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Short contribution

How can local under-utilised varieties of perennial crops be attractive and profitable for farmers?

Report on activities of the EU Cap Focus Group

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Abstract

The report presents the findings of the EU CAP Network Focus Group (FG) on 'Local perennial plant genetic resources in view of climate change and biodiversity loss'. The aim was to explore how the conservation and use of local under-utilised varieties of perennial crops can be attractive and profitable for farmers and thereby contribute to biodiversity-friendly sustainable farming under climate change. The issues addressed included the benefits of local varieties, challenges and opportunities for farmers, innovative practices in different pedo-climatic zones, valorisation pathways, capacity-building needs, research gaps, and ideas for EIP-AGRI Operational Groups.

Keywords: genetic resources, germplasm, heritage varieties, agroecology, fruit

Introduction

Local perennial crops represent an important yet rather overlooked resource for agriculture. This is particularly evident in terms of promoting important agroecosystem services, diversification at farm-level, sustainability, and food security, as they hold a potential for climate change adaptation, resilience and mitigation, as well as diversified income, and enhancement of ecological health in rural Europe (Weißhuhn et al, 2017).

Despite their value, many of these crops, traditionally used for centuries, are currently under-utilised due to the rise of commercial, competitive cultivars. Indeed, the EU's Common Catalogues of plant varieties contains several hundred perennial varieties for legal protection and use within the EU, however only a very small fraction is actively commercialized. For example, although there are more than 2,000 registered apple varieties

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in EU (2024) and the apple production area is widespread geographically, the production is dominated by only 38 cultivars, many of which are closely related, while 4 varieties (Golden Delicious, Idared, Jonagold and Gala) make up almost 45% of the production area (Hokanson et al., 2001; Urrestarazu et al., 2016).

Pear varieties registered in EU reach a number of 2364 (EU, 2024), however only 15 of them are the most broadly commercialised. Regarding grape varieties, Anderson & Aryal (2013) reported 1271 ones cultivated worldwide, but a continuing concentration was determined, with only 15 wine varieties planted on half of the world's grape areas.

Main aspects of their importance & value

Climate change adaptation, resilience & mitigation: local and underutilized perennial crops are increasingly recognized for their role in climate change adaptation. By evolving in specific regions, they are inherently well-adjusted to local micro-climates, becoming resistant to environmental stresses, including drought, temperature fluctuations, and pests (Padulosi et al., 2013). This adaptability is especially important for areas facing climate stresses, as these crops provide stable, nutritious food sources when other crops may fail (Chivenge et al.,2015). Indeed, the deep root systems of perennials enhance water retention and reduce soil erosion, a crucial factor for maintaining agricultural productivity in degraded or arid regions (Pimentel et al., 2012). By diversifying local farming systems with the inclusion of appropriate adapted varieties can create a more robust and well-functioning agroecosystem, which in turn improves resilience to climate-induced stresses (Foley et al., 2011). Additionally, they use per se a greater fraction of carbon to produce root systems, therefore more carbon is integrated into soil organic matter, contributing to increases in soil organic carbon stocks and consequently mitigation of greenhouse gases emissions (Board et al., 2019). Furthermore, incorporating these crops into farming systems can reduce greenhouse gas emissions due to lower input requirements, such as fertilizers and pesticides, compared to more intensive monocultures (Glover et al., 2010). As perennials are not replanted annually, they also reduce soil disturbance, thus improving soil health, and consequently enhance carbon sequestration (Crews et al., 2018).

Agroecosystem diversification: Diversity at gene, species & landscape level to maintain ecosystem functioning is referred as an important resilience strategy & toolkit, as well for reversing biodiversity loss at agroecosystem level (Altieri et al, 1999). By growing a wider range of varieties, especially under-utilised ones, farmers contribute to agricultural diversity. This also contributes at enhancing important agroecosystem services, among others such as pollination and pest control, considered crucial for the sustainability of farming systems (Jackson et al, 2007).

Low-input farming: As related to the above, many of these crops are adapted to conditions of minimal agricultural inputs e.g. synthetic fertilizers or pesticides.

These attributes make them particularly attractive for diversified, agroecological farming systems and methods including agroforestry, polycropping and others (Altieri et al., 2017).

Plant breeding: Local perennial plant varieties are considered as critical resources needed by farmers and breeders to develop new crop varieties with desirable traits, such as higher yields, resistance to pests and diseases, and adaptability and resilience, to meet current and evolving human needs, growing food demands and changing climatic and environmental conditions (FAO, 2023).

Nutritional and health benefits: Certain under-utilised perennial crops offer high nutritional value and contain compounds beneficial for human health (Kreitzman et al., 2020).

Material and Methods

The FG was comprised of a team of 20 selected experts (see Focus Group webpage[22]), including farmers, researchers, advisors, innovation brokers and others, who exchanged their expertise and knowledge on the topic.

