

# Report of a Cereals Network

Second Meeting, 21-24 April 2008, Foça, Turkey

L. Maggioni, A. Katsiotis, H. Knüpffer, G. Kleijer and E. Lipman







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**The European Cooperative Programme for Plant Genetic Resources (ECPGR)** is a collaborative programme among most European countries aimed at contributing to national, sub-regional and regional programmes in Europe to rationally and effectively conserve *ex situ* and *in situ* Plant Genetic Resources for Food and Agriculture and increase their utilization. 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. The Coordinating Secretariat is hosted by Bioversity International. 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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Oat research field at the Aegean Agricultural Research Institute (AARI). Courtesy of © Nurgul Sari, AARI, Izmir, Turkey.

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Related presentations can be downloaded from  
[http://www.ecpgr.cgiar.org/networks/cereals/ecpgr\\_cereals\\_network\\_second\\_meeting/presentations.html](http://www.ecpgr.cgiar.org/networks/cereals/ecpgr_cereals_network_second_meeting/presentations.html)



## INTRODUCTION

The second full meeting of the Cereals Network of the European Cooperative Programme for Plant Genetic Resources (ECPGR) was organized in collaboration with the Aegean Agricultural Research Institute (AARI), Menemen, Izmir, and was held at Hotel Club Phokaia in Foça, Turkey on 21-24 April 2008.

The Network Coordinating Group (NCG) and representatives of the ECPGR Secretariat met before the beginning of the meeting and after each day's sessions to agree on procedures, necessary changes, and to monitor the progress of the meeting.

### Opening of the meeting, welcome address and opening remarks

Helmut Knüpffer, Coordinator of the Cereals Network, welcomed all the participants to Foça, and invited the local hosts to open the meeting.

Dr Ali Osman Sarı, Director of AARI, opened the meeting, welcoming all the participants on behalf of AARI. He gave an account of AARI, which was founded in 1963 under the auspices of the Food and Agriculture Organization of the United Nations (FAO) and then became the national coordination centre for plant genetic resources (PGR) in Turkey. He described the structure and mission of AARI and then wished all the participants a successful meeting and a pleasant stay in Turkey.

Mr Kamil Köten, Foça District Governor, welcomed the meeting. He considered this meeting to be very important in light of global warming and recent changes in the agriculture scenario. He was happy to receive the meeting in Foça, where the sea is very clean, and the environment is hospitable for monk seals. He encouraged the visitors to enjoy their time in Turkey.

Assoc. Prof. Dr Masum Burak, Director General of Agricultural Research of the Ministry of Agriculture and Rural Affairs, expressed the honour that he felt at welcoming the participants on behalf of the Ministry of Agriculture. It was a pleasure to host the meeting in Turkey, one of the most significant countries for PGR diversity. He realized that it was a great and important responsibility to preserve the existing richness in genetic variation. He also praised collaboration with FAO and Bioversity as important for Turkey, for their help in the implementation of the Global Plan of Action. The Ministry of Agriculture has always considered the PGR programme as one of the most important in its mandate. He informed the participants about the structure of agricultural research in Turkey (58 research institutes) and the planned changes. He also praised the collaboration within the framework of ECPGR and mentioned the important subject of global warming and the risk of reduction in the supply of products due to droughts. He feared the unwise decisions of countries producing biofuels rather than food. He finally wished everyone a productive meeting and an enjoyable stay in Turkey.

Lorenzo Maggioni, ECPGR Coordinator, welcomed all participants to the second meeting of the Cereals Network, on behalf of the ECPGR Secretariat and of Bioversity International. He referred to the first meeting held in Armenia in 2003 and appreciated the presence of the previous organizers as a sign of continuity. He was happy to receive the offer from AARI, where the new Director, Dr A.O. Sarı, had accepted the commitment to organize a complex meeting and he thanked him and his staff for their tremendous efforts.

The meeting gathered 61 members from 33 countries and included a total of 80 participants. Ukraine was represented for the first time as a full ECPGR member. Observers from international agricultural research institutes (International Maize and Wheat Improvement Center, CIMMYT and International Center for Agricultural Research in the Dry Areas, ICARDA) and from non-ECPGR member countries (Morocco and Russian Federation) were warmly welcomed. Invitations had been sent to FAO, non-governmental

organizations (NGOs), European Seed Association (ESA), and the Global Crop Diversity Trust. Apologies were received from FAO, NGOs and the Trust.

H. Knüpfper introduced the agenda. The organizers took advantage of the presence of several observers to request presentations on PGR activities on wheat, barley and oats outside the ECPGR. Among these were the crop strategies for wheat, barley and oats developed with support from the Global Crop Diversity Trust, the global crop registries for wheat and barley to be developed within the frame of the Global Public Goods (GPG2) project of the Consultative Group on International Agricultural Research (CGIAR), and an international workshop on barley genetic resources held in conjunction with the 10th International Barley Genetics Symposium (IBGS) in Alexandria, Egypt, earlier in April 2008. He reported on the latest changes to the agenda and listed the tasks to prepare for the future: one of the most important will be to start to implement the initiative for "A European Genebank Integrated System" (AEGIS) for barley, oats and wheat. He reminded the participants of the major expected outcomes of the meeting, i.e. a good strategy for ECPGR Phase VIII, not only for the individual Working Groups (WGs) but also for the Network as a whole, thus demonstrating its coherence. The WGs should therefore aim at defining joint activities to reach common goals. The NCG felt that the programme was very demanding and that there was not much time for the necessary discussions. H. Knüpfper suggested that the self-introduction of participants be scheduled for the beginning of the individual WG Group sessions.

## **National PGR activities of Turkey, with emphasis on cereals**

Ayfer Tan described the National PGR programme of Turkey, which is one of the most significant countries in the world for its richness in plant genetic resources and plant diversity and one of the centres of origin and/or diversity of several crop plants and many plant species.

Plant genetic resources activities were started by the establishment of the International Regional "Crop Research and Introduction Centre (CRIC)" in Izmir in 1963 (now the Aegean Agricultural Research Institute, AARI). The PGR activities were reorganized in 1976 within the framework of the National Plant Genetic Resources Research Programme (NPGRRP) and AARI then became the National Project Coordination Institute. The objective of NPGRRP is the exploration, collection, conservation (both *ex situ* and *in situ*) and evaluation of existing PGR and plant diversity of Turkey for today and the future.

*In situ* conservation programmes are coordinated by a "National Plan for *In situ* Conservation of Genetic Diversity". As part of a global project coordinated by the International Plant Genetic Resources Institute (IPGRI, now Bioversity International) to strengthen the scientific basis of *in situ* conservation of agricultural biodiversity, Turkey studied the possibility of *in situ* on-farm conservation of genetic diversity for selected landraces grown in the North Western Transitional Zone. Another project on "Ecosystem Conservation and Management for Threatened Plant Species" was initiated to identify Important Plant Areas (IPAs), as defined by the Bern Convention, in the southern part of the Central Anatolian Region and adjacent transitional zones.

The international project on "Design, Testing and Evaluation of Best Practices for *in situ* Conservation of Economically Important Wild Species", involving Egypt, Lebanon, Morocco and Turkey, focused on conservation and sustainable use of selected economically important wild plant species. In the case of Turkey these were *Galanthus elwesii*, *Sideritis stricta*, *Sideritis congesta*, *Liquidambar orientalis* and *Sternbergia candida* found in southwest Turkey.

*Ex situ* conservation activities were started in 1964. The National Gene Bank at AARI provides for long-term (-18°C) and medium-term (0°C) storage, respectively, of the base and

active seed collections. The base collection is safety-duplicated at the Field Crop Central Research Institute (FCCRI) in Ankara.

The national collection contains landraces, wild and weedy relatives and other wild species of economic importance (medicinal, aromatic, ornamentals, etc.) and endemic plant species. There are also a few South West Asian collections, and a small proportion of the world wheat and barley collection.

The vegetatively propagated germplasm (fruits, garlic and some medicinal and aromatic plants) are kept in field genebanks at 15 institutes, including AARI. Recently, cryopreservation studies were started for garlic and mint.

The Central Database of the national programme utilizes a Geographic Information System (GIS) to evaluate the quantitative and spatial data.

Characterization and evaluation activities are coordinated by the NPGRRP and conducted by the plant groups (cereals, food legumes, forage crops, vegetables, industrial crops, fruit and grape, medicinal and aromatic plants, ornamental plant groups) in cooperation with the National Plant Breeding Programmes.

Over 50 000 accessions are long-term maintained at the National Gene Bank. Over 8600 cereal accessions are stored at the National Gene Bank and at FCCRI. Over 30 700 herbarium specimens of various species are maintained at AARI Herbarium, as well as 4510 barley and wheat landrace herbarium specimens collected by Mirza Gökgöl in the 1920s-1930s.

## Information on the current ECPGR Phase and international PGR events

L. Maggioni described the structure, objectives, membership (39 countries) and budget (€ 2.2 million in five years) of ECPGR. It was reported that Bosnia and Herzegovina would join ECPGR during the coming weeks. The priorities for Phase VII and the structure and activities of the Cereals Network during the present Phase were also outlined.

A brief account was given of the outcomes of the mid-term meeting of the ECPGR Steering Committee in Riga, Latvia, 2006, where the current ECPGR four priority areas were all considered as relevant for the subsequent Phase VIII, but "Task sharing and capacity building" was indicated as the top priority for the next Phase. Networks will need to provide a list of proposed actions for Phase VIII, including clearly measurable targets, and will have to compete for funding. Recommendations were made to countries to ratify the International Treaty for Plant Genetic Resources for Food and Agriculture (ITPGRFA) and to implement it. The name and acronym of the Programme were changed to European Cooperative Programme for Plant Genetic Resources and ECPGR, respectively.

L. Maggioni also mentioned the activities of the Cereals Network and other Networks in Phase VII (see also the ECPGR Web site). Within the Cereals Network, ad hoc meetings of the WGs on barley and oats were held in 2004, in conjunction with international conferences, and a regular meeting of the WG on Wheat took place. The NCGs met in Bonn in 2006, and in September 2006, an ad hoc meeting on triticale and rye was held in Nyon, Switzerland. The Forages Network agreed on regeneration standards for various species (preferable/acceptable). A workshop on European home gardens of the *In situ* and On-farm Conservation Network in Ljubljana in October 2007 determined that home gardens are still important refuges for genetic resources in Europe. The Documentation and Information Network met in Bonn, Germany, in March 2008 on various issues (cf. separate presentation on EPGRIS3). An open-source toolkit for the Central Crop Database (CCDB) on eggplants developed in The Netherlands was also applied to develop the CCDB for *Capsicum* (Vegetables Network).

Regarding the international context, L. Maggioni mentioned the approval of the Standard Material Transfer Agreement (SMTA) in June 2006 and the second meeting of the Governing Body of the International Treaty (October 2007) ([www.iisd.ca/biodiv/itpgrgb2](http://www.iisd.ca/biodiv/itpgrgb2)). He also referred to the EC Regulation (GEN RES) 870/2004, where cereals projects (Rice and Oats) were recently approved for funding, among other plant projects. Unfortunately, there was no plan to renew the Regulation in the near future, unless strong political pressure can be applied by the EU member countries. The opportunity of submitting project proposals through the Seventh Framework Programme (<http://cordis.europa.eu/fp7/>) was mentioned, as well as the recent inauguration (February 2008) of the Arctic Seed Vault, a safety-duplication *ex situ* repository provided by the government of Norway and managed by the Nordic Genetic Resource Center (NordGen). The availability of funds from the Global Crop Diversity Trust for regeneration of threatened accessions and for a competitive grants scheme to support the evaluation of genetic resources were mentioned.

### **Information on AEGIS and implications for the Working Groups of the Cereals Network**

A brief overview of why AEGIS was established with some key facts and figures was presented by Jan Engels along with the perceived benefits. The procedures for establishing an effective and efficient European Collection were described with reference to the just published *Strategic Framework Discussion paper*, as well as the decisions made by the ECPGR Steering Committee during its mid-term meeting. Special attention was paid to the draft Memorandum of Understanding (MoU) that is intending to provide a legal framework for the commitments and responsibilities of the AEGIS partners as well as the associated institutions within the countries. The roles and responsibilities of the Crop Working Groups with respect to the establishment and operation of AEGIS as a virtual European genebank system were outlined. The concept of the Most Appropriate Accessions (MAAs), and the provisional primary and secondary selection criteria to allow the identification of the MAAs which will eventually make up the European Collection as well as the process to be followed were briefly described. Due attention was paid to the quality management system that will be needed in order to assure adequate quality management of the European Collection. Plans to assess the operational costs for the maintenance of the germplasm prior to and after the introduction of AEGIS were shared with the meeting. Finally, the tasks and responsibilities which are expected to be carried out by the ECPGR Working Groups for the establishment and operation of AEGIS were presented as an input into the discussions of the Working Groups to set priorities for the next ECPGR Phase. Legal aspects and the principles of collaboration (MoU) will be worked out for the next Steering Committee meeting.

#### ***Discussion***

H. Knüpffer asked about the implementation of AEGIS in non-model crops, i.e. whether it was expected to start activities at the same time as for the model crops, or wait until they could show their progress, and also whether it would be possible to adopt different, autonomous methodologies rather than those preferred for the model crops.

J. Engels replied that the decisive step would take place at the next ECPGR Steering Committee meeting in September 2008<sup>1</sup>, which was expected to be positive for the continuation of AEGIS. Once a formal, legal framework is in place, all the WGs will be ready to start. It was expected that the Working Groups would discuss during their meetings their

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<sup>1</sup> During its Eleventh Meeting in Sarajevo, Bosnia and Herzegovina, 2-5 September 2008, the ECPGR Steering Committee decided that all WGs are expected to start AEGIS activities during Phase VIII (2009–2013).

possible first steps in implementing AEGIS for their respective crops, so as to be prepared to start the implementation after the Steering Committee meeting. The approaches can be very different, crop by crop.

G. Kleijer thought that activities of all WGs should focus on AEGIS.

## **Collections of genetic stocks in Europe, introduction**

In his introduction, G. Kleijer specified that precise genetic stocks can be classified in three categories. Conventional material (mapping populations, doubled haploids [DH], recombinant inbred lines [RIL], isogenic lines, mutant populations and mutant isogenics) and alien material (synthetics, amphiploids, alien additions, alien substitutions, alien translocations and alloplasmic lines) necessitate selfing during regeneration and generally only a few seeds are available for distribution. Aneuploids (deletion lines, monosomics, ditelocentrics, double-ditelocentrics, isochromosomes, trisomics, tetrasomics, nulli-tetrasomics, single chromosome substitution lines, recombinant chromosome substitution lines and intra-varietal translocation lines) generally need cytogenetic analyses for regeneration which can only be carried out by specialized laboratories.

An inventory of precise genetic stocks in Europe has been made for the Global Strategy for *ex situ* conservation with enhanced access to wheat genetic resources of the Global Crop Diversity Trust. Several European countries (Bulgaria, Czech Republic, Germany, Hungary, Italy, The Netherlands, Russian Federation and Switzerland) are holding precise genetic stocks but this inventory is not complete.

There is a lot of material available in Europe and several questions are still open: for example, conservation conditions; documentation which may exist, but often only in the literature and as personal knowledge. Many collections are private and we need to discuss how to make this material available and whether these genetic stocks have to be included in the Central Crop Databases.

Tom Payne, CIMMYT, commented that clients are using genetic diversity to address climate change, new diseases, the price of commodities, reduction in research etc. These genetic stocks are useful for addressing these problems and for the identification of diseases. CIMMYT and other genebanks have been approached by unusual clients (countries) who want to grow wheat (Indonesia, Jamaica, Mauritius, Sri Lanka), due to the high price of commodities. Future users will not necessarily be plant breeders, but researchers interested in particular genes or traits.

## **New reporting and planning guidelines for ECPGR Networks in Phase VIII**

L. Maggioni described the criteria for the allocation of Network budgets (overall principles and specific requirements). The document containing all the details was sent to the Network Coordinator and was made available online.

Progress reports, project proposals and the proposed Network budget need to be developed by the Working Groups and coordinated by the NCG, to be submitted by 15 June 2008.

## **Introduction to the structure and main topics of parallel meetings**

H. Knüpfner summarized the objectives of this meeting, with the need to focus on major topics and to obtain as a product of the meeting a report on the progress of the present phase. Projects for the future and priority setting among the WGs (if any) also needed to be

defined. Regarding AEGIS, the WGs should start to plan what they can do towards a smooth implementation. Additional topics that can be discussed relate to wild relatives (e.g. rescue collecting, protected areas), pre-breeding and also genetic stocks (e.g. compiling an initial overview of such collections and their status). The WGs should decide how many meetings and what type of meetings they plan to organize in Phase VIII. The possibility of planning thematic workshops overarching the Network on topics of joint interest (e.g. pre-breeding, genetic stocks) was envisaged. He recommended the WGs to consider whether the chairing of the WGs needed reconfirmation/elections.

