



DELIVERABLE 6.3

1st International Workshop and Training School on the Sustainable Management of Plant Genetic Resources

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Promoting a plant genetic resource community for Europe

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on the Sustainable Management of Plant Genetic Resources

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1. Introduction

The PRO-GRACE dissemination, communication and exploitation activities were designed to ensure that all relevant stakeholders and political decision makers would be thoroughly informed about the objectives of the project, which focus on active conservation and exploitation of Plant Genetic Resources (PGR). The project is identifying gaps that prevent scientists and other stakeholders from selecting and accessing the appropriate PGR for scientific and breeding purposes, and then working to fill these gaps by laying the foundations for a European Research Infrastructure (RI), the GRACE-RI, dedicated to the conservation, management and study of European PGR. Moreover, the GRACE-RI concept will further elaborate specific actions in the context of the already existing European Strategy Forum on Research Infrastructures (ESFRI) landscape, aiming to complement their activities and thus increase the added value of this new RI.

The conceptual development of the GRACE-RI, the objectives, the activities and the gaps in the current ESFRI landscape were discussed by international experts and interested stakeholders at the 1st International Workshop and Training School on the Sustainable Management of Plant Genetic Resources at the Mediterranean Agronomic Institute of Chania, Crete, Greece from October 3-6, 2023. On October 3-4, the Workshop featured talks by PGR managers and research leaders from the public and private sectors, as well as discussion sessions dedicated to developing a concept for the prospective infrastructure and identifying the needs of its future utilizers. On October 5-6, the Entry Level Training School addressed to managers of small PGR collections, breeders, and other people interested in PGR management provided basic training on several topics.

2. Activities

To prepare for the workshop and training school, the organizing committee held numerous online meetings to make plans for the timing, agenda, speakers, and subsistence fellowships (lodging + meals). In consultation with the organizing committee, staff working with Dr. Panagiotis Kalaitzis at the Department of Horticultural Genetics and Biotechnology and the conference centre of MAIC, prepared registration forms, first and second announcements with options for accommodation and an accommodation form, a Google form so partners could indicate their participation, fellowship application forms, an agenda, and a privacy policy. Announcements were sent out to partners and stakeholders via e-mail, as well as being posted on the project's website and social media.

3. Results

The Workshop took place at the MAICH conference centre on Tuesday and Wednesday, followed by the Training School in the same venue on Thursday and Friday. The Workshop took place in the MAICH conference centre on Tuesday and Wednesday, followed by the Training School in the same venue on Thursday and Friday. As indicated in the graphs in Annex 1 on participant statistics, the largest number of participants (both on-site and online) came from Italy (43), Spain (21), Greece (18), and the UK (16). Two scientists travelled all the way from Argentina and Taiwan to Crete, and several online participants joined from as far away as Central and South America, Africa, and Asia. Most participants were affiliated with research institutes (84) or universities (63), with a number also associated with private companies (20), public or governmental organizations (15), NGOs (9), and seed banks (8). Most participants (68%) were project partners, with 22% stakeholders and 10% associated partners. 8 participants received residential fellowships,

consisting of 4 nights, breakfast, and lunch at the MAICH conference centre. The registration and accommodation form is shown in Annex 2, while Annex 3 contains the email to fellowship winners (8). An article about the event published in a major Greek daily newspaper's Science section is copied in Annex 4. Pictures about the event (<https://www.grace-ri.eu/pro-grace/news-events/news/first-pro-grace-international-events-successfully-run>) and a news event run by a local Cretan television (<https://www.grace-ri.eu/pro-grace/resources>) can be found on the project website.



PRO-GRACE participants at the premises of MAICH

The Workshop featured talks by PGR managers and research leaders from the public and private sectors on PGR information systems, *ex situ* and *in situ* PGR management, PGR access and benefit sharing, technologies and scientific services for PGR management, as well as PGR evaluation and valorisation.



PRO-GRACE International Workshop and Training School took place at the auditorium ARISTOTELIS.

The participants also had a chance to hear presentations from representatives of the existing EMPHASIS, DISSCO, ELIXIR, and METROFOOD European Research Infrastructures. They shared valuable insights on the establishment, timing, and process of a European research infrastructure.

One of the highlights of the workshop was an interactive session in which all the participants had the opportunity to discuss their ideas in small groups and offer feedback on aspects important for making the GRACE Research Infrastructure a reality. Participants shared numerous useful points about services for future users (the PGR community and other stakeholders), as well as visions for the structure, finance, and governance of a prospective infrastructure.

The Entry Level Training School was addressed to managers of small PGR collections, breeders, and other people interested in PGR management. The goal was to provide basic training on the following topics:

- Introduction to PGRs
- Guidelines and principles for *ex situ* and *in situ* PGR management
- Basic phytosanitary techniques
- Informatic tools for accessing/providing information related to PGRs
- Omics technologies for the management of PGRs.

Katrina Karklina, a PhD student at the Institute of Horticulture in Latvia who attended the workshop and training school, appreciated the opportunity to learn from experts who provided “advice based on real-life experience, not just what’s written in documents,” as well as sharing “experience from different countries.” She also valued the inclusion of the young people who will follow in the footsteps of those who retire.

Originally from Algeria, Sarra Yataghene is working on a Master’s degree at the Hungarian University of Agriculture and Life Sciences. She is “really grateful” that fellowships covering food and lodging at the Mediterranean Agronomic Institute of Chania “gave opportunities to students like me,” enabling them to attend. “We learned a lot.” She was particularly impressed by “the human experience,” both in terms of networking opportunities and learning about applied science and useful techniques.



Katrina Karklina and Sarra Yataghene attendees of the Workshop and training school

The workshop and training school were productive for experienced scientists as well as younger ones. As Bela Bartha of the Swiss NGO ProSpecieRara pointed out, a gathering of scientists from different backgrounds enables everyone to “get a bigger picture. Colleagues take in new ideas to integrate as well,” which can fruitfully “broaden the picture of PGR in the room” and enable professionals with various specializations to make their work complementary.

4.1 WORKSHOP ON THE SUSTAINABLE MANAGEMENT OF PLANT GENETIC RESOURCES (PGR)

Tuesday, Oct 3

9.30-9.40 Welcome from MAICH Director

9.40-10.00 Introduction. G. Giuliano (ENEA, Rome): The *GRACE-RI: A European Research Infrastructure dedicated to PGR*

The PRO-GRACE project was presented emphasizing the importance of PGR-related Research Infrastructure (RI) and the urgent need for the creation of such an RI, to conserve PGR for future generations. The GRACE-RI fills a clear gap in the European Research Infrastructure roadmap and nicely complements existing RIs in different domains. The importance of PGR for mankind can be clearly explained considering the potato food crisis in Ireland in the last century leading to a famine crisis, the death of many people, and the forced immigration of others. Climate crisis immigration is a real threat to Europe nowadays. This emphasizes the importance of preserving PGR to combat pests and develop resilient cultivars through breeding. Crucial for the development of the RI will be to expand the stakeholders' list beyond the scientific community and include farmers' associations for decision-making in the future considering their role in PGR diversity conservation. Moreover, breeders are also important stakeholders in PGR exploitation.

10.00-11.00 Presentations of existing European Research Infrastructures: LIFEWATCH, EMPHASIS, DISSCO, ELIXIR, METROFOOD. (Chairs: G. Giuliano, ENEA and G. Bucci, CNR)

DISSCO Research Infrastructure presentation by Dr. Jose Alonso

DISSCO aims to digitally unify European natural science collections. It is important to digitize, integrate, and improve access for acceleration of biodiversity research and face global challenges. The development of an integrated risk infrastructure model called the **digital extended specimen** was also elaborated, to transform static records into dynamic and usable digital objects. This model requires persistent identifiers and Artificial Intelligence to promote data curation, interoperability and accessibility.

The preparation of the DISSCO RI was very long for following the roadmap to go to the next construction phase of the project. The objective was to provide unified access to loans and visits and digitization dashboard for comparing collections, a very complex technical task.

EMPHASIS Research Infrastructure presentation by Dr. Roland Pieruschka

EMPHASIS aims at plant phenotyping and is important for understanding the interaction between genes and environments. The need for specialized infrastructure and expertise to monitor in real-time plant traits towards sustainable agricultural production was highlighted. There are various plant phenotyping approaches, such as field categories, modeling options, and information systems. A brief description of EMPHASIS development was presented considering that is a long process which however resulted in a plethora of funded EU projects. The importance of collaboration with other European RIs was highlighted as well as the importance of open calls for project support through the EMPHASIS network of infrastructure facilities across Europe.

ELIXIR presentation by Dr. Andrew Smith (Online)

Andrew Smith presented the research infrastructure called **ELIXIR** and its potential interaction with GRACE-RI. ELIXIR, a life science research infrastructure, is involved in the challenges and opportunities of managing data and software from research projects across Europe. It was highlighted the need for coordination, interoperability, and collaboration among institutes and initiatives in order to effectively handle the growing volumes of data and provide valuable services to scientists. A. Smith explained that ELIXIR provides various services such as databases, software tools, training courses, and funding opportunities to scientists. They also mentioned collaborations with EU projects and efforts to make data interoperable.