A Starting Paper (SP) has been prepared, serving as preliminary material to describe the state of the art and provide a general framework for the FG's tasks. A preliminary survey among FG experts was also conducted to collect experts' insights on important aspects of the FG's topic and prepare the discussions. Furthermore, the experts collected case studies (for further details, check Annex 1) that were presented and discussed at the first meeting.

FG experts identified six topics on key questions and issues raised and developed in the form of Mini Papers (see FG webpage).

These topics are:

› MP1: How to conserve local germplasm 'on farm' & 'in situ'?

› MP2: Benefits and services of local and under-utilised perennial crops

› MP3: Boosting traditional genetic resource use and sharing in agriculture: practical steps for farmers and stakeholders

› MP4: Developing participatory plant breeding for perennial crops

› MP5: Unique varieties: Unique opportunities – Local perennial species valorisation

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

Results

The main findings of the FG were:

› Perennial crops - including fruit and nut trees, olives, vines, berries, and certain herbaceous species for food, feed and non-food purposes - offer environmental and socio-economic advantages for climate change adaptation and biodiversity conservation and use due to their adaptability, low-input requirements, and potential to deliver ecosystem services. However, many local varieties remain underused or at risk of extinction due to the dominance of commercial cultivars, declining traditional agricultural knowledge, and market constraints.

› The core benefits of using and conserving local under-utilised perennial varieties relate to:

I. Climate resilience: Deep root systems, long lifespans, and local adaptation make many of these crops more tolerant to drought, pests, and extreme weather, all of which are critical traits for farming under climate change.

II. Biodiversity and ecosystem services: These crops enhance on-farm diversity and deliver ecosystem benefits such as pollination, soil conservation, carbon sequestration, and habitat for beneficial species.

III. Economic opportunities: Niche markets, regional branding, agrotourism, and product innovation can offer added value and new income streams, particularly for small-scale or multifunctional farms.

IV. Cultural Identity: Many local varieties are deeply tied to regional food traditions, landscapes, and heritage, enhancing their cultural relevance and community support.

V. Breeding and genetic resources: Local crops often contain unique genetic traits valuable for developing new varieties suited to future climate and market conditions.

[22] https://eu-cap-network.ec.europa.eu/focus-group-local-perennial-plant-genetic-resources-view-climate-change-and-biodiversity-loss_en

Despite the above, notable barriers faced by farmers are:

I. Access to genetic material: Difficulties in obtaining disease-free, certified genetic material from gene banks or nurseries are widespread.

II. Knowledge gaps: Farmers often lack technical training in propagation, pest management, or modern marketing tools.

Traditional knowledge is also at risk of being lost.

III. Market constraints: Many local varieties have lower or inconsistent yields. Value chains are underdeveloped, and consumer awareness remains low.

IV. Policy and infrastructure: progress is slow due to rather weak policy support, limited subsidies for conservation efforts, and insufficient coordination between farmers and researchers.

Nevertheless, opportunities exist in leveraging EU funding, integrating farmers into participatory breeding networks, building local short value chains, and fostering collaborations with advisory services and processors.

Innovative approaches and good practices, identified and documented from various EU Member States, include i) agroecological farming approaches such as polyculture, intercropping, and agroforestry, as well as development of ecological infrastructure such as hedgerows and terraces, and ii) breeding and propagation innovations, including participatory plant breeding, community germplasm houses, and grafting techniques.

Valorisation is a central issue related to the FG's topic. While some respective steps, such as cultivar identification and product development, are relatively straightforward, other aspects (for example: certification, branding, ecosystem services payment) require higher investment and coordination. Additionally, strengthening value chains and improving consumer education are considered critical to success. Key enablers for valorisation include origin labelling, consumer education, collaboration with chiefs and processors, and better access to niche markets.

However, challenges such as certification, low yield, and fragmented supply chains must be addressed with coordinated support.

Capacity building was evaluated as a major priority. Experts emphasised the need for i) training programs tailored to farmers, advisors, and local actors, ii) greater use of demonstration farms and peer-to-peer learning, and iii) expanded access to tools such as varietal identification services, online platforms, and living labs.

Traditional Agricultural Knowledge (TAK) must also be preserved and integrated into contemporary conservation and breeding efforts, while training-related EU programs (e.g.

Erasmus+) could play a stronger role in supporting education for both young and experienced practitioners. The FG also proposed establishing farmer-friendly networks and participatory models, such as those used in ECPGR and EUFORGEN, but specifically adapted to the needs of perennial crop conservation and use.

References

Full references will be found in the reports provided by the Focus Group[23].

[23] Starting paper and mini-papers : https://eu-cap-network.ec.europa.eu/focus-group-local-perennial-plant-genetic-resources-view-climate-change-and-biodiversity-loss_en
Full report : https://eu-cap-network.ec.europa.eu/publications/eu-cap-network-focus-group-local-perennial-plant-genetic-resources-view-climate-change_en