The meeting split into the three separate group sessions (*Avena*, Barley and Wheat) and the results reported by the rapporteurs are included later in this document.

## **Video presentation**

Dilek Kahraman, Agrohydrology Research and Training Centre (ARTC), Menemen, presented a video on a Sixth Framework Project dedicated to the restoration of the water purity within the basin of the Gediz River.

## REPORTS OF WORKING GROUP SESSIONS

### Working Group on *Avena*

#### Participants:

Wolfgang Kainz (Austria), Nadejda Antonova (Bulgaria), Lenka Nedomová (Czech Republic), Külli Annamaa (Estonia), Elina Kiviharju (Finland), Jean Koenig (France), Christoph Germeier (Germany), Andreas Katsiotis (Greece), Sean Gaule (Ireland), Gideon Ladizinsky (Israel), Trond Buraas (Norway), Zofia Bulińska-Radomska (Poland), Peter Hozlár (Slovakia), Jens Weibull (Sweden), Nürgül Sarı (Turkey), Athole Marshall (United Kingdom).

#### Observers:

Nezha Saidi (Morocco), Igor Loskutov (Russian Federation), Jan Engels (Bioversity International).

Athole Marshall was nominated as the rapporteur.

### **First Session (21 April) – Review and assessment of progress of the *Avena* Working Group**

#### Meetings

- An ad hoc meeting was held at Helsinki, Finland, 23 July 2004.
- A one-day meeting was held 28 November 2004 at Alnarp, Sweden to discuss opportunities and research direction for future project proposals. During that meeting *Avena* quality and mycotoxins were identified as research priorities for future GENRES projects.
- The Global Crop Diversity Trust held the Global Crop Strategy Meeting for Oats in St. Petersburg, Russian Federation, 1-3 March 2007.

#### Collecting activities

(A. Katsiotis)

During the last Cereals Network meeting in Yerevan, Armenia in 2003, gaps and potential needs for collecting *Avena* wild species were discussed. Several *Avena* species have been identified and recommended to be further collected. Among the first in the priority list were *A. murphyi* and *A. magna*, the former present in both Spain and Morocco and the latter in Morocco only, and the recently discovered *A. insularis* present in Sicily, Italy and Tunisia. In spring 2005 F. Branca (University of Catania, Italy) and L. Maggioni (Bioversity International) collected *A. insularis* in areas of South-central Sicily (around Lake Comunelli, near the city of Butela). About 60 samples were collected from two sites and these accessions are now part of the germplasm collection of the Dipartimento di OrtoFloroArboricoltura e Tecnologie Agroalimentari (DOFATA), University of Catania, an active collection utilized in pre-breeding and breeding activities. In June 2007 A. Katsiotis (Agricultural University of Athens, Greece) and P. Garcia (University of León, Spain), visited the regions of Murcia and Andalusia to collect *A. prostrata* and *A. murphyi*. Five populations of *A. prostrata* and three of *A. murphyi* were collected. After regeneration the seeds will be deposited to the Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA), Spain and the following

accessions numbers were assigned: 1. *A. prostrata* NC085199 to NC085203, and 2. *A. murphyi* NC085204 to NC085206.

### Research activities

- **EU-funded project under Regulation 1467/94: “Evaluation and enhancement of *Avena* landrace collections for extensification of the genetic basis of *Avena* for quality and resistance breeding”;** GENRES CT99-106 (Coordinator: A. Katsiotis).

The above project came to completion at the end of 2004. In total 1011 entries originating from more than 30 countries around the world were characterized, of which 333 were landraces or traditional cultivars, 213 were breeders’ lines, 388 were advanced cultivars and 77 entries were of unknown status, belonging to either *A. sativa* or *A. byzantina*. Morphological characters were scored according to the “Oat Descriptors” (IBPGR 1985)<sup>2</sup>, in four environments. Additionally, disease resistance screenings for crown and stem rusts and powdery mildew were performed. Protein content was also measured. Molecular markers (amplified fragment length polymorphism, AFLPs) were used to fingerprint more than 600 entries. All results were incorporated in the European *Avena* Database (EADB).

- **EU-funded project under Regulation 870/2004: “An Integrated European *In Situ* Management Workplan: Implementing Genetic Reserves and On Farm Concepts (AEGRO)”;** AGRI GENRES 057 (Coordinator: L. Frese).

This project was initiated in October 2007. The start-up meeting took place at Evershot, United Kingdom in November 2007. The main objective of the project is to develop an *in situ* management workplan, including finding suitable sites to establish genetic reserves, and the technical guidelines, procedures and databases required for population management and monitoring, by using model crops, one of which is the genus *Avena*. Prioritization of *Avena* species for *in situ* conservation is mainly based on their limited geographic distribution range. The three priority species identified for *Avena* are *A. murphyi*, *A. insularis* and *A. ventricosa*.

- **EU-funded project under Regulation 870/2004 “*Avena* genetic resources for quality in human consumption (AVEQ)”;** AGRI GENRES 061 (Coordinator: C. Germeier).

The project was initiated in September 2007. The first meeting took place at Clermont-Ferrand, France in September 2007. The project has 15 partners from 9 countries and three co-sponsors. The main objectives of the project are to screen a large number of cultivated and wild materials for protein content, fat, avenins, minerals, antioxidants (tocols and avenanthramides),  $\beta$ -glucans, fibres, starch, check *Fusarium* and mycotoxin presence in inoculated material, and evaluate cold tolerance.

### Summary reports of activities in a number of countries

- **Oat collection in the Czech Republic**

(Lenka Nedomová)

Currently the oat collection in the Czech Republic contains 2094 *Avena* accessions, of which 80% are advanced cultivars, 7% landraces, 7% breeders’ lines and 6% wild species. The working collection is at Kroměříž, the active collection is stored in Prague and there is a set of safety-duplicates stored in Slovakia at Piešťany. The aims are to extend the collection,

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<sup>2</sup> IBPGR. 1985. Oat Descriptors. International Board for Plant Genetic Resources, Rome.

evaluation, regeneration, and distribution of the samples, and national and international cooperation.

- ***Avena* collection in Slovakia**

(Peter Hozlár and Daniela Dvončová)

A total of 1005 *Avena* accessions are currently held at the Research Institute of Plant Production (RIPP), Piešťany of which 985 are *A. sativa*, 8 *A. byzantina* and 2 *A. fatua*. Genotypes are evaluated for morphological, biological and economic characters and disease resistance. Priority is given to the collection of indigenous landraces. Naked oats are also being evaluated.

- ***Avena* genetic resources in Bulgaria**

(Nadejda Antonova)

Most of the oat collection is advanced cultivars (65%), or breeders' lines (23%), followed by mutants (5%) and landraces and wild species. Most of the material originates from Europe (51%), North America (18%) and Australia (1%), while the rest (30%) is of unknown origin. Twenty-one accessions were recently added from local collecting trips, including wild species *A. clauda* and *A. eriantha*, both found in threatened areas.

- ***Avena* activities at the N.I. Vavilov Institute**

(Igor Loskutov)

The total oat collection of the N.I. Vavilov Institute (VIR), stored at the Department of Genetic Resources of Oat, Barley and Rye, comprises 12 700 accessions (10 800 accessions belong to the four cultivated species and 1900 accessions belong to 22 wild species). The oat working collection is stored in St. Petersburg, the active collection is situated in the National Seed Store on the Kuban Experimental Station of VIR and the base collection, under long-term storage conditions (-10°C), is situated in St. Petersburg. Safety-duplicates of the working collection are stored at the five stations of VIR under short-term storage conditions. Since 2008 the VIR oat collection has safety-duplicates (200 accessions) in Svalbard Global Seed Vault (Norway). Every year more than 2000 accessions are regenerated. Since 2003 a total of 250 new accessions has been added and 6900 accessions were distributed nationally and 880 internationally (including the *Avena* EU-funded projects).

Due to lack of time some of the scheduled presentations were not presented. Abstracts are included below.

- **Oat collection of the Institut National de la Recherche Agronomique (INRA), France: composition, evaluation for agronomic traits and protein content**

(Jean Koenig)

The INRA oat collection is part of the cereal collections held by INRA at the Cereal Genetic Centre in Clermont-Ferrand. About 900 *Avena* accessions are stored and can be distributed upon request. Facilities allow medium-term conservation: a drying chamber brings the seeds down to a humidity content of less than 8% and a cold chamber conserves the seeds at 4°C and 15% relative moisture. All accessions are duplicated in a deep-freeze chamber at -20°C.

The majority of the accessions belong to the species *Avena sativa* L. They include 331 landraces and old cultivars, 76 modern cultivars and 479 breeding lines, mainly released by the former INRA breeding programmes based at Rennes. Very few (20 accessions) belong to other species, mainly *A. byzantina* L. and *A. strigosa* L.

More than 80% of the accessions of this collection are French, the others originating mainly from Western Europe (Germany, United Kingdom, Sweden, Belgium, etc.).

The problem of this collection is its low utilization, since it is no longer linked to any breeding programme. In France, only two breeders are currently involved in small oat breeding programmes.

The Clermont team has participated in the first RESGEN *Avena* project (2001-2004), mainly with field evaluation and measure of protein content. Interesting characteristics were observed for some landraces: crown rust and powdery mildew tolerance, some cold tolerance but maybe not sufficient for autumn sowing in central France (winter types are mainly sown in February). Some accessions were found with high thousand-grain weight (TGW) values, and a wide range of protein contents, some low, some very high. The ongoing second RESGEN *Avena* project will put more emphasis on quality, especially on oats for human consumption.

In the future, the institute is planning to give priority to conserving the French heritage, as part of the AEGIS framework. Another priority should be to organize the conservation of safety-duplicates in a different location.

- **The *Avena* collection in Ireland**

(Sean Gaule)

The Department of Agriculture, Fisheries and Food (DAFF)<sup>3</sup> maintains the national oats genebank in the variety testing station at Backweston, Leixlip, Co. Kildare. There is also a collection of old oats varieties held in the Botanic Gardens, Trinity College Dublin which is part of the Irish Threatened Plant Genebank collection (an *ex situ* collection made up primarily of non-food crops). This was established by DAFF grant aided funding to an Irish NGO, Genetic Heritage Ireland.

The DAFF collection in Backweston is stored at  $-35^{\circ}\text{C}$  in a deep freezer with seeds in heat-sealed laminated foiled packaging. Both a base and an active collection are held here. There are 24 accessions in the collection, which is mostly made up of old Irish varieties. The collection is periodically germination tested and is regenerated as appropriate based on such tests.

Due to the absence of an oats breeding programme in Ireland the current objective for the collection is their safe long-term conservation. The collection is available to all interested organizations and institutions.

The DAFF collection is available online in the European Plant Genetic Resources Catalogue (or European Internet Search Catalogue, EURISCO); as the collection grows in size further updates will be uploaded. There has been recent correspondence with the EADB manager with a view to uploading the DAFF collection onto this database and this will be completed shortly.

Three varieties from the DAFF oats collection have been bulked up and assessed under organic conditions in the National Variety Testing Programme. While initial results for these were poor, work is going on this year to bulk up other varieties in the DAFF collection for assessment under the organic variety-testing programme.

DAFF are sourcing additional native Irish oat varieties from foreign genebanks. These accessions will be regenerated and made available from our active collection for distribution and inclusion in organic trials.

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<sup>3</sup> Now the Department of Agriculture, Food and Marine.

## **Second Session (21 April) – The European Avena Database and AEGIS**

The second session was devoted to AEGIS, because *Avena* was selected as a model crop for implementing AEGIS.

### **The European *Avena* Database and AEGIS**

(C. Germeier)

The current main activities of the EADB are partially connected to the two EU AGRI GENRES projects, AVEQ and AEGRO. For AVEQ, a new Web technology based on the JEE5 Frameworks is currently being used in order to obtain a more stable and protected environment, professionally designed components and a fully object-oriented design. For AEGRO, improvement of geographic information in the EADB will be performed by implementing interaction with Google Maps, similar to the International Database for *Beta* (IDBB) approach. A task force on a global oat information system was established with a priority task of geo-referencing of collecting data. Comparisons between the EADB and EURISCO revealed differences among number of entries in cultivated hexaploid, marginally cultivated diploid and tetraploid (569 EURISCO vs. 613 EADB entries), and wild *Avena* species (2884 EURISCO vs. 3803 EADB entries), while 1801 accessions in EURISCO and 346 in EADB are not determined to species level. Furthermore, in some cases changes of accession number designations were observed between EURISCO and EADB. Since *Avena* is a model crop for AEGIS, an update of the EADB from EURISCO is urgent. However, in some cases accession numbering in EURISCO deviates more or less severely from numbering in the EADB and/or numbering in EURISCO is different from numbering actually used in the genebanks. In these cases the update will be complicated and curators must be involved to clarify numbering. It is strongly recommended that accession numbers used in genebanks are reported to EURISCO and further pressure may be needed to ensure that National Inventories do not change the assigned accessions numbers. In addition, data of important accession categories are missing in EURISCO. This fact shows the importance of monitoring historic data. In order to update the EADB and harmonize data between EURISCO and EADB a considerable working capacity is needed.

The primary criteria for AEGIS selection are:

- a. accessions need to be in the public domain (no such field exists in any database, unless it can be assumed that all listed material in EURISCO fulfil this criteria);
- b. genetically unique (duplicate search is available in EADB);
- c. agronomically (including research material) and/or historically/culturally important (can it be decided by the multicrop passport descriptors (MCPDs), or do they need to be identified by curators?);
- d. plant genetic resources, including medicinal and ornamental species, and their crop wild relatives (i.e. excluding forest genetic resources, non-plant agrobiodiversity species, etc.) (applies to all *Avena* accessions);
- e. European origin or introduced germplasm that is of actual or potential (breeding/research) importance to Europe (can this be decided by using the MCPDs, or do they need to be identified by curators?).

A number of secondary criteria for AEGIS selection also need to be fulfilled:

- f. maintained in “country of origin” (what if no accession is present in the country of origin?);
- g. of known origin (collected and/or bred);

- h. comprehensiveness of passport information (identify database fields, i.e. donor, donor code, accession name, genus, species, subtaxa, origin country, collecting date, collecting site, collector, collecting number, breeder, breeding number, pedigree, registration date);
- i. number of regeneration/multiplication cycles (this information is not available either in EADB or in EURISCO);
- j. health status (i.e. is the germplasm disease-free?) (this information is not available either in EADB or in EURISCO);
- k. existence of morphological/molecular characterization data;
- l. existence of agronomic evaluation data;
- m. validated accession name.

Thus, duplication, identification and lack of information on some set criteria in order to identify the MAAs are the most important obstacles to implementing AEGIS.

### **Discussion and preliminary selection of MAAs**

(I. Loskutov)

The value of any collection strictly depends on the completeness of information about each accession. Creation and appropriate use of passport, characterization and evaluation databases for the *ex situ* collections should be among the priorities of any genebank. An item (accession) of a collection in any genebank is a plant botanical form which must be registered and precisely identified. The main purpose of the AEGIS project is based on the identification of the unique part of any national collection in European genebanks. AEGIS will consist of the Most Appropriate Accessions (MAAs) from national collections. A definition for MAA is **an accession of an original seed lot or seed sample that is genetically as close as possible to the original population that it is intended to represent; it shall be true to name, held in the country of origin or introduced material of importance for breeding and research and used in Europe, virus-free or of highest health status, accompanied by passport data, and characterized morphologically (botanically) or with markers.** The EADB contains about 34 000 accessions held in more than 20 genebanks. Different genebanks have very different levels of information in their databases. Botanical information in these databases is mostly very poor and unclear or sometimes erroneous, which is the case when the botanical characterization on the seed envelope does not correspond to the respective data in the passport and characterization databases. Botanical identification is one of the most important components for identifying any original and duplicate accession. It is supported by the fact that data on specific, and especially intra-specific classification are gaining significance not only for botanical research and breeding purposes, but also for genebanks seeking genetic purity of their maintained *ex situ* seed collections. The type of accessions held include *ex situ* collections of genebanks' **wild populations, landraces (local varieties), obsolete improved varieties, advanced improved varieties, breeding and research materials.** One of the ways to identify originality of accessions is to access available data and/or the recorded history of the accessions. We presume that most wild populations and landraces collected by national collectors, most obsolete improved varieties collected by national collectors before the 1950s, national advanced improved varieties, national breeding and research materials **are unique.** All of them could be candidates to be MAAs in AEGIS. The first step of this identification is the selection of these unique accessions by national curators and submission of their list to the Working Group Database Manager (EADB in the case of oat). All national databases have to do complex revision (check germination and authentic seed characters and database information) and update their passport database. Updates should be made on the base of the

*FAO/IPGRI Multi-Crop Passport Descriptors*. The most important descriptor fields are taxonomical, geographical, numerical and genetic groups. The taxonomical group includes the genus, species, species authority, subtaxa and subtaxa authority. All of them are very important for all types of accessions from wild species to research material. The geographical group includes country of origin, location of collecting site, collecting/acquisition source and donor (country) institute code. Location of collecting site is very important for wild species and landraces; other descriptors are important for all types of material. The numerical group includes accession number, collecting number, accession name, acquisition date, collecting date of sample, donor accession number and other identification (numbers) associated with the accession. Collecting number and date are very important for wild species and landraces, accession name is very important for searching for duplicates among varieties and others are important for all types. Some genetic information with ancestral data is very important for advanced varieties, breeding and research material. Additional information about genetic originality of the accession could be taken from results of field and lab characterization and evaluation and from molecular biology evaluation. However, one of the main problems for identifying an MAA lies in the fact that each genebank provides different quantity and quality of information and there is lack of reliable and consistent information.