METROFOOD presentation by Dr. Claudia Zoani (Online)

Claudia Zoani discussed the METROFOOD project, which aimed to enhance food quality and safety through high-level metrology services. They also talked about the project's focus on various aspects of the agro-food system, and the development of new analytical methods and digitalization of agro-industrial systems. Claudia Zoani discussed the different types of users and services provided by their organization, including collaborations at national and international levels. She also mentioned specific projects and initiatives, highlighting the opportunity for interested parties to apply for integrated services within the research infrastructure.

11.00-11.20 Round table: Synergies/complementarities between the future GRACE-RI and other European Research Infrastructures (Chair: G. Bucci, CNR)

The participants discussed the challenges and benefits of applying for a research infrastructure (RI) and the importance of engaging with national governments and ministries for funding and support. They emphasized the need for strong champions and the ability of the RI to solve problems and offer something unique to attract participation from multiple countries. The discussion hinged around the challenges faced in developing research infrastructures, including the need for clear differentiation and a pan-European approach. They also discussed the importance of making data FAIR (findable, accessible, interoperable and reusable), while considering legal obligations and benefit sharing related to genetic resources. The participants discussed the importance of data sharing and tracking the benefits of publicly funded data. They also shared their experiences and advice on building research infrastructures, emphasizing the need for global collaboration and long-term planning. The discussion revolved around the challenges of transitioning from the design phase to the preparatory phase funding and applying for the S3 roadmap. They emphasized the importance of having support from national ministries and governments, as well as utilizing existing EU funding to build momentum for research infrastructure.

11.20-11.40: Coffee break

11.40-13.10 Presentations of EU-funded projects dedicated to PGR: G2P-SOL, FARMER'S PRIDE, TRADITOM, HARNESSTOM, INCREASE, AGENT, BREEDINGVALUE, GEN4OLIVE, FORGENIUS, COUSIN. (Chair: G. Giuliano, ENEA)

Antonio Granell Richart presented two projects, **TRADITOM** and **HARNESSTOM**, both funded by Horizon 2020, focused on tomato genetic resources. The projects aimed to understand the genetic basis of tomato variability, develop breeding tools, engage with companies, and involve farmers in participatory breeding. Giovanni Giuliano discussed their progress in developing tools and methods to increase species efficiency and precision breeding. They also mentioned their efforts in compiling a centralized public repository

(HarnesstomDB, <https://gateway.harnesstom.eu/>) of information related to genetic resources and breeding materials.

Giovanni Giuliano discussed the **EU-G2P Sol project**, a six-year project that focused on collecting and organizing genetic data of major *Solanaceae* crops. The project successfully created a centralized database with passport data, scientific observations, and images of over 56,000 accessions, allowing for various functionalities and studies related to the crops' biodiversity and domestication history. Giovanni discussed the process of conducting a large-scale experiment on genetic diversity in crops, including the identification of key genes and the establishment of core collections. However, there are concerns about the future funding and maintenance of genebanks and the data repository.

Bruno Mezzetti discussed the **BREEDING VALUE project**, which focused on the cultivation and economic value of small fruits like strawberries, raspberries, and blueberries. The project aimed to create a European network and generate breeding data to address the decline in genetic diversity caused by intense breeding practices. Bruno presented a project on characterizing genetic resources for strawberries, raspberries, and blueberries. The project involved identifying and characterizing the genetic resources, validating new markers for genomic selection, and using various techniques for phenotyping and analysing the plants.

Ivan Scotti presented the **FORGENIUS project**, which aims to conserve and describe forest genetic resources in Europe. The project focused on increasing information on forest intraspecific biodiversity, homogenizing data collection, and converting it into prediction and management tools, to make it accessible to the public. The use of satellite data was also presented to update and model the short-term resilience of genetic conservation units in forests, focusing on hydraulic traits and water relationships. The goal was to provide multidimensional indices of forest stability and resilience to the network of forest management systems in Europe.

The **AGENT project** was presented by Stephan Weise on behalf of Nils Stein, which aims to build a network of actively cooperating genebanks in Europe using agreed standards and protocols to collect data on plant genetic resources, specifically focusing on wheat and barley. The project has 18 partners from 16 countries and aims to improve the management of other crops as well. The data collection efforts for abiotic stress, particularly drought stress, in the AGENT project were shown among others. The project involves multiple stakeholders and institutions, including the European Evaluation Network (EVA) and the Italian organic farmers network Rete Semi Rurali, and focuses on genotyping, phenotyping, and developing standards for data collection and exchange.

The **COUSIN project** was presented by Stephan Weise on behalf of Christian Schöb, which will start in 2024 and aims to utilize and conserve crop wild relatives for sustainable agriculture. The project will involve multiple partners and focus on five flagship crops, with activities including data acquisition, conservation, characterization, and breeding to develop registered varieties with desired traits.

Roberto Papa presented the **INCREASE project** focused on genetic resources and biodiversity, particularly in relation to food legumes. The project aimed to develop new tools for genebanks, involve citizen scientists and promote the decentralized conservation of genetic resources. He also discussed the participation of various stakeholders in a decentralized conservation system aimed at improving the utilization of genetic resources worldwide. He also mentioned the development of field trials, genotyping methods, and published research papers as part of their ongoing work.

Nigel Maxted presented the **FARMER'S PRIDE project** the fourth EC-funded project in a series led by members of the ECPGR Wild Species and On-farm Conservation Working Group. In Farmer's Pride, several concepts and methodologies developed in the earlier projects reach fruition, particularly the initiative to establish a European Network for In Situ Conservation and Sustainable Use of Plant Genetic Resources. Some of the most important project products are: (1) CWR and LR network showcases of best practice, (2) the tool for identifying which CWR are found in the Natura 2000 network, (3) CWR population management and LR on-farm guidelines, (4) the *in situ* plant genetic resources conservation information management tools (within the CAPFITOGEN toolkit), (5) guidelines for associating incentives for PGR sustainability and the public willingness to pay for support mechanisms for effective conservation, (6) the case for the establishment of PGR-Centres, (7) the linking of *in situ* conserved PGR with *ex situ* and stakeholder use, and the establishment of the European and national *in situ* conservation network of sites and stakeholders. More active *in situ* / on-farm conservation of CWR / LR diversity in Europe will more than double the breadth of PGR diversity available to breeders and farmers.

Cristian Garcia presented the **GEN4OLIVE project**, which aimed to characterize and evaluate over 600 olive cultivars across the Mediterranean basin in terms of biotic and abiotic stresses, adaptation to mechanization, production, and quality. The project also focused on developing biomarkers, studying environmental impacts, and creating a solid database for olive information, including the development of apps for cultivar and pest identification. The preliminary results of their research on the effects of temperature and environmental conditions on olive crops were illustrated. They also mentioned their efforts in characterizing and conserving wild olives, developing genetic markers for breeding, and creating a user-friendly database and apps for public access to the research findings.

13.10-13.30 Round table: How to best incorporate the know-how gathered in previous EU projects on PGR in the future GRACE-RI Research Infrastructure. (Chair: G. Giuliano, ENEA)

The importance of genebanks in conserving genetic diversity for plant breeding was discussed. The chair highlighted the need for a complementary approach of *in situ* and *ex situ* conservation to address the limitations of genebanks and ensure sufficient access to diverse genetic resources for breeders. The need for an explicit link between conservation and use in genebanks, emphasizing the importance of connecting *in situ* conservation to utilization for long-term funding was also discussed, as well as the development of various tools and protocols to establish a network for conserving crop wild relatives and landraces across Europe, which received encouraging participation from stakeholders.

13.30-14.30 Lunch break

15.30-16.50 Thematic Session 1: Plant Genetic Resources Information system; making data FAIR and useful (Chair: S. Weise, IPK Gatersleben)

C.H. Aguilar (IPK Gatersleben): The European PGR Information System and the Fair Imperative: Progress and prospects

CH Aguilar focused on FAIR principles—Findable, Accessible, Interoperable, and Reusable. Recognizing the transformative impact of digital tools, the critical role of digital information in managing diverse plant genetic resources was emphasized. The complexity of PGR data was underscored, highlighting the challenges in standardization, accessibility, and interoperability across multiple databases. Drawing inspiration from EURISCO's current alignment with DOIs and MCPD standards, CH Aguilar advocates for semantic data standards, structural standards, and technical standards to achieve FAIR compliance. Collaboration, user

feedback mechanisms, and capacity building for data contributors are pivotal for success. Pertinent questions were raised on data findability, accessibility, standardization, usability metrics, and institutional dynamics, emphasizing a step-by-step approach for overcoming obstacles to sustainable PGR management in Europe. This approach is vital for achieving sustainable and efficient management of Plant Genetic Resources in the European context, ensuring the preservation and accessibility of crucial genetic information for future generations.

