EU CAP Network Focus Group

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

Mini Paper 2

Benefits and services of local and under-utilised perennial crops

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Disclaimer

This Mini Paper has been developed within the frame of the EU CAP Network Focus Group 'Local perennial plant genetic resources in view of climate change and biodiversity loss' with the purpose of providing input to the Focus Group discussions and final report.

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1. Introduction - motivation

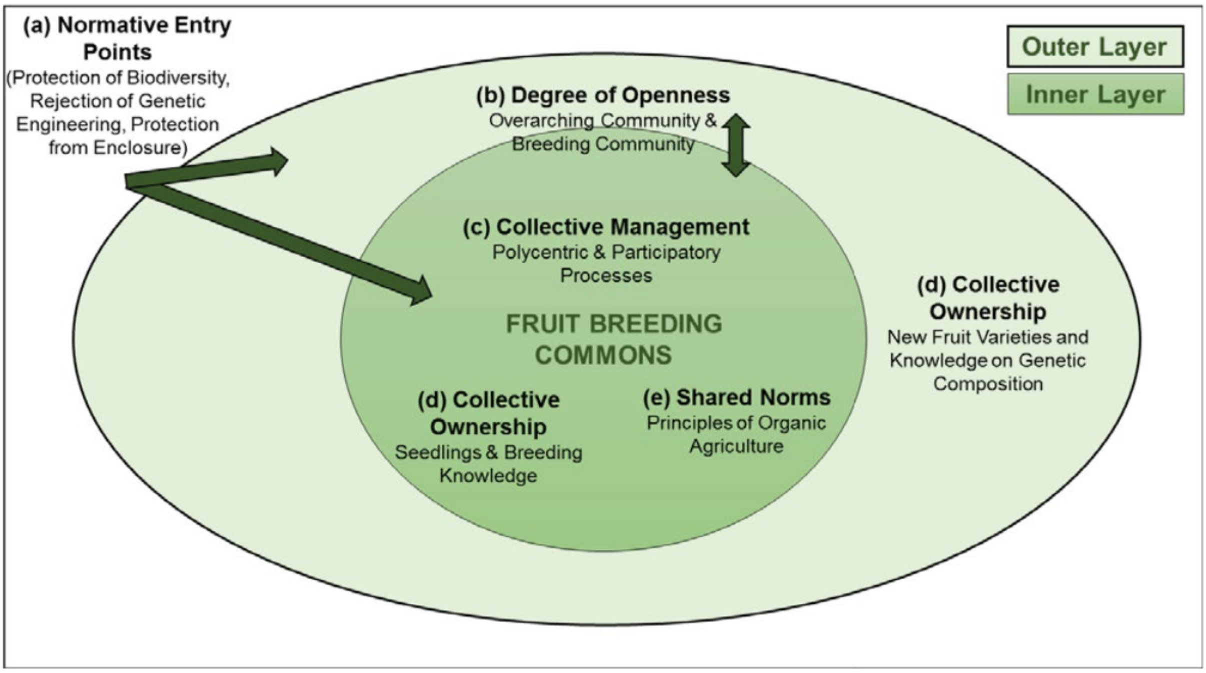
1.1 What is the Mini Paper about?

Environmental and economic benefits of local and under-utilised perennial crops

Fruit growing is probably the most pesticide demanding crop, as it is perennial and much exposed to various pests and diseases. Apples may support from 30 to 40 sprayings annually. But society is now requiring less pesticide use. More resilient orchards have to be developed. Climate change is another growing threat with significant physiological impacts on fruit trees and yields. Related traits have been neglected for years and should now be considered.

This Mini Paper will show the different assets of landraces in the fruit sector, in our changing world.

It is targeting not only farmers and breeders, but also consumers, opinion leaders, institutions having a role in public support of breeding for the Commons (S. Sievers-Glotzbach, H. Wolter, 2018).