More information can be found in the paper on "Identification of duplicates by comparing passport data of *Avena* germplasm collections" (available from <http://www.ecpgr.cgiar.org/networks/cereals/avena.html>) and on the VIR Web site (<http://www.vir.nw.ru>).

### **Implementing AEGIS for *Avena***

*(All Working Group members)*

Taking into consideration the above presentations, discussion was generated on how AEGIS can be implemented for *Avena*. The ultimate goal of assigning the MAAs is to identify most of the genetic variability on a limited set of material. It was agreed that AEGIS should be a collaborative task involving all genebank managers and not specific people on selected criteria. A reliable database was recognized as the most important component in order to proceed in selecting the MAAs. It was also pointed that the available database information is not complete and additional steps to verify, confirm, harmonize and update the present EADB are needed. Support money is needed to complete this task. Two different approaches to develop the MAA list for *Avena* were proposed. The first one is a "bottom-up/step-by-step" approach where, as the initial step, national genebanks have to identify the material that has originated from and is maintained in their own collection. As a second step, unique and useful material that has been lost from the collections of the "country of origin" will be looked for in other genebanks. In this case however, the material can be considered "different" due to genetic drift. Following steps can include search for duplicates among the genebanks. During all steps the material included must be well documented. The second option is to use the existing database. The accessions will be identified and categorized (landraces, advanced cultivars, breeders' material, etc.) in collaboration with curators from "country of origin". Everything that is well described (including non-European accessions that have been proved of value in developing European varieties), including wild relatives, will be integrated. Material with incomplete or missing information will be excluded. After the list is generated, it will be circulated among the curators for verification and approval of the MAAs. After the MAA list is finalized, the technical guidelines and quality management system, involving all relevant stakeholders, will be agreed.

### **Third Session (22 April) – WG priorities for ECPGR Phase VIII**

(All Working Group members)

The discussion on implementing AEGIS continued for part of the present session, in order to adopt one of the two above-mentioned approaches in building the MAA list. After discussion and further explanation from Christoph Germeier the second option, using the EADB as the starting point, was adopted.

#### **Task sharing (AEGIS) and capacity building**

Implementing AEGIS for *Avena* remains a priority, as it is evident from the discussion time spent on it in the present meeting.

Compiling information on the status of wild species accessions conserved in genebanks was considered an essential first step in order to make a plan for their regeneration and to identify the necessary resources. Procedures for regeneration of wild species will also be developed (Z. Bulińska and J. Weibull will take the initiative forward).

A pre-breeding meeting with the Barley WG was decided on.

#### **Characterization and evaluation**

A large number of cultivated and wild materials will be screened for protein content, fat, avenins, minerals, antioxidants (tocols and avenanthramides),  $\beta$ -glucans, fibres, starch, checked for fusarium and mycotoxin presence in inoculated material, and evaluated for cold tolerance, through AVEQ.

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

Prioritization of the species *A. murphyi*, *A. insularis* and *A. ventricosa* for *in situ* conservation was confirmed. Population surveys of these three species in specific areas will be made. Site selection, guidelines and procedures for *in situ* conservation of the above species will be set. Some of these tasks are part of the AEGRO project, while the population surveys will be a project funded by ECPGR.

#### **Documentation and information**

As a result of the GENRES CT99-106 project, morphological characterization data under four different environments for 1011 accessions have been incorporated in the EADB. Characterization and evaluation data generated from AVEQ will also be included in the EADB.

Three projects were proposed for funding under ECPGR Phase VIII.

- The first one relates to implementing AEGIS for *Avena*, by developing a new application database. However, the project needs a substantial amount of funds and the resources are insufficient.
- The second project proposed was to provide support money to help genebanks to multiply *Avena* wild relatives. Time is needed to develop the regeneration procedures (see “task sharing and capacity building”) and allocated funds were considered limited to accomplish such a task.
- The third project proposed and favoured for funding is to provide travelling money for surveying the prioritized *in situ* conserved *Avena* species (*A. murphyi*, *A. insularis*, *A. ventricosa*) populations in order to assess the current situation in southern Spain, Sicily, Crete and Cyprus.

**Meetings suggested**

- *Avena* WG meeting (full participation)
- Cereals Network meeting (limited participation)
- Pre-breeding meeting (in conjunction with the Barley WG)
- Meeting to develop FP7 proposals (seen as a priority to take forward ideas for the future and to obtain the necessary funds).

Two topics that will be discussed during the next *Avena* WG meeting will be regeneration of wild species and *Avena* genetic stocks.

Andreas Katsiotis was reconfirmed as Chair of the WG and Jens Weibull was nominated as Vice-Chair.

## Working Group on Barley

### Participants:

Gayane Melyan (Armenia), Paul Freudenthaler (Austria), Jarmila Milotová (Czech Republic), Ahmed Jahoor (Denmark), Vahur Kukk (Estonia), Marja Jalli (Finland), Helmut Knüpffer (Germany), Konstantinos Bladenopoulos (Greece), Jón Hallsteinn Hallsson (Iceland), George Garland (Ireland), Tzion Fahima (Israel), Valeria Terzi (Italy), Isaak Rashal (Latvia), Algė Leistrumaitė (Lithuania), Noor Bas (The Netherlands), Michaela Benková (Slovakia), José Luis Molina Cano (Spain), Agnese Kolodinska (Sweden), Morten Rasmussen (Sweden), Alptekin Karagöz (Turkey), Luke Ramsay (United Kingdom).

### Observers:

Tryggvi Sturla Stefánsson (Iceland), Aydin Imamoglu (Turkey), Lorenzo Maggioni (Bioversity International), Jan Konopka (ICARDA).

Helmut Knüpffer reported the results of the WG discussion to the plenary session.

## Agenda

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### Monday 21 April

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14:00	Review and assessment of progress of the Barley WG ( <i>Helmut Knüpffer, All</i> )
14:45	Preparation and discussion of the progress report of the Barley WG ( <i>Helmut Knüpffer, All</i> )
15:15	Genetic stocks collections, and the Nordic Database on Barley Genetic Stocks ( <i>Morten Rasmussen</i> )
15:30	Coffee break
16:00	Specific genetic stocks collections in Europe, discussion ( <i>All</i> )
16:15	The European Barley Database (EBDB) and the Barley Core Collection ( <i>Helmut Knüpffer</i> )
17:00	Report from the Workshop on Barley Genetic Resources (10th International Barley Genetics Symposium, Alexandria, Egypt, April 2008) ( <i>Jan Konopka</i> )
17:15	Evaluation of the Barley collection of Turkey ( <i>Alptekin Karagöz</i> )
17:30	End of session

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### Tuesday 22 April

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9:00	Planning and prioritizing of the Barley WG for ECPGR Phase VIII ( <i>All</i> ) Discussion on the WG priorities in the future <ol style="list-style-type: none"><li>1. Task sharing (AEGIS) and capacity building</li><li>2. Characterization and evaluation</li><li>3. <i>In situ</i> and on-farm conservation and management</li><li>4. Documentation and information</li></ol>
10:15	Other matters Election of Chair and Vice-Chair Closing of the Meeting (Chair)
10:30	Coffee break

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## Introduction

Marja Jalli (Vice-Chair of the Group) and Helmut Knüpffer (Chair) jointly chaired the session and shared the task of reporting. A brief self-presentation of the participants was followed by a review and assessment of progress of the Barley WG. Eighteen questionnaires from countries were received before, during and after the meeting, and the country reports were compiled into a single report by H. Knüpffer and M. Jalli (separate document), and circulated to the Group for completion.

The **workplan and priorities** defined at the ad hoc meeting of the Barley Working Group (20 June 2004, Brno, Czech Republic, during the 9th International Barley Genetic Symposium) were presented by Helmut Knüpfner, the present situation reviewed, and elements of the workplan for ECPGR Phase VIII discussed. The essence of the presentation and the results of the discussion are integrated in the following sections.

## ***Background presentations***

### **Barley genetic stocks**

As a new topic, collections of genetic stocks of barley were included in the agenda, taking up a suggestion from the Wheat Working Group. This subject had received attention in the Strategies for Wheat and Barley of the Global Crop Diversity Trust, and was therefore also considered to be of high relevance for European cooperation (cf. also the introduction to the topic by Gert Kleijer and Tom Payne at the plenary session).

Morten Rasmussen, NordGen, gave an overview of genetic stocks collections in the Nordic countries. He also described the Nordic database of mutants and genetic stocks.

### ***Discussion***

The presentation was followed by a lively discussion, arguing whether genetic stocks should be considered a matter for the ECPGR Barley Working Group and its member genebanks. By definition, genetic stocks are one of the categories of plant genetic resources. It was concluded that genetic stocks form an important resource not only for breeding, but also for crop plant research, and that in view of climate change and the search for new traits, well-characterized collections of precise genetic stocks will be increasingly in demand in the future. Such collections are often curated by a single scientist and very vulnerable when he/she is no longer available. Some genetic stocks collections require specific skills and may be more labour-intensive than the usual genebank accessions, but this is also true for various wild species. On the other hand, some genetic stocks can be reproduced in genebanks as easily as cultivars and breeders' lines. The crop strategies for wheat and barley stress that genetic stocks collections need to be inventoried and handed over for long-term maintenance to suitable genebanks in order to safeguard them. As a first step, an assessment of such collections existing in Europe/the ECPGR member countries and their status will be carried out, coordinated by Morten Rasmussen. Questions on genetic stocks were included in the country report questionnaire distributed before the meeting; the responses will be included in the Assessment.

Tasks for reporting on genetic stocks (adopted from Wheat WG proposals):

- Contact other relevant networks (e.g. IBGS) and the Global Crop Diversity Trust (Barley Strategy), as to current stocks available.
- Discuss with molecular geneticists as to which classes of stocks will continue to be of use in the future.
- Produce a report for the next WG meeting on the inventory of stocks in the public domain which are freely available and future options.
- Consider addressing the need for capacity building, since cytogenetic skills are required if genebanks take on the commitment to conserve genetic stocks.
- Include a reference to crop strategies of the Global Crop Diversity Trust.

The discussion turned also to **genetically modified (GM) material**. It included the question of whether GM varieties and other GM materials should be included in genebanks. Consensus was reached that GM material was not in the mandate of genebanks, and that

genebanks should take measures to keep the PGR collections free from GM material and uncontaminated.

- **Plan for Phase VIII**

Compile an assessment of existing barley genetic stocks collections in Europe, with the following criteria (possibly extended) – Coordinator: Morten Rasmussen:

- Description of collections (specific kinds of stocks, numbers of accessions, hosting institution);
- Status (curator; is the collection well conserved, is it safe, integrated into a genebank with long-term commitments? Does the expertise exist on how to handle and multiply the material?).

M. Rasmussen should participate in the project on wheat precise genetic stocks as an observer.

### **The European Barley Database and the International Barley Core Collection**

A presentation on recent developments since 2003 (Yerevan meeting) and current status was given by Helmut Knüpffer.

**Abstract.** The European Barley Database (EBDB) has been developed and hosted by the Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) since the early 1980s. The first version was published in 1987, the second in 1997. In the frame of the EU GENRES Barley Project (1999-2002), the EBDB was upgraded and made accessible online, and contains ca. 155 000 accessions at present. The EBDB was not updated since 1997. Two Web interfaces exist in parallel, the “old” one including characterization and evaluation (C&E) data from the EU project (<http://barley.ipk-gatersleben.de/ebdb.php3>) and the “new” one without C&E data searchability, developed in the frame of a Bioinformatics project which ran until 2007 (<http://pgrc-35.ipk-gatersleben.de/ebdb/>).

The International Barley Core Collection (BCC) started as an initiative of the ECPGR Barley Working Group in 1989 and was extended into an international project in 1991. Designated subset coordinators created geographical subsets of the cultivated genepool, as well as subsets for wild *Hordeum* species and genetic stocks. The collection is aimed at representing the barley genepool with a number of accessions not exceeding 2000.<sup>4</sup> The present state and recent developments of the EBDB and the BCC and related discussion are reported below, under “Documentation and Information” (pp. 23-24).

Jan Konopka gave a brief report from a Workshop on Barley Genetic Resources organized during the 10th International Barley Genetics Symposium, 5-10 April 2008, Alexandria, Egypt.

### **Evaluation of the Barley collection of Turkey**

A presentation was given by Alptekin Karagöz, Ankara. Barley is the second most important crop in Turkey, cultivated on 955 100 ha (16.4% of the arable land). It has also been important in history. Turkey is considered one of the gene centres for barley. There are eight wild species of barley in Turkey. The Plant Genetic Resources Department of the Central Research Institute for Field Crops (CRIFC) in Ankara was established in 1987. The 4117 cultivated barley accessions have been characterized agromorphologically since 2004. The following

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<sup>4</sup> Knüpffer H, van Hintum Th. 2003. Summarised diversity - the Barley Core Collection. In: von Bothmer R, van Hintum Th, Knüpffer H, Sato S, editors. Diversity in Barley (*Hordeum vulgare*). Elsevier, Amsterdam. pp. 259-267.

traits were measured: growth habit, stipule colour, ligule colour, ligule length, flag leaf length, flag leaf width, status of flag leaf, early spring growth, number of days to heading, number of days to maturity, resistance to lodging, stem length, spike length, kernel row number, awn tip pigmentation, awn length, awn toothedness/smoothness, awn colour, auricle colour, stem colour, number of productive tillers, kernel colour, 1000-kernel weight and growth class. A remarkable variation was found in ligule colour, awn colour and stem colour, while low variation was observed in number of days to heading and number of days to maturity. Three hundred populations with high degree of variation have been sampled for biochemical (hordein) and molecular (RAPD) assessments. A catalogue will be published at the end of 2008.

### **Review and assessment of progress of the Barley WG in ECPGR Phase VII, and planning and prioritizing of the Barley WG for ECPGR Phase VIII**

The progress report is provided under subheadings related to the current ECPGR priorities. The progress made since the previous meeting of the ECPGR Barley Working Group (Yerevan, July 2003, in the frame of the first meeting of the Cereals Network) is reported.

An ad hoc meeting was held in June 2004 in conjunction with the 9th International Barley Genetics Symposium in Brno, Czech Republic. The Chair of the Barley Working Group also organized an international workshop on barley genetic resources on the same day.

The Chair was also invited to represent the ECPGR Barley Working Group in a meeting of the GPG2 (Global Public Goods) Informatics Workpackages (May 2007, Rome) and in a meeting organized by the Global Crop Diversity Trust to develop the crop strategy for barley (September 2007, Tunis).

### **Task sharing (AEGIS) and capacity building**

- **AEGIS – Progress made in Phase VII**

The Group had previously decided to observe the progress with the four model crops, and especially the cereal, *Avena*, with the objective of adopting the results for barley when available. Therefore, no progress has been made so far.

#### **Discussion**

The Group needed clearer specifications of the criteria for identifying the Most Appropriate Accessions (MAAs) from the AEGIS coordinator, Jan Engels (cf. presentation at plenary meeting).<sup>5</sup> At the request of the Group, the tentative list of primary and secondary criteria was made available on the second day but could not be discussed in detail because of the shortage of time.

