PRIVATE PUBLIC PARTNERSHIPS FOR THE USE OF PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Report of a Workshop, 7–9 June 2017, Bonn, Germany

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Bioversity International

Federal Ministry of Food and Agriculture

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 (http://www.ecpgr.cgiar.org/). 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 Working Groups composed of pools of experts nominated by the National Coordinators. The ECPGR Working Groups deal with either crops or general themes related to plant genetic resources (documentation and information and *in situ* and on-farm conservation). Members of the Working Groups carry out an agreed workplan, based on specific ECPGR objectives, through ECPGR–funded activities and/or with their own resources.

Citation

Thormann I. 2017. Private Public Partnerships for the use of Plant Genetic Resources for Food and Agriculture. Report of a Workshop, 7–9 June 2017, Bonn, Germany. European Cooperative Programme for Plant Genetic Resources, Rome, Italy.

Cover illustration

Nordic public-private partnership in pre-breeding: spring barley trial at Korpa experimental station in Iceland 2012. © M. Göransson, Agricultural University of Iceland.

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Executive summary

A voluntary contribution was provided by Germany to ECPGR for the organization of a workshop on "Increasing ECPGR knowledge and opportunities on Private Public Partnerships (PPPs) for the use of Plant Genetic Resources for Food and Agriculture (PGRFA)". This workshop took place in Bonn, Germany, 7-9 June 2017 and was attended by 48 participants from the private and public sectors, from 18 different countries.

The main objectives of the workshop were to share experiences with PPPs in Europe and to discuss options to enhance use of PGRFA through European-wide private public partnership collaboration in characterization and evaluation of PGRFA. A draft proposal developed by the German Federal Agency for Agriculture and Food (BLE) for a European Evaluation Programme was discussed and recommendations for next steps agreed.

A European Evaluation Network was considered of strategic importance for Europe as it would present an opportunity to position PGRFA at a more strategic level within Europe. The Network would play a critical role in facilitating adaptation of European agriculture to climate change and would also contribute towards achievement of related Sustainable Development Goals. The importance of an Evaluation Network was seen as not only related to increase the use of genetic diversity in plant breeding, but also to increase the diversity of stakeholders in plant breeding, including private and public sectors, small and medium enterprises (SMEs) and participatory plant breeding actions. Further discussion would be required on how to establish a permanent Evaluation Network, and draft related documents such as a Memorandum of Understanding (MoU) and Terms of Reference (ToRs). The ECPGR was requested to develop a concept note for implementing a preparatory phase towards the establishment of such Network, which would mainly see the development of the framework required to start operating. The participants considered that the establishment of a Network for European-wide evaluation would be an important action that ECPGR should take on, and recommended that the ECPGR Executive and Steering Committees discuss in their upcoming meetings how this activity can become a permanent part of the Secretariat's work.

Welcome, introductions and PPP project background

Welcome by ECPGR Secretariat and BLE

The ECPGR Secretary, L. Maggioni, and F. Begemann from the German Federal Agency for Agriculture and Food (BLE), welcomed the participants. They thanked the Federal Ministry of Food and Agriculture for funding the development of the PPP knowledgebase and the PPP workshop. All participants then introduced themselves briefly (the list of participants is provided as Annex I).

Introduction of agenda and objectives

L. Maggioni introduced the agenda and described the objectives that the workshop aimed to achieve. These were the following:

- Share experiences, lessons learned from existing PPPs, and visions for a European approach;
- Discuss opportunities/problems that could be addressed through PPPs at European level, conditions for partnerships, proprietary issues;
- Discuss and refine draft proposal for a European PGRFA Evaluation Programme as a PPP;
- Outline funding opportunities for a European PGRFA Evaluation Programme.

The agenda was approved and is available as Annex II.

Overview of the PPP project and ECPGR PPP webpages

I. Thormann, ECPGR Secretariat, introduced the participants to the Private Public Partnerships project background, explained how past and ongoing PPPs were surveyed, and provided an overview of the search interface and data content of the PPP knowledge base available at http://www.ecpgr.cgiar.org/resources/private-public-partnerships/ppp-knowledge-base/.

She concluded with a summary of responses that were received through the survey about potential PPPs. The presentation is available at http://www.ecpgr.cgiar.org/resources/private-public-partnerships/ppp-workshop/presentations/.

Plenary presentations[1]

Fourteen presentations describing PPP examples currently ongoing in Europe were delivered at the workshop during the afternoon session on Wednesday 7 June and the morning sessions on Thursday 8 June 2017.

In addition, a draft proposal for a European Evaluation Programme of PGRFA developed by BLE was presented, as well as AEGIS, EURISCO, critical aspects of PPPs and the value of PGRFA from a breeder's perspective.

The following summaries are mostly based on short descriptions or abstracts provided by the presenters.

[1] All presentations are available at http://www.ecpgr.cgiar.org/resources/private-public-partnerships/ppp-workshop/presentations/

The Nordic PPP on pre-breeding – from start to today

A. Nilsson, Swedish University of Agricultural Sciences (SLU); A. Hägnefelt, Nordic Genetic Resource Center (NordGen), Alnarp, Sweden

The Nordic PPP on Pre-breeding was set up in 2011 on the basis of a commission from the Nordic Council of Ministers to investigate how to promote Nordic plant breeding. The preparations started already in 2007. After a considerable number of meetings the formal decision on setting up the Nordic PPP was taken in spring 2011. All five Nordic countries form the public part of the PPP through the Nordic Council of Ministers and twelve private companies and public breeders. The PPP was then established as of 1 January 2012.

Key features of the PPP Agreement are:

- 50/50 funding of the PPP
- Contributions from the Nordic countries are pooled
- Private breeding companies and public breeders are participating project-by-project
- Broad definition of pre-breeding
- Participation from plant breeding research and institutes
- Steering Committee with representation from all five countries, plant breeding entities and academia
- Open Calls from the second phase (2015-2017).

Efforts to secure the continuation and development:

- Evaluation in 2013
- Concept Notes, seminars, support letters, etc.
- Continued contacts with plant breeding entities and respective Ministries.

Three projects started in the initial pilot phase, now also a fourth project established

- Pre-breeding for future challenges in Nordic apples
- Combining knowledge from field and from laboratory for pre-breeding in barley II
- PPP for pre-breeding in perennial ryegrass (*Lolium perenne* L.)
- The public private partnership plant phenotyping project.

The national programme for the evaluation of genetic resources in cereals (EVAII) – a model for a private public partnership

F. Ordon, Julius Kühn-Institute (JKI), Quedlinburg, Germany

To improve resistance to diseases, plant breeders rely on the genetic diversity present in plant genetic resources, e.g. stored in genebanks. In the past, huge amounts of evaluation data have been collected, e.g. for wheat and barley in Germany. But data collected in different years in tests with changing standards and methods cannot be reliably compared over years. Therefore, the EVAII programme was established in 2001 to resolve this problem. EVAII currently consists of 16 private cereal breeding companies mostly organized in the German Federation for Plant Innovation (GFPi) and 4 scientific institutions and is coordinated by the JKI. EVAII was founded as a public private partnership (PPP) with the aim to provide plant breeders with accelerated access to resistant genetic resources of wheat and barley. To achieve this, an expert working group consisting in members both from JKI and plant breeding companies involved in the programme meets each year to discuss on the current importance of pathogens and to set priorities for the next year's evaluation

programme. Based on this decision, genetic resources for which respective information on resistance is available, are ordered, propagated at the JKI and then provided to the partners for field testing. Field tests and evaluation is conducted in a standardized manner including resistant and susceptible checks. To manage propagation, sending of seeds, and to store data, an information system was created for EVAII which allows the coordinator to automatically create lists of lines propagated and lines tested as well as the uploading of respective data. All partners can search the system for information by crop, year, disease, location and a combination thereof. Furthermore, simple statistics are currently implemented. In the first three years results are available to EVAII partners only and get public afterwards. EVAII has been working successfully for more than 15 years now with some changes in participants, and the database currently consists of more than 65 000 data points.