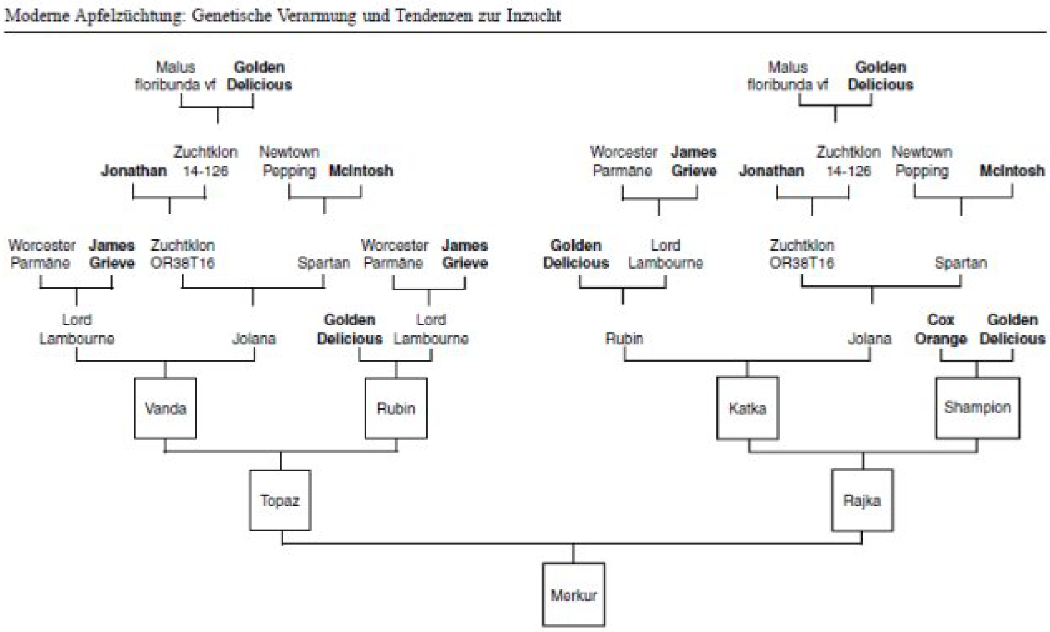


Source: https://www.ecofruit.net/wp-content/uploads/2020/04/3_Sievers-Glotzbach_19-28.pdf

Fruits are one major sector concerned by loss of genetic resources, but other perennial crops are also concerned such as vegetables, aromatic plants.

Breeding in perennial crops is a very long and expensive process, and is also not always successful when considering progenies performances. For years, priorities have been given to agronomic traits such as yield or fruit colour. Germplasm used for parents has been more and more limited to well-known species and cultivars, in order to optimize the chances of a performing progeny.

Studies indicate that modern fruit breeding programs commonly utilize a limited genetic base, frequently involving only five to six major cultivars in recent crosses (Bannier, 2014.)



Source: https://www.suttonelms.org.uk/apple-vitality.html

Genetic erosion occurring for a long time may lead to more fragile crops, less able to cope with biotic and abiotic stresses, thus leading to an increased use of pesticides, or other input to face these difficulties. This input reliance also increases production costs and affects farmers profitability in the end.

Another concern deals with the inner quality of modern fruits, having less nutritional elements and polyphenolic compounds than old cultivars (Szot et al., 2022).

Meanwhile, in vivo conservation of the fruit genetic resources in heterogeneous places of Europe is also expensive and exposed to many threats (frosts, pests). Consequently, many conservation orchards have declined or disappeared since the 90s, sometimes leading to irremediable loss of local traditional varieties, and knowledge associated.

But conservation of perennial genetic resources is fundamental to face increasing threats, especially climate change requiring a strong capacity of adaptation to climate events. Our modern varieties do not have this ability, therefore we rely very much on our germplasm and on wild fruit species to introduce new characteristics in our breeding programmes.