Noor Bas gave a background explanation of the draft AEGIS primary and secondary criteria, based on her experience with another AEGIS model crop, *Brassica*. The draft list of selection criteria is meant as a guide for discussions. The primary selection criteria stated in this document are applicable to all European accessions. The secondary criteria are crop-specific and each Working Group needs to agree on these criteria and their ranking. The *Brassica* WG decided to perform a pilot study on the *B. rapa* accessions present in the European *Brassica* Database to detect problems in the selection of MAAs and to give an insight into how to select and rank the secondary criteria. In the meeting of the model crops curators and database managers in Radzików, Poland, 1-3 July 2008, the outcome of

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<sup>5</sup> See revised list of criteria on the AEGIS Web site ([http://aegis.cgiar.org/european\\_collection/selection\\_methods/selection\\_criteria.html](http://aegis.cgiar.org/european_collection/selection_methods/selection_criteria.html)).

discussions and/or studies on the selection criteria within the model WGs will be presented and discussed.

It was stressed that the EBDB needs to be up-to-date and to be regularly updated, to serve as an information basis and tool to support the AEGIS process for barley.

- **Plan for Phase VIII**

The Group agreed to start the AEGIS activities in the following way:

- Update the EBDB by requesting new data from all genebank collections;
- Discuss and decide upon the primary, and some of the secondary, criteria for selection of MAAs. Improve their definitions so that they can become descriptors, extending the EURISCO Multi-Crop Passport Descriptors (MCPD) format;
- All genebanks/national programmes should start by identifying potential MAAs originating from their own country;
- Extend the EURISCO MCPD to include the new AEGIS descriptors (descriptors needed to document MAAs and their criteria);
- Extend the structure of the EBDB to include additional descriptors relevant for AEGIS;
- Accumulate information on these new AEGIS descriptors for the barley accessions (preferably within the genebank documentation systems), and submit it to the EBDB.

- **Safety-duplication – Progress made in Phase VII**

A safety-duplication network has not been established. Individual genebanks reported that part of their material is safety-duplicated elsewhere, in other genebanks or in the Svalbard Global Seed Vault.

#### *Recommendation*

The Group recommended using the Svalbard Global Seed Vault for safety-duplication of barley accessions.

### **Characterization and evaluation (including use of modern technologies)**

- **Barley Core Collection**

#### **Tasks for Phase VII**

*Complete the International Barley Core Collection (BCC) with an Ethiopian/Eritrean subset and a subset of genetic stocks; further develop the BCC documentation; study the BCC using molecular markers.*

#### **Progress made in Phase VII**

Research is being carried out to create the Ethiopian/Eritrean BCC subset (Ethiopian PhD student under supervision of A. Björnstad, Norway), but no recent information is available. The practical problem of creating an Ethiopian/Eritrean subset remains unsolved.

The candidate accessions for the genetic stocks subset were selected and initially multiplied by J. Franckowiak (Fargo, ND, USA) and U. Lundqvist (Svalöv, Sweden) (reported at the Barley Genetic Resources Workshop in Brno, 20 June 2004). The latter subset is now maintained by the United States Department of Agriculture (USDA) Small Grains Collection, Aberdeen, Idaho, USA, from where material can be requested (reported by H. Bockelman, Aberdeen, in Tunis, September 2007).

The International BCC Committee met in June 2004 at the 9th International Barley Genetics Symposium (Brno, Czech Republic) and decided to dissolve itself, only the BCC secretariat (K. Sato, Kurashiki, Japan) and documentation (H. Knüpffer, Gatersleben, Germany) to remain active.

Another BCC status meeting was held in September 2007 in Tunis, Tunisia, in conjunction with the Barley Strategy meeting of the Global Crop Diversity Trust. It was recognized that the BCC has been widely utilized for various evaluation and diversity studies, including the application of molecular markers, and it was decided to prepare a review on the utilization of the BCC and its results to be presented at the next Triticeae Symposium in Kyoto, Japan, planned for 1-5 June 2009. The BCC activities have been carried out without any external funding for the last 15 years. Before, there was some funding available, but only for coordinating meetings.

### *Discussion*

The preparation of a publication on the BCC was encouraged, including a list of publications with results from BCC studies. The BCC should be more widely publicized.

José Luis Molina-Cano informed the Group that among the ca. 120 accessions of the Spanish Barley Core Collection ([www.eead.csic.es/EEAD/barley/index.php](http://www.eead.csic.es/EEAD/barley/index.php)), resistant accessions for most diseases can be found.<sup>6</sup>

Ahmed Jahoor reported that a high diversity was found in barleys from Eritrea, and a domestication independent from the Fertile Crescent material was postulated.<sup>7</sup>

### **Plan for Phase VIII**

Prepare the review paper on the BCC utilization and results.

- **ECPGR Task Force for pre-breeding in barley**

### **Tasks for Phase VII**

*Set up an ECPGR Task Force of barley breeders and scientists with an interest in pre-breeding and base-broadening, and develop regional cooperation on this issue in collaboration with FAO.*

### **Progress made in Phase VII**

This group was formed under the coordination of Marja Jalli (Finland) during the Barley Genetic Resources Workshop in Brno, 20 June 2004. The group, as a first step, aimed at preparing a background paper together with FAO as a basis for possible funding of pre-breeding activities. For several reasons, no substantial progress has been achieved with this subject. Some pre-breeding and base-broadening has been carried out independently in different research institutes/breeding companies (unfortunately with decreasing funds), some cooperation has existed between institutes but no common structure has yet evolved in this area. However, there is an increasing need for pre-breeding and base-broadening through genetic resources, and now, the timing could be more “ready” both for cooperation and for funding.

Marja Jalli attended a workshop on pre-breeding in China in 2006 with funding from Bioversity International (cf. her report to the plenary session).

<sup>6</sup> Lasa JM, Igartua E, Ciudad FJ, Codesal P, García EV, Gracia MP, Medina B, Romagosa I, Molina-Cano JL, Montoya JL. 2001. Morphological and agronomical diversity patterns in the Spanish Barley Core Collection. *Hereditas* 135: 217–225.

Yahiaoui S, Igartua E, Moralejo M, Ramsay L, Molina-Cano JL, Ciudad FJ, Lasa JM, Gracia MP, Casas AM. 2008. Patterns of genetic and eco-geographical diversity in Spanish barleys. *Theoretical and Applied Genetics* 116:271–282.

<sup>7</sup> Orabi J, Backes G, Wolday A, Yahyaoui A, Jahoor A. 2007. The Horn of Africa as a centre of barley diversification and a potential domestication site. *Theoretical and Applied Genetics* 114:1117–1127.  
Backes G, Orabi J, Wolday A, Yahyaoui A, Jahoor A. 2008. High genetic diversity revealed in barley (*Hordeum vulgare*) collected from small-scale farmer’s fields in Eritrea. *Genetic Resources and Crop Evolution* 56(1):85–97. (<http://www.springerlink.com/content/p161t8534m498mx3/>).

### *Discussion*

In view of climate change, plant responses to biotic and abiotic stresses are NordGen priorities across all cereal crops (Morten Rasmussen).

Luke Ramsay suggested that the Barley WG should take advantage of the ongoing genome sequencing activities in barley, and form an informal subgroup/task force to develop joint project proposals or activities (this is considered an advantage for barley compared to wheat and oats). Luke Ramsay will coordinate this, as part of the pre-breeding project proposal.

Background: recent developments in high-throughput genotyping in the crop mean that genetic fingerprinting of genebank accessions is now a real possibility in barley. Such genotype data offer considerable potential for the monitoring of collections themselves through, for example, the tracing of duplicates and spurious outcrossing. More fundamentally, they also offer the possibility of a radical change in the ease and means by which collections are characterized and perhaps more importantly utilized by breeders and researchers. These genotyping technologies are already being used in several large-scale European projects that are focussing on the relationship between the marker genotypes and field performance in current elite cultivars. There is thus already an enormous amount of genetic information available in barley and this will continue to grow with ongoing physical mapping and envisaged future sequencing projects. As a crop, barley is very well placed (compared to both wheat and oats) to make the most of this genotyping revolution, being an inbreeding diploid species with a large extant easily utilized primary gene pool. There is therefore a real opportunity for barley to act as an exemplar in the utilization in genotyping information in the characterization of genebank material, but in order to fully take advantage of these developments it is imperative that there is some coordination of activities at both the national and European level.

Konstantinos Bladenopoulos proposed that evaluation of barley genetic resources with respect to nutritional quality characters could also be a topic for the pre-breeding group.

### **Plan for Phase VIII**

- Considering that the pre-breeding initiative could benefit from AEGIS and vice versa, it was proposed to organize a **thematic 2-day meeting on pre-breeding** (with participants from the Working Groups on Wheat and *Avena*) at the end of 2008, or early 2009, with the collaboration of FAO (to be budgeted for Phase VIII, with ca. 10 participants from the Barley WG (organization will be taken care of by M. Jalli, M. Rasmussen and L. Ramsay).
- Develop a project plan for pre-breeding for climate change (coordinated by Marja Jalli and Luke Ramsay) to be submitted to the Steering Committee as project proposal of the Barley Working Group, June 2008.

### • **Ring tests**

#### **Tasks for Phase VII**

- *Screening of existing breeding material for barley net blotch, scald and Ramularia, continue exchange of results.*
- *Continue the ring test on barley net blotch (under the coordination of Marja Jalli, Finland) that started as an activity of the Barley Working Group at its meeting in Salsomaggiore in 2000, with the objective of testing the resistance of spring barley breeding material against barley net blotch in different environments (with different population structure).*

#### **Progress made in Phase VII**

The ring test has been actively working during this phase. The number of participants has varied; in 2007 seven countries were involved. The ring test has been carried out with

minimum extra efforts. The benefit of the results varies from year to year, depending from the environmental conditions and the net blotch infection level. Big efforts have been made in evaluating and developing the global barley differential set for *Pyrenophora teres* virulence screenings. In future, the net blotch differential set (nine varieties) could be included in the test to get more knowledge on the pathogen population structure.

Besides the barley net blotch ring test, the ring tests on *Ramularia* and scald were also active.

### **Plan for Phase VIII**

Continue ring tests; aim at attracting the involvement of more partners.

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

### **Tasks for Phase VII**

*The Barley Working Group stressed the importance of facilitating the conservation of wild relatives and encouraged the creation of an On-farm Task Force with a mandate to prepare a list of wild Hordeum spp. occurring in the ECPGR mandate region and to identify species and areas in need of protection, in cooperation with the EU project PGR Forum and the ECPGR In situ Task Force.*

### **Progress made in Phase VII**

No activities were reported. However, relevant information on crop wild relatives can be found in the Crop Wild Relative Information System (CWRIS), Birmingham, UK, established in the framework of the EU-funded project PGR Forum.

### ***Discussion***

Paul Freudenthaler informed the Group that the EU adopted a regulation for marketing of seeds of PGR. Registered PGR are “conservation varieties” (criteria adapted to the region), and seed can be marketed, but with quantitative restrictions. The EU member states have to put this regulation into force by September 2009.

### **Plan for Phase VIII**

Prepare a list of crop wild relative species of barley (or more broadly, cereals) in Europe and ECPGR countries for *in situ* conservation planning, but also as background for the pre-breeding initiative. Sources: CWRIS and Flora Europaea (hosted at Botanical Garden Berlin-Dahlem).

## **Documentation and information**

- **European Barley Database**

### **Tasks for Phase VII**

- *Further develop the European Barley Database (EBDB) at IPK, transfer it to Oracle, and develop new and user-friendly search interfaces. The Barley Working Group is very keen to ensure that the development of the EBDB is guaranteed in the future.*
- *Develop updating mechanisms based on retrieving barley data from EURISCO instead of, or in addition to, requesting new updates from data providers (the contributing genebanks). The mutual access procedures between EURISCO and Central Crop Databases need to be clarified.*
- *Seek cooperation and integration between the EBDB and other international databases and information networks on barley genetic resources (such as the System-wide Information Network for Genetic Resources (SINGER) of the CGIAR, the Global Barley Genetic Resources Inventory, the*

*Germplasm Resources Information Network (GRIN), USA, and the Database on Barley Genes and Genetic Stocks (BGS). A short technical workshop is planned.*

### **Progress made in Phase VII**

The EBDB was re-engineered after the end (2002) of the EU GENRES project on barley, transferred to Oracle, equipped with a new Web interface for searching (however, incompletely – C&E data searchability was not implemented in the new Web interface). Therefore, the “old” version is still accessible. After the end of the Bioinformatics project at IPK (October 2007), the developments came to a halt; the development of the EBDB is presently not safeguarded in terms of staff. The EBDB has not been updated since 1997, except for the inclusion of three non-European collections during the GENRES project (1999-2003). The EBDB was included in a global inventory of barley genetic resources released on CD-ROM in 2004 (J. Konopka, ICARDA).

The recommended technical workshop was not held, the funds were re-allocated to AEGIS by the Steering Committee.

### **Discussion**

Updating the EBDB should be coordinated with the Global Barley Registry. In updating Central Crop Databases, Global Biodiversity Information Facility (GBIF) technology should be widely employed.

Jan Konopka (ICARDA) noted that there are several existing or planned regional and global compilations of data on barley genetic resources: EBDB, EURISCO, Global Barley Registry, and the planned Global Accession-Level Information System. Why not join forces to create one single global system for barley and keep it up-to-date? It was pointed out that the CCDBs sometimes contain not only passport data but also C&E data. Considering a particular crop, the CCDB may also contain more data, for a higher number of accessions than EURISCO, due to different updating mechanisms and policies. Additional crop-specific descriptors are also included in some CCDBs.

### **Plan for Phase VIII**

- Update and upgrade the EBDB.
- Make C&E data from GENRES project searchable through the new Web interface.
- Improve updating mechanisms using Web services technology.
- Include AEGIS-relevant information items (such as additional descriptors, or other information, to be defined).
- Improving BCC documentation (e.g. Web site, previous uses, review).

Support from the EBDB host institution, IPK, will be required to carry out further development of the EBDB, including updating, developing/adopting new mechanisms for updating, improving Web site functionalities, including search facilities for C&E data, etc.

The Group recognizes the strong need for updating the EBDB and maintaining it sustainably, as a prerequisite for the AEGIS process, but also as a one-stop-shop for information on European barley genetic resources for researchers and breeders worldwide.

## **Other matters**

### **Participation of the Vavilov Institute in ECPGR activities**

The Group expressed its concern as to why VIR is not more actively involved in ECPGR. The situation on PGR documentation in VIR was not known. It was considered that the largest genebank in Europe should fully cooperate and that VIR therefore should be represented in the Barley Working Group. The new ECPGR policy of only funding the participation of member countries was not fully accepted.<sup>8</sup>

### **COST860 SUSVAR final meeting**

Marja Jalli submitted greetings from the COST860 SUSVAR final meeting in Denmark (14-17 April 2008). The aim of the workshop was to develop future visions for 2020 to 2030 on sustainable cereal production, which encompass our understanding of recent developments in cereal production and work towards joint visions, design, and analysis of future sustainable cereal production systems. As an output of the meeting, seven papers were written:

- Cereals for food or for biofuels? There are solutions.
- Soil: muck or magic?
- Setting seed free: More voice for more choice in the seed sector.
- Eat more to be healthy.
- Future-proof food – plant breeding strategies to cope with climate change.
- Wholemeal – Good Feel. Cereal grains for healthy food and feed.
- “Ecological dictator” needed for security of land use.

People interested in these papers may request them from Marja Jalli.

### **Priority target characters in barley breeding for organic farming**

George Garland, Ireland, asked the Group about the main priority target characters in barley breeding for organic farming. For Ireland, the highest priority characters are (1) weed suppression, (2) tolerance to barley yellow dwarf virus, (3) lodging resistance. Group members were invited to contact G. Garland and provide relevant information. The following are some of the main points, in addition to the usual conventional breeding requirements, that merit consideration when breeding for an organic regime (summarized from the responses received):

- **Early weed suppression.** This is important in that tillering under an organic regime is not as high as under conventional systems. Breeding should therefore focus on achieving early initial vigorous growth that can compete for light interception more efficiently and effectively than the weeds.
- **Resistance to seed-borne diseases.** As no chemical treatment of seeds is possible under an organic regime it is imperative that varieties with resistance to seed-transmitted diseases, such as loose smut, covered smut, barley leaf stripe, or net blotch, are developed.
- **Resistance to major foliar diseases.** Increased emphasis needs to be placed on a higher level of resistance to the major foliar diseases, as fungicides cannot be used to alleviate subsequent problems, as is the case in the conventional system.
- **Barley yellow dwarf virus (BYDV).** This can present a major problem since aphids seem to find the organic fields most attractive as a feeding venue because chemicals

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<sup>8</sup> The Russian Federation signed membership in ECPGR as of 2009.

are not permitted as a control measure in the organic regime. Varieties need to be developed that have a high tolerance to BYDV.

