, offered to coordinate this activity on behalf of the Group.

- **Lodging in *Pisum***

This trait is important in Bulgaria, Portugal and UK. The Group could describe and characterize this trait.

M. Ambrose, UK and **S. Angelova, Bulgaria** offered to coordinate this activity on behalf of the Group.

- ***Phaseolus* ideotype**

Bean breeders need to develop a new habit for the crop, something like a soybean habit. Suitable traits have already been cloned in pea and in *Arabidopsis*. The Group activity could consist in looking for determinate habit in *Phaseolus*.

A. Carboni, Italy, offered to coordinate this activity on behalf of the Group.

- ***Vicia faba* pollinators and flower morphology**

Traits that are important for pollinators should not be lost. These are also important for their ecological value for legumes. There is not enough expertise in the Working Group regarding *Vicia faba* pollinators and flower morphology.

M.J. Suso, Spain, offered to get in contact with experts and provide further details.

- **Improvement of characterization data availability**

The Group should focus on the most important traits and make sure that the data are made available to breeders.

The NCG considered as an action point the need to contact the Documentation and Information Network and to plan an activity for characterization improvement.

- ***In situ / on-farm***

The Group will remain in contact with the AEGRO project.

- **Regeneration methods**

It is important to compare the results of different methods. It is a research question that is not easy to address.

M.J. Suso, Spain offered to provide a flow chart on how to approach the problem.

Conclusion

Election of the Chair and Vice-Chair

Mike Ambrose was reconfirmed as Chair of the Group and he asked Gérard Duc to remain as Vice-Chair. The NCG was completed with the nominations of Siyka Angelova (especially for *in situ*/on-farm activities) and Andrea Carboni.

Closing remarks

Thanks were expressed by the Chair to the ECPGR Secretariat, with a special mention to Lidwina Koop for her support in the organization of the meeting. Thanks were given to all the participants, with the promise to remain in contact to develop a collaborative workplan.

APPENDICES

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Appendix I. Acronyms and abbreviations

AARI	Aegean Agricultural Research Institute, Menemen-Izmir, Turkey
AEGIS	A European Genebank Integrated System
AEGRO	An Integrated European <i>In situ</i> Management Work Plan: Implementing Genetic Reserves and On-Farm Concepts
AEP	European Association for Grain Legume Research
AFLP	Amplified fragment length polymorphism
AGES	Austrian Agency for Health and Food Safety, Linz, Austria
AIS	Agricultural Institute of Slovenia, Ljubljana, Slovenia
BPGM	Banco Português de Germoplasma Vegetal (Portuguese Plant Germplasm Bank), Braga, Portugal
CCDB	Central Crop Database
CGIAR	Consultative Group for International Agricultural Research
CIN	Centro di Ricerca per le Colture Industriali (Research Centre for Industrial Crops), Bologna, Italy
CRA-	Consiglio per la Ricerca e la Sperimentazione in Agricoltura (Agriculture Research Council), Italy
CRF	Centro de Conservación de Recursos Fitogenéticos (Centre for Plant Genetic Resources Conservation), Spain
CSIC	Consejo Superior de Investigaciones Científicas (Spanish National Research Council), Spain
CWR	Crop wild relative
EC	European Commission
ECPGR	European Cooperative Programme for Plant Genetic Resources
ENMP	Estação Nacional de Melhoramento de Plantas (National Plant Breeding Station), Portugal (<i>now Unidade de Recursos Genéticos, Ecofisiologia e Melhoramento de Plantas, Instituto Nacional de Investigação Agrária</i>)
EU	European Union
EURISCO	European Internet Search Catalogue
FAO	Food and Agriculture Organization of the United Nations, Rome, Italy
GLIP	Grain Legumes Integrated Project
GRDC	Grains Research and Development Corporation, Australia
IAS	Instituto de Agricultura Sostenible (Institute of Sustainable Agriculture), Córdoba, Spain
ICARDA	International Centre for Agricultural Research in the Dry Areas, Aleppo, Syria
INRA	Institut National de la Recherche Agronomique (National Institute for Agronomic Research), France
IPGR	Institute for Plant Genetic Resources, Sadovo, Bulgaria
IPGRI	International Plant Genetic Resources Institute (<i>now Bioversity International</i>)