1.2 Why is this Mini Paper needed?

This Mini Paper is needed to highlight the critical yet often overlooked benefits and ecosystem services provided by local and under-utilised perennial crops. Despite their ecological, economic, and cultural value, these traditional varieties face increasing genetic erosion due to the dominance of modern, intensive agriculture. By emphasizing their resilience to environmental stresses, such as drought and pests, as well as their low input requirements, the paper addresses gaps in current research needs and contributes to raising public and policy-level awareness with ideas for innovation in the field. Ultimately, documenting and promoting these under-utilised perennials helps ensure the conservation of valuable plant genetic resources, which are essential for sustainable agricultural practices and future food security. This paper aims at drawing attention of different targets (institutions, consumers and farmers organizations) that genetic resources are endangered. It shows the multiple benefits of taking care of these resources, and better using them in agriculture.

2. Dissertation

Key issues:

- **Recognition and funding**
  Local varieties are often underestimated by the public as well as policymakers. The growing global market is only responding to the demand for cheaper and faster agricultural products. Options for funding the traditional varieties do not exist in member states eco-scheme funding in the programming period of 2023-2027. However, a large number of arrangements exist in which, through financial incentives, are being offered to actors, to encourage them not to cause environmental harm.

- **Acceptance of traditional varieties**
  Acceptance of traditional varieties comes in the form of exchange or the marketing of the varieties on local scale, the direct relation between producers and consumers. It is not only an economic transaction, but also a moment of acknowledgment and cultural reproduction of one's own identity and of the sense of belonging to the territory. Producers and consumers identify themselves with the variety and this is the vehicle of identification with the territory in which the variety is produced.

- **Conservation of germplasm on long term**
  Conservation involves the protection of the genetic diversity of plant crops from genetic erosion which can be either ex-situ or in situ. Field collections, although most widely used at present, have a number of limitations. The collections are prone to natural hazards, such as drought and disease incidence.

Ecological and other services that traditional varieties can provide:

- Crop Nutrient Use Efficiency
- Cultivation Effort and Crop Storability (shorter cropping cycle, less framework)
- Resilience to Environmental Changes

By being locally adapted, traditional varieties get a higher resilience and better adaptation to climatic changes.

- Biological pest and disease control

These old varieties are usually less productive but have a higher phenolic rate which makes them less attractive for pests and even disease. Therefore they may need less pesticides and be more favourable to natural biocontrol.

- Cultural services

Traditional varieties offer a wider range of use in cooking, as anthropology can attest from former traditional recipes made from very local fruit varieties.

- Agricultural heritage, rural development… rural tourism

Patrimonial fruit heritage is also a great opportunity to communicate to consumers and show them about agricultural diversity and cultural offer.

- Short value food chains

These local varieties are not adapted for industrial orchards but should rather be kept for small-size farms with local and maximum valorisation with or processed fruits. This short food chain is a key for profitable use of a fruit diversity.

- More processed products

Many traditional varieties need to be cooked or processed for an optimal valorisation of their quality. They have often been under-cultivated because know-how associated with their valorisation has been lost.

Benefits of the practice:

Biodiversity:
Traditional perennial crops cultivated under low-input agricultural practices significantly enhance biodiversity. For instance, old apple varieties and fig orchards have been shown to sustain diverse populations of beneficial insects, including pollinators and natural pest predators such as ladybugs and lacewings. This increased biological diversity improves natural pest management, thus reducing reliance on chemical pesticides.

Cultural Benefits:
Under-utilised perennial crops play a crucial role in preserving local diets and cultural heritage. For example, carob trees in Mediterranean regions are integral to traditional culinary recipes, confectioneries, and beverages. Similarly, elderberry bushes in

Eastern Europe form an essential ingredient in local syrups, juices, and traditional remedies, thereby sustaining culinary heritage and fostering cultural identity.

Socio-economic Benefits:
Cultivating traditional varieties can strengthen local economies by providing diversified and sustainable income streams. For example, small-scale producers of traditional nuts like chestnuts in Italy or almonds in Spain can capitalize on niche markets and agrotourism opportunities, boosting rural employment and reducing migration to urban areas.