C. Pons-Puig (CSIC-IBMCP, Valencia): Towards a harmonized system of standards for PGR phenotypic, image, and genetic (meta)data

Clara Pons-Puig referred to the aims to establish a harmonized standards system for PGR phenotypic, image, and genetic data. The significance of this endeavour lies in fostering data reuse and integration. The adoption of existing standards was stressed, with a particular emphasis on MIAPPE, a mechanized standard, for documenting plant phenotyping experiments, with wide adoption across various projects and initiatives. A need for specific metadata standards was identified for image standards, and UPV, CSIC-IBMCP, and IPK proposed a minimum requirement for collecting images. Regarding genetic data, challenges were outlined, including the lack of unique identifiers and species-specific standards. CSIC - IBMCP suggested using persistent unique identifiers, specific genomic data standards, and enriching file metadata to link genetic data with phenotypic and passport data. To ensure high-quality genetic data, CSIC - IBMCP recommended setting thresholds for sequence quality and incorporating standards from international repositories. Finally, the conclusion emphasized the importance of adopting existing standards, using common identifiers, and fostering universal adoption through education and collaboration.

J. Magos Brehm (Univ. of Birmingham): *In situ* PGR conservation data standards

Joana Magos Brehm referred to the development and/or compiling of data standards for *in situ* PGR conservation and management. In addressing challenges related to documenting PGR populations, Joana emphasized the diverse nature of PGR, encompassing both wild and cultivated resources, for which very specific considerations regarding documentation need to be considered. She underlined the (potential) absence of detailed population management data standards and seeks input on this aspect. Existing standards for *in situ* populations include principles from EURISCO and publications by Theo van Hintum and José Iriondo. The history of standards for crop wild relatives and landraces was outlined, indicating progress but underscoring the need for adaptation to wild food plants. Joana highlighted that one of the tasks in PRO-GRACE will be to facilitate the interfacing with EURISCO's platform for unified access to *in situ* PGR data. In conclusion, nine discussion points were presented, inviting feedback on managing data, ensuring accessibility, and addressing challenges in *in situ* conservation.

16.50-17.10: Coffee break

17.10-18.30 Thematic session 2: *Ex situ* and *in situ* PGR management: ensure quality and efficiency (Chair: J Magos Brehm, Univ. of Birmingham)

T. van Hintum (CGN Wageningen): A certification system for *ex situ* genebanks

Theo van Hintum emphasized the need to establish a certification system for *ex situ* genebanks, addressing critical challenges in PGR conservation. It was highlighted the current inefficiencies and unreliability in existing genebanks, emphasizing the need for a global standard to enhance collaboration and eliminate redundancies. Moreover, he proposed a certification system that involves formulating standards based on FAO guidelines, introducing quality management, and implementing an auditing process. It was acknowledged the potential cost but was argued that the long-term benefits outweigh expenses. The

collaborative effort, involving CGIAR and the Crop Trust, seeks to create a robust infrastructure for genebank certification. Key discussions included the specificity of standards, auditing authority, and criteria for inclusion, acknowledging the necessity of capacity building. Theo urged input from stakeholders to shape the certification system, fostering genetic resource conservation for future generations.

MJ Díez (Polytechnic Univ. of Valencia, online): Experiences with peer reviews in European genebanks

MJ Díez discussed the enhancement of the quality management of European genebanks through a transparent and collaborative approach. Drawing inspiration from Aegis and European genebanks, the AQUAS system focuses on four key actions: Plan, Do, Check, and Act. The manual guides genebanks in activities such as acquisitions, security, and maintenance, fostering a comprehensive understanding of their operations. The Polytechnic University of Valencia review system involving three institutions, emphasizing transparency and mutual learning. A pilot experiment successfully conducted with teams in Spain, the Netherlands, and Poland showcased the benefits of reciprocal visits, detailed reviews, and shared expertise. The reports from these peer reviews, available on ECPC's website, serve as valuable tools for improvement and can be instrumental in securing funding. MJ Díez invites discussion on the sustainability, role, and broader applicability of peer reviews within the context of research infrastructure.

N Maxted (Univ of Birmingham): Quality improvement in *in situ* management of PGR

Nigel Maxted focused on current challenges faced by genebanks, emphasizing their lack of reliability, limited access, and hindrances to collaboration. He proposed a certification system to ensure adherence to standards, introducing quality management, auditing, and an independent body to verify compliance. Collaboration with CGIAR and the global community is sought to create a global standard. In addition, he underscored the need for capacity building, policy support, and discussions on the specificity of standards and auditing. Input and collaboration from various stakeholders are crucial for achieving a system that effectively conserves genetic resources for future generations. The University of Birmingham's initiative aligns with the broader European strategy for PGR, aiming to improve genebank quality and collaboration across the global PGR system.

V Holubec (Crop Research Institute, Prague): Building capacity to assure quality in PGR management

Vojtech Holubec discussed the plan for capacity-building programs supporting genebanks and *in situ* conservation networks. The strategy encompasses assessment, training, and networking, emphasizing legal aspects and global, European, and ECPGR information. The focus extends to genebanks, specifically targeting national genebanks and specialized collections, excluding private companies. The importance of addressing diverse starting points and respecting national environments was stressed. Training proposals cover customized programs addressing specific needs, including germplasm handling, regeneration, and data management. The Crop Research Institute from Prague underscores the significance of international treaties, such as the CBD Nagoya, and emphasizes the role of ECPGR as a pillar for PGR management in Europe. Key components include ex-situ and vegetatively propagated plant training, documentation systems, and collaboration encouragement, all monitored to ensure sustained progress.

Wednesday Oct 4, 9.30 EET

9.30-10.30 Thematic session 2: PGR access and benefit sharing, IP protection, training (Chair: N Wangeluwe, EUROSEEDS)

P Kalaitzis (MAICH, Chania): Training opportunities in the GRACE-RI

The training opportunities are of interest to a wide range of stakeholders, plant scientists, genebanks, plant breeders, seed conservation networks, farmers, seed companies and national and international agencies dealing with plant biodiversity. The GRACE-RI can provide training to genebank personnel, young scientists working on phenotyping, genotyping, multi-omic approaches and PIs working on PGRs. These training courses can be tailored to the needs of specific groups. Stakeholders can serve as both providers and utilizers of GRACE-RI. These objectives can be served by the establishment of a training platform creating a training community functioning as scaffold for training activities. Moreover, call for proposals can be implemented for very short and longer research missions for research project development. Various training activities can be developed such as technical webinars, hands-on training schools, e-learning platforms, and workshops for PGR stakeholders. Combined courses with other RIs such as EMPHASIS and ELIXIR can be designed to complement activities in the ecosystem of European research infrastructures.

N Vangheluwe (Euroseeds): IP considerations

Nick Vangheluwe presented an input on how the private seed sector views PGR. The conservation of PGR is key for plant breeders while the purpose is making the material available for use by everyone. Questions that arise and complicate the use of *in situ* and *ex situ* material as well as digital sequencing information include if the country of origin is party to the Nagoya protocol, what the ABS (Access and Benefit Sharing) obligations are and the financial contributions to be made. The Euroseeds webpage includes an ABS navigator that provides information on what kind of regulations one needs to comply with when using a particular PGR. The most effective system for protecting plant breeders' rights is patenting the seeds, however one of the problems that arises concerns the transparency of the patents. Euroseeds has launched the PINTO database which links a plant variety to known patents. The fact that plant breeders contribute greatly in the conservation and sustainable use of PGRs was emphasized as well as the fact that they have to make an extra effort in order to comply with ABS legislation while facing unjustified criticism.

L Escajedo San-Epifanio (Univ. of Basque Country): Access and benefit sharing in agricultural research and development

An introduction to the problem of ABS was given as well as a report of its significance in imposing equitable sharing of the benefits of PGR between users and providers. The current status of global ABS regimes was discussed. The main challenge arises from the fact that only some countries have signed to the Nagoya protocol while others follow their own national laws, bringing an obstacle to the harmonization of the fair exchange and use of PGR. Another challenge includes the fact that regulations of PGRs often overlap with other regulations concerning trade law etc. The legal process of gaining access to a resource in accordance to the CBD (Convention on biological diversity) was described.

10.50-11.50 Thematic session 4: *Evaluation and valorisation of PGRs: facilitating their adoption in breeding programs* (Chair: I Verde, CREA Rome)

I Verde (CREA Rome): Introduction

At first, the structure of the tasks and deliverables of WP4 were described. Then there was the description of the status and progress of the work. Crops were divided into 4 groups: Fruit trees, Fruit vegetables, Leafy vegetables and Grains. The scope of WP4 is the valorisation of PGR for breeding, so, in the WP only traits with importance for breeding were considered rather than others used for botanical or varietal classification such as DUS tests. In particular, the traits being considered are the following: Yield, Quality characteristics (before and after processing), Resistance to biotic stresses, Tolerance to abiotic stresses, Plant and root architecture. An important task of the WP will be the rationalization of the crop and trait ontology. This is a complex task that was discussed in the main presentation in Thematic Session 4.