- **Lodging resistance.** Under Irish conditions this is important as the expression of straw length and usually subsequent lodging is exacerbated by our unique climatic conditions. It can also be further confounded in that varieties with good weed suppression are usually tall.
- **Quality aspects.** End use requirements, i.e. human food, feeding, brewing needs to be catered for in a breeding programme, as food or feed additives are not permitted as part of the food processing in the organic scenario.
- **Varietal evaluation.** All trials involving organic material should always be conducted under certified organic farming conditions using seeds emanating from organic production systems. Results of trials using seeds from conventional sources versus seeds from organic production give different results and only confound the selection process for organic breeders.

### **Recovery of viability in historical seed collections**

George Garland (Ireland) and Isaak Rashal (Latvia) will cooperate in an attempt to recover old Irish barley cultivars, using tissue culture techniques developed for this purpose developed in Latvia.<sup>9</sup>

### **Prioritization of Working Groups within the Cereals Network**

It was concluded that all three Working Groups of the Network should receive equal priority in the next Phase in order to be able to organize full meetings of each of the Groups. On the other hand, a full Network meeting may not be necessary, and thematic meetings with topics of joint interest across the Network (but lower numbers of participants) should be preferred.

### **Working Group and Network workplan principles**

In developing the workplans of the Crop Working Groups and the Network, it was agreed to identify common topics and common approaches to be presented from the Network level to the Steering Committee.

### **Proposed meetings for Phase VIII**

- **Full meeting of the Barley Working Group.** The Group should have the possibility of a regular meeting early in Phase VIII, but also use the opportunity of short business meetings back-to-back with suitable conferences where members of the Group participate (largely without extra costs for ECPGR). The main objective should be to specify the process of joining AEGIS, but also to refine tasks and monitor progress in other items of the workplan. Helmut Knüpfner informed the Group about an official offer from the director of the Agricultural Research Institute, Nicosia, Cyprus, to host the next meeting, which was communicated by Dionysia Fasoula, member of the Barley Working Group, who was unable to attend the present meeting.
- In addition, a **smaller meeting**, possibly with participation from wheat and oats group representatives, should be organized on **pre-breeding**.

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<sup>9</sup> Grauda D, Rashal I. 2007. Recovering of the red and aslike clover genetic resources of the Latvian origin by plant tissue culture. Plant Genetic Resources and their Exploitation in the Plant breeding for Food and Agriculture. Book of Abstracts. 18th EUCARPIA Genetic Resources Section Meeting, 23-26 May 2007, Piešťany, Slovak Republic. SARC – Research Institute of Plant Production, Piešťany, Slovakia. p. 84.

***Election of Chair and Vice-Chair, closing remarks***

At the end of the meeting of the Barley Working Group, the Chair and Vice-Chair (H. Knüpfer and M. Jalli, respectively) were reconfirmed by the Group. The re-elected Chair thanked the participants for their active participation and constructive contributions, and closed the meeting.

## Working Group on Wheat

### Participants:

Vladimir Malo (Albania), Alvina Avagyan (Armenia), Heinrich Grausgruber (Austria), Sevinj Mamedova (Azerbaijan), Adrien Dekeyser (Belgium), Iva Faberová (Czech Republic), Dagmar Janovská (Czech Republic), Erik Tybirk (Denmark), François Balfourier (France), Volker Lind (Germany), Penelope Bebeli (Greece), Lajos Horváth (Hungary), Barry O'Reilly (Ireland), Eitan Millet (Israel), Vija Strazdina (Latvia), Emilija Simeonovska (Macedonia FYR), Asmund Asdal (Norway), Marcin Zaczyński (Poland), Manuela Ibanescu (Romania), Pavol Hauptvogel (Slovakia), Kristiina Antonius (Sweden), Gert Kleijer (Switzerland), Hatice Geren (Turkey), Oleg Leonov (Ukraine), Mike Ambrose (United Kingdom).

### Observers:

Yehoshua Saranga (Israel), Ayfer Tan, Lerzan Aykes, Tuncer Taskin and Meltem Begenc (Turkey), Tom Payne (CIMMYT).

## Country progress reports

G. Kleijer provided a compilation of the country progress reports on wheat:

### Organizations

The Chair of the Working Group presented a compilation of the different country reports. Twenty-five country reports had been received from the following countries: Armenia, Austria, Azerbaijan, Czech Republic, Estonia, France, Germany, Greece, Hungary, Ireland, Israel, Lithuania, Macedonia FYR, The Netherlands, Nordic countries (for Denmark, Finland, Iceland, Sweden and Norway), Norway, Poland, Romania, Serbia, Slovak Republic, Spain, Switzerland, Turkey, Ukraine and United Kingdom.

In all these countries from one to six public organizations are active in the conservation of wheat genetic resources. Private organizations (from 1 to 19) are also involved in 10 countries. Nineteen countries have a national programme and 16 a national collection. One country has a draft national programme.

### Facilities and methods used

The active collection is conserved in 2 countries at 15°C, in 18 countries at +4°C and in 3 countries at -18°C. The base collection is conserved in 4 countries at -4°C and in 19 countries at -18°C. Armenia and Azerbaijan are starting to be equipped at -18°C. Israel and Ukraine have only a part of their accessions stored at -18°C.

The active collection is conserved either in paper bags, glass cans, plastic containers or aluminium laminated foil. The base collection is conserved in aluminium laminated foil (14 countries), aluminium cans (3 countries) or glass cans (9 countries).

## Description, characterization and evaluation of the collections

The current status of the descriptors is as follows:

Status of the data	No. of countries with respective status	
	for the 6 descriptors agreed in 2001	for the 14 descriptors agreed in 2005
Available	9	5
Being processed (evaluation still ongoing; further updates expected)	3	2
Partially documented (results not available for all accessions; no further updates expected)	5	5
Absent	5	10

Other descriptors used by different genebanks include: simple sequence repeat (SSR) markers or other molecular markers; descriptors defining bread-making quality; descriptors of the International Union for the Protection of New Varieties of Plants (UPOV); or others, not specified.

### Wheat germplasm distribution

About 10 000 accessions per year are distributed by the different genebanks, of which 65% are distributed within the country.

### Specific use of the wheat accessions

In most of the countries the wheat accessions are used for breeding and research. Some countries are using them for genetic analyses, demonstration fields or reintroduction of old varieties and landraces or other *Triticum* species (3 countries).

### Documentation and computerization

Fifteen countries have integrated their wheat accessions into the European Wheat Database (EWDB) and six have not yet integrated them. Sixteen countries have integrated their accessions in EURISCO, whereas one country has done this partially and three countries have not.

### Specific activities in documentation

Several specific activities in documentation have been carried out by the different countries such as development of a new database, introduction of additional data or old data in their database, development of an Internet interface, improvement of the data quality, introduction of passport data in the EWDB and/or in EURISCO, addition of descriptor data to the EWDB and development of a specific program for the national genebank.

### Core collections

Core collections have been developed only in 3 countries, 2 countries intend to develop a core collection and in 14 countries there is no core collection.

### **Results of the WG discussion**

Mike Ambrose reported the results of the WG discussion:

#### **Precise genetic stocks**

A sub-group was formed to take the initiative forward (A. Avagyan, Armenia; I. Faberová, Czech Republic; F. Balfourier, France; E. Millet, Israel; G. Kleijer, Switzerland; and M. Ambrose, UK). Communication will be via email. Tasks of the sub-group were outlined:

- Contact other relevant networks (European Wheat Aneuploid Co-operative (EWAC), International Triticeae Mapping Initiative (ITMI), CGIAR Generation Challenge Programme) as to current stocks available.
- Discuss with molecular geneticists as to which classes of stocks would continue to be of use in the future.
- Produce a report for the next WG meeting on the inventory of stocks in the public domain which are freely available and future options for their maintenance and use.
- Consider addressing the need for capacity building, since cytogenetic skills are required if genebanks take on the commitment to conserve genetic stocks.
- Make a reference to crop strategies (comment by M. Ambrose).

#### **European Wheat Database (EWDB)**

Positive elements of the database development were registered:

- It currently holds information on 164 352 *Triticum* and 7827 *Aegilops* accessions (59 institutions from 35 countries).
- There was a recent increase in its functionality for users through linking the EWDB passport records to the online catalogue wheat pedigree and allele databases.
- High value of the presence of characterization data, which are not otherwise available from EURISCO.

A few negative remarks were also noted:

- EWDB is not as frequently updated as EURISCO.
- Only a few countries are actively improving their datasets.
- Slow progress is being made on the agreed workplan.

A revised timetable for data delivery by the WG members was proposed, to be completed in time for the next mid-term ECPGR Steering Committee in 2011.

#### **Planning for Phase VIII: Project proposals**

The Group felt that the Wheat WG should be a priority for Phase VIII. The following suggestions for projects were made:

- Improving searching/tackling of duplicates (*low priority for the Network at this point in time*);
- Evaluation of germplasm for drought tolerance (*interesting but would set a precedent for funding in this area, other initiatives in this area are ongoing*);
- Training of evaluators to improve consistency of evaluations (*would require a meeting and therefore expensive*);
- Pre-breeding proposal utilizing wild species (*not clearly articulated at this point in time therefore decided not to take forward*);
- Capacity building with respect to “precise genetic stocks” in the PGR community in Europe. Identify genebanks which may engage with the long-term conservation of such material and key laboratories for short-term training. Link to the Wheat Precise

Genetic Stocks (WPGS) sub-group initiative on inventory (*may be of interest to other WGs*).

### Wheat WG Priorities (Phase VIII)

- **Task-sharing**
  - General intent within the WG to engage with AEGIS.
  - Genebank managers should start to engage with the task of identifying MAAs and prepare a list of potential AEGIS accessions.
- **Documentation**
  - Quality of EWDB is critical for the AEGIS project. Workplan needs to be completed (*revised timetable for data delivery agreed*).
  - Priority focus on inclusion of characterization data.
- **Characterization and evaluation**
  - Protein content, Zeleny sedimentation index and their ratio are important characters (*protein content is already listed in the EWDB. Sub-group to develop proposal for Zeleny Index and ratio*).
  - Future restrictions on the use of agrochemicals will result in a higher significance of data on responses to pests and diseases (*further discussion required*).
  - Sub-group to develop the initiative relating to precise genetic stocks.
  - WG wanted to develop an overview of genebank work relating to traits associated with climate change. The Chair and Vice-Chair will take the initiative forward.

### Summary of the milestones

- **Sharing capacity**
  - Implementation of AEGIS
    - a. Genebank managers and collection curators will start to engage with the task of identifying European wheat MAAs and prepare a list of potential AEGIS accessions (2009).
    - b. Adoption of the resulting list of European wheat accessions by the Wheat WG members (2010). Safety storage of the European wheat collection accessions in Svalbard (2013).
  - Development of a project for the Cereals Network dealing with capacity building with respect to precise genetic stocks (2008).
  - Formation of a sub-group dealing with the production of a report on precise genetic stocks for the next meeting of the Wheat WG (2010 or 2011).
- **Characterization/evaluation**
  - Introduction of the new quality descriptors
    - a. Zeleny sedimentation index
    - b. Ratio Zeleny index/protein content
  - Provision of all available data by the Wheat WG members for all the 23 descriptors into the EWDB (2011).
  - Preparing an overview before the next Wheat WG meeting of genebank work relating to traits associated with climatic change (2010 or 2011).

- **Documentation/information**

- Include the new passport descriptor – flag for the AEGIS accessions (= European Wheat Collection) and implement relevant information into EWDB (after adoption of the AEGIS list - 2010-2011).
- Implementation of all available characterization/evaluation data into EWDB (2012-2013).
- EWDB continuous update (2009-2013).

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

- No specific activities.

The intention is to have a full meeting of the Wheat WG in Phase VIII.

Gert Kleijer (Chair) and Iva Faberová (Vice-Chair) were willing to stand for a further term and were re-elected unopposed.

## NETWORK ACTIVITIES

### ***Secale* activities and Database**

M. Zaczyński, speaking also on behalf of Z. Bulińska-Radomska, reported on the progress of the European *Secale* Database. Following suggestions from the Ad hoc Rye and Triticale meeting held in 2006 in Nyon, Switzerland, a proposal was made to introduce a duplicate search mechanism and a tool for identification and selection of Most Appropriate Accessions (MAAs). These two database tools will be accessible through the Web interface. It was also decided that passport data and characterization and evaluation (C&E) data be stored in one data system in order to facilitate their use.

A preliminary test will be made regarding the duplicate search mechanism, which is based on the following statements:

1. Same taxon and same accession name
  - a. Same taxon means only Genus and Species (ex. *Secale cereale*). The mechanism cannot use whole taxon name because of different taxonomic systems used in genebanks.
  - b. The mechanism excludes from Accession name:
    - i. National characters (converted into their basic ASCII equivalent)
    - ii. Spaces and punctuations (for comparison use only letters and numbers).

As around 24% of accessions have no given accession name, alternative methods for the identification of duplicates will have to be employed for those accessions. This can be done by using other passport descriptors than those listed above such as other number, donor number and accession number.

Currently, the *Secale* database contains 13 610 accession data from 26 countries and 31 descriptors. Eighteen of these are exactly in EURISCO format. Further details are available in the report of the above-mentioned Triticale and Rye ad hoc meeting.<sup>10</sup>

The *Secale* Database itself is available online at [http://www.ihar.edu.pl/gene\\_bank/secale/secale.html](http://www.ihar.edu.pl/gene_bank/secale/secale.html)).

A renewed database system is planned, which will be fully compatible with the EURISCO passport data format. The *Secale* Database should comprise both characterization and evaluation (C&E) data, which is not the case at present. Nine additional descriptors should be included in the new data system. These are the following:

1. Growth class
2. Plant height
3. Susceptibility to powdery mildew
4. Susceptibility to stem rust
5. Susceptibility to leaf rust
6. Susceptibility to *Fusarium* head blight
7. Susceptibility to eyespot
8. Thousand-kernel weight
9. Grain – crude protein content

<sup>10</sup> Kleijer G, Häner R, Knüpffer H, compilers. 2007. Triticale and Rye Genetic Resources in Europe. Ad hoc Meeting, 28 September 2006, Nyon, Switzerland. Bioversity International, Rome, Italy. ([http://www.ecpgr.cgiar.org/Networks/Cereals/Triticale\\_Rye\\_Sept06.pdf](http://www.ecpgr.cgiar.org/Networks/Cereals/Triticale_Rye_Sept06.pdf)).

## Triticale activities and Database

Gert Kleijer reported that the European Triticale Database (ETDB) was created in 1999 with 5203 accessions from 9 different genebanks coming from 8 countries. In 2007 the database contained 13 822 accessions from 18 genebanks coming from 18 countries. For several genebanks an update from EURISCO has been carried out. The EURISCO descriptors are used for the ETDB.

More than 60% of the accessions are of European origin. Data are missing for a number of descriptors. The most frequent descriptors are "accession name" (98.7%) and "acquisition date" (91.5%). The important descriptor "availability of the accessions" is documented for 56.1% of the accessions. Sixty-five percent of the accessions are breeding material or breeding lines, probably due to the fact that most genebanks are linked to a breeding programme and that triticale is still a very young crop. An estimate of the duplicates in the ETDB based on accession number and holding institute is between 20 and 25%. This is very low compared to other crops, probably due to the high number of breeding lines amongst the accessions.

The ETDB has been online since January 2008 at the following address: <http://www.bdn.ch/pages/edtb/>.

Future activities of the ETDB will be to update and contact the different genebanks, include additional descriptors, improve the Web site and implement AEGIS.

### *Discussion*

The nature of a wild Triticale accession reported in the Database was questioned and it remained uncertain.

No information was available regarding the number of initial crosses between *Triticum* and *Secale*.

## Maize activities and Database

Violeta Andjelkovic illustrated the history of the establishment in the early 1960s of the Genebank of the Maize Research Institute (MRI), with the aim to collect, characterize, classify, evaluate and maintain material from both Yugoslavia and the world. Today, the basic collection consists of 2178 samples of local Yugoslav populations and 3259 samples of synthetics, composites, populations and inbred lines collected throughout the world. The unique collection of local populations is considered the most valuable resource of the Maize Research Institute. The high variability of these genotypes has been determined, since the collected material originates from almost all ecogeographical areas.

The collection of domestic maize populations has been fully characterized in line with the Maize Descriptors developed by the International Board for Plant Genetic Resources (IBPGR, now Bioversity International) and CIMMYT.<sup>11</sup>

In recent years, molecular marker analysis of some of the local populations was also carried out with restriction fragment length polymorphism (RFLP) and random amplified polymorphic DNA (RAPD) for identification of variability and duplicate accessions. Although duplicates were not found, suspected duplicate accessions showed the highest genetic similarities. Local populations have also been screened through AFLP and SSR analysis in order to develop fingerprints for their characterization, identification and classification, as well as for estimation of their genetic diversity.

