

Focus Group 'Local plant genetic resources in view of climate change and biodiversity loss'

Chania, Greece 20-21 May 2025



Presentations of Mini Papers



MP1: How to conserve local perennial germplasm "on farm" and "in situ"

Coordinator: FA (Phil) Aravanopoulos Team : Gunars Lacis, Tommaso Frioni, Lorenzo León, Raluca Deneş, Ivan Tsvetkov, Gordana Đurić

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Problem: Probable loss of valuable traits & characteristics potentially essential for future breeding efforts, or the reintroduction of cultivars nature

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Global meta-analysis shows action is needed to halt genetic diversity loss

Robyn E. Shaw, Katherine A. Farguharson, Michael W. Bruford, David J. Coates, Carole P. Elliott, Joachim Mergeay, Kym M. Ottewell, Gernot Segelbacher, Sean Hoban, Christina Hvilsom, Sílvia Pérez-Espona, Dainis Rungis, Filippos Aravanopoulos, Laura D. Bertola, Helena Cotrim, Karen Cox, Vlatka Cubric-Curik, Robert Ekblom, José A. Godoy, Maciej K. Konopiński, Linda Laikre, Isa-Rita M. Russo, Nevena Veličković, Philippine Vergeer, ... Catherine E. Grueber → Show authors

nature ecology & evolution

Article

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https://doi.org/10.1038/s41559-023-02260

Monitoring of species' genetic diversity in Europe varies greatly and overlooks potential climate change impacts

Fig. 1: Geographic distribution of effort to monitor population genetic diversity (GME), for purposes of conservation or management, among COST full-member countries







Why is this Mini Paper needed?

- Urgent need to generate awareness & provide training for farmers, public authorities & other stakeholders regarding on farm & in situ conservation.
- Initiate a discussion on possibilities, options, opportunities & benefits that conservation actions will create for farmers.
- Raise public sector & civil society awareness of the LG importance, & the necessity of an onfarm management system.
- > Acknowledging farmers that are already involved in conservation actions by local & regional communities; this will ensure that their activities are continued and will enhance chances of wider participation.



Content of the Mini Paper: Key Issues of on-farm & in situ conservation

- Need for better germplasm identification and characterization
- Establishing local germplasm phytosanitary standards
- Linking local germplasm to ex situ collections
- Linking local germplasm to farmers



Fig. 1 The PGR and the FGR Strategies for Europe: two important documents for the conservation of perennial plant genetic resources.



Content of the Mini Paper: Considerations on conservation application

- Plant material suitable for on-farm conservation: landraces sensu stricto, introduced landraces
- > Other variable populations developed by farmers and breeders
- > Evolutionary populations
- Selections from landraces
- > Obsolete cultivars







Content of the Mini Paper: Recommendations & Conclusions

- On-farm & in situ conservation: main actors & gaps
- > Existing best practices & tools
- Recommendations
- Conclusions



Figure 1. National inventory of plant genetic resources, Sweden Photo: Pom, SLU.



Figure 2. Growers could destine a portion of their courtyard for the propagation and conservation of plant material. (here: on-farm conservation of local grapevine varieties in Colli Piacentini, Italy.



MP2: Benefits and services of local and underutilised perennial crops

Coordinator: Josip Šare Team : François Warlop and Gordana Đurić

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What's the Mini Paper about?

- >Environmental and economic benefits of local and under-utilised perennial crops
- ➤Cooperation on local level with the opinion leaders to raise awareness
- Knowledge sharing with public and private sector
- >Not only fruit perennials but also perennial vegetables, MAP and arable crops
- Externality beside the economic arguments (health, climate adaptation and resilience, pesticide reduction, biodiversity
- Ecosystem services that can be used from local perennials



Why is this Mini Paper needed?

- > because of strengthening public awareness about importance of plant genetic resources preservation and sustainable use
- > Because of increasing genetic erosion that leads to a more sensitive ecosystem (more pests and disease, less beneficial organisms...)
- > Because the traditionals are more adapted to the local conditions in terms of less input (offers opportunities to drought adaptation with irrigation management of trees that are with lot of constraints
- > The risks of traditional varieties are lost forever.