Combining knowledge from field and from laboratory for pre-breeding in barley II

A. Jahoor, Nordic Seed, Denmark

The Nordic public-private partnership in pre-breeding was initiated in 2011 in order to support development of Nordic plant breeding that can meet current and future climate challenges as well as consumer and market demands facing the agricultural and horticultural industries. The objectives for the first phase of the PPP barley project were to examine the genetic diversity in existing breeding material and to find a larger variability of genes for abiotic and biotic stresses with emphasis on various climatic conditions. Using a genome-wide association studies (GWAS) approach, with three years of large-scale field experiments in very variable environments and genotyping with the Illumina iSelect 9K SNP array, resulted in genomic localization of resistance traits e.g. nematode, scald and powdery mildew resistance and agronomical traits e.g. earliness, plant height and lodging. Competitive allele-specific PCR (KASP) markers have been developed for the identified loci and are now applied for marker-assisted breeding in the Nordic barley breeding programmes. The focus of the second phase has been on gaining increased knowledge about known as well as new resistance genes and to incorporate these into a genetic background of relevance using multi-parent advanced generation inter-cross (MAGIC). Seven MAGIC populations, six for pyramiding of resistance traits and one for earliness, have up to now been developed within the project. The PPP project has led to a strengthening of the Nordic spring barley breeding network with an increased exchange of material, 'know-how' and new techniques between the partners.

Living Seeds – Sementes Vivas SA (LSSV) and INIAV: Seeds and more in Portugal

A.M. Barata, Instituto Nacional de Investigação Agrária e Veterinária (INIAV), Portugal; S. Doeblin, Living Seeds Sementes Vivas, SA (LSSV), Portugal

In Northern Europe the organic food market is growing at a two-digit rate and is importing a lot of organic food outside of Europe. This is a chance for Southern Europe and in particular for Portugal. In addition the European Commission is pushing to eliminate the exception rule to use conventional seeds to grow organic food.

Portugal imports 90% of it needs in seeds, an average amount of 85 million € per year.

Living Seeds Sementes Vivas, SA (LSSV), founded in July 2015, is the only professional organic and biodynamic seed company in Portugal and Spain, which is focusing on open-pollinated seeds. It supports its knowledge and seed multiplication exchange with

Bingenheimer Saatgut AG, Germany, Sativa Rheinau AG, Switzerland, and De Bolster Ltd, the Netherlands.

LSSV targets are to:

- Increase seed production and diversity with strong local adaptations,
- Generate independence on seed production, aiming for a 10% seed market share of Portugal.

Instituto Nacional de Investigação Agrária e Veterinária (INIAV) is a Ministry of Agriculture State laboratory. It saves, evaluates and documents plant genetic resources and has generated knowledge over generations. INIAV has high reputation and international recognition.

The Joint Partnership between LSSV and INIAV will allow seed support of multiplication, plant breeding trials and joint project proposals (e.g. Liveseed, CONvigna), as well as raising the awareness of the use of organic seeds in joint education and training programmes and joint public activities.

Collaboration between CGN and the seed industry

R. van Treuren, Centre for Genetic Resources, the Netherlands (CGN), Wageningen, The Netherlands

Wageningen University and Research is involved in PPPs that focus mainly on mining the genetic diversity of culture collections and exploring phenotype/genotype relationships. Most of the projects are of pre-competitive nature, facilitating the handling of intellectual property between consortium partners. Furthermore, the governmental partner provides a framework for rules and regulations further facilitating the cooperation between government, private partners from the breeding sector, and knowledges institutes. Examples were presented in the context of currently running Horticulture and Propagation Materials Topsector PPP programmes.

Vegetable Genetic Improvement Network (VeGIN)

C. Allender, University of Warwick, UK

The Vegetable Genetic Improvement Network is a collaborative stakeholder network aiming to develop the genetic resources and tools to accelerate breeding for sustainability traits in field vegetables and to facilitate knowledge transfer to promote the market delivery of research and development. The project is funded by the UK Department of the Environment, Food and Rural Affairs (DEFRA) as well as incorporating inputs from industry stakeholders. The project has successfully developed public domain pre-breeding resources and has resulted in a range of outputs including further bilateral projects as well as a range of seed resources and data sets.

Collaboration within the French *Daucus* Network

J. Sacré, Limagrain, France

The erosion threat of the French historical genetic resources in the mid-1990s led the private and public partners to initiate the "Carrot and other *Daucus* French Network". The network is composed of a group of carrot national experts who mutualize the characterization and conservation of the French genetic resources.

This PPP based on voluntary participation (no direct public funding) relies on equilibrium between private interest, partners' common interest and public good. Such structure is a

unique place to exchange on a regular basis and elaborate new collaborative projects. However it is difficult to initiate small/medium scale projects for budget reasons and to acquire collaborative evaluation data (on traits of interest such as resistance, quality, etc.) as they are costly and depend more on private priorities. Data management and PGR regulation evolutions are also part of the difficulties faced by the Network.

Technology-driven innovation for plant breeding in PPPs - Access to diversity through access to information

S.A. Peters, Applied Bioinformatics, Department of Bioscience, Wageningen University and Research (WUR), Wageningen, The Netherlands

One important funding scheme in the Netherlands is that of the Topsectors. For PPPs addressing PGRFA this is in particular the Topsector for horticulture and starting materials. This topsector includes a PPP programme 'Better Plants for new demands'. Several genome initiatives have been started under this PPP programme, such as the Potato Genome Sequencing Consortium PGSC in 2011, 150 Tomato Genome Project in 2012, the 100 Melon Genome Project in 2014 and the International *Lactuca* Genome Consortium ILGC in 2015. These aim to assess genetic and structural diversity through sequencing, genome mapping and phasing technology, and connecting phenotype to genotype and the research can be characterized as highly technology-driven. WUR is currently involved in five types of PPPs. These differ in the type of research, the funding, the intellectual property rights and the expected time-to-market. The projects are evaluated by both private partners in case of bilateral projects, but the majority is evaluated by a panel of experts who are appointed by the funding agency. Most of the projects are applied research projects and almost all of the PPP projects are of pre-competitive nature. The pre-competitive nature makes it easier to agree on intellectual property rights. All the data are made publically available and can be accessed online via a public database. The public can search for accessions having specific phenotypic and genotype data. Nevertheless, in light of the vast amounts of data being generated these days, development of a digital genebank infrastructure, supporting genotype-phenotype integration and creating added value for genebank collection, becomes urgent.

PRO-MAÏS and AMAIZING: an overview of PPP related to maize genetic resources in France since 35 years

A. Charcosset, Institut National de la Recherche Agronomique (INRA), France

A private public partnership on maize genetic resources was initiated more than 35 years ago by André Gallais and Jean-Pierre Monod with maize researchers of the French National Institute of Agronomic Research (INRA) and maize breeders from all private seed companies installed in France grouped within PROMAÏS (http://pro-mais.org/). It made it possible to conserve maize genetic resources, study their diversity and their use as source materials for breeding programmes. In total, 1600 maize populations from 38 countries, including 260 original French landraces, were assembled (http://www1.montpellier.inra.fr/zea_french_network/) and conserved in Mauguio (INRA). Each year, each partner of the network (presently INRA and nine companies) contributes to the multiplication of maize landraces needing regeneration. From 1983 to 1987, all the accessions of the collection were evaluated *per se* and in crosses with testers for grain and silage production. Collaboration has continued since then with the study of maize diversity with molecular and phenotypic analysis, the survey of the origin of European

maize, the study of selection methodology using molecular markers, use of genetic resources in breeding. A complementary PPP, AMAIZING, addressing maize genomics and ecophysiology for environmental adaptation has been settled in 2011. These two original partnerships contribute new perspectives for a better characterization and use of maize genetic resources.