IPK	Leibniz Institut für Pflanzengenetik und Kulturpflanzenforschung (Leibniz Institute of Plant Genetics and Crop Plant Research), Germany
ISCI	Istituto Sperimentale per le Colture Industriali (Experimental Institute for Industrial Crops), Bologna, Italy
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
JIC	John Innes Centre, Norwich, UK
NCG	Network Coordinating Group
NGO	Non-governmental organization
PGR	Plant genetic resources
PGRFA	Plant genetic resources for food and agriculture
RBIP	Retrotransposon-based insertion polymorphism
RIPP	Research Institute of Plant Production, Piešťany, Slovakia
SARC	Slovak Agricultural Research Centre
SMTA	Standard Material Transfer Agreement
SSR	Simple sequence repeat
VIR	N.I. Vavilov Institute of Plant Industry, St. Petersburg, Russian Federation

Appendix II. Agenda

Fourth meeting of the ECPGR Working Group on Grain Legumes 16-17 November 2007, Lisbon, Portugal

Thursday 15 November 2007

Arrival of participants in Lisbon

Friday 16 November 2007

Venue: Lisbon Congress Centre

9:00 **Introduction**

- Opening and welcome address (*M. Ambrose; G. Duc*)
- Brief self-introduction of the participants
- Approval of the agenda

9:30 **ECPGR and the Working Group on Grain Legumes**

- The Chair's report (*M. Ambrose*)
- Report on work of Ad hoc Task Force, Conservation and Regeneration of Grain Legumes (*M.J. Suso*)
- Update on ECPGR (*L. Maggioni*)
- International Treaty on PGRFA and associated SMTA (*M. Ambrose*)

Discussion

10:30 *Coffee break*

11:00 **Crop by crop progress review**

Review of progress made for each grain legume crop in terms of establishment of the Central Database, inclusion of passport data, definition of characterization descriptors, analysis of the Database, level of safety-duplication of the collections, definition of regeneration needs and standards, definition of collecting needs, definition of other priority actions (core collections, pre-breeding, etc.)

- *Phaseolus and Vigna (introduced by W. Kainz)*
- *Vicia faba (introduced by G. Duc)*
- *Cicer (introduced by I. Duarte)*

12:30 *Lunch*

14:00 **Crop by crop progress review (continued)**

- *Lens (introduced by N. Atikyilmaz)*
- *Lupinus (to be confirmed)*
- *Pisum (introduced by M. Ambrose)*
- *Glycine (introduced by M. Vishnyakova)*
- *Arachis and Vicia spp. (introduced by S. Angelova)*

15:30 ***In situ* and on-farm conservation**

- Short presentations based on recent activities (*S. Angelova*)

16:30 **Farewell addresses and joint coffee break with GLIP-AEP conference**

17:15 **Optimizing the utilization of collections**

- The point of view of the breeder
- The point of view of the research scientist

17:30 *End of first day*

20:00 *Social dinner at Restaurant Solmar*

Saturday 17 November

Venue: Hotel Vila Galé Opera

8:30 **Inter-regional cooperation**

- Collaboration with EU GLIP and TTP (*M. Ambrose*)
- Collaboration with Global Crop Diversity Trust (*M. Ambrose*)
- Collaboration with AEP (*G. Duc*)
- Cooperation with ICARDA and China on *Vicia faba* genetic resources (*G. Duc*)
- *Pisum* Genetic Resources Consortium (PeaGRIC) (*M. Ambrose*)
- FababeanGRIC (*G. Duc*)

9:30 **Future Workplans for the Working Group on Grain Legumes including proposals for the next funding phase**

Presentations based on discussion within the Network Coordinating Group, Paris 2006 (*G. Duc*)

10:00 *Coffee break*

10:30 **Discussion and Recommendations**

12:15 **Any other business**

12:30 **Election of the Chair and Vice-Chair**

12:45 **Closing remarks**

13:00 *Lunch*

Departure of participants

Appendix III. List of participants

Fourth Meeting of the ECPGR Working Group on Grain Legumes 16-17 November 2007, Lisbon, Portugal

N.B. Contact details of participants updated at time of publication. However, the composition of the Working Group is subject to changes. The full list, constantly updated, is available on the Grain Legumes Working Group's Web page (http://www2.bioversityinternational.org/networks/ecpgr/Contacts/ecpgr_wggl.asp).

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