Content of the Mini Paper

- ≻Key issues of our mini paper:
- ➢ Recognition and funding
- >Acceptance of benefits and service traditional varieties can provide
- ➤Conservation of germplasm on long term





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Horizontal Flowchart of Traditional Crop Varieties and Their Services





MP3: Boosting the use and knowledge sharing of Traditional Genetic Resources in Agriculture: Practical steps for farmers and stakeholders

Coordinator: Véro Decroocq

Team : Yannis Chatzieffraimidis ; Liliana Fernandez Pérez ; Concepcion Munoz Diez ; Alfonso Ribas Álvarez

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What's the Mini Paper about? (Problem)

This paper tackles the challenges of using traditional genetic resources (TGRs) in farming. We identify better ways to find, understand, and share information about these valuable varieties while at the same time, we make sure farmers can easily access TGR-related knowledge.

> Practical solutions to improve

- > Identification and accessibility to these genetic resources
- > Knowledge based and high throughput characterisation as well as added-value of local know-how
- > Transfer of Knowledge and practical know-how between farmers or between academics and farmers





Why is this Mini Paper needed?



Local and highly valuable traditional genetic resources (TGR) exist but....

They are (still) under-utilized for the following reasons :

They are not properly well identified and described

> They are not well characterised for their full (added-) value

Know-how & local knowledge related to them is not well archived; at worst, it's not even known

Gap(s) in knowledge sharing and access to the farmers to the resources and know-how





Issues with solutions to implement

> Track of traditional agricultural knowledge requires

- □ Systematic surveys and community collaboration
- Upgrading and improving access to farmers to databases such as ECPGR (European Cooperative Programme for Plant Genetic Resources) or the PRO-GRACE initiative (EUfunded project to develop the concept for a novel European Research Infrastructure dedicated to cataloguing, describing, safeguarding and enhancing European plant genetic resources)
- Twining between local actors, gene bank curators & academics to track local know-how and knowledge and better archive/share it







Content of the Mini Paper

> Deeper & better characterisation of traditional, local cultivars requires

- Implementation of high throughput techniques to fully understand the added value of those genetic resources (genomics, metabolomics, nutritional benefits, agronomic value)
- Genetic fingerprinting and characterisation to avoid confusion and be sure that we are sharing knowledge on the same things
- Multi-site planting to evaluate their potential in other locations, with other agricultural practices and in the context of climate changes
- □ HTP characterisation to acknowledge local and cultural heritage and secure it and to facilitate/improve their use in breeding programs (see next minipaper)





Content of the Mini Paper

Transfer of knowledge, including operability (database, tools to share knowledge, know-how and training) requires

- To adapt the ICT tools (Information & Communication Technologies) to rural situations (remote places, little access, isolated farmers etc...)
- □ To foster knowledge exchange among farmers and training/learning opportunities
- To enhance access to knowledge developed by researchers (Top-Down) or by fellow farmers (incl. know-how) through peer to peer or remote ways (video, virtual clubs, twining initiatives to visit fields etc.)



Include in the agencies of agricultural advisers, local communities, public services because certain issues are structural and systemic



MP4: Developing Participatory Plant Breeding for Perennial Crops

Coordinator: Concepción Muñoz Diez Team:, Filippos Aravanopoulos, Veronique Decroocq, Gunars Lacis, Lorenzo León, Tommaso Frioni, Ivan Tsvetkov, Francois Warlop

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What's the Mini Paper about?

Participatory Plant Breeding (PPB) refers to the active involvement of farmers in at least one of the stages of a plant breeding program.

Close collaboration between farmers, breeders, researchers and other stakeholders in the breeding process.

The document explores the application of PBBs to perennial crops, identifying key issues, challenges and strategies.



Why is this Mini Paper needed?

PPB is successful in annual crops,

Limitted application on perennials

Long crop cycles hinder engagement and funding

> Lack of robust stakeholder collaboration Limited farmer participation

Stable long term collaborational formal frame and budget

Intellectual property restrictions on farmerbreeder collaboration





Introduction

- > Origins and evolution of PPB.
- > Farmer participation models: consultative, collaborative, collegial.
- > Different PPB modalities.
- Participation variety selection (PVS) most widely applied option in perennials.
- >Wild relatives \rightarrow Evolutionary Plant Breeding (EPB).



