



Food and Agriculture
Organization of the
United Nations



International Treaty
on Plant Genetic Resources
for Food and Agriculture

Realising Dynamic Value Chains for Underutilised Crops

Unlocking the potential
of underutilized crops
for a sustainable future

The **RADIANT** project, “Realizing Dynamic Value Chains for Underutilized Crops” is funded by the European Union’s Horizon 2020 program. Coordinated by the Universidade Católica Portuguesa in Porto, Portugal, the four-year project brings together 29 partners from 12 countries¹, including the Food and Agriculture Organization (FAO) of the United Nations.



RADIANT aims to raise awareness of the importance of underutilized and neglected crops (UCs) by integrating them into dynamic and sustainable agrifood value chains across Europe. The project’s mission is to unlock the full potential of underutilized and genetically diverse crops, enhancing their competitiveness and supporting European Union strategies for sustainable Agrifood systems. **RADIANT** also seeks to foster synergies between agricultural production, biodiversity, and the provision of ecosystem services, generating benefits at local, regional, and global levels. Built on a multi-actor approach, the project brings together researchers, farmers, value chain actors, and consumers, all collaborating to realize the potential of these crops and contribute to a more resilient, inclusive, and biodiverse food system.

¹ Bulgaria, Cyprus, Germany, Greece, Hungary, Ireland, Italy, Netherlands (Kingdom of the), Portugal, Slovenia, Spain, United Kingdom of Great Britain and Northern Ireland (the).

Underutilized Crops

Underutilized and neglected crops are valuable species, landrace, variety or cultivar that has limited current use in a given geographic, social, and economic context and that holds great promise to diversify agricultural systems, create resilient agroecosystems, diversify diets, and create economically viable dynamic value chains for feed, food, and non-food uses.

Underutilized species refers to locally cultivated crops that have been neglected by research and are underutilized locally, nationally or even globally. Due to their adaptation to local production conditions, frequently in low-input agriculture, they might have a potential in terms of fitting into marginal production systems, possessing specific characteristics for their use as food plants or otherwise and thus providing market opportunities for smallholder farmers.

RADIANT is promoting UCs over a four-year period through 20 pilot farms, known as **AURORA** farms, located across diverse agro-ecological zones throughout Europe. These farms serve as living laboratories, where innovative practices are evaluated and demonstrated in real-world conditions. To implement the project, 45 farmers have been recruited to facilitate the integration