Crop Improvement Research Club (CIRC)

J. Phillips, Biotechnology and Biological Sciences Research Council (BBSRC), UK

The Biotechnology and Biological Sciences Research Council (BBSRC) is the UK's largest public funder of agricultural research. BBSRC has established PPPs across the bio-economy with one example being the Crop Improvement Research Club (CIRC). The club has supported research projects focused on barley, oilseed rape and wheat for food uses. The projects engaged with research challenges which were identified by consulting industry and included: increasing nutrient use efficiency, combating pests and diseases, increasing yield potential, seed structure and composition, germination properties, and spoilage factors.

CIRC is managed by BBSRC in conjunction with an external coordinator and a steering group made up of industry and academic representatives. Fourteen companies are members of CIRC and are representative of the breadth of innovation in the crop production and processing industry in the UK. In return for a financial contribution, the member companies gain access to the outcomes of a research portfolio of 15 projects. The projects are based at 13 research institutes, universities and independent research organizations in the UK. The club has brought together a community of 60 investigators to form multidisciplinary teams focused upon innovative, industrially relevant research.

CIRC supported research projects from a joint fund totalling £7.06M with £560k from industrial membership subscriptions, £500k from the Scottish Government, and £6M from BBSRC. The company members have reported a range of significant benefits from their involvement with CIRC:

- Capacity to influence research in important strategic areas
- Knowledge on the progress of relevant research projects and early access to results
- Opportunity to work with leading researchers and to build strong relationships with them
- Opportunity to identify the best potential industry recruits
- Guidance on other public funding activities and opportunities
- Promotion of companies through relevant activities, objectives and outputs.

CIRC has established a new capability for the crop production and processing sectors to address significant research challenges associated with food security. The projects have already generated useful outputs which are being used by the member companies. For case studies and further information, please visit CIRC's webpage at: www.bbsrc.ac.uk/circ

Fruit tree genetic resources PPP projects boosting uses of genetic resources and public awareness

M. Lateur, Centre Wallon de Recherches Agronomiques (CRA-W), Gembloux, Belgium

The general context of fruit tree genetic resources in Europe was introduced with a focus on apple genetic resources, pointing out that commercial apple cultivars have a very narrow genetic base and commercial apple growing is reaching its limits.

The Centre Wallon de Recherches Agronomiques (CRA-W) started a programme for safeguarding fruit tree genetic resources (FTGR) in 1975. Long-term evaluation in non-sprayed evaluation orchards for disease tolerance and agronomic traits began in 1979. Many interesting traits were identified in the large diversity of old cultivars and activities for promoting the use of fruit tree genetic resources were started. These included partnership with SME nurseries, the development of a label for certified fruit trees, partnership with fruit processing enterprises, partnerships with farmers for on-farm conservation and use of fruit trees in agroforestry, as well as pre-breeding and breeding using well evaluated fruit tree genetic resources.

The collaboration with private partners in the conservation and use of FTGR has shown to boost efficiency, as it requires more precise and short-term objectives and complementary expertise. The scientific public institutes involved offered confidence to citizens, which represents an added value for private enterprises.

The successful utilization of FTGR furthermore demonstrates the usefulness of PGR conservation for both citizens and decision-makers and boosts public awareness.

Grapevine genetic resources: evaluation and pre-breeding at the European level

R. Töpfer, Julius Kühn-Institute (JKI), Quedlinburg, Germany

At the international level, grapevine genetic resources are well organized: cultivar-related information is organized in the *Vitis* International Variety Catalogue (www.vivc.de) and the European repositories manage their accessions in the European *Vitis* Database (www.eu-vitis). Several projects funded by the EU and national funds contributed to an excellent information platform. This knowledge gained added value by the EU-project INNOVINE which addressed screening grapevines for biotic and abiotic stress.

Facing problems of climate change, researches need to identify clonal variants within the grapevine genetic resources which are better adapted to changing environmental conditions. Furthermore, disease-resistant varieties are endangered for breaking of resistances as long as single resistance loci are used in breeding programmes. As a consequence for the most devastating diseases, powdery and downy mildew, further resistances need to be identified and genetically characterized. A European evaluation and pre-breeding effort to develop introgression lines and markers for resistance loci would be a highly valuable approach to overcome the limits of single breeding programmes, share work and thus prepare the floor for durable resistances in future cultivars. For grapevine, PPP could contribute to find solutions but long-lasting work needs a strong public involvement.

BIOVEGEN – R&D network for plant biotechnology

D. Lapuente, INVEGEN (Association for the promotion of Research and Technological Development in Plant Genomics), Spain

BIOVEGEN – the Spanish Technology Platform for Plant Biology (http://biovegen.org/en/) is a public-private partnership, led by the business sector, which brings together entities from the agrifood sector with an interest in R&D in applied plant biology. Our objective is to improve the agrifood sector competitiveness through the incorporation of new technologies based on plant biology. To that end, BIOVEGEN coordinates agrifood entities, connecting technological offer and demand and generating business opportunities through public-private collaboration. BIOVEGEN develops collaborations and R&D projects, identifying technological challenges of the sector. The Platform also serves as an interface between

science community, business sector and administration. To do so, BIOVEGEN offers a wide range of tools to facilitate R&D activities to its members. Currently, the Platform has 73 members: 60 companies and 13 research centres, as well as the support of the Secretary of State for R&D, which co-finances the initiative. Furthermore, BIOVEGEN is open to partnerships with other entities within the sector.

The Citruseq Consortium: a public-private initiative for citrus breeding

M. Talon, Instituto Valenciano de Investigaciones Agrarias (IVIA), Moncada, Spain

The Citruseq-Citrusgenn Consortium is a public-private initiative aimed to the improvement of citrus. The birth of the consortium in 2009 took place in the frame of the Strategic Singular Projects of the Spanish Ministry of Science and Innovation. Citruseq integrates a set of interrelated activities of scientific and technological nature that have as common goal to develop genomic and biotechnological tools to facilitate the generation, selection and management of new lines and varieties of citrus. This objective involves the identification of variants of genes of agronomic interest in citrus and the technological application of this knowledge. The companies and institutions collaborating in the development of the initiative are Eurosemillas, S.L., ICC S.A., S.N.F.L. Special New Fruit Licensing Mediterraneo (Citrus Genesis), S.L., Anecoop S. Coop., GCM Plant Varieties A.I.E., Príncipe Felipe Research Foundation, CSIC, IVIA and Fundación Cajamar Valencia.

A European Evaluation Programme for Plant Genetic Resources

F. Begemann, Federal Office for Agriculture and Food (BLE), Germany

Frank Begemann presented the draft proposal developed by BLE for a European Evaluation Programme on PGRFA. The proposal had been shared with all participants prior to the workshop and is included as Annex III. He introduced the background for such a programme, its possible goals, opportunities to consider for its creation and some advantages of such a programme.

The Establishment of A European Genebank Integrated System

L. Maggioni, ECPGR

The rationale for establishment by ECPGR of A European Genebank Integrated System (AEGIS) relates to opportunities for better efficiency of conservation and management of genetic resources in Europe. The objective of AEGIS is to conserve the genetically unique and important accessions of all crops in a collaborative way and at agreed quality standards and to make them available for breeding and research through Standard Material Transfer Agreement (SMTAs). So far 34 countries have signed the MoU to be members of AEGIS and the European Collection includes nearly 33 000 accessions, either part of the Annex I of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) (74%) or not (26%). Currently AEGIS ensures a framework for prompt availability of quality material under standard terms, and of data. The European Collection still needs to expand with more material. The collection will likely be a priority for investment of national and international funds for maintenance, characterization, evaluation and open distribution.

Documenting European Agrobiodiversity: EURISCO – The European Search Portal for Plant Genetic Resources

S. Weise, Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Gatersleben, Germany

The European Search Catalogue for Plant Genetic Resources (EURISCO) provides information about more than 1.9 million accessions of crop plants and their wild relatives, preserved *ex situ* by almost 400 institutes in Europe. It is based on a network of National Inventories of 43 member countries and represents an important effort for the preservation of world's agro-biological diversity by providing information about the large genetic diversity kept by the collaborating institutions. The presentation gave an overview about the background and the architecture of EURISCO. Moreover, a special emphasis was put on characterization and evaluation data in EURISCO.