Environmental Sustainability:
Local perennial crops contribute significantly to environmental sustainability through improved soil health, erosion control, efficient water use, and carbon sequestration. Olive groves and vineyards cultivated traditionally in Southern Europe, for instance, protect soils from erosion through deep root systems, improve water retention in drought-prone regions, and significantly increase soil organic matter, thus enhancing long-term agricultural sustainability.

Economic Benefits:
Adopting traditional, low-input perennial cropping systems reduces vulnerability to market fluctuations and input costs. For instance, farmers cultivating ancient varieties of grapes or heritage apples often benefit from premium pricing due to the high quality, uniqueness, and local authenticity of their products. Additionally, these low-input farming methods shield farmers from price volatility associated with fertilizer and pesticide markets, promoting economic resilience.

<u>Existing best practices and tools:</u>

Promoting native varieties on the local level (Involvement of local government)

In some regions of Croatia, municipalities regularly distribute fruit tree saplings free of charge to encourage local agricultural production. This initiative could effectively highlight and promote the use of local, underutilized cultivars. However, to achieve these benefits, municipalities should avoid selecting predominantly commercial or non-local varieties, neglecting diversity, and overlooking long-term management practices. Instead, deliberate selection of locally adapted cultivars, proper education of recipients on cultivation and conservation methods, and ongoing monitoring should be prioritized.

Source: https://dulist.hr/vec-19-godina-rotarijanci-opet-dijele-sadnice-maslina-provjerite-gdje/557574/

"Tepka" pear in Slovenia, example of valorisation in tourism and gastronomy

The valorisation of Tepka pear in Slovenia exemplifies good practice in preserving traditional landraces, showcasing how local agricultural heritage can be sustainably maintained. Originating from the Alpine regions around Bled and Zasip, the Tepka pear has been preserved not only for its distinctive flavour and culinary versatility—used fresh, dried, or distilled into renowned local schnapps—but also for its significant cultural value. Community efforts, including local festivals, culinary workshops, and dedicated conservation groups, have ensured the continued relevance and cultivation of this resilient variety, adapted perfectly to regional soil and climate conditions. Tepka pear cultivation requires minimal fertilizer input, reinforcing soil health and ecological balance. Such active integration into the local economy through tourism, gastronomy, and regional fairs demonstrates an effective merger of cultural identity with socioeconomic benefits, establishing the Tepka pear as a benchmark for sustainable landrace preservation.

Olive landraces in Dalmatia, Croatia,

Local olive landraces in Dalmatia, Croatia provide an excellent example of preserving traditional agricultural biodiversity through sustainable practices. These indigenous olive varieties, naturally adapted to Dalmatia's rocky terrains and Mediterranean climate, require minimal water and fertilizer input, thus significantly contributing to soil conservation and ecological sustainability. Local communities actively integrate these olive landraces into the regional economy, capitalizing on their unique qualities by promoting olive oil tourism, culinary festivals, and regional fairs. Through initiatives like olive oil trails and tasting events, these landraces not only preserve cultural heritage but also strengthen social cohesion and rural livelihoods. Such efforts effectively merge economic, social, and environmental benefits, making Dalmatian olive landraces a model of sustainable development and agricultural resilience.

3. Conclusions

The consumption of local products, with the same origin as the consumer, stimulates regional economies, and also represents a short commercialisation channel, meaning it has a low carbon footprint. Organic production offers foods while having less of an impact on the environment.

Cultivation of traditional varieties aimed at local markets would make it possible to achieve a triple objective: contribute to the sustainability of rural communities, satisfy the demands of consumers regarding the protection of flavour and the environment, and help the health authorities find ways to promote the consumption of fruit and vegetables.

The utility of crop varietal diversity within the production system also lies in its potential to provide ecosystem services such as the regulation and control of pest and diseases, sustain pollinator diversity and support below-ground biodiversity and soil health. This can in turn reduce the financial and health risks of high levels of agricultural inputs, such as fertilizer and pesticides to small-scale farmers and the environment.