R Pieruschka (Forschungszentrum Jülich) and C Pommier (INRAE Saclay): *Plant phenotyping data management from phenomics to integration for analysis and PGR characterizations: challenges and solutions from ELIXIR and EMPHASIS*

A description of the type of data researchers work with in phenomics was given. During phenotyping at an initial stage, there is a collection of raw data in the form of images, which are expensive to acquire and are not reproducible. At a second stage, computer-derived data are produced in the form of matrices. Raw data is reduced at the first stage and then moved to other platforms to be analysed. A useful tool that was designed by ELIXIR is the research management toolkit which provides guidelines on how to design a research data management plan. How data can be standardized was also mentioned and the use of comparable identifiers for all data was emphasized.

10.30-11.30 Thematic session 5: *Technologies and scientific services for the management of PGR* (Chair: L Barchi, Univ. of Torino)

A Fernie (Max Planck Institute Golm): *Metabolomic and phytosanitary technologies and scientific services* (20')

The major work to this date focused on D3.1 – Simplified sample collection protocols amenable to use by non-specialized personnel, dealing with plant sample preparation, which is a fundamental step in the case of high-throughput omics strategies. In addition, the power of metabolomics and its value in assessing crop wild relatives as a potential source for breeding programs was discussed in the context of the ongoing deliverable 3.3. and details regarding phytosanitary requirements for cross-border transfer of plant material was likewise discussed in the context of ongoing deliverable 3.5.

L Barchi (Univ of Torino): *Genomic and bioinformatic technologies and scientific services* (20')

Lorenzo Barchi highlighted that genomics-based identification should become the golden standard for the management of PGR. However, he pointed out that some people working on PGR do not have the facilities and skills to use these technologies. He then described the main approaches that users can adopt for having their accessions DNA-barcoded and how to use this information. In particular, end-users could exploit genetic data to identify duplicates and misclassified accessions within and among genebanks, spot critical gaps in ex situ and in situ collections with respect to natural genetic variability of a species, construct core collections representative of the genetic variation of a much larger gene pool to carry out GWA studies and how to use genetic data to study loci selected during crops' domestication.

Lorenzo Barchi also described the role that cytogenomics protocols could play for PGR management in the genomics era. In particular, ploidy/aneuploidy/genome size determination (especially for clonally propagated species) provides precious information on chromosome number, karyotype and genomic constitution of CWR (Crop Wild Relatives), as well as the role of molecular cytogenetics (genomic in situ hybridization – GISH) for the identification of parental chromosomes in interspecific hybrids and introgressions.

Discussion (20').

11.30-11.50: Coffee break

11.50-13.10 Thematic session 6: *Stakeholders, services, sustainability–Visions for the future GRACE-RI*

Interactive workshop moderated by Lise-Lykke Steffensen (NordGen) and Sandra Goritschnig (ECPGR).

Work package 5 organized an interactive session to engage project partners and stakeholders in a discussion on central issues for the development of a future European research infrastructure for PGR (GRACE-RI). More than 50 participants engaged in groupwork both online and in person to identify: 1)

the most likely stakeholders of the future RI (both as users and providers), 2) the main services that they currently use in their work on PGR and that they would like to see provided by the future RI, 3) which elements need to be considered when developing a governance structure and financial plan of the future GRACE-RI and 4) the future RI's main opportunities and challenges.

Participants expressed a clear need for establishment of a dedicated RI for PGR, which would serve mainly genebanks and researchers, but also breeders and farmers as a one-stop shop for their needs in *in situ* and *ex situ* conservation and utilization of PGR. The main services currently used on PGR are related to conservation (both *ex situ* and *in situ*) and data generation, management, and analysis. In the future, participants would also like to be able to access training, standardized protocols, and support for legal and policy issues through the GRACE-RI. Current bottlenecks, such as lack of harmonized standards and protocols, issues with data accessibility and interoperability as well as lack of staff, capacity, and facilities could be addressed through the development of a GRACE-RI that would provide access to dedicated PGR services. Stakeholder representation, effective communication and dissemination of service outputs, and the need for agile, coordinated leadership were considered important elements for the governance of GRACE-RI with political support from host countries highlighted as essential. This is reflected also in the observed need to gain governments and the EU's commitment to supporting GRACE financially, which together with support from third-party users of the services will contribute to the RI's financial sustainability.

Establishing the GRACE-RI will contribute to connecting the European PGR community, improving PGR conservation, access, and use, implementing quality standards in conservation and data collection and management, and through the provision of complementary services, connect with and fill gaps in the current European RI system. The main challenges that the GRACE-RI will face in its development and implementation are funding, the diversity of stakeholders and their visions as well as legal and political issues related to PGR availability.

The interactive session highlighted important aspects that will be considered during the development of the GRACE-RI. This process will continue engaging more stakeholders of the future RI in dedicated surveys to collect information that will feed into proposed services, governance structures, and financial planning. A detailed summary of the results of the interactive session is available in Appendix to Deliverable 5.2.





Interactive workshop to discuss ideas and collect feedback

4.2 ENTRY-LEVEL TRAINING SCHOOL IN PLANT GENETIC RESOURCES (PGR)

Thursday, Oct 5

9.30-11.15 Introduction to PGR (Chair: L Maggioni, ECPGR)

L. Maggioni (ECPGR): *The European Cooperative Programme on Plant Genetic Resources*

Lorenzo Maggioni began the session with an introduction to PGR and discussed the history and conservation of PGR. He covered the exchange of plants throughout history, the establishment of genetic resource collections, and the shift in perspective regarding the ownership and sharing of genetic resources, following the Convention on Biodiversity of 1993. The speaker discussed the evolution of a Global System for the conservation and sustainable use of PGR, including the establishment of a multilateral system for exchanging genetic resources, as part of the FAO International Treaty on Plant Genetic Resources for Food and Agriculture. He also mentioned the establishment in 1980 of a European Cooperative Programme for Plant Genetic Resources (ECPGR), which has promoted collaborative actions in Europe until the present day.

Maggioni described in particular the creation of a European genebank Integrated System called AEGIS which aimed to coordinate high quality conservation, safety and prompt availability of unique genetic material across Europe. However, after 10 years, only 70,000 accessions were included in this decentralized system by the member countries, highlighting the challenges in achieving widespread participation and growth. Various other activities and initiatives related to the conservation and utilization of PGR in Europe were also presented, such as the online catalogue EURISCO with more than 2 million genebank accessions, the activities of 24 crop and thematic Working Groups, the European Evaluation Network and the new scientific journal 'Genetic Resources'. The speaker highlighted the importance of establishing a European Infrastructure to ensure the long-term maintenance and sustainable use of these resources and the need for strong political commitment for successful implementation.

L. Escajedo San-Epifanio (Univ of Basque Country): *Access and Benefit Sharing*

Leire Escajedo San-Epifanio discussed the implementation and challenges of the ABS system in the context of biodiversity conservation. She highlighted the complexities of ABS, the need for international cooperation, and the advantages of the multilateral system provided by the International Treaty on Plant Genetic Resources for Food and Agriculture. She also considered the advantages and limitations of the multilateral system for standard material transfer agreements, a useful tool for promoting equality and providing clarity which also involves challenges in terms of negotiation, automation, and inclusion of all plant genetic resources.

Other points included the challenges and limitations of the current system for accessing and sharing genetic resources. There was a call for a reality check and the need to address the discrepancies between the idealized system and actual implementation, particularly in the context of agriculture and the implications for other users, such as the pharmaceutical industry. The discussion concluded that despite reasonable efforts, it is politically challenging to reach fair agreements due to the problematic stance of European countries and the United States.

A conversation between the speaker and an audience member focused on the need to demonstrate political support, preliminary work, and visible improvements in future infrastructure. They also talked about the challenges of exchanging PGR and the shift in approach from free exchange to a bilateral system between providers and users, as well as the challenges of establishing ownership and sovereignty over genetic resources, particularly in relation to plant genetic resources. The Nagoya Protocol was seen as overly restrictive, and there was a desire to find a solution that ensures benefit sharing while promoting openness, accessibility, and reusability of scientific knowledge.

11.15-13.30 Tools for PGR management (Chair: R Schafleitner, The World Vegetable Center)

L. Barchi (Univ of Torino): *Genomic tools for the management and characterization of PGR*

Lorenzo Barchi discussed different methodologies for sequencing and bioinformatics approaches, including whole genome-sequencing. He also mentioned the use of different sequencing technologies such as Illumina, Nanopore, and Pacbio and talked about the analysis of sequencing data to identify polymorphisms in a genome. Barchi mentioned various tools and filters to extract and refine the polymorphic sites, emphasizing the importance of defining common pipelines and adjusting filters based on a project's needs. The speaker discussed the use of markers and genetic resemblance calculations in population genetics studies. He also mentioned the importance of phenotyping, extensive genotyping, and evaluating population stratification in studies.

After the presentation, the discussion revolved around the challenge of implementing techniques to capture the variability within accessions. There was a debate about the minimum number of plants that should be genotyped and the need for genebank managers to understand the possibilities and limitations of different technologies before making decisions. There was also a comment about the incorporation of genetic analyses on the same plants used for characterization, particularly in the context of autogamous plants. The advantages of using SNPs for genotyping were highlighted, and there was a suggestion to consider installing sequencing technology for more accessible and independent research.