Critical aspects of public partnerships in germplasm development

M. Rasmussen, Norwegian Genetic Resources Centre (NIBIO), Norway

Partnerships between public entities and private companies to address pre-breeding and mobilization of plan genetic resources require good knowledge of the partners' capacities and interests, aligned goals, to create realistic expectations from both sides. Funding models may be tailored for the purpose. Pre-breeding partnerships must be crop-specific, and understanding the value chain of the crop addressed is important. For both parties, long-term dedication, willingness to fund and trust to share information and germplasm is crucial for the success of the collaboration.

Valorization of PGR from a breeder's perspective

B. Kilian, Crop Trust, Germany

The rationale for using PGR in breeding is to bring in necessary diversity for specific traits of importance to specific breeding programmes, as well as beneficial traits that are not present in adapted crop genotypes. Obstacles for their use are the breeders' preference for material which is reasonably adapted to the current target environment, limited resources, short-term breeding goals (as PGR require lengthy and expensive programme of pre-breeding), and the genetic variability of some elite genepool seems currently sufficient (in Europe).

Obstacles for use of PGR in breeding are outlines and options for better linking genebanks with breeders and farmers to increase the use of PGR are presented, such as the development of core collections and core reference sets, preparing the germplasm for characterization and use, genomic resources as well as PPPs. Two major initiatives to increase the utilization of PGR for crop improvement are presented as examples, which are the ongoing project coordinated by the Crop Trust "Collecting and using CWR - Adapting Agriculture to Climate Change" and Genesys gateway to PGR.

Break-out group session

The break-out group session provided the opportunity to participants to brainstorm and make comments about the proposal for a European Evaluation Programme.

Participants were divided into three break-out groups, based on their own choice.

All three groups were provided with two sets of questions to guide their discussions. A first set of questions about the reasons and goals of a European Evaluation Programme was

given to all groups. Furthermore, each group was asked to address a specific set of questions regarding one of the following three aspects:

- What materials should be evaluated by a European evaluation programme and for which traits?
- Partners and their comparative advantages
- Data and incentives.

The detailed discussion results reported back to plenary from each group are provided as Annex IV. The results reported by the break-out groups were discussed and summarized during plenary session and further refined during the final session on Friday 9 May.

Final session for revision of proposal, discussion results and recommendations

Agenda items for final session:

1. Summary of results from break-out groups
2. Timeframe
3. Elements for a concept note on preparatory work for an ECPGR Evaluation Network

The ECPGR Secretary introduced the agenda and sought advice from the group on draft documents presented for each agenda item.

Prior to discussing the documents, the Secretary invited participants to flag any pending issues not addressed in the break-out group reporting session of the previous day.

The documents revised during the final session are included as Annex V of this report.

Agenda item 1. Summary of results from break-out groups

Comments were made to emphasize the strategic importance for Europe of an Evaluation Network on PGRFA, as well as its relevance to address climate change and to promote the Sustainable Development Goals. The contribution of this Network to the use of genetic diversity as well as to increase the diversity of stakeholders in plant breeding were also remarked and it was suggested to include all these aspects in the executive summary of the workshop report.

Another important point reiterated by the group was the need to extend the scope of the network beyond evaluation, including pre-breeding, as well other activities such as genotyping and the development of markers, as long as they remain at a pre-competitive level.

Agenda item 2. Timeframe

No comments were received about the timeframe outlined by the Secretariat. It was confirmed to participants that the draft report would be shared with all participants of the workshop for comments. Their comments would be incorporated before publishing the report online. It was further confirmed that the workshop report is not intended to be formally submitted to the EU. The work carried out by the break-out groups and their notes would be reflected in the report.

Agenda item 3. Elements for a concept note on preparatory work for an ECPGR Evaluation Network

As first activity, it was suggested to set up a task force coordinated by ECPGR Secretariat, possibly including the European Seed Association (ESA) and some other stakeholders. This ECPGR Task Force should define the MoU, the framework for standards, the structure of the Network, criteria for the choice of the crops, etc.

A few volunteers offered to be members in the Task Force: Reinhard Töpfer (JKI), Jens Freitag (GFPi) and Matthias Ziegler (BLE). It was also suggested to include Stephan Weise, EURISCO Coordinator, in order to cover data aspects from the beginning.

The second activity regards advice on criteria and choice of exemplar crops. Participants agreed that there is no need for a committee to decide on criteria for exemplar crop selection. The concept note will include an activity on developing the criteria.

It was suggested that the Task Force should be overseen and helped by a larger Advisory Group, composed of about 10 people, representing different stakeholders and geographical areas. Its activity would provide advice at strategic level to the ECPGR Task Force, would help in finalizing the draft documents or give directions on them, and would give feedback on the ToRs for selection of exemplary crops. The Advisory Group would furthermore need to anchor the process within the organizations represented by its members, to avoid any conflict of interest and language. It will be expected that the Advisory Group include experts from those countries that have made experience with national or sub-regional evaluation networks, such as for example from France, Germany, the Netherlands, the Nordic Countries, Spain, UK, etc. The ITPGRFA Secretariat representative also expressed interest for involvement in this Advisory Group, which was welcomed.

It was specified that the MoU would be used to get people on board, specifying the aims of the Network. Draft standard contracts will specify the elements that would need to be included in contracts required to establish specific PPPs. A draft proposal for consortia agreements would represent the legal document to be signed by partners.

The result of this preparatory phase should be a clear and agreed framework for a permanent Network, and the selection of three exemplary crops, which would form the basis for the development of a Horizon2020 proposal.

It was observed that this framework should spark interest and actions, independently from the success of a potential project proposal submitted to the European Commission (EC). A project proposal would be an additional incentive to speed up the process, but not a pre-requisite for action. The intention is to plan for a long-term action by a permanent Network that should be functioning with or without an additional successful proposal. This activity will strengthen the bridge to the breeders that ECPGR is currently building.

Concerning the envisaged Horizon2020 proposal, it was recommended to seek professional support, a consulting partner well connected to the EC, such as INRA Transfert.

It was finally agreed that the establishment of a Network and European-wide evaluation is an important action that ECPGR should take on, and the workshop recommended that the upcoming ECPGR Executive and Steering Committee meetings discuss how this activity could become a permanent part of the Secretariat's work.

Annexes

Annex I. List of participants

Increasing ECPGR knowledge and opportunities on Private Public Partnerships for the use of Plant Genetic Resources for Food and Agriculture

7–9 June 2017, Bonn, Germany

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Annex II. Workshop agenda

Increasing ECPGR knowledge and opportunities on Private Public Partnerships for the use of Plant Genetic Resources for Food and Agriculture

7–9 June 2017, Bonn, Germany

Wednesday 7 June – Wolfgang-Paul Saal		**Chair: Marc Lateur, Belgium**
12.00 – 13.45	Registration of participants	Foyer of Wolfgang-Paul Saal
14.00 – 14.10	Welcome by ECPGR Secretariat and BLE	L. Maggioni, ECPGR; F. Begemann, BLE, Germany
14.10 – 14.30	Introduction of participants	All
14.30 – 14.40	Introduction of agenda and objectives	L. Maggioni
14.40 – 15.00	Overview of ECPGR PPP webpages	I. Thormann, ECPGR
15.00 – 15.20	The Nordic PPP on pre-breeding - from start to today	A. Nilsson, SLU; A. Hägnefelt, NordGen, Sweden
15.20 – 15.40	The national programme for the evaluation of genetic resources in cereals (EVAII) – a model for a private public partnership	F. Ordon, JKI, Germany
15.40 – 16.00	Combining knowledge from field and from laboratory for pre-breeding in barley II	A. Jahoor, Nordic Seed, Denmark
16.00 – 16.30	**Tea/coffee break**	
16.30 – 16.50	Living Seeds – Sementes Vivas SA and INIAV: Seeds and More in Portugal	A.M. Barata, INIAV; S. Doeblin, Sementes Vivas, Portugal
16.50 – 17.10	Collaboration between CGN and the seed industry	R. van Treuren, CGN, The Netherlands
17.10 – 17.30	Vegetable Genetic Improvement Network VeGIN	C. Allender, Warwick, UK
17.30 – 17.50	Collaboration within the French *Daucus* Network	J. Sacre, Limagrain, France
17.50 – 18.10	Technology-driven innovation for plant breeding in PPPs - Access to diversity through access to information	S. Peters, WUR, The Netherlands
18.10 – 19.30	**Social event (drinks and snacks)**	Foyer of Wolfgang-Paul Saal
20.00	**Dinner (voluntary, self-paid) in restaurant close by**	