4. Research needs from practice

Acceptance of traditional varieties in general public

The issue arises from economic, societal, and environmental factors reducing the viability of traditional varieties. Industrial agriculture, market pressures, inadequate policy frameworks, limited public awareness, and the decline of traditional farming practices have collectively diminished their presence. Additionally, limited farmer access to infrastructure and targeted support further complicates efforts to preserve these crops, despite their ecological, cultural, and nutritional advantages. Challenges exist at both societal and systemic levels, influencing food production and public perceptions, particularly across EU regions with strong rural identities and food cultures, such as France, Italy, and Croatia.

Addressing these challenges requires research into effective policy incentives, strategies for enhancing consumer acceptance, analysis of market opportunities for traditional products, and innovative solutions to improve farm-level infrastructure and support systems.

Public Awareness and Evaluation of Ecosystem Services

Traditional local and underutilized perennial crops provide substantial ecological, cultural, and economic benefits, yet their contributions remain significantly under-recognized in public discourse, agricultural policies, and land-use strategies. There is a critical need for interdisciplinary research that quantifies and highlights ecosystem services provided by these crops—including carbon sequestration, soil health enhancement, biodiversity support, and natural pest control—to elevate their ecological value and visibility in policy-making and public engagement. This research need is especially pressing in Southern and Eastern Europe, notably in Mediterranean countries such as Spain, Italy, and Greece, where native perennials like carob, fig, and almond are underutilized, as well as in Central and Eastern regions like Romania and Bulgaria, where elderberry and sea buckthorn possess considerable but underexplored environmental potential. Key sectors impacted include agrobiodiversity, climate-smart agriculture, perennial horticulture, and public awareness initiatives.

5. Ideas for innovation

Chestnut Agroforestry Revival

Proposal for a Potential Idea for Innovation: This proposal may also be implemented as a series of potential Operational Groups (OGs), each operating at a small territorial scale. The project aims to address rural land abandonment and wildfire risks in southern European mountain areas—especially in Italy and Spain—by restoring traditional chestnut orchards. Historically a vital food source known as the "bread of the poor," many of these orchards were abandoned in the 20th century. This proposed initiative seeks to reestablish them as climate-resilient agroforestry systems, integrating nut production, grazing, and forest management. The approach aims to reduce fire-prone vegetation, support biodiversity, and create new income opportunities for local communities. The project could be supported by EU rural development programs, local governments, and agricultural cooperatives, inviting participation from farmers, local communities, and environmental groups interested in sustainable land management practices.

Cultivation of traditional varieties as a suitable alternative for the sustainability of the territory's agricultural activity

The cultivation of traditional varieties is not only a sustainable agricultural practice but also a key strategy for fostering long-term environmental, economic, social, and cultural sustainability in the agricultural sector. By promoting the use of locally adapted, under-utilized, and resilient crops, communities can strengthen food security, preserve biodiversity, and support more self-reliant, diverse, and **vibrant agricultural systems.** As such, the cultivation of traditional varieties offers an effective and viable alternative for the future of farming, particularly in the face of challenges like climate change and the degradation of natural resources. The project aims to test and demonstrate how the cultivation of traditional varieties can contribute to the sustainability of agricultural systems in selected EU territories, particularly within fruit, wheat, and vine sectors.

The project of cultivation of traditional varieties is applicable to all member states of the European Union especially in sectors like fruit growing perennials and wheat, as well as in the vine sector.

Demonstration Orchards for Ecosystem Services

To address the limited field evidence on the ecological benefits of traditional perennial crops, this project proposes the creation of demonstration orchards across various European bioclimatic zones—particularly in France, Romania, and Greece. These orchards will serve as living laboratories to monitor key ecological indicators such as soil health, pollinator presence, water use efficiency, and overall biodiversity. The data collected will support evidence-based policymaking and promote the integration of traditional crop systems into agroecological and climate resilience strategies across Europe. Relevant sectors include agroecology, orchard management, climate adaptation, and science-policy integration. Farmers would serve as active co-creators, managers, and knowledge brokers in the demonstration orchards, ensuring practical relevance, supporting ecological monitoring, and helping transfer insights to peers and policy processes.

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