- **Coffee break (30')**

R. Schafleitner (The World Vegetable Center): *Phytopathological tools and techniques*

Roland Schafleitner discussed the importance of seed health testing and the common phytosanitary problems associated with seed-borne pathogens, such as bacteria, fungi, nematodes, and viruses. He emphasized the need to prevent the spread of diseases through contaminated seeds and highlighted the challenges in detecting and controlling these pathogens. He talked about the importance of controlling virus transmission through seeds to prevent the spread of quarantined organisms, highlighting the need for seed disinfection, testing, and production under protected conditions to ensure seed health and certification.

Schafleitner explained the process of testing and ensuring the quality of seeds and seedlings to minimize varietal contamination. He mentioned the use of specific detection methods, such as loop-mediated isothermal amplification, to detect and prevent the spread of viruses in seeds. He also discussed the seed health and quality laboratory, highlighting the processes of seed extraction, washing, treatment, and testing. He addressed the challenges of organic seed treatment and the need for research on beans, as well as the potential for post-entry quarantine and the loss of unique accessions if they are contaminated by viruses.

The discussion revolved around the challenges of testing and preventing the spread of known and unknown pathogens in plant genetic resources, also touching on the difficulties in importing and distributing seeds due to phytosanitary requirements, and the need for a workable system to facilitate the global exchange of plant genetic resources.

13.30-14.30 Lunch

14.30-18.00 *Ex situ* and *in situ* management of PGR (Chair: N Maxted, Univ of Birmingham)

T van Hintum (CGN, Wageningen): *Ex situ management of PGR*

Theo van Hintum discussed the importance of conserving PGR for food production and other objectives, starting with the origins of agriculture, the need for action to protect these resources, and different strategies for conservation. He highlighted how early farmers without scientific knowledge or education transformed wild plants into the crops we eat today, leading to a remarkable change in the diversity and availability of food. However, with the advent of scientific breeding and the globalization of eating culture, there has been a loss of genetic diversity and a shift towards a few uniform, high-yielding varieties, which has made our food system more vulnerable to environmental changes, threatening the preservation of traditional crops.

Van Hintum highlighted the issue of genetic erosion in our food system, with a decrease in diversity and an increase in uniformity. This loss of genetic diversity led to disasters, such as the Irish potato famine, in the past, and it poses a future risk of food scarcity and vulnerability to climate change. Van Hintum introduced different approaches to conserving plant genetic resources, including *ex situ*, *in situ* on farm, and *in situ* in nature. He acknowledged the strengths and weaknesses of each approach and emphasized the need for synergies and collaboration among them to effectively conserve and provide access to plant genetic resources.

The discussion revolved around the importance of both conservation and adaptation in agriculture. While some argued for the preservation of existing varieties, others emphasized the need for scientific knowledge and selective breeding to adapt to new conditions. There was an emphasis on the importance of access to global genetic diversity for plant breeders, while acknowledging that local farmers may not have the same access. It was suggested that collaboration between local farmers and conventional breeders is necessary to incorporate broader genetic material into local crops.

The importance of preserving obsolete varieties in genebanks for future generations was also mentioned, as well as the challenges in sampling, conserving, and making the material available to users such as breeders, scientists, and NGOs. The conversation touched upon the different types of samples included in genebanks, such as advanced cultivars, land races, wild species, and research materials. The challenges of maintaining and preserving genetic resources in genebanks were discussed. There was an emphasis on the importance

of safety backups, genetic integrity, and periodic germination testing to ensure the viability and stability of the stored seeds. Various strategies were discussed for the regeneration and distribution of PGR, and the importance of data collection and documentation was stressed. The need for improved coordination and collaboration among genebanks to effectively address the challenges posed by climate change and ensure food security was highlighted.

N Maxted, J Magos Brehm (Univ. of Birmingham), V Holubec (Crop Research Institute, Prague): *In situ management of PGR*

Nigel Maxted began his presentation with the story of Nikolai Vavilov, a scientist in St. Petersburg who convinced Trotsky to fund his own institute during the Russian Revolution. However, after falling out of favour with Stalin, Vavilov was imprisoned and eventually died in a tragic ending to his contributions as the founding father of genetic resources. The discussion then turned to the importance of conservation planning and implementation for PGR. It also highlighted the significance of monitoring and choosing the right sites for *in situ* conservation, including genetic reserves and on-farm conservation of landraces. The speaker discussed the concept of *in situ* conservation and genetic reserve conservation, focusing on crop wild relatives. He emphasized the importance of selecting target taxa based on various criteria and conducting eco-geography gap analysis to identify suitable sites for long-term conservation.

Maxted discussed the need to conserve *Vavilovia formosa*, a wild relative of the garden pea, due to its hardiness and lack of active conservation efforts. He emphasized the importance of setting up protected areas with diverse habitats and multiple sites to preserve the genetic diversity of crop wild relatives. He also talked about the need for *in situ* conservation to maintain genetic diversity of wild lentils in Uzbekistan and emphasized the need for proper management plans and monitoring to ensure the sustainability of populations. He highlighted the significance of linking *in situ* conservation with *ex situ* utilization to benefit local farmers and breed new crop varieties.

The issue of the Mexican and Parvig-Loomis species in Mexico was also raised; they are becoming rarer but are considered pests by farmers due to their cross-breeding with maize and their destructive behaviour. The question is how to handle these crop adaptivities when farmers view them as pests or weeds. Joana Magos Brehm spoke about how national conservation planning is necessary to maintain PGR, and how important it is to involve stakeholders in the decision-making process, to generate checklists of crop wild relatives, prioritize conservation efforts, and analyse species distribution to make informed conservation recommendations. The speaker discussed the importance of conservation planning tools in guiding countries for conservation planning and promoting standardization of protocols. She also highlighted the use of an interactive toolkit for crop wild relative conservation planning, which included descriptions, examples, and interactive schemes for better contextual suitability.

There was a discussion about setting up rules and clarifying the frequency of observations. The challenges, opportunities, and variations in *in situ* conservation of plant species were acknowledged, with examples from Africa and the Czech Republic and other monitored sites. The need for collaboration between the agricultural and environmental sectors, as well as the importance of funding and land ownership, were highlighted as key factors in successful conservation efforts. Compromise, negotiation, and changes in legislation are also often necessary. A question was raised about the conflict between prioritizing hotspots for genetic reserves and the rights of indigenous communities, with examples given of successful biocultural restoration in Costa Rica.

M Castellanos (Univ. of Nottingham): *The Nottingham Arabidopsis stock centre*

Marcos Castellanos discussed the usefulness of *Arabidopsis* as a model plant and the history of the Arabidopsis Stock Centre in Nottingham. He described the growth and management of a stock centre funded

by the UK government that houses a million genetically diverse stocks, primarily transgenic. The centre's purpose is to safeguard and distribute these stocks to researchers worldwide, with China and Germany being the top recipients. He explained the cost, certification, and delivery process for ordering stocks. The centre's staff has made efforts to simplify the donation and ordering process, including addressing language barriers and offering express delivery options. They also improved the stock collection experience, including the use of a map to locate specific plants and a Twitter channel for community updates. Castellanos described the process of receiving and distributing donations, as well as the challenges and regulations involved in shipping orders to different countries.

The speaker discussed the success of using led lights to accelerate plant growth, reducing the life cycle of *Arabidopsis* plants from six to eight weeks to three to four weeks. He also mentioned the availability of frozen stock and the involvement of the community in their work. He added information about the screening process for diseases in plant stocks, the different *Arabidopsis* species carried, the cost coverage of the fees, and the awareness of the Nagoya Protocol. Moreover, he mentioned the use of patents and the shift from using MTAs to an academic disclaimer for material transfer.

Friday, Oct 6

9.30-11.15 PGR in breeding (Chair: J Prohens, Polytechnic Univ. of Valencia)

J Prohens (Polytechnic Univ. of Valencia): *Breeding and pre-breeding*

The applications of plant breeding were introduced, namely the increase of crop productivity and quality as well as the reduction of the environmental impact on agriculture by increasing the use of resources. An emphasis was given to the interdisciplinarity of plant breeding; a breeder must have knowledge on multiple fields including but not limited to genetics, botany, agronomy, and plant physiology. Pre-breeding refers to the process that breeders must go through when they do not have the desired variation. It involves developing elite materials (varieties) using exotic materials such as wild species. This process has benefited highly from omic technologies. An example was given, of obtaining sixty introgression lines of a particular CWR, the entire genome of which was integrated in these lines in a sort of "genetic library" within the genetic background of the cultivated species.

T van den Boom (BASF Vegetable Seeds, online): *Pre-competitive research on genebank material for commercial use*

The fact that plant breeders use mostly modern varieties was mentioned. It was emphasized that as modern traits are not always found in modern varieties it is important to have access to wild crop relatives. For breeders conducting precompetitive research, this is crucial. Breeders must face the challenges of multiple legal frameworks and ABS compliances. Euroseeds has recommendations and guidelines on its website. Especially for Europe, they have created a system, as well as a tool indicating all the obligations for the different European countries on ABS. Additionally, they include a database on ABS laws in all European countries.