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<sup>11</sup> IBPGR and CIMMYT. 1991. Descriptors for Maize. International Maize and Wheat Improvement Center, Mexico City; International Board for Plant Genetic Resources, Rome.

Searching for new sources of beneficial alleles in the Genebank's germplasm was also performed for several traits. The whole collection of maize germplasm (more than 4000 entries) was tested in the field for presence of restorer cytoplasm for the gene *ms10*. This experiment revealed almost 100 sources of male sterile cytoplasm.

Testing with a broad spectrum of herbicides resulted in the identification of resistance to the Pivot herbicide (active ingredient imazethapyr) and the genes controlling this trait were found to be dominant. Testing for drought resistance is ongoing after a first screening carried out on 6371 accessions that were subjected to water stress in experimental fields in Egypt, where 10% of the genotypes were selected for further testing.

Genebank operations are carried out at three levels:

1. *In-company PGR conservation and management activities* include collecting and storing maize accessions, characterization, evaluation and documentation of the germplasm, pre-breeding activities and core collection establishment.
2. *National level PGR conservation and management activities*: MRI has over 15 years of unique expertise in managing the Yugoslav PGR collection database (55 species; 5437 accessions), as well as over ten years of expertise in *ex situ* storage (35 species; 3803 accessions) and management of the Yugoslav PGR collection.
3. *European level PGR activities*: the European Maize Database (EMDB) is intended to compile all available data on maize from European genebanks. The ECPGR Maize database was established at the Maize Research Institute Zemun Polje, Belgrade, Serbia on the initiative of ECPGR in 1996. The EMDB includes data from 13 countries and a total of 11 865 accessions (Table 1).

**Table 1.** Institutions contributing to the European Maize Database

Institution	Country	No. of accessions
Bundesamt für Agrobiologie	Austria	23
Institute for Plant Genetic Resources "K. Malkov"	Bulgaria	464
Genebank, Crop Research Institute	Czech Republic	914
Institut National de la Recherche Agronomique	France	15
Leibniz-Institut für Pflanzengenetik und Kulturpflanzenforschung	Germany	948
Cereal Institute – National Agriculture Research Foundation	Greece	272
Istituto Sperimentale per la Cerealicoltura	Italy	201
Banco Português de Germoplasma Vegetal	Portugal	562
ZealInvent	Slovakia	488
Centro de Investigaciones Agrarias de Mabegondo	Spain	900
Centre for Genetic Resources (CPRO-DLO)	Netherlands	135
Aegean Agricultural Research Institute	Turkey	1506
Maize Research Institute	Serbia	5437
<b>Total</b>		<b>11865</b>

All the activities carried out at the Genebank for Maize serve as a good basis for further successful development of new and useful germplasm. Increased international cooperation with genebanks regarding all aspects of genebank activities (characterization, evaluation, pre-breeding and germplasm exchange) would be tremendously beneficial for maize breeding development and for the development of agriculture in general.

## Minor cereals activities

Dagmar Janovská reported that the ECPGR Minor Crops Network held a meeting of its Coordinating Group for the first time in 1999 in Turku, Finland. “Minor crops”, and minor cereals among them, were identified as crops with limited production and consumption levels, sometimes restricted to a specific area where ecological and market niches exist or as neglected or underutilized crops, etc. However, in 2003 the Minor Crops Network was terminated.

The utilization of Minor Crops is very wide. They can provide specific quality products for a more balanced diet and increase agro-biodiversity. They have relatively lower demands for pesticides and fertilizers, which designated them for use in low input systems and on less favourable land.

Since minor wheat, barley, oat, and rye are included in the respective major crop collections and databases, we will focus on other minor cereals. Table 2 shows numbers of accessions of minor crops in EURISCO and in the minor crops collection in the Czech Gene Bank. Species in bold were chosen by the Minor Crop Network as priority crops.

**Table 2.** Number of minor crops' accessions recorded in EURISCO and in the Czech Gene Bank

Species	No. of accessions	
	in EURISCO	in the Czech Gene Bank
<i>Sorghum bicolor</i>	941	40
<b><i>Panicum miliaceum</i></b>	<b>15257</b>	<b>179</b>
<i>Setaria italica</i>	354	41
<i>Echinochloa frumentacea</i>	20	1
<i>Digitaria sanguinalis</i>	18	3
<b><i>Fagopyrum esculentum</i></b>	<b>4007</b>	<b>126</b>
<i>Fagopyrum tataricum</i>	173	49
<i>Amaranthus</i> sp.	1494	124
<i>Chenopodium quinoa</i>	82	3

The Czech Gene Bank undertakes many national and international projects focused on minor crops, such as the EU Sixth Framework Programme project on “Adding value to holy grain: providing the key tools for the exploitation of amaranth – the protein-rich grain of the Aztecs”, where the immediate objective is to provide the tools for an extensive and sustainable exploitation of amaranth.

Future activities at the European level, focused on Minor Crops, include the intention to create databases on Minor Cereals (*Amaranthus*, proso millet, buckwheat), cooperation with other organizations and institutes, recommendations for their utilization and support of public awareness etc. The establishment of a Working Group on “Other Cereals”, including all cereals except *Avena*, *Hordeum* and *Triticum* genera should be recommended.

## THEMATIC ISSUES

### **Crop strategies of the Global Crop Diversity Trust, and Global Crop Registries of the CGIAR**

#### ***Introduction to crop strategies***

Tom Payne described the guidelines that are informing the process of development of the global crop conservation strategies, which include the identification of important collections and assignment of priorities, the rationalization of global crop conservation, the recognition of threatened collections and ensuring strong links with users. Regarding the cereals strategies, maize, sorghum and wheat had been already completed. Barley (facilitator Jan Valkoun), Oats (Lothar Frese and Christoph Germeier) and Rice (Ruaraidh Sackville-Hamilton) were still in progress. The development of these strategies involved respected crop scientists, strategic advisory groups, regional networks (e.g. ECPGR), interested supporters (e.g. Grains Research and Development Corporation (GRDC), Australia), the Global Crop Diversity Trust, and surveys were made of genebank managers, specialist collections and users of genebanks.

#### ***Introduction to Global Crop Registries of the CGIAR project GPG2 and the Global Barley Registries***

J. Konopka informed the meeting that the System-wide Genetic Resources Programme (SGRP) of the CGIAR has started the second phase of the project on Collective Action for the rehabilitation of Global Public Goods (GPG2) in 2007. One of the activities is dedicated to the design and validation of a crop registry model for priority collections and collections in common (among CGIAR centres). The experience from earlier work on the Global Inventory of Barley Genetic Resources, developed and published in 2004 on CD-ROM, will be taken into account. Seven new Registries for Rice (IRRI), Wheat (CIMMYT), Chickpea (ICRISAT), Cassava (CIAT), *Musa* (Bioversity), Forages (ILRI) and Potato (CIP) will be developed in addition to re-developing the Global Barley Inventory into a Barley Registry at ICARDA.

Each registry will contain the consolidated list of accessions and associated information for a "virtual global crop collection" and will be accessible through the Internet. In other words, the crop registry will be a new stand-alone catalogue of crop germplasm conserved in major genebanks around the globe. The important objective is cross-referencing of accessions in different collections which leads to the identification of overlap between collections. In the future, the crop registry can be a one-stop gateway to locating specific germplasm in the genebank nearest to the scientist. A very important consideration is that each registry should be built in coordination with other crop databases, e.g. those established within ECPGR. At first, the crop registry will only house passport data; "horizontal" extension by adding characterization and evaluation data is possible, but this will depend on the interest and willingness of data providers.

The data standards, technical options for data harvesting from multiple data providers as well as models for international crop databases were discussed.

Examples from the Global Inventory of Barley Genetic Resources, 2004 version, were discussed to illustrate the possible functionality and use of such a data system. The Inventory shows that less than 50% of the material in 60 genebanks is not replicated and that some 35% of accessions are replicated in several collections.

The Global Barley Registry will be released in 2008. The meeting on Strategy of Conservation and Use of Barley Genetic Resources, held in Tunis, September 2007, suggested the establishment of an Advisory Group (composed of prominent scientists) to guide the Barley Registry development.

#### *Discussion*

C. Germeier asked on which information the duplicate search was based and J. Konopka replied that it was based on names, sites and collecting numbers.

#### **Strategy for Wheat (including Aegilops, rye and triticale), and the Global Wheat Registry**

Tom Payne explained that the “Global Strategy for the *ex situ* Conservation with Enhanced Access to Wheat, Rye and Triticale Genetic Resources” was the result of consultations involving genetic resource specialists and crop researchers. The authors, a Strategic Advisory Group, foresee a strategy that will serve as a dynamic work in progress, ever evolving as the client base of collections broaden and vary, as the collections themselves change, and as the world community becomes more aware of the incalculable value of crop genetic diversity. They strongly endorse the support of conservation networks, involving diverse stakeholders, oriented towards regional demands, and even involving crops beyond those discussed directly in this report. Bridging diverse cultures, philosophies, approaches to research, development and business, to achieve greater and more sustainable food and agricultural development in the light of increased awareness of our changing climate are goals we can only fully achieve together.

The Strategy Advisory Group was composed of a small group of experts with global experience in all aspects of the conservation and use of the genetic resources of wheat, rye and triticale. The major germplasm collections of wheat, rye and triticale globally were identified from existing public databases including those held by the FAO, Bioversity International and ECPGR. Particular emphasis was given to identification of collections holding unique accessions of wild relatives and genetic stocks of wheat. The wild relatives of wheat have proved to be highly useful sources of resistance to biotic and abiotic stresses in wheat breeding over the last two decades and this trend is expected to accelerate in the future. Similarly, genetic stocks are finding increasing use as tools in the sophisticated application of modern biotechnologies in wheat improvement. Surveys were conducted of genebank managers and users (primarily wheat breeders). Catalogues of collections of precise genetic stocks and wild relatives of wheat were also compiled. Using information gleaned from the surveys and the Strategy Advisory Group, a list of key collections that should be targeted for inclusion in global networks of wheat, rye and triticale genetic resources was developed. High priority is given to the identification of gaps in the existing collections, establishment of priorities to fill those gaps and plans to meet the most urgent needs identified through this process. Evaluation of options for the development of integrated information management systems for the global networks of collections of each of the crops and how these fitted with both current developments by strong existing networks as well as broad developments in the field of information technology was roundly endorsed.

The full strategy document can be found at <http://www.croptrust.org/documents/cropstrategies/wheat.pdf>.

#### *Discussion*

Mike Ambrose asked about the issue of sustaining the strategies, how will these be implemented.

Tom Payne replied that the strategies are not a proposal, but a road map. They were never perceived as projects to be funded, but collectively, institutes can move in that direction, step by step. The Trust has however started to support the global community with regeneration and evaluation grants.

Jan Engels asked about the relationship between Trust-funded initiatives and agreed priorities in the strategies. In particular, how about the non-key collections that are perhaps more threatened than others.

Tom Payne shared the same concern that the collections that we don't know about might be the most valuable. There are scientists at the universities with desks full of material, but who may be unable to tackle the conservation issue. CIMMYT is informally involved, with a central role in promoting the strategies, but there is hope that "the community will act as a community" in order to start solving its own problems.

### **Strategy for Barley**

J. Konopka described the principles and the process leading to the development of a global barley conservation strategy and specifically the results of the Workshop held in Tunis, Tunisia on 4-6 September 2007. Barley genetic resources were defined as modern cultivars in current use, obsolete cultivars (often the elite cultivars of the past), landraces, wild relatives in the genus *Hordeum*, genetic and cytogenetic stocks and breeding lines. The total size of collections had been estimated to be over 402 000 accessions, with 32% of landraces, 12% breeding material, 11% cultivars, 11% wild material and 6% genetic stocks. Status was unknown for 28% of the accessions.

Regeneration needs were evaluated, and first priority was given to wild species and genetic stocks. Major collections, such as Plant Gene Resources of Canada (PGRC), USDA, ICARDA and IPK Germany were in good shape, with high germplasm availability for all the categories. Urgent regeneration needs were identified in Eritrea, Ethiopia, Mongolia, Iran and Peru.

Safety-duplication needs were also identified, with highest priority for wild relatives, landraces and genetic stocks.

The information management status was analysed and a number of recommendations had been made, indicating that researchers and breeders will require, first of all, evaluation data.

The need was expressed to strengthen capacity of National Programmes in documentation and to develop crop portals. Geo-referencing was encouraged, being mainly important for wild material and landraces. Set-specific variables/descriptors may be required, e.g. for genetic stocks.

A number of gaps and threats had been identified, for example *H. vulgare* subsp. *spontaneum* and other wild relatives are endangered because of habitat loss by overgrazing, changes in land use and other negative human-induced activities. Landraces are gradually being replaced with improved germplasm, but they are still grown in low-input farming systems in marginal and stress-affected areas. To assess accurately the gaps in the *ex situ* collections, it is necessary to complete geo-referencing of existing collections as fully as possible and to map the collection sites onto the distribution area of natural populations of wild relatives and landrace-growing regions.

Collaboration and coordination among existing Networks needs to be strengthened, in particular to ensure evaluation using a common set of germplasm (e.g. based on the International Barley Core Collection), to promote molecular characterization, diversity analysis and climate modelling. It was suggested that the Barley Genetic Resources Committee of the International Barley Genetic Symposium be re-established.

As a strategic approach to conserving the barley gene pool, the strategy concluded that key collections may be the basis of a global network providing diversity to the international community of users. Twenty-one genebanks holding about 240 000 accessions were considered to rank highest in terms of structure, quality of operations and accessibility of the material.

A Global Barley Conservation Strategy Advisory Group was constituted at the Tunis meeting to facilitate the next steps for the implementation of the strategy. The Group will be responsible for periodically reviewing the strategy, assessing its implementation and identifying threatened collections and orphan collections.

### **Strategy for Oats**

C. Germeier explained that an analysis of the world *ex situ* collections of *Avena* species (oats) was carried out in 2006-07, supported by the Global Crop Diversity Trust. Based on questionnaires and genetic resource databases such as GRIN, GRIN-CA, EURISCO, the European *Avena* Database and the Bioversity Directory of Germplasm Collections, an attempt was made to get an updated picture on the structure of the world's collections. The questionnaire was answered by curators of 38 collections, which represent about 80% of the *Avena* accessions known to the Bioversity Directory. Additional information on management and constraints was requested. The results were discussed in experts and stakeholders meetings in Fargo, United States and St. Petersburg, Russian Federation.

While the centres of diversity for wild *Avena* are around the Mediterranean, especially in Spain, North Africa and the Middle East, only Israel, Morocco and Turkey hold significant collections (>100 accessions) of wild *Avena* species in this region. The largest *Avena* collections are held in North America (Canada, USA), Russia, Germany, Australia, Kenya and China. Some *Avena* species are extremely rare in *ex situ* collections: these are the diploid *A. nuda* L. (= *A. strigosa* subsp. *nudibrevis* (Vav.) Kobyl. et Rod.) (39 accessions), *A. atlantica* (41), *A. damascena* (28), *A. ventricosa* (14) and the tetraploids *A. macrostachya* (13), *A. agadiriana* (37), *A. insularis* (14) and *A. murphyi* (85). Analysis of correspondence was used to visualize unique collection structures based on taxa and country of origin. As unique collections the Moroccan, the British Institute of Biological, Environmental and Rural Sciences (IBERS), Aberystwyth and the Israeli Lieberman collections were highlighted, mainly because of their highly specific wild species collections; furthermore the Spanish, Tunisian, Chinese, Romanian, Peruvian and Latvian collections were also distinguished because of their focus on material of national origins not well represented in other collections. Strategy documents are available at <http://www.croptrust.org/documents/cropstrategies/Oat.pdf>.

During the St. Petersburg meeting a Global Oat Diversity Network with two task forces (Documentation and Information; and Pre-breeding) were established. Interest in participating should be expressed to A. Diederichsen, NordGen, Sweden (axel.diederichsen@nordgen.org).