Thursday 8 June – Wolfgang-Paul Saal		**Chair: Gordana Đjurić, BiH**
09.00 – 09.20	Promaïs and Amaizing: an overview of PPP related to maize genetic resources in France since 35 years	A. Charcosset, INRA, France
09.20 – 09.40	Crop Improvement Research Club (CIRC)	J. Phillips, BBSRC, UK
09.40 – 10.00	Fruit tree genetic resources PPP's projects boosting uses of genetic resources and public awareness	M. Lateur, CRA-W, Belgium
10.00 – 10.20	Grapevine genetic resources: evaluation and pre-breeding at the European level	R. Töpfer, JKI, Germany
10.20 – 10.50	**Tea/coffee break**	
10.50 – 11.00	BIOVEGEN - R&D network for plant biotechnology	D. Lapuente, INVEGEN, Spain
11.00 – 11.20	The Citruseq Consortium: a public-private initiative for citrus breeding	M. Talon, IVIA, Spain
11.20 – 11.40	Presentation of draft proposal for a European Evaluation Programme PPP	F. Begemann
11.40 – 11.55	Presentation on AEGIS	L. Maggioni
11.55 – 12.10	Presentation on EURISCO	S. Weise, IPK, Germany
12.10 – 12.30	Presentation on critical aspects of PPPs	M. Rasmussen, NIBIO, Norway
12.30 – 12.50	Valorization of PGR from a breeder's perspective	B. Kilian, Crop Trust, Germany
12.50 – 13.00	Questions and preparation for working groups	I. Thormann
13.00 – 14.30	**Lunch**	
14.30 – 16.30	Break out groups	
15.30 – 16.00	**Tea/coffee break**	
16.30 – 18.00	Reporting back and discussion	**Chair: Frank Begemann, BLE**

Friday 9 June – Curtius Saal (basement)		**Chair: ECPGR Secretariat**
09.00 – 10.30	Discussion of results and recommendations	
10.30 – 11.00	**Tea/coffee break**	
11.00 – 13.00	Revision of draft proposal	
End of workshop		

Annex III. Draft proposal for a European Evaluation Programme (ECPGR-EVA) [2]

BLE, 27.4.2017

1. Background

ECPGR is a collaborative Programme among most European countries, aimed at facilitating the long-term conservation on a cooperative basis and the increased utilization of plant genetic resources in Europe. The Programme, which is funded by the participating countries and is coordinated by a Secretariat hosted at Bioversity International, operates through broadly focused Networks. 34 European states have become a member of the ECPGR. The thirteenth meeting of the ECPGR Steering Committee (Vienna, December 2012) agreed on a long-term goal to which ECPGR contributes and six objectives that should be attributable to ECPGR as follows:

B.1 Long term goal

National, Sub-regional and Regional Programmes in Europe collaboratively, rationally and effectively conserve plant genetic resources for food and agriculture (PGRFA) *ex situ* and *in situ*, provide access and increase utilization.

B.2 Objectives

1. AEGIS is operational. Accessions in AEGIS are characterized and evaluated.
2. Quantity and quality of data in EURISCO, including *in situ* and on-farm data, have been increased. Functionality of EURISCO meets users' expectations.
3. *In situ* and on-farm conservation and management of priority crop wild relative (CWR) and landrace (LR) populations are implemented throughout Europe. Mechanisms are in place for more effective utilization of the conserved germplasm.
4. Commitment and regular resources of national governments are sustained or increased, and commitments and resources of the European Commission (EC), as well as of other potential donors towards ECPGR are increased.
5. Relations with users of germplasm are strengthened.
6. Organizational structure and secretarial support are adequate to effectively sustain the operations of ECPGR.

The **EURISCO** Web catalogue of ECPGR receives data from the European National Inventories (NI). It provides information at the accession level of PGR conserved in European genebanks or other collections. EURISCO is hosted at and maintained by IPK Gatersleben on behalf of the Secretariat. EURISCO is managed based on the principle that it should contain data, which can be made publicly available and can be used without limitation or restraint. The National Focal Points of the National Inventories should therefore not provide to EURISCO data, which do not fulfil these expectations.

The goal of **AEGIS** is to create A European Genebank Integrated System for plant genetic resources for food and agriculture, aimed at conserving the genetically unique and important

[2] (Original text as provided by BLE prior to meeting)

accessions for Europe and making them available for breeding and research. Such material will be safely conserved under conditions that ensure genetic integrity and viability in the long term. AEGIS will allow all germplasm accessions and their related information registered to AEGIS to be readily available and easily accessible to users.

The Establishment of a European Evaluation Programme of PGRFA for AEGIS selected crops/accessions is an important step to make AEGIS operational and EURISCO more user-friendly for breeders. A Policy Guide (ECPGR 2009) and the current procedure is available at the ECPGR website.

Selection requirements for AEGIS

1. Material under the management and control of the member countries and their Associate Members, in the public domain and offered by the associate members for inclusion into AEGIS.
2. Genetically unique within AEGIS, to the best available knowledge (i.e. genetically distinct accessions; assessment based on available data and/or on the recorded history of the accession).
3. Plant genetic resources for food and agriculture as defined in the International Treaty as well as medicinal and ornamental species.
4. European origin or introduced germplasm that is of actual or potential importance to Europe (for breeding, research, education or for historical and cultural reasons).

The final step of including accessions in the European Collection is their flagging in EURISCO as European Accessions by filling in the corresponding field ('AEGIS status'). This flagging is done by the EURISCO National Inventory Focal Point, under instructions from the National Coordinator.

The National Coordinators of AEGIS and the Associate Members (usually genebanks) have signed Memoranda of Understanding, including the task of making available non-confidential characterization and evaluation data.

The most recent development is the extension of EURISCO for characterization and evaluation (C&E) data. The data exchange format for C&E data (EPGRIS 3) was finalized. Some countries support the new module already by providing relevant data. Others are in the process to collect data for more accessions to improve the information of the National Inventories and EURISCO.

A European Evaluation Programme as a public-private-partnership focussing on AEGIS crops/accessions could also support (via AEGIS/EURISCO) the International Treaty with its Multilateral System (MLS) and its Global Information System (GLIS, Art. 17, see also SMTA Art. 5 Abs 2 and Art. 6.9) facilitating the Value Addition Chain within the GLIS for users of PGRFA.

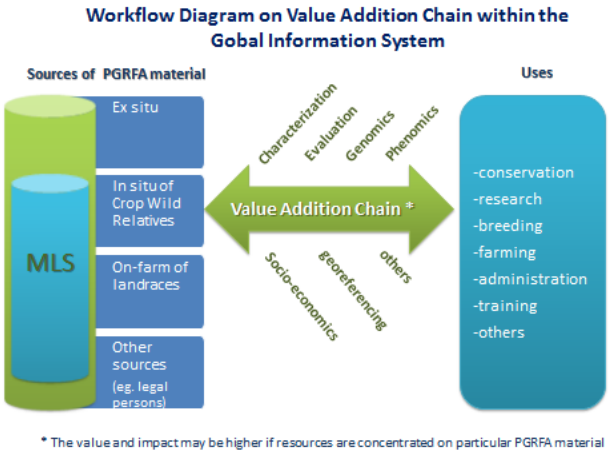


Figure 1. Workflow Diagram on Value Addition Chain within the Global Information System (Source IT/COGIS-1/15/Report).