11.15-11.45 Coffee break

11.45-13.30 Evaluation and characterization (Chair: S. Goritschnig, ECPGR)

MJ Díez (Polytechnic Univ of Valencia, online): *Tools and methods for the evaluation of PGR*

MJ Diaz discussed the enhancement of the understanding of plant traits and genetic resources through efficient evaluation strategies. MJ Díez showcased innovative techniques for characterizing and evaluating a

vast number of plant accessions. The utilization of advanced technologies, including drones and digital phenotyping, to streamline the assessment process was discussed. This comprehensive approach involved capturing high-resolution images for data analysis, facilitating the identification of key traits related to stress tolerance and overall plant health. The strategy involved a digital infrastructure for evaluating genetic resources, akin to initiatives like DISCCO. Moreover, by employing sophisticated tools, such as spectral imaging and digital extended specimen models, it was aimed to transform static plant records into dynamic and usable digital objects. The presentation highlighted the significance of persistent identifiers, artificial intelligence, and standardized protocols to ensure data curation, interoperability, and accessibility. In essence, the suggested approach mirrors the broader trends in research initiatives, aligning with the digitization and integration goals observed in DISCCO while emphasizing the importance of specialized infrastructure, collaboration, and open calls, as demonstrated.

S. Goritschnig (ECPGR): *EVA networks – public private partnerships to evaluate genebank material for breeding*

Sandra Goritschnig presented an ECPGR initiative dedicated to enhancing conservation and sustainable use of European PGR through its European Evaluation Network (EVA). This project facilitates collaboration between the public and private sectors, with a primary focus on the systematic evaluation and breeding of crops. By public-private partnerships, EVA actively involves genebanks, public research institutes, private breeders, and private sector entities, boasting over 90 partners who collectively contribute resources, expertise, and funding. This collaborative effort spans across Europe, involving the evaluation of a substantial number of accessions. S. Goritschnig discussed that the initiative encompasses extensive evaluations, data generation, and dissemination, emphasizing a commitment to FAIR and open data and material sharing. Notably, the success of EVA relies on in-kind contributions by all partners, with crucial support from the German government, catalysing the project's initiation. So far, ECPGR has established five crop-specific EVA networks dedicated to wheat, barley, carrot, lettuce, maize, and pepper. A new EVA network on grain legumes is currently under development. These networks serve as platforms for ongoing efforts, fostering collaboration and facilitating continuous evaluation cycles, thus generating a wealth of knowledge on European PGRFA. The overarching goal is to tap into the vast diversity within European genebanks, ensuring a sustained and fruitful impact on PGR management in the region.

Concluding Remarks (G. Giuliano ENEA)

In concluding speech, G. Giuliano expressed gratitude for the enriching week of learning. He acknowledged personal growth and suggested the possibility of having a training school before future workshops to establish baseline knowledge. Additionally, Giuliano emphasized the importance of efficiency in using public funds for genebanks and proposed the specialization of genebanks based on crops, along with the creation of European centres to address specific issues (such as quarantine). He highlighted the need for a European research infrastructure for effective coordination across countries. Moreover, drawing inspiration from the Greek concept of "kairos," he emphasized the importance of seizing the right moment and opportunity in building the research infrastructure. Finally, Giuliano concluded by announcing plans to contact PRO-GRACE partners and stakeholders to further discuss and plan the way forward.

13.30-14.30 Lunch

14.30 Meeting end

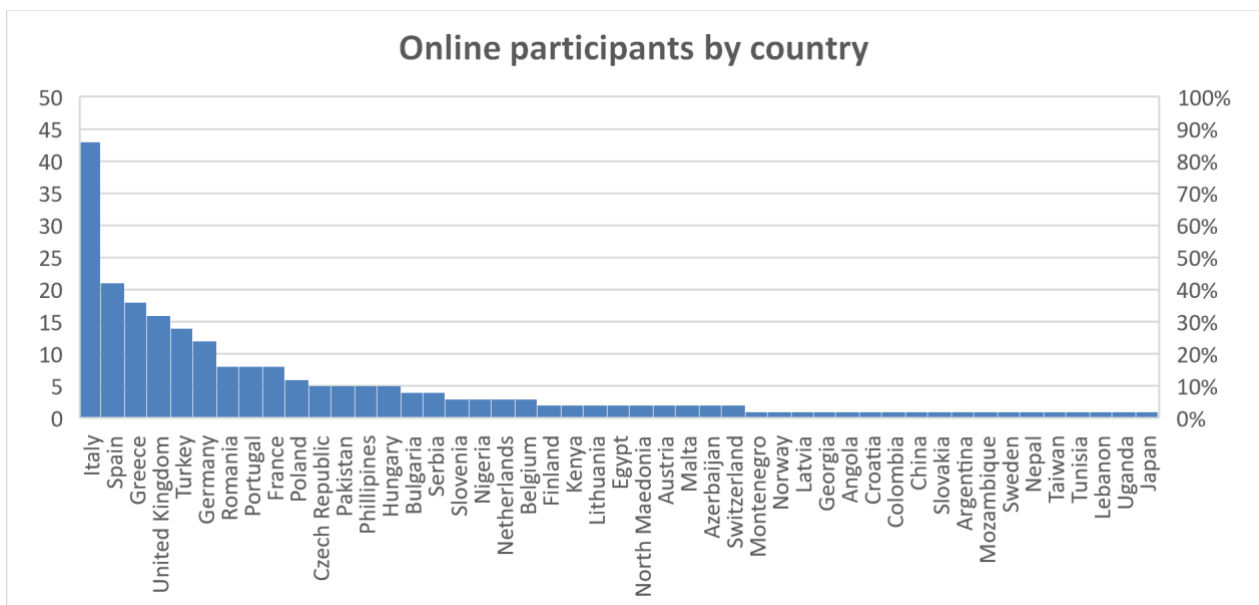
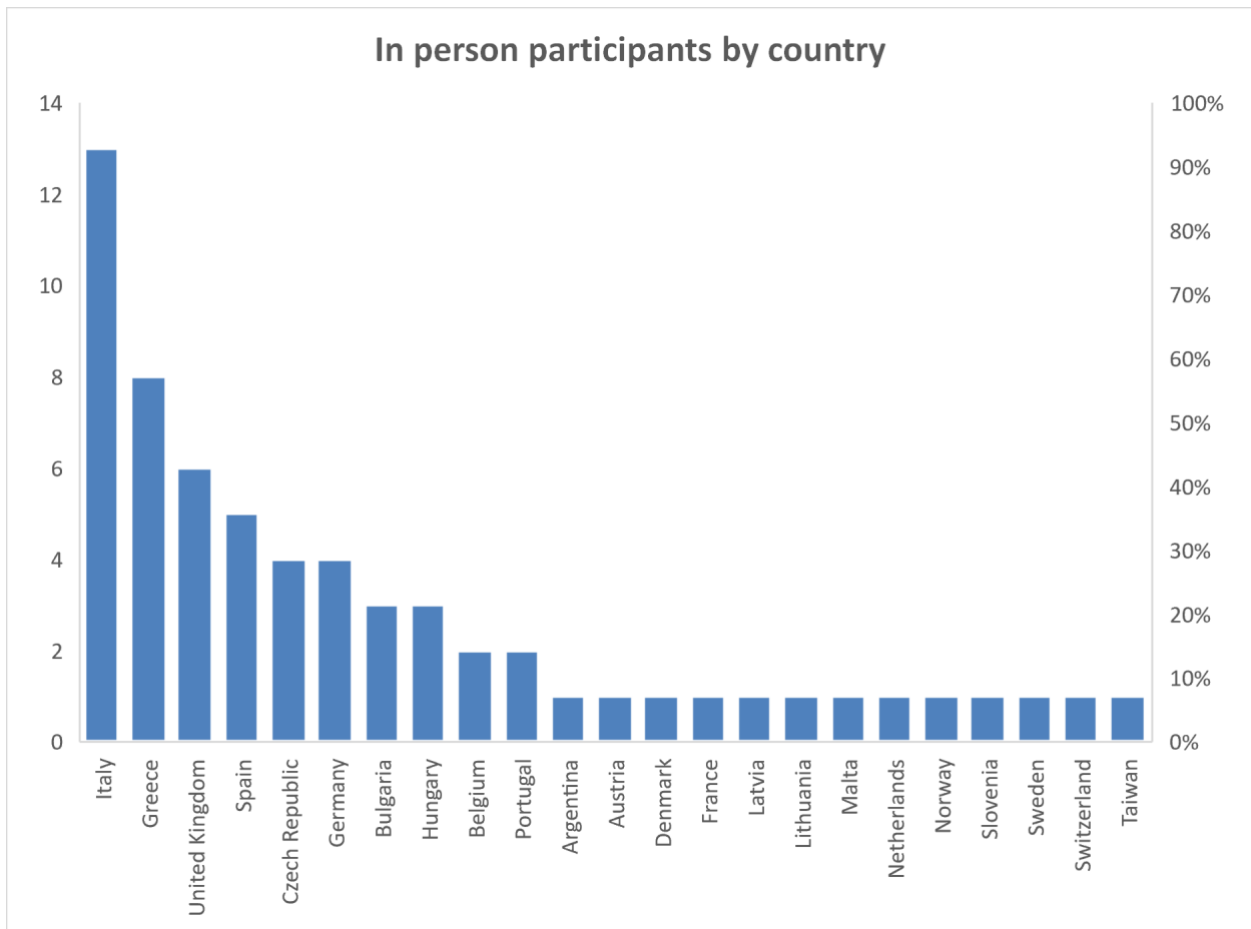
4. REFERENCES