### **Global Crop Diversity Trust: European Regeneration Project for cereals and grain legumes**

Mike Ambrose explained that the Global Crop Diversity Trust intends to identify key *ex situ* collections that are essential to the global community, including unique or specialist material and they are working to ensure safety-duplication in international collections (including Svalbard). The importance of networking and coordination of this effort was underlined and ECPGR was recognized by the Trust as the coordinating network in Europe. The ECPGR Secretariat was approached by the Trust on 16 October 2007, with an invitation to collate proposals for priority regeneration and safety-duplication of collections for funding over

3 years. Among the crops of relevance for Europe, only the following Annex 1 crops were considered eligible: wheat, barley, finger millet, rice, sorghum, chickpea, faba bean, lentil, grass pea and potato. The proposals should cover only material originating within the region and not duplicated in a CGIAR or other international collection. Accessions should be at risk, e.g. with reduced viability. Accessions should be available on terms consistent with the International Treaty. There must be willingness to safety-duplicate the material in an international collection. Proposals could include an element of characterization, particularly of traits associated with climate change.

The relevant Network Coordinators were contacted by the ECPGR Secretariat and data were compiled in a proposal that was sent to the Trust on 30 November 2007. The proposal, compiled by Mike Ambrose, Roel Hoekstra, Helmut Knüpffer and Lorenzo Maggioni, involved 10 countries (Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Georgia, Hungary, Israel, Portugal and Ukraine). In the case of cereals, 9 countries are included, representing 12 collections. The amount requested for cereals amounted to US\$ 125 193 for the regeneration of 3790 accessions of wheat (1228), barley (1119), *Aegilops* (750), maize (339), rice (60), sorghum (159) and millet (135). The requested total for the full proposal, including cereals, grain legumes and potato amounted to US\$ 201 060. A formal response from the Trust was received on 18 April 2008, where differences in regeneration costs were queried and available funds were capped at 45% of the original request. The ECPGR Secretariat and Network Coordinators will therefore enter a period of dialogue with the Trust to clarify details of the proposal and mode of operation.

The coordinating role of ECPGR within Europe was clearly demonstrated as important. The compilation exercise provided a quantified overview of current regeneration problems. Other areas where ECPGR might be called on to respond could be identified, one example being safety-duplication.

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

### ***Pre-breeding in barley, and report from the Pre-Breeding Workshop in Beijing, China, October 2006***

M. Jalli reported that an *Expert Consultation on Germplasm Enhancement and Broadening the Genetic Base of Crop Varieties on-farm in Support of Sustainable Agriculture Production* was held in Beijing, China, in October 2006. The workshop was organized by Bioversity International and the Institute of Crop Sciences of the Chinese Academy of Agricultural Sciences. It is increasingly accepted that sustainable future crop productivity can only be achieved through broader use of PGR, including wild relatives and exotic materials, using different approaches within plant breeding. Twenty-seven experts from 15 countries shared their experiences on the methodologies for pre-breeding/germplasm enhancement and broadening the genetic base of crop varieties. The need for initiating collaborative activities at the regional and global levels was discussed and crops were identified for development proposals. Crucial items in developing the base-broadening are (i) understanding the missing diversity in the system, (ii) developing cooperation between genebanks, breeders, farmers and end-users, (iii) ensuring accessibility to good quality passport and evaluation data and (iv) making information available to stakeholders and politicians. The outcome of the Beijing workshop perfectly supports the planned pre-breeding activities of the ECPGR Cereals Network.

### ***On-farm conservation of wheat in Turkey***

A. Tan and L. Aykas presented the results of a project carried out on the basis of the “National Plan for *in situ* Conservation of Genetic Diversity in Turkey”, focusing on on-farm conservation of beans (*Phaseolus vulgaris* and *P. coccineus*), lentil, chickpea and two species of hulled wheat, einkorn (*Triticum monoccocum*) and emmer (*T. diccicum*). Landraces are being studied for the possibility of on-farm conservation with the active participation of the farmers in five provinces of the North Western Transitional Zone. The project is fully financed by the Government of Turkey (Turkish Scientific and Technical Board and Ministry of Agriculture and Rural Affairs) and is coordinated by AARI, with involvement of local institutions, NGOs and local farmers.

Eco-geographical and socio-economic surveys for hulled wheat landraces were carried out to determine the distribution of landraces and socio-economic aspects of landrace cultivation. Other landraces grown in the transitional zone and traditional agricultural practices were inventoried. Seed samples and herbarium specimens were collected for conservation and future reference. Agro-morphological studies were carried out on plants produced from seed samples of the landraces, grown at the Anadolu Agricultural Research Institute. A project database was established and linked with Geographical Information Systems (GIS), which made it possible to have comprehensive analysis of both the collections made in former years and the collections made in the framework of this project.

Overall, 1846 landraces of cereals, industrial crops, forage crops, food legumes and vegetables were recorded in the study sites. Forty-one villages were surveyed to record the general information about each village, crop and animal production in the village and marketing and seed exchange mechanisms. This region appears to have retained traditional farming methods to a higher degree than in the intensively cultivated coastal region or the Anatolian plateau. The farm population in the region is fully integrated into the national economy and culture of Turkey. Agricultural Development Programmes have been providing improved varieties through the seed corporation, which causes the landrace planting areas to decline. However, fragmentation of holdings allows farmers to manage several fields and to cultivate landraces in at least one field. Marginal agronomic conditions, especially steep slopes and the heterogeneous soils of mountainous lands, make landraces competitive with improved varieties. Farmers keep landraces in fields that are relatively marginal and with poorer soils, steeper slopes and higher altitudes. Economic isolation in the mountainous areas creates market imperfections and lessens the competitive commercial advantage of improved varieties. Cultural and traditional demands and preferences for diversity cause farmers to maintain landraces. Most of the farmers support the idea of the maintenance of landraces. But they are worried about the lack of interest of the younger generations in continuing to work on the farms.

Hulled wheat, einkorn and emmer cultivation has declined and is limited to the Northwest and Northeast of Anatolia. Agro-morphological characterization of 81 hulled wheat landrace accessions was conducted and interpreted by Principal Component Analysis and Interpolation Analysis by using GIS. High variation was observed for spike density, plant height, number of spikelets per spike, number of seeds per spikelet, seed size, 1000-seed weight and grain filling. Suitability to low input and traditional agricultural systems, good adaptation to marginal lands, scarce competition with other crops, good competition with weeds in the field, potential for ecological farming, marketing potential (niche market and increased demand for bulgur of einkorn), nutritional value of hulled wheat for food and feeding are promising points in favour of the on-farm maintenance of hulled wheat. Public awareness, participatory approaches for conservation and improvement and legislation needs are important points to be considered.

## Documentation and information

### ***Update on the EURISCO search catalogue***

Sónia Dias, EURISCO Coordinator, presented the progress of EURISCO and views on its future. She described the Network of National Focal Points and its mode of operation and the progress in the EURISCO catalogue since its inception in 2003 up to the present. The features of the new Web site and searching options were described. At the time of the Network meeting, EURISCO provided data for 1 101 000 accessions held by 230 institutions in 35 countries. These refer to more than 8500 species from more than 1300 genera and the material was collected in more than 19 300 sites in 199 countries. She described the results of an external evaluation of the catalogue, commissioned by Bioversity, which identified the EURISCO strengths and weaknesses and provided recommendations for the future. Future issues to focus on include provision of further support to countries (National Inventory and National Focal Points), revision of the uploading mechanism, improvement of data quality, further improvement of Web site and search components, further links to other data types, revision of standards, etc.

Key issues for the future include the need for an increased sustainable participation of genebanks/National Programmes in exchanging information about the germplasm they hold; exploring ways to integrate other collections in National Inventory/EURISCO and in ECCDBs; promoting standards within the scientific community; and raising awareness within existing networks about the value of such information resources.

Iva Faberová, who had conducted a survey about EURISCO among National Focal Points and CCDB managers, also distributed a questionnaire to all participants of the present meeting.

### ***Information about the EPGRIS3 meeting***

L. Maggioni informed the Network about an EPGRIS3 ([www.epgris3.eu](http://www.epgris3.eu)) meeting held at the Central Office of the Federal Agency for Agriculture and Food (BLE) in Bonn, Germany, in March 2008.

Three project activities were on the agenda, specifically to discuss opportunities arising from the existing PGR information infrastructures in Europe for:

1. the registration procedure for European material under the Multilateral System (MLS) of the International Treaty;
2. the reporting procedure under the Standard Material Transfer Agreement (SMTA) of the MLS of the International Treaty for European providers; and
3. the relationship between EURISCO and the European Central Crop Databases (ECCDBs).

A proposal was made to adopt new descriptors in EURISCO that would enable the registration, through the European National Inventories, of accessions that are part of the MLS and of those that are part of AEGIS. The EURISCO catalogue would then serve as a regional interface for Europe to report on material included in the MLS to the International Treaty Secretariat.

Discussion also focused on suitable additional descriptors that would enable EURISCO to serve as a regional infrastructure to record germplasm transactions taking place in Europe and therefore to serve as the reporting mechanism on concluded SMTAs to the International Treaty Secretariat.

Technical issues were thoroughly discussed and suitable solutions proposed. The possible implementation of these mechanisms will be tabled for discussion at the ECPGR Steering Committee meeting in September 2008. If agreed, and based on its future results this ECPGR initiative could be reported to the Governing Body of the International Treaty as an example that could be used by other regions.

The issue of the relationship between EURISCO and the ECCDBs was introduced by a presentation illustrating the discrepancies among these two documentation systems. The status of development of the 62 existing ECPGR databases was also reported, showing that ECCDBs contain data for nearly 750 000 accessions, but only 12 databases (20%) contain partial sets of characterization data. It was noted that ECCDBs have different roles from EURISCO and obtain data from different sources. This explains some of the data discrepancies (i.e. historical data are sometimes included in ECCDBs; only a selection of national data is included in EURISCO, at the discretion of the individual countries). It was agreed that the objectives of the ECCDBs would need to be more precisely defined in order to better serve the needs of the ECPGR Working Groups. To ensure efficient maintenance and update of the ECCDBs, it would be useful to define the ECPGR quality criteria for ECCDBs and have formal agreements signed between ECPGR and the institutions hosting the databases.

Under the leadership of Theo van Hintum (Centre for Genetic Resources, The Netherlands (CGN)), EPGRIS3 activity partners agreed that the best way forward would be to draft a "Vision paper for a European PGR information and documentation landscape". This document will be presented to the Steering Committee at its next meeting in September 2008. It could serve as a foundation to create a consensus within the ECPGR Networks, in order to move in a common direction for the establishment of a more efficient PGR documentation and information environment in Europe.

### *Discussion*

Mike Ambrose asked the opinion of the meeting about the need to present in the most convincing way the respective value of EURISCO and of the ECCDBs to implementing agencies and donors.

Christoph Germeier commented that the Central Crop Databases respond to the needs of users, while EURISCO responds to the needs of administrators.

Gert Kleijer put on the table the issue of characterization and evaluation data, asking whether there were plans to include these in EURISCO in the future.

Lorenzo Maggioni replied that there was no clear decision made and the options could be described in the "Vision paper".

Mike Ambrose commented that the Crop Networks should have the opportunity to contribute to the Vision Paper, before it goes to the Steering Committee in September.

## WRAP-UP SESSION

H. Knüpffer suggested that, during the identification of priorities for the future at Network and Working Group levels, the Network should undertake a few relevant joint actions and therefore demonstrate its cohesion. One example is the pre-breeding activity, which will be led by the Barley WG, with participation of Wheat and *Avena* WGs' members.

The participants asked J. Engels to prepare a summary of his observations on the feedback received from the WGs regarding AEGIS, to be presented on the last day, and also to clarify a few points that seemed to have generated different interpretations of the AEGIS process.

It was agreed that the ECPGR Secretariat would be available to distribute the PowerPoint presentations made during the meeting to anybody who would be interested in receiving them.

## CONCLUSION

### Address to the Network by the AEGIS Coordinator

#### ***Observations made during the discussions and presentations regarding AEGIS***

The Cereals Network meeting demonstrated throughout that there is significant interest and preparedness in taking the AEGIS ideas and principles forward. However, from observations made during the meeting as well as from discussions with individuals and smaller groups it seems justified and necessary to list a number of the topics and issues that seem to be interpreted in different ways.

1. There exists a strong view that AEGIS is about identifying and eliminating duplicates in collections. However, this is not what AEGIS is aiming at. The objective is simply not to include evident duplicates in the European Collection. Therefore, an agreed procedure will be used to decide on the "Most Appropriate Accessions" (MAAs) to be included in the European Collection, among those that will be offered for inclusion by the member countries. This is very different from trying to identify all the duplicates in all the existing European collections, and it is more effective and cost-efficient. Moreover, the elimination of accessions from existing collections is not foreseen as an AEGIS activity, this is left to the individual countries and institutions.
2. It should also be noted that AEGIS is not intending to eliminate duplicates from the respective collections or to interfere with internal decisions on the scope and objectives of individual institutions. The objective is to use the identified sub-set of MAAs as a means to further improve the quality of management of the collections in Europe through adherence to commonly agreed standards, to ensure that these accessions remain readily available and to use these accessions as a priority for characterization, evaluation and distribution at the regional level. It is anticipated that the introduction of a Quality Management System for the management of the European Collection will also improve the management quality of the other germplasm.

3. With respect to the process of identifying the MAAs a few points should be noted:
  - a. The primary or general criteria are very much intended to facilitate the aims of the European Region and the countries to implement the International Treaty as well as to ensure that all important accessions are well conserved. These criteria are intended to be applicable to all crops throughout Europe and refer to the genetic, agronomic, cultural and historical importance of accessions. The criteria intend to be inclusive of all types of plant genetic resources, keeping in mind that it remains a national decision what to include in the European Collection.
  - b. The secondary criteria are those that might vary from one crop to another and which the Working Groups are requested to develop and to agree upon. This has not yet happened for most of the crops and this seems to be one area of "confusion".
  - c. It was noted from the presentations and discussions that the criteria have been considered in a rather dogmatic manner. This was not the original intention and a rather more flexible approach seems to be required in order to allow for a meaningful selection process. In particular, the "genetic uniqueness" is more a general guideline than a fixed requirement. There is no intention to prove the genetic uniqueness of all the MAAs, but only to avoid evident redundancies in the collection. Furthermore, through the inclusion of cultural and historic considerations in selecting MAAs it is believed that sufficient room is left for a rather flexible approach. Also, the wording of both primary and secondary criteria is not final and suggestions for improvement are welcome.
  - d. It was further noted that the lack of information and data for some of the criteria could easily lead to very wrong conclusions. Consequently, it is suggested that the WGs take an approach that would be based on priority considerations of the accessions to be included and would not "discriminate" strongly against accessions that lack information. The process of selecting MAAs should be conducted using a step-by-step approach; for instance, start with the accessions that have originally been collected and/or bred in a given country and add new ones and/or allow for future reviews as more information becomes available.
  - e. Some comments have been made that considering the existing constraints to the identification of MAAs it would be wrong to call the resulting set of accessions "the European Collection". It is proposed that the AEGIS Advisory Committee gives some further thoughts to this aspect and provides more guidance on how best to proceed with the process.
4. The role of the model crops is another area of concern. It was intended by the Steering Committee to base future decisions on the experiences gained from work on these four chosen model crops. Consequently, it is important that all Working Groups directly concerned with these model crops should fully accept their responsibilities and proceed with the tasks assigned in a timely manner to allow comprehensive reporting to the Steering Committee. This reporting should reflect on all the constraints encountered, on suggestions how to improve the process, time horizon considerations etc.
5. In view of the above point it is suggested that the "non-model crops" wait for the outcome of the results obtained by the model crops and only embark on the MAA selection process when sufficient clarity on the process has been established (i.e. following the next Steering Committee meeting in September 2008).
6. It is noted that the process of establishing European Crop Collections is a delicate and very important one, that should allow all partners to play an active role and that the result at the end of the process is more important than the meeting of deadlines.

7. A significant concern was expressed that in general, individuals who have to play a major role in the identification of MAAs have no or very limited time and resources to complete these tasks and that this could easily lead to significant delays. The overall situation for scientists and experts in Europe with respect to the possibility of providing voluntarily contributions to ECPGR has drastically changed, and this should be taken into consideration when tasking specific responsibilities to individuals or groups. Consequently, it is suggested that this matter be brought to the attention of the Steering Committee.
8. The entire concept of AEGIS is based on the principle of a decentralized collection and all its organizational structure and mode of operation is a consequence of this approach, which was the prevailing view expressed by the member countries on several occasions (through surveys and questionnaires). It is not foreseen that AEGIS will gradually move towards an increased centralization of the collections, unless the member countries collectively decide to change their approach to conservation at the regional level.
9. The decentralized mode of operation of AEGIS also means that an active participation in AEGIS does not only depend on the actual presence of MAAs in a given genebank. It could well be that the role of some (smaller) genebanks might shift from conserving what others already conserve towards (a) serving their own constituencies and specific users; (b) conserving specific accessions; (c) offering their expertise for regeneration and characterization etc.; and (d) making use of their specific agro-ecological conditions, among others, for the evaluation of germplasm. The role in AEGIS would relate to services under b, c and d and actually be a gain for the entire community. Consequently, institutions should not fear being “marginalized” within a European context and thus running the risk of losing the justification for their existence.
10. AEGIS is not only about identifying the MAAs, but it is also a system for joint management of these accessions. Therefore, jointly planned activities such as the initiative of the *Avena* WG for the regeneration of wild accessions will be a typical AEGIS activity, once the accessions are formally included in the European Collection.