State of the Art and Best Practices

- > Stages in the development of PPBs.
- Farmer participation models: consultative, collaborative, collegial.
- > PPB expected results:
- Farmers expectations \rightarrow innovation.
- Upscaling progenies obtained to be tested.
- Multi-site cultivars performances.
- Provide farmers with first-hand information.
- Increased awareness on locally selected plant material

European case studies: apples,

grapes, olives.





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GEN4 OLIVE



CartograPlant





Conclusions & Innovations

> **PPB** improves climate adaptation to specific environmentes and reinforce the conextion and integration of stakeholders.

>Research needs: germplasm databases, GxE analysis, wild relatives.

Innovations: digital platforms, funding mechanisms, modern breeding tools, stakeholder agreements.



MP5: Unique Varieties: Unique Opportunities – Local Perennial Species Valorisation

Coordinator: Raquel Caetano Ferreira Team : Alfonso Ribas Alvarez, Arno Todt, Ionannis Chatzieffraimidis, Giorgios Stravrianakis, Liliana Fernández Pérez

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What's the Mini Paper about?

Local perennial crops offer untapped potential to strengthen agricultural resilience, support biodiversity, and sustain rural economies. However, challenges such as market access, limited branding, and fragmented stakeholder engagement hinder their broader adoption. This paper identifies best practices and strategic recommendations based on European examples to promote the economic viability and conservation of these crops.



Why is this Mini Paper needed?

To preserve these varieties that in a way allow to preserve regional identity, cultural heritage, and align with consumer trends favouring healthier, more sustainable products. Their conservation enhances food security and agricultural adaptation, making them catalysts for sustainable rural development.





Strategies for their conservation and valorisation

- Branding and Storytelling differentiating products through regional identity and historical narratives
- Short value chains strengthening direct market access via tourism, gastronomy, e-commerce and small-scale processing
- Sustainable farming practices enhancing climate resilience while maintaining biodiversity
- Stakeholder engagement fostering cooperation among farmers, policy makers, food industries, entrepreneurs, and consumers



Challenges

Challenges in Cultivating Local Perennial Varieties









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Success and Failure factors

Success and Failure Factors











Conclusion and Next steps

- Local perennial varieties can support more resilient and sustainable agriculture. Their valorisation requires strategic branding, market integration, sustainable practices, and inclusive cooperation. Addressing knowledge gaps and enabling cross-sector dialogue are key steps towards conservation and economic renewal.
- >Next Steps: Strengthen market-driven conservation strategies; Engage stakeholders; Invest in research & policy support.





MP6: Conservation and valorisation of potential perennial arable crops case studies from five European countries

Coordinator: Marjo Keskitalo Team: Anamaria-Raluca Denes, Gordana Đurić, Zoltan Mezes and Paula Scotti

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What's the Mini Paper about? (Problem)

- Cropping systems are lacking perennial crops suitable for food and feed production, but also providing ecosystem services (C sequestration, pollination, pure water, etc.)
- In this context, perennials are herbaceous plants, and many of those can be cultivated instead of annuals or with annuals in cropping systems
- > The need for perennials is increasing due to climate change
- Local plant species are important genetic sources for more adaptive alternatives





Why is this Mini Paper needed?

- To rise out the need for perennial arable crops for various reasons and for different locations in Europe
- > To challenge the dominance of annual crops
- To show, how distinct plants and species exist, which could be valorised much more
- > To call for more resources for the development of perennial crops
- To give hope for sustainable food production



Content: Distinct examples of the cultivation and uses of perennials





Dryer's woad

n (1 km)

Oregano

Canary grass



Common nettle

Finland



EU CAP



Dryer's woad

Oregano

Undergrown clover

Strawberry

Z.

Alfalfa

Finland

Hungary Romania

Bosnia and Herzegovina **Common nettle**

Scorzonera

Patience Dock

Canary grass

Нор



Dryer's woad

Alfalfa

Strawberry

Common nettle

Oregano

Undergrown clover

Caraway

Perennial rye

Canary grass

Нор

Black bryony

Scorzonera

Patience Dock





EU CAP Network Focus Group 'Local plant genetic resources in view of climate change and biodiversity loss'

2nd meeting | 20-21 May 2025 | Chania, Greece

All information on the Focus Group is available on the webpage: https://eu-cap-network.ec.europa.eu/focus-group-local-perennial-plant-genetic-resources-viewclimate-change-and-biodiversity-loss