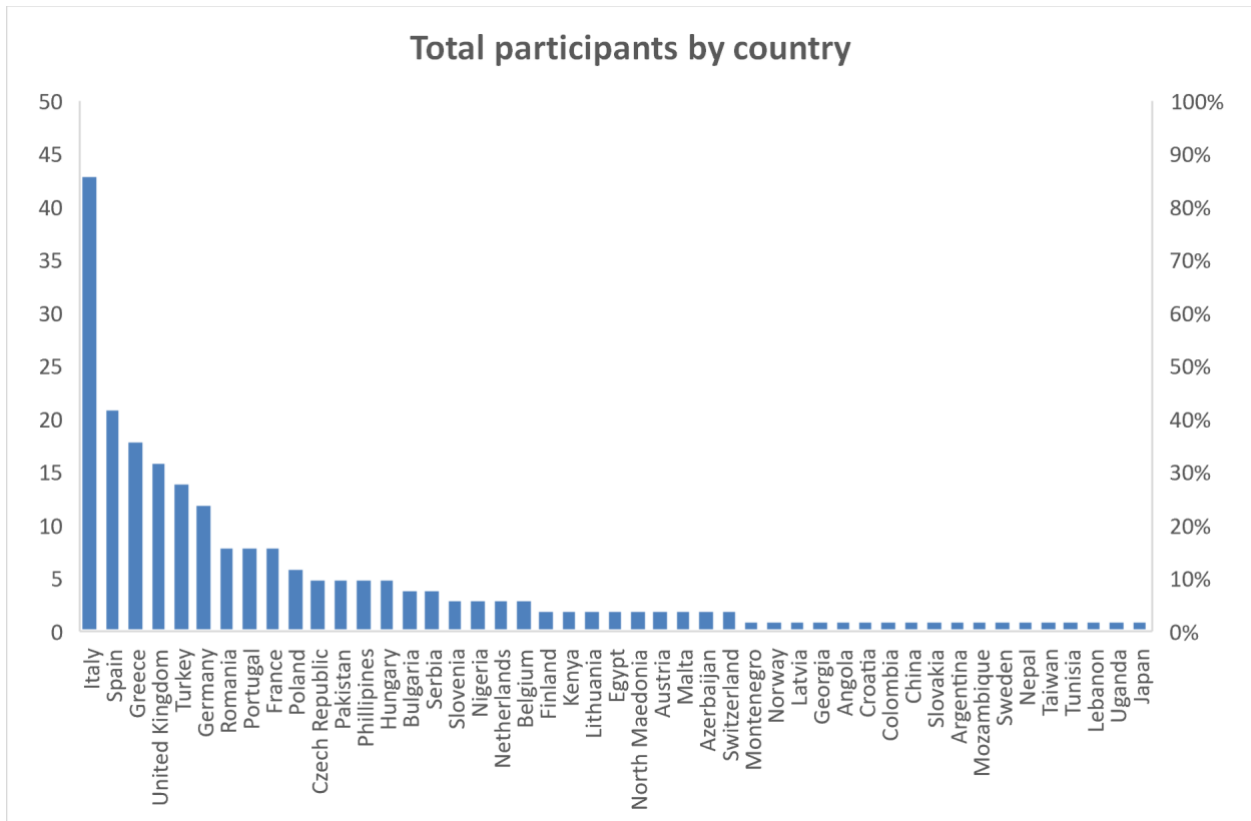
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5. DEVIATIONS

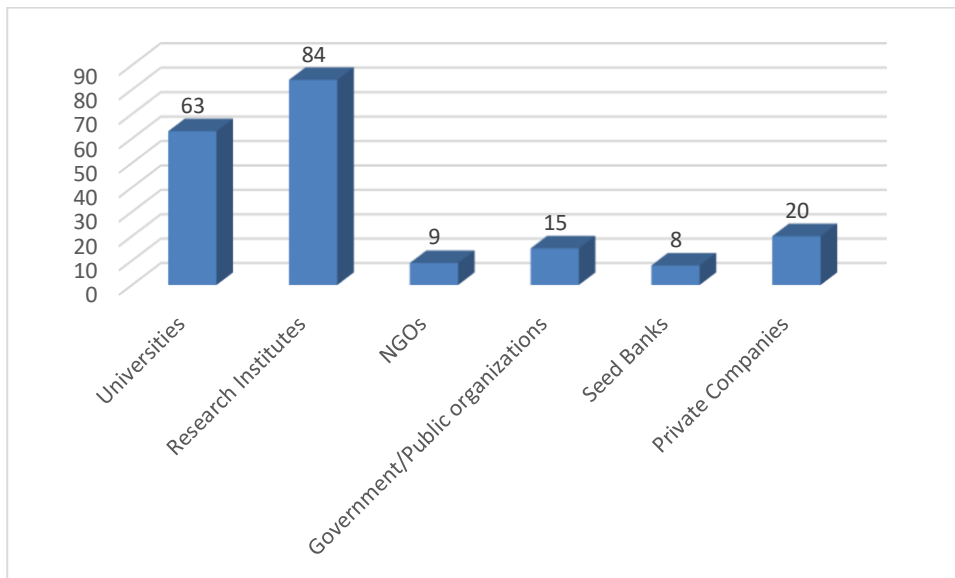
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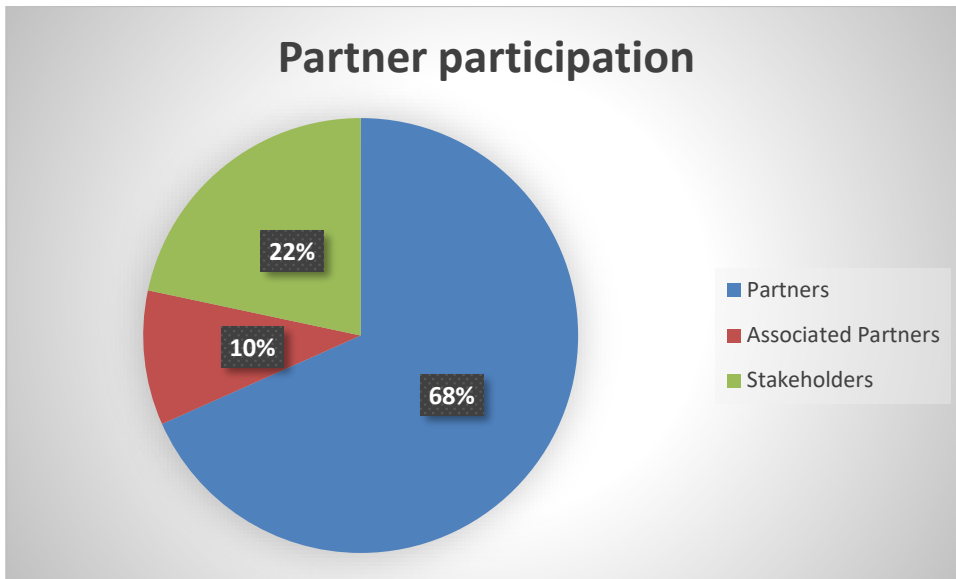
ANNEX 1. PARTICIPANT STATISTICS





Total Participants' Affiliations





ANNEX 2. REGISTRATION AND ACCOMMODATION FORMS

Conference Center of MAICH

Horizon Europe (HORIZON) -RIA
 PRO-GRACE Promoting a Plant Genetic Resource Community for Europe
 WORKSHOP and TRAINING COURSE
 3-6 October 2023

Online Registration Participation

*Fields marked with * are mandatory*

Title * **Name *** **Family name ***

Gender *

Institution * **Department ***

Position *

Address *

Postal code * **City *** **Country ***

Phone * **Email ***

Accompanying persons

Are you a PRO-GRACE partner? *

Are you an Associate PRO-GRACE partner? *

Are you applying for residence fellowship? *

WORKSHOP Attendance *

TRAINING COURSE Attendance *

Are you attending on line? *

Indicate disabilities or special requirements

Can we contact you for future initiatives regarding Plant Genetic Resources? *

*Fields marked with * are mandatory*

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4. Samaria Hotel www.samariahotel.gr
5. Nefeli Hotel <https://nefelihotel.com/>
6. Premises of CIHEAM – MAICH <http://confer.maich.gr/facilities/accommodation.html>

ANNEX 3. EMAIL TO FELLOWSHIP WINNERS

From: PANOS KALAITZIS <panagiot@maich.gr>
Sent: Friday, August 25, 2023 2:05 PM
To: panagiot@maich.gr <panagiot@maich.gr>
Cc: Giovanni Giuliano <giovanni.giuliano@enea.it>
Subject: **RESIDENTIAL FELLOWSHIP FOR PRO-GRACE WORKSHOP and TRAINING COURSE**

Dear Colleague,

Congratulations! We are pleased to inform you that you have been selected for the award of a Residential Fellowship to attend the PRO-GRACE WORKSHOP and TRAINING COURSE that will take place from October 3 to 6, 2023, on the campus of the Mediterranean Agronomic Institute of Chania (MAICH), Crete, Greece.