2. Goals of a European Evaluation Programme

1. Establishment of a Network for the evaluation of PGRFA for AEGIS[3] selected crops/accessions

- Improvement of secondary evaluation on biotic and abiotic stresses with coordinated and collective evaluation with the same methods and standards
- Improvement of National Inventories and EURISCO exploring also solutions for the integration of phenotyping or genotyping information in C&E-data schemes
- Development of a dynamic information system for a coordinated C&E data acquisition and assessment

3. Creating a European Evaluation Programme

Different countries have different programmes and efforts for evaluating PGRFA, examples being presented during the workshop. Besides, there are huge amounts of genebank observation and other evaluation data.

First steps have been initiated to include C&E data (via a meta-data approach) in EURISCO. While evaluation data were collected for various crops, data from different sources, agro-environmental and test-conditions or different years cannot be compared (random and fragmented scores, no standard lines, etc.).

To improve the situation and the usefulness of the data for breeding research and breeding purposes the data mining technologies could be improved as well as the origin of the data itself by avoiding the afore-mentioned problems. A solution could be a well-coordinated and pre-organized European-wide collaborative approach by harmonizing separate evaluation programmes in a collaborative European Evaluation Programme (ECPGR-EVA) under common terms and conditions.

Such a European Evaluation Programme could be established as a public-private partnership. It could link activities of European institutions and stakeholders scattered over

[3] *A Strategic Framework for the Implementation of a European Genebank Integrated System (AEGIS) – A Policy Guide* (ECPGR 2009)

European countries and exploit synergies by participating along their respective comparative advantages.

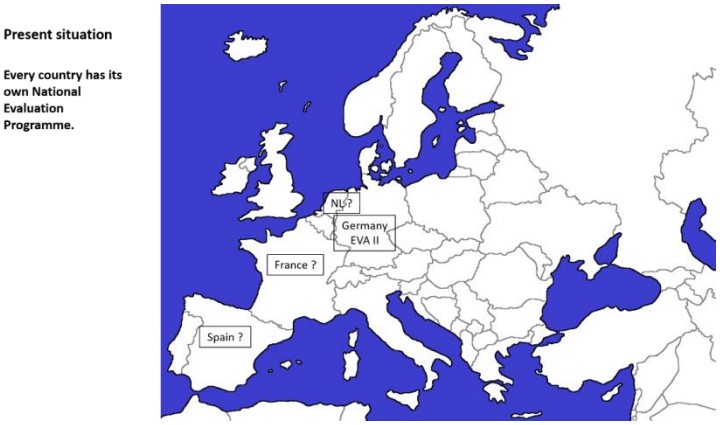
AEGIS could provide terms and conditions to facilitate the identification of

- relevant crops and accessions to be evaluated
- relevant Associate members holding and offering AEGIS accessions and other stakeholders, including private sector entities, offering additional germplasm to be included
- "Evaluation partners" as supporting members, including private sector entities, to conduct the evaluation and additional activities

EURISCO could support ECPGR-EVA by:

- creating a "supporting collaborative data platform", open for ECPGR-EVA partners, to document their new observations and acquired data.
- making available non-confidential data under terms to be discussed (discretion period).

Present situation: separate programmes generate value.



Future situation: a collaborative programme could generate added value.

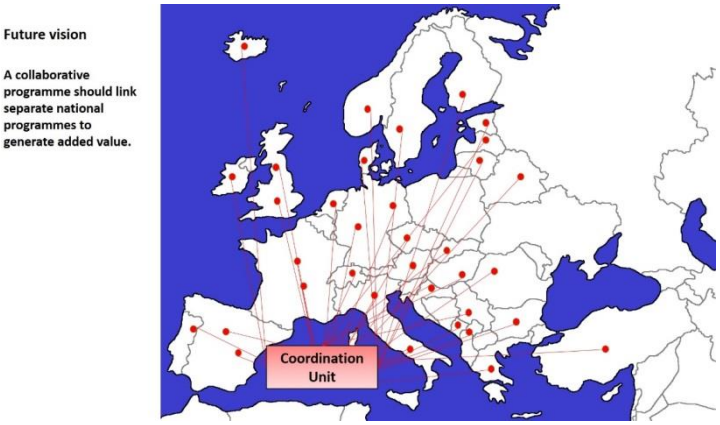


Figure 2. Geographic visualization of evaluation programmes in Europe.

Additional items should be discussed and agreed upon by all partners involved:

- **AEGIS Associate partners** (e.g. genebanks) and other partners, including private sector entities, could multiply and provide interesting material (e.g. AEGIS-Accessions with non-confidential data available.
- **Public breeders** could provide technical advice for traits to be evaluated, project results and further data for AEGIS-accessions (analysis of traits for quality and chemical analysis, high throughput phenotyping etc.).
- **Private breeders** could provide technical advice for traits to be evaluated, own material to be included in the tests on a voluntary basis, participate in evaluation of the trials with their own test sites and taking the scores (biotic and abiotic stresses)
- **National Inventory Focal Points** could facilitate the quality management of the data and their documentation in the respective national databases (where the National AEGIS-accessions are flagged).

A Coordination Unit would be needed to support the collaboration among all partners involved. The ECPGR Secretariat could be an option for this function.

The EURISCO host could support the data exchange between all partners involved by providing a separate intranet platform. Internal ECPGR-EVA data from the intranet platform could be handed-over to EURISCO and be made publicly available after an agreed period (e.g. 3 years).

A Memorandum of Understanding (MoU) would be elaborated and endorsed by all partners involved. The role of the AEGIS Coordinators and ECPGR-secretariat should be clarified.

4. Further steps

Workshop results documented by the ECPGR secretariat.

ECPGR could invite stakeholders to elaborate a proposal for ECPGR-EVA.

Application for funding e.g. in HORIZON 2020.

Annex IV. Break-out group discussion results

All three break-out groups addressed questions related to "**Reasons and goals of a European Evaluation Programme**".

The following three aspects and questions were addressed by one group respectively:

- **What materials should be evaluated by a European evaluation programme and for which traits?**
- **Partners and their comparative advantages**
- **Data and incentives**

The discussion results of the three groups as reported back in their respective PPT presentations to plenary are provided below.

Reasons and goals of a European Evaluation Programme

1. **Which facts, and which key reasons would justify the case for establishment of a European evaluation programme?**

Statements

- Climate change causes immense pressure on agriculture, and response is needed
- National efforts insufficient, require collaboration and PGR utilization is lacking behind
- Strategic importance of PGR and applied plant research to pool resources in Europe
- Breeders ready to use GR but need access
- Genomic Selection (GS) will accelerate erosion of diversity; need to top up
- Advantages of testing over large agro-environmental area

Critical aspects

- Active participation from plant breeding entities is required
- Should not push a supplier-driven process
- Ability to phenotype and exploitation of genotyping information require collaboration across borders
- Meeting SME needs
- Availability of material and access to the material

Recommendations

- Revisit and update survey on breeders' needs, crops and traits[4]
- Pool resources on PGR utilization through pre-breeding

[4] Survey conducted in the framework of the PGR Secure project (http://www.pgrsecure.bham.ac.uk/) Frese L, Palmé A, Kik C. 2014. On the sustainable use and conservation of plant genetic resources in Europe. Report from Work Package 5 "Engaging the user Community" of the PGR Secure project "Novel characterization of crop wild relative and landrace resources as a basis for improved crop breeding". (https://www.nordgen.org/ngdoc/plants/Samarbeten_och_natverk/PGR_secure_workshop2013/Final%20report/On_the_sustainable_use_and_conservation_of_PGR_in_Europe_Sept2014.pdf)