## Discussion and approval of the draft report

A draft report was presented to the meeting and the Network Coordinator asked for comments, objections or the need for changes.

In reply to a question about the requirements that countries and institutions need to respect when they wish to deposit safety-duplicate seed batches in the Svalbard Seed Vault, it was indicated that information could be found at <http://www.nordgen.org/sgsv/index.php?page=welcome>.

Regarding genetic stocks, it was commented that they would be an extension of the scope of genebanks, but need to be considered, since users need them. Zofia Bulińska and Ayfer Tan discouraged the Network from getting involved in these, since genebanks do not have the capacity to broaden their activities.

Morten Rasmussen specified that NordGen does hold genetic stocks and that they should not be confused with breeders' material. They are the base for research and science.

Ahmed Jahoor explained that some addition lines and trisomics are difficult to maintain and they require the expertise of cytogeneticists. Association lines are also complex to conserve.

Mike Ambrose thought that it was important to make a link to the global crop strategies on wheat, barley and oats where special emphasis was given to collections of genetic stocks

and wild species. Christoph Germeier specified that genetic stocks were not included in the strategy for oats.

Mike Ambrose commented that the global crop strategies in principle take into account genetic stocks and that ECPGR cooperation would not exclude collaborating on their preservation. At present, there is no specific regional strategy for their conservation. He suggested undertaking an exchange and collation of information in order to verify which genebanks are maintaining them and whether there are any threats to their long-term maintenance. Subsequently, it will be possible to make an assessment and decide on further action. It will be useful to interact with other Networks on this topic.

Jan Engels encouraged the WGs to consider what the priority for conservation is.

Helmut Knüpffer concluded the session, assuring participants that the NCG will compile a synthesis of the recommendations from the WGs and from the discussion in the plenary session.

## **Recommendations and conclusions for Phase VIII**

The following is a synthesis of the major recommendations and outcomes of the meeting and of the three WG meetings. To build synergy between the WGs of the Network and demonstrate its coherence, it is suggested that the other WGs be invited to participate in activities of each WG, as far as appropriate.

### ***Task sharing, AEGIS***

1. All three WGs will start implementing the AEGIS process, taking into account decisions that will be taken by the Steering Committee (September 2008).

### ***Characterization and evaluation***

2. Emphasis at the Network level will be on initiating a pre-breeding project, with emphasis on barley, coordinated by the Barley WG. Pre-breeding in barley should take advantage of the ongoing genome sequencing activities in barley. For this aim, a thematic start-up meeting including barley, wheat and oats is planned at the end of 2008 or beginning of 2009, with active participation of FAO. This will be submitted to the Steering Committee as a project proposal from the Barley WG.

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

3. A list of crop wild relative species for *Hordeum* (possibly also for other cereals) occurring in Europe will be prepared, to support decision-making on necessary *in situ* activities.
4. The *Avena* WG will give emphasis to collecting and *ex situ* maintenance of certain wild *Avena* spp., and this will be the contents of the project proposal by the *Avena* WG to the Steering Committee.

### ***Documentation and Information***

5. All three Central Crop Databases need to be updated in order to assist the AEGIS process. For this, the National Programmes and hosting institutions are requested to provide the necessary support.

**Other matters**

6. All three WGs (*Avena*, Barley and Wheat) should receive equal priority in Phase VIII. A formal request will be addressed to the Steering Committee. There should be full meetings for each of the three WGs in Phase VIII.
7. Collections of precise genetic stocks received high attention during the Meeting. It is planned to organize a thematic workshop on genetic stocks, with emphasis on wheat, to be organized by the Wheat WG, with participation of members of the other WGs. The major aim would be to identify endangered genetic stocks collections and the genebanks ready to host them, and capacity building for their maintenance (multiplication and regeneration).
8. Genebanks were encouraged to deposit safety storage samples of their cereal collections at the Svalbard Seed Vault.
9. The managers of the ECCDBs of the additional crops (maize, minor cereals, rye and triticale) are encouraged to continue working on their respective databases, keep them up-to-date and provide online access.

**Closing remarks**

Helmut Knüpffer thanked Ali Osman Sarı, Director of AARI, and Ayfer Tan for the excellent organization. He noted that everything worked very smoothly and he extended his thanks to the hotel management. The excursion was very interesting, offering a great opportunity to visit a place of ancient civilization. The combination of monuments of human culture with the great diversity of wild plants, including many crop wild relatives, has been a welcome addition to the programme. He also thanked the NCG for its responsiveness, and the ECPGR Secretariat for continuous assistance in compiling the documents and organizing the logistics. Thanks were also extended to the compilers of the draft report and those who gave presentations and will submit their abstracts. Hope was expressed that the participants and their institutions will all collaborate in the activities of the Network in the future.



## APPENDICES

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## Appendix I. Acronyms and abbreviations

AARI	Aegean Agricultural Research Institute, Izmir, Turkey
AEGIS	A European Genebank Integration System
AEGRO	An Integrated European In Situ Management Workplan: Implementing Genetic Reserves and On Farm Concepts ( <i>EU project</i> )
AFLP	Amplified fragment length polymorphism
AGES	Österreichische Agentur für Gesundheit und Ernährungssicherheit GmbH (Austrian Agency for Health and Food Safety), Austria
AVEQ	<i>Avena</i> genetic resources for quality in human consumption ( <i>EU project</i> )
BCC	International Barley Core Collection
BYDV	Barley yellow dwarf virus
CCDB	Central Crop Database
CGIAR	Consultative Group on International Agricultural Research
CGN	Centre for Genetic Resources, The Netherlands
CIAT	Centro Internacional de Agricultura Tropical, Cali, Colombia
CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo (International Wheat and Maize Improvement Center), Mexico (CGIAR)
CIP	Centro Internacional de la Papa (International Potato Center), Peru (CGIAR)
CRA	Consiglio per la Ricerca e la Sperimentazione in Agricoltura (Agricultural Research Council), Italy
CRA-W	Centre Wallon de Recherches Agronomiques, Belgium
CRIFC	Central Research Institute for Field Crops, Ankara, Turkey
CWRIS	Crop Wild Relative Information System
DAFF	Department of Agriculture, Fisheries and Food, Ireland
EADB	European <i>Avena</i> Database
EBDB	European Barley Database
ECCDB	European Central Crop Database
ECPGR	European Cooperative Programme for Plant Genetic Resources
EMDB	European Maize Database
EPGRIS	European Plant Genetic Resources Information Infra-Structure
ESA	European Seed Association (),
ETDB	European Triticale Database
EU	European Union
EURISCO	European Internet Search Catalogue
EWAC	European Wheat Aneuploid Co-operative
EWDB	European Wheat Database
FAO	Food and Agriculture Organization of the United Nations, Rome, Italy
FCCRI	Field Crop Central Research Institute, Ankara, Turkey
GBIF	Global Biodiversity Information Facility
GIS	Geographical information system
GRDC	Grains Research and Development Corporation, Australia
GRIN	<i>Germplasm Resources Information Network</i>
GRIN	Genetic Resources Information System (USA)
IBGS	International Barley Genetics Symposium

ICARDA	International Center for Agricultural Research in the Dry Areas, Aleppo, Syria (CGIAR)
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics, Patancheru, India
IDBB	International Database for <i>Beta</i>
ILRI	International Livestock Research Institute, Nairobi, Kenya
INIA	Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (National Institute of Food and Agriculture Investigation and Technology), Spain
INRA	Institut National de la Recherche Agronomique (National Agronomic Research Institute), France
INRA	Institut National de la Recherche Agronomique (National Agronomic Research Institute), Morocco
IPGR	Institute for Plant Genetic Resources, Sadovo, Bulgaria
IPGRI	International Plant Genetic Resources Institute ( <i>now Bioversity International</i> )
IPK	Leibniz Institute of Plant Genetics and Crop Plant Research, Gatersleben, Germany
IRRI	International Rice Research Institute, Los Baños, Philippines
ITMI	International Triticeae Mapping Initiative
ITPGRFA	International Treaty for Plant Genetic Resources for Food and Agriculture
MAA	Most Appropriate Accession
MCPD	Multi-crop Passport Descriptors (FAO/IPGRI)
MLS	Multilateral System
MoU	Memorandum of Understanding
MRI	Maize Research Institute, Belgrade, Serbia
NAGREF	National Agricultural Research Foundation, Greece
NCG	Network Coordinating Group ()
NGB	Nordic Gene Bank, Alnarp, Sweden
NGO	Non-governmental organization
NordGen	Nordic Genetic Resource Center, Alnarp, Sweden
NPGRRP	National Plant Genetic Resources Research Programme, Turkey
PGR	Plant genetic resources
PGRC	Plant Gene Resources of Canada
RAPD	Random amplified polymorphic DNA
RFLP	Restriction fragment length polymorphism
RIPP	Research Institute of Plant Production, Piešťany, Slovak Republic
SCRI	Scottish Crop Research Institute, Dundee, United Kingdom
SGRP	System-wide Genetic Resources Programme (CGIAR)
SINGER	System-wide Information Network for Genetic Resources (CGIAR)
SMTA	Standard Material Transfer Agreement
SSR	Simple sequence repeat
UPOV	Union pour la Protection des Obtentions Végétales (International Union for the Protection of New Varieties of Plants), Geneva, Switzerland.
USDA	United States Department of Agriculture
VIR	N.I. Vavilov Research Institute of Plant Industry, St. Petersburg, Russian Federation
WG	Working Group
WPGS	Wheat Precise Genetic Stocks

## Appendix II. Agenda

### Second Meeting of the ECPGR Cereals Network 21-24 April 2008, Foça, Izmir, Turkey

#### Sunday, 20 April

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Arrival of participants at Izmir Airport, transportation to Foça

19:00 – 20:30      *Welcome dinner*  
                          *Network Coordinating Group: closed session for meeting preparations*

#### Monday, 21 April

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##### Introduction

09:00 – 10:30

##### **Chair morning session 1: H. Knüpfper**

- Opening of the meeting, welcome address and opening remarks (15 min.)
  - *Dr Ali Osman Sari, Director of AARI*
  - *Mr Kamil Köten, Governor of Foça District*
  - *Assoc. Prof. Dr. Masum Burak, Director General of Agricultural Research of the Ministry of Agriculture and Rural Affairs*
  - *Mr Lorenzo Maggioni, ECPGR Coordinator, Bioversity International*
- Presentation of the agenda, adjustments (*H. Knüpfper*) (10 min.)
- Short presentation of the national PGR activities of Turkey, with emphasis on cereals (*A. Tan*) (15 min.)
- Information on the current ECPGR Phase and international PGR events (*L. Maggioni*) (15 min.)
- Discussion (10 min.)

10:30 – 11:00

*Coffee break*

11:00 – 12:30

##### **Chair morning session 2: G. Kleijer**

- Information on AEGIS and implications for the Working Groups of the Cereals Network (*J. Engels*) (20 min.)
- Collections of genetic stocks in Europe, introduction (*G. Kleijer and T. Payne*) (10 min.)
- New reporting and planning guidelines for ECPGR networks in Phase VIII (*L. Maggioni*) (10 min.)
- Introduction to the structure/main topics of parallel meetings, current ECPGR priorities (see below) and other issues, e.g. Regeneration, Safety-duplication, Conservation and management of wild relatives, Pre-breeding, election of Chairs and Vice-Chairs (*H. Knüpfper*) (10 min.)
- Video presentation on the restoration of water purity within the basin of the Gediz river (15 min.)
- Discussion (10 min.)

12:30 – 14:00

*Lunch*

- 14:00 – 15:30 **Parallel Meetings of the Avena, Barley and Wheat WGs in separate rooms**
- Review of status quo and assessment of progress, preparation of reports for ECPGR Phase VII (2006-2008)
  - Planning and prioritizing for ECPGR Phase VIII (2009-2013), project proposals, budget requests
  - Discussion on Working Group priorities for the future.  
ECPGR Priorities:
    1. Task sharing (AEGIS) and capacity building,
    2. Characterization and evaluation,
    3. *In situ* and on-farm conservation and management,
    4. Documentation and information.
- 15:30 – 16:00 *Coffee break*
- 16:00 – 17:30 **Parallel Meetings – continuation**  
*End of the first day*

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**Tuesday, 22 April**

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- 09:00 – 10:30 **Parallel Meetings – continuation**
- 10:30 – 11:00 *Coffee break*
- 11:00 – 12:30 **Chair morning session 2: M. Jalli**
- Plenary session – Reporting**  
*Rapporteurs present results of the first day /second morning group discussions (Reporting Phase VII, Planning and Budget Phase VIII, with emphasis on the above 4 priorities)*
- Avena WG (Rapporteur) (20 min.)
  - Barley WG (Rapporteur) (20 min.)
  - Wheat WG (Rapporteur) (20 min.)
  - Secale activities and Database (M. Zaczyński) (15 min.)
  - Triticale activities and Database (G. Kleijer) (15 min.)
- 12:30 – 14:00 *Lunch*
- 14:00 – 15:30 **Chair afternoon session 1: I. Faberová**
- Reporting – continuation**
- Maize activities and Database (V. Andjelkovic) (15 min.)
  - Minor cereals activities (D. Janovská) (15 min.)
- Thematic issues**
- **Crop Strategies of the Global Crop Diversity Trust, and Global Crop Registries of the CG**
    - Introduction to Crop Strategies (*T. Payne*) (10 min.)
    - Introduction to Global Crop Registries of the CG programme GPG2, the Global Barley Registry, and Information about the Barley Genetic Resources Workshop (Alexandria, April 2008) (*J. Konopka*) (10 min.)
    - Crop Strategy for Wheat (including *Aegilops*, rye and triticale), and the Global Wheat Registry (*T. Payne*) (10 min.)
    - Crop Strategy for Oats (*C. Germeier*) (10 min.)
    - Global Crop Diversity Trust: European Regeneration Project for cereals and grain legumes (*M. Ambrose, H. Knüppfer and L. Maggioni*) (10 min.)

15:30 – 16:00 *Coffee break*

16:00 – 17:00

**Chair afternoon session 2: A. Katsiotis**

**Thematic issues (continued)**

- ***In situ* and on-farm conservation and management**
  - Pre-breeding in barley, and report from the Pre-Breeding Workshop (Beijing, China, October 2006) (*M. Jalli*) (10 min.)
  - On-farm conservation of wheat in Turkey (*A. Tan and L. Aykas*) (10 min.)
- **Documentation and information**
  - Update on the EURISCO search catalogue (*S. Dias and I. Faberová*) (15 min.)
  - Information about the EPGRIS3 meeting (Bonn, March 2008) (*L. Maggioni*) (15 min.)
  - Discussion (10 min.)

17:00 – 17:30

**Wrap-up session**

**Chair: H. Knüpffer**

- Identification of priorities for the future at Network and Working Group level (ECPGR end of Phase VII – Phase VIII) (30 min.)
  - Any other business
- End of the second day*

**Wednesday, 23 April**

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09:00 – 17:30

Excursion to AARI Menemen and Bergama (Pergamon), departure from hotel  
Drafting of the report (Network Coordinating Group and rapporteurs meet to agree on report drafting principles and responsibilities) (*L. Maggioni, A. Katsiotis, L. Koop*)

20:00

*Social dinner (hotel)*

**Thursday, 24 April**

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**Chair: H. Knüpffer**

8:30 – 10:30

Comments from the AEGIS perspective on the results of the meeting (Jan Engels)  
Presentation, discussion and approval of the draft report  
Concluding remarks (*H. Knüpffer*)

11:00 – 12:00

Final discussion: finalization of the report, other matters to be dealt with before the Steering Committee Meeting (*ECPGR representatives, members of NCG*)

*Departure of participants to Izmir Airport*

## Appendix III. List of participants

### Second Meeting of the ECPGR Cereals Network 21-24 April 2008, Foça, Izmir, Turkey

*N.B. Contact details of participants updated at the time of publication. However, the composition of the Working Group is subject to changes. The full list, constantly updated, is available from the respective Working Groups' Web pages (see <http://www.ecpgr.cgiar.org/networks/cereals.html>)*

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