Your fellowship includes 4 nights of accommodation on the premises of MAICH—the same campus where the workshop and training course will take place. Your fellowship also covers breakfast and lunch. It does not cover any travel or transportation costs.

Accommodation will be provided for the nights of October 3, 4, 5 and 6. Breakfast and lunch will be covered on October 3, 4, 5, and 6.

Please confirm your acceptance of this fellowship, and your ability to be present in person for the workshop and training course, no later than Friday, September 1. If we do not receive your confirmation by that date, we will offer the residential fellowship to someone else on our waiting list.

We look forward to hearing from you soon, and to seeing you in Chania in October.

Best regards,

Panos Kalaitzis and Giovanni Giuliano

ANNEX 4. ARTICLE ABOUT THE EVENT IN A MAJOR GREEK DAILY

SCIENCE TO ΒΗΜΑ 19 3



ΓΝΩΜΗ

Φυτογενείς πόροι κατά της κλιματικής αλλαγής

ΤΟΥ ΠΑΝΑΓΙΩΤΗ ΚΑΛΑΪΤΖΗ

Στο πλαίσιο του προγράμματος HORIZON EUROPE PRO-GRACE - Promoting a Plant Genetic Resource Community for Europe (Προωθώντας μια κοινότητα φυτικών γενετικών πόρων (ΦΓΠ) για την Ευρώπη), διοργανώθηκε στο Μεσογειακό Αγρονομικό Ινστιτούτο Χανίων (MAD) στα Χανιά αρχές Οκτωβρίου, η πρώτη συνάντηση για την πρόοδο του έργου και το 1ο διεθνές εργαστήριο και εκπαιδευτικό σχολείο στην Αειφόρο Διαχείριση των ΦΓΠ.

Στο πλαίσιο αυτής της προσπάθειας συμμετείχαν για πρώτη φορά οι περισσότερες υπάρχουσες ευρωπαϊκές ερευνητικές υποδομές, όπως EMPHASIS, ELDIR, DISSCO, METROFOOD, όπου και αναδείχθηκαν η ανάγκη μιας μελλοντικής υποδομής αξιοποίησης των ΦΓΠ αλλά και η συμπληρωματικότητα με τις ήδη λειτουργούσες ευρωπαϊκές υποδομές. Επιπρόσθετα, παρουσιάστηκαν προγράμματα HORIZON αφιερωμένα στους φυτικούς γενετικούς πόρους, όπως τα G2P-SOL, FARMER'S PRIDE, TRADITOM, HARNESSTOM, INCREASE, AGENT, BREEDINGVALUE, GEN4OLIVE, FORGENIUS και COUSIN. Ο οδικός χάρτης 2016 του Ευρωπαϊκού Φόρουμ Στρατηγικής για τις Ερευνητικές Υποδομές (ESFR) εντοπίζει ένα σαφές κενό στον τομέα «εγκαταστάσεις για φυτικούς πόρους - Εκκλιδώνοντας την πρόσηνη ενέργεια».

Το PRO-GRACE θα κάνει το πρώτο βήμα για να καλύψει αυτό το κενό, αναπτύσσοντας την ιδέα μιας νέας ερευνητικής υποδομής (RI) αφιερωμένης στη διατήρηση και μελέτη των ΦΓΠ. Το PRO-GRACE συντονίζεται από τον καθηγητή Τζιοβάνι Τζουλιάνο (Giovanni Giuliano) του Ινστιτούτου ENEA της Ρώμης και συμπιέχουν 23 Πανεπιστήμια, Ερευνητικά Κέντρα και Τράπεζες Σπόρων. Από την Ελλάδα συμμετέχει το Τμήμα Γενετικής & Βιοτεχνολογίας του MAD με τον ερευνητή Δρα Παναγιώτη Καλαϊτζή.

Τα φυτά αποτελούν τη βάση όλων των τροφίμων, των ζωοτροφών και της παραγωγής ανανεώσιμης βιοενέργειας και είναι απαραίτητα για τη μετάβαση από την οικονομία που βασίζεται στα ορυκτά, στη βιοοικονομία. Οι ΦΓΠ διαδραματίζουν καθοριστικό ρόλο στη διασφάλιση αυτής της μετάβασης, καθώς και της επιστημονικής ασφάλειας σε σχέση και με την εμφάνιση της κλιματικής αλλαγής. Οι πρόσφατες πλημμύρες στη Θεσσαλία αποτελούν χαρακτηριστικό παράδειγμα.

Περισσότερες από 2 εκατομμύρια καταχωρήσεις που αποσπώνται από ποικιλίες φυτών, σιγαλέων και άγρια είδη, ενδημικά φυτά διατηρούνται ex situ σε 410 ινστιτούτα στην Ευρώπη και στις συνδεδεμένες χώρες και καταγράφονται στη βάση δεδομένων EURISCO. Ακόμη μεγαλύτερη ποικιλομορφία βρίσκεται in situ σε περιοχές καλλιέργειας και οικοσυστήματα ανά την Ευρώπη, συμβάλλοντας σημαντικά στην προσαρμοστικότητα της γεωργίας σε εύρο φάσμα καιρικών συνθηκών.

Λεπτομερείς πληροφορίες για τις καταχωρήσεις ex situ είναι, στην καλύτερη περίπτωση, αποσπασματικές, ενώ για τις καταχωρήσεις in situ είναι σχεδόν ανύπαρκτες. Ένα σημαντικό μέρος αυτών των γενετικών πόρων θα μπορούσε να χαθεί κατά την επόμενη δεκαετία λόγω των περιορισμών στην ex situ υποδομή και διαχείριση, στην κλιματική αλλαγή και λόγω των εισβολών/ξενικών ειδών.

Οι χρήστες των ΦΓΠ δεν διαθέτουν τις απαραίτητες πληροφορίες για να επιλέξουν και να αποκτήσουν πρόσβαση στο υλικό που χρειάζονται για τις επιστημονικές και γενετικές βελτιώσεις δραστηριότητες. Επιπρόσθετα, η γενετική διάβρωση συμβαίνει όχι μόνο στο πεδίο, σε ενεργές περιοχές διατήρησης in situ, αλλά και σε πολλές τράπεζες γονιδίων. Η προστασία της βιοποικιλότητας εν γένει αποτελεί έναν από τους πυλώνες της ευρωπαϊκής Πράσινης Διαστροφής (European Green Deal).

Το γενικό όραμα του προγράμματος PRO-GRACE είναι η δημιουργία μιας ευρωπαϊκής ερευνητικής υποδομής (GRACE-RI) αφιερωμένης στους ΦΓΠ με σκοπό να υλοποιηθεί συγκεκριμένος ειδικός στόχος. Διασφάλιση της κατάλληλης διατήρησης των ΦΓΠ και της πρόσβασης σε αυτούς σε συνδυασμό με την ανάπτυξη και δοκιμή στρατηγικών και λογισμικού για την ενσωμάτωση στο EURISCO (European Search Catalogue for Plant Genetic Resources) των πληροφοριών που εξακολουθούν να λείπουν από τις ευρωπαϊκές τράπεζες γονιδίων και τους χώρους in situ διατήρησης. Επιπρόσθετα, ανάπτυξη και δοκιμή προτύπων και πρωτοκόλλων για την ποιοτικά διασφαλισμένη ex situ και in situ διαχείριση των ΦΓΠ, καθώς και ανάπτυξη ενός καταλόγου επιστημονικών υπηρεσιών που θα παρέχει το GRACE-RI στην επιστημονική κοινότητα, καθώς και ενοποιημένων στρατηγικών, διαδικασιών και προτύπων για την αξιολόγηση φαινοτυπικών χαρακτηριστικών των ΦΓΠ που αποθηκεύονται τόσο in situ όσο και ex situ. Επίσης, ανάλυση του ηθικού, κοινωνικού και ρυθμιστικού πλαισίου που επιτρέπει τη μετάβαση των ευρωπαϊκών τραπεζών γονιδίων σε πιο σύνθετες ερευνητικές υποδομές, συμπεριλαμβανομένων των πολιτικών, των νόμων και των προκλήσεων που παρεμποδίζουν επί του παρόντος την ανοχή ανταλλαγή ΦΓΠ και των γενετικών πληροφοριών τους (για παράδειγμα, Digital Sequence Information, DSI) και τον δίκαιο επιμερισμό των ωφελειών που προκύπτουν από τη χρήση τους.

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