



Exploiting the Untapped potential
of Fruit tree Wild Diversity for
Sustainable Agriculture



The project

Crop Wild Relatives (CWR) are wild plant species closely related to cultivated species. They hold important potential as a source of genetic diversity, offering agronomic and nutritional traits like pest and disease resistance, tolerance to drought, and adaptability to fluctuating climatic conditions affecting fruit quality and production. Harnessing this genetic diversity is crucial for enhancing crop improvement, ensuring sustainable agricultural practices, tackling climate challenges and meeting the demands of food security and better nutrition.

This approach aligns with the goals of the European Green Deal, and the Biodiversity and Farm to Fork strategies, aiming i.a. to reduce pesticide use and risks. Moreover, fruit trees' long lifespan and a current production dominated by only few cultivars make them particularly vulnerable to the effects of global changes. Further research and conservation efforts are thus needed to unlock the full potential of fruit tree CWRs and secure our agricultural future.

Objectives and scope

FruitDiv focuses on stone (Prunus) and pome (Malus and Pyrus) fruit species of the Rosaceae family because of their importance in human nutrition and the transition to sustainable food systems, including balanced diets and low-input agricultural production.

The FruitDiv project aims to:

- Monitor CWR in the European genebanks among the European historical hotspots of diversity;
- Characterise genetically CWR to establish ex situ collections representative of the CWR diversity to be further multiplied in common gardens, and to identify key CWR natural populations to be preserved in situ;
- Share and develop new and high-throughput phenotyping tools and protocols for the evaluation of traits linked to resistance to pests and diseases, and adaptation to low-input cultivation systems in highly contrasted environments;
- Integrate CWRs in plant genetic resources collections and breeding programs by developing new methods for wild-to-crop translational research;
- Promote sustainable data sharing by standardising and giving access to FAIR (Findable, Accessible, Interoperable and Reusable) genotypic and phenotypic Open Data;
- Develop pre-breeding material and CWR-adapted methodologies for breeding at single and multi-trait scales, making use of existing or future multi-site experimental designs and predictive models;
- Foster a more efficient and sustainable conservation of CWR, in situ, on-farm and through NGOs, and enhance stakeholders' awareness of the value and importance of CWR;
- Promote the use of CWR or first-generation pre-breeding material by breeders to disseminate plant material of interest for growers, organic farmers and the fruit tree industry.

Ambitions and activities



For a species-wide inventory of fruit tree CWR diversity, FruitDiv seeks to

- improve the situation for pome and stone fruit CWR at the European level. As a first step, the project aims to monitor the genetic and phenotypic diversity still available in fruit tree CWR species, including Mediterranean hotspots of biodiversity.

- balance the representativeness of European CWRs in national and European PGR programmes and to enhance their characterisation, thus fostering a better conservation and use.

For a participatory management of CWR with a focus on European biodiversity, FruitDiv aims to

- bring back the management and conservation of CWR in to the spotlight by linking botanists, ecologists, geneticists, breeders, forestry officers, amateur/citizen associations, NGOs and end-users.

- through a multi-actor approach, help implementing a more rational and extensive characterisation of CWR, contributing to its conservation in-situ, ex-situ and on-farm.

- For a better characterisation of CWR diversity that relies on the most innovative technologies, the project strives to

- organise European-wide CWR collections that will be planted in multi-sites and interconnected so as to share genetic and phenotypic characterisation of CWR behaviours in multiple environments and under complementary cultivation regimes using innovative methodologies.

- address the potential interest of long-term maintenance of the same plant material in different agronomic and pedo-climatic conditions across Europe and will propose in the medium-term rationalised conservation strategies, both ex-situ and in-situ, for future uses.

For a greater insight into the characteristics and the value of fruit tree CWR, FruitDiv will

- develop an innovative strategy relying on germplasm characterisation and implementation of up-to-date methodologies of pangenomic-assisted breeding, graph-based integration of heterogeneous data including biochemical process knowledge and CWR-adapted genomic/metabolomic prediction models.

- use state of the art genomic and phenomic approaches currently under development in major annual crops to fruit tree breeding to drive the sustainable conservation and use of CWR genetic resources.

Consortium



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