- Pool resources to exploit genotyping information through phenotyping, and to investigate climate/ecological response
- Stress the strategic importance of pre-competitive plant research and use of PGR

2. What would be its primary goals? (See 4 major goals suggested in the draft proposal)

Statements

- Open access of data and germplasm to everyone
- Agree with dynamic information system
- General agreement on the four goals identified in the draft proposal
- AEGIS provides a good framework
- Relevance and value of using AEGIS and EURISCO as platforms to support the programme

Critical aspects

- Traits and crops must be defined by private and public breeders

Recommendations

- Establishing a network is the primary goal
- Improve evaluation - standards and methods
- Improve national inventories
- Develop dynamic and user-friendly information system
- Improve access to information and material
- Access to genotyping and phenotyping data is a priority
- Secure participation from all types of breeding entities, public, private, global, local
- Coordination and standardization of data collection (re-scaling)

3. Should it only focus on evaluation or include pre-breeding, pre-competitive breeding activities?

Statements

- Logical steps to start with C&E but pre-breeding must follow immediately
- Focus on pre-breeding to attract breeding companies
- Need a broader definition of pre-breeding
- Construct a good reference genome for each species

Critical aspects

- Traits must be of interest for breeders
- Evaluation is regarded as pre-existing, but this is not the case
- Further research can be funded through competitive grants
- Genome sequencing is neither cheap nor accessible for some species
- Need tools to link genotyping and phenotyping data (e.g. digital genebanks)

Recommendations

- Structure the network to include pre-breeding from the start
- Development of methods and equipment should be formed as separate projects
- Implementation depends upon the crop
- Some need to move beyond evaluation to parent building
- Evaluation of genotype and phenotype

4. Could a H2020 project proposal (estimated value €7M in 3 years) be the starting point and/or are there other options?

Statements

- Starting point is not the application but identifying stakeholders, traits and crops, and establishing the network/consortium based on demand
- Evolution from National programmes but not for all countries
- Yes, H2020 would be the vehicle for funding

Critical aspects

- Motivation must be interest, not funding
- Critical to show the needs of the industry prior to funding
- Frame must be developed first; ToRs, MoU and project proposal, not crop-specific at the initial stage

Recommendations

- Starting points could be grants from ECPGR
- Grants could be applied to elucidate breeders' needs and to set up the frame
- Establish the network, then write an EU funding proposal

5. Is the focus on harmonizing or interlinking existing programmes across Europe or on establishing new programmes (or might this vary from crop to crop)?

Statements

- Obviously build on existing knowledge and activities/initiatives

Critical aspects

- Need to establish something new, but aware of existing work done, adding value
- Not seen as competition to ongoing activities

Recommendations

- Establish new initiative linking to ongoing work and previous experiences
- Establish new projects after initial establishment

What materials should be evaluated by a European evaluation programme and for which traits?

1. Is a focus on AEGIS accessions justified?

- Keep it open for other accessions (e.g. new research materials produced in projects – at the end of the project the material is just left on the shelf – could be useful for new breeding programmes) ('material under development' [MUD] – has to be available to all, i.e. not under patent)
- Easier not to include MUD due to intellectual property (IP) issues – many breeders would like to have an opportunity to maintain the material after 5 years
- Not always possible to curate MUD in genebanks to the usual standards (e.g. as defined by AEGIS standards)
- To receive funding for new genotyping or phenotyping experiments, inclusion in AEGIS could be a criteria

- Many countries are not currently part of AEGIS, so how can a pan-European programme be built around it?
- Is sufficient material available for the purposes of evaluation through AEGIS?
- If focusing on one to a few gene pools, do we need to increase germplasm collection to make existing collections more representative or only focus on existing material?

2. Should other material be included, to which extent, under which conditions, e.g. from particular research consortia, core collections or, on a voluntary basis, material from private sector partners?

- Material must be available to everyone
- Voluntary donations of other material (e.g. MAGIC populations) is okay
- However, these materials need to be permanently managed by genebanks (challenging)
- Sufficient material needs to be available

3. Should the focus initially be on specific crops, and for which ones is there wider interest/need for a regional initiative?

- Consider species that have complementary characteristics e.g. clonal (grapevine), autogamous (wheat), allogamous (maize)
- Could consider AEGIS model crops

4. Should it focus initially on specific traits, and which would that be? Who would suggest and select them?

- Could use EVA model
- Public scientists and breeders from diverse organizations define the goals (expert group)
- Could use ECPGR Working Groups (WGs)

Partners and their comparative advantages

1. What are comparative advantages of the different types of institutes/partners that are involved?

Statements

- Advantages may be crop-specific and should be clarified in each project
- Global entities and regional/national breeding entities may not have same view

Critical aspects

- Breeders: time of access to germplasm and information
- Breeders: providing knowledge of the market tomorrow – and (more entities providing) the day after tomorrow (medium and long term)
- Breeeders: providing access to test facilities
- Genebank: knowledge of material, access, and for some genebanks also facilities for evaluation

Recommendations

- Network should open for all types of breeding partners, including SMEs

2. What role could for example genebanks/companies located in different agro-ecological zones play?

Critical aspects

- Offering test sites and exposure of PGR to local climate and ecology
- Provide knowledge sharing of diseases and other threats at specific site
- May have available site specific data

Recommendations

- Secure eco-geographical/climatic distribution of test sites in projects

3. Would genebanks be expected to simply provide material or any other roles?

Critical aspects

- Genebanks must be fully involved in evaluation process

Recommendations

- Genebanks must be full partners
- Genebanks should be repository of information / data and relevant material

4. Who are the suitable partners to ensure multiplication/evaluation/data transfer/analysis of results/ dissemination of results/utilization of results?

Critical aspects

- Work must be shared, regardless of entities,
- Whomever qualified and willing to share results should do the work
- Harmonization of protocols and methods are crucial
- Secretariat function very important, must be scientific neutral and provide contact to breeders

Recommendations

- Secure dissemination and documentation
- Responsibilities must be clear within each project
- Monitoring of established common protocols/methods are clear within each projects
- Secure compliance
- Secretariat should be established as a collaboration between ECPGR Secretariat and ESA, exploiting the neutral platform of ECPGR and the lobbying ability of ESA

5. How to make best use the different agro-ecological conditions in Europe?

Statements

- By networking
- Is crop-specific

Recommendations

- Secure representation of relevant climates and agro-ecological zones in the individual projects
- Remind that not all regions may be relevant in each projects

6. To which extent do ongoing PPPs already consider a regional approach and what advantages do they see?

Statements

- Genbanks must move to utilization phase, and resume the critical role of service provider to crop development

Critical aspects

- Develop trust amongst partners
- Regional may reflect common interests and breeding goals
- Involving ECPGR WGs when relevant for the purpose of the individual projects, securing that critical competences and contact points are available

Recommendations

- Projects should focus on the needs of the crops and breeding goals and the possible future growing areas, not regional representation per se
- Share knowledge between national and regional PPPs

7. Who should be the partners/groups of stakeholders that need to be involved and would need to participate in the programme?

Critical aspects

- Must be open to developments within the community

Recommendations

- Genebanks
- Plant breeding entities – public and private, global and SMEs
- Research public and private, sector and universities, as partners where relevant
- Partners outside Europe whenever required for the purpose of the projects, should be well defined in the frame
- ECPGR Secretariat
- ESA +
- NGOs whenever relevant for the projects, should be well defined within the frame
- Crop Trust and CGIAR should be associated, but may not be partners

Data and incentives

1. Why should private partners wish to participate? What is the return they expect from such a programme?

Statements

- Access to expertise and/or material
- Share risk and gain financial efficiencies
- Not interested in all crops but have crop-specific focus

Critical aspects

- Don't start all crops at once
- Companies space limited – ability to filter for target trait
- Lead time for IP exploitation

Recommendations
- Find common ground based on technologies (pheno, geno…)
- Sequence data, population development
- Clear standardized approaches to IP exploitation

2. What could be incentives for less strong partners/genebanks to participate?

Statements
- Access to knowledge that they could not generate themselves
- Demonstration value of collection

Critical aspects
- Uniqueness of collection

3. What are incentives in the ongoing PPPs to convince partners to participate (e.g. having access to confidential data earlier than others? Having access to material that would not otherwise be available to them? Taking advantage of wider evaluation plan than feasible individually?)

Statements
- Confidential data will not be released
- Access to specialized populations

Critical aspects
- Current PPPs all have lead time restricting outside access
- Access to raw data

Recommendations
- Let projects run through to end of exploitation period

4. Which level of harmonization of evaluation protocols would be necessary and how could this be reached?

Statements
- Harmonize all aspects within a project

Recommendations
- Work to specific quality standards
- Ability to respond to technology developments

5. How could the long-term sustainability of a European Evaluation Programme be guaranteed? What would be incentive mechanisms to join such a programme even after an initial project phase?

Statements
- Must have right to delay publication; IP exploitation

Critical aspects
- Projects should be minimum of 5 years, ideally longer
- Ability to join later but under what conditions?

Recommendations
- Lobbying for longer term projects

- Late joiners pay 'fees' for whole project term
- Public partner for coordination

6. Would a EURISCO intranet platform with temporary confidentiality be useful as an incentive?

Statements

- Feasible for a project specific embargo period
- Companies have own system so not necessary with raw data

Critical aspects

- Protocols to prevent data security breaches; contractural issue

Recommendations

- Utilize data in EURISCO once embargo is over
- Original GR at one site for unified access

7. What are the major obstacles to the establishment of such initiative (apart from funding)?

Statements

- Willingness to collaborate
- Self-pollinated crops are easier to manage

Critical aspects

- Build and maintain trust
- Ability to maintain private data where appropriate

Recommendations

- Begin with crops with already established networks
- Also begin with crops with lower competition or equal share

Annex V. Workshop statements and recommendations resulting from break-out groups and final session discussions

- There was general support to continue the work towards establishing a Network for the evaluation of PGRFA in Europe. This is considered of strategic importance for Europe and presents an opportunity to position PGRFA at the same strategic level as it is currently done in other countries like China and USA.
- It should be noted that the Evaluation Network will be critical to facilitate adaptation of European agriculture to climate change and is also contributing towards achievement of related Sustainable Development Goals.
- The importance of an Evaluation Network was seen as not only related to increase the use of genetic diversity in plant breeding, but also to increase the diversity of stakeholders in plant breeding (i.e. private and public plant breeding, SMEs and participatory plant breeding actions).
- Further discussion is required on how to establish a permanent Evaluation Network, and related documents (Memorandum of Understanding (MoU), Terms of Reference (TORs)).
- The Network must be based on strong interest and demand from the breeding sector. Without the private sector seeing a benefit it will not work.
- There was general agreement to start focused, i.e. to validate the structure and functions with exemplar crops and then add stepwise other crops if it works.
- The workshop participants agreed that some preparatory activities are required from today until the development of a Horizon2020 project proposal could be started.
- It is recommended that the ECPGR Secretariat be charged to develop and implement a concept note for this transition phase.
- The transition phase should include the development of the required documentation for the establishment of a Network (MoU, agreement), the contracts to join, a procedure on how to select the exemplar crops, and the identification of partners.
- The Secretariat cannot do this within its existing resources. All participants are invited to look into possible resources to support this process.
- The draft proposal developed and presented to the participants by BLE and the suggested roles of AEGIS and EURISCO in the same were approved.
- The Evaluation Network shall support and include pre-breeding, as well as it may include genotyping and the development of markers, as long as activities remain at a pre-competitive level.
- The participants considered that the establishment of a Network and European-wide evaluation is an important action that ECPGR should take on, and recommended that the ECPGR Executive and Steering Committees discuss in their upcoming meetings how this activity can become a permanent part of the Secretariat's work.

Timeframe

- End of July 2017: Workshop report finalized, published and sent to the attention of the Steering Committee (SC).
- October-November 2017: Preparation of a concept note on "Preparatory work for an ECPGR Evaluation Network"

- Two possible ways:
  - Work Package in H2020 Coordination Support Action – deadline Feb. 2018
  - Concept submitted for funding to ECPGR countries/ECPGR Scheme (End of September 2017)
- October 2017: Executive Committee (ExCo) meeting to discuss status of implementation of transition phase
- May 2018: ECPGR Steering Committee meeting to establish priorities and budget for Phase X (2019-2023)

Elements for a concept note on preparatory work for an ECPGR Evaluation Network

Activities

- Setting up a Task Force of stakeholders involved in preparatory work (ECPGR + ESA + drawing from those involved in PPPs)
- Setting up of Advisory Committee of stakeholders (around 10 people) to oversee and advise on the preparatory work
- Preparation of framework documents, based on analysis of existing partnerships' documents:
  - Draft MoU between partners to define objectives of the Network, sharing of responsibilities, intellectual property terms, terms of access to data and material
  - Draft standards, defining which protocols and methods of a joint evaluation should be harmonized
  - Draft structure of a Network: composition and responsibilities in terms of partner roles (scientific committee (breeders), providers of material (genebanks), evaluators (network of sites, breeders), phenotyping/genotyping skills, maintainers of material, data analyst, coordination unit, documentation platform, other partners?)
  - ToRs for choice of crops
- Draft a budget per exemplar crop project under H2020

Timeframe

- 6 months from the moment the preparatory phase is funded

Budget

- Staff time (1/2 pm at ECPGR Secretariat + at ESA, other?)
- Travel
- 1-2 meetings of Task Force and Advisory Group
- Legal advice
- Overheads

Next step (after preparatory work)

- Exemplar crop(s) stakeholders meeting

Annex VI. Acronyms and abbreviations

AEGIS	A European Genebank Integrated System
BBSRC	Biotechnology and Biological Sciences Research Council, UK
BLE	German Federal Office for Agriculture and Food
C&E	Characterization and evaluation
CGN	Centre for Genetic Resources, the Netherlands, Wageningen, The Netherlands
CIRC	Crop Improvement Research Club, UK
CRA-W	Centre Wallon de Recherches Agronomiques, Gembloux, Belgium
CWR	Crop wild relative
DEFRA	Department of the Environment, Food and Rural Affairs, United Kingdom
EC	European Commission
ECPGR	European Cooperative Programme for Plant Genetic Resources
ESA	European Seed Association, Brussels, Belgium
EU	European Union
EURISCO	European Internet Search Catalogue
ExCo	Executive Committee
FTGR	Fruit tree genetic resources
GFPi	German Federation for Plant Innovation, Bonn, Germany
INIAV	Instituto Nacional de Investigação Agrária e Veterinária, Portugal
INRA	Institut National de la Recherche Agronomique, France
IP	Intellectual property
IPK	Leibniz Institute of Plant Genetics and Crop Plant Research, Gatersleben, Germany
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
IVIA	Instituto Valenciano de Investigaciones Agrarias, Moncada, Spain
JKI	Julius Kühn-Institute, Quedlinburg, Germany
LR	Landrace
LSSV	Living Seeds Sementes Vivas, SA, Portugal
MLS	Multi-lateral system
MoU	Memorandum of Understanding
MUD	Material under development
NI	National Inventory
NIBIO	Norwegian Genetic Resources Centre, Norway
NordGen	Nordic Genetic Resource Center, Alnarp, Sweden
PGR	Plant genetic resources
PGRFA	Plant Genetic Resources for Food and Agriculture

PPP	Private Public Partnership
SC	Steering Committee
SLU	Swedish University of Agricultural Sciences
SMEs	Small and medium enterprises
SMTA	Standard Material Transfer Agreement
ToRs	Terms of Reference
WG	Working Group
WUR	Wageningen University and Research, Wageningen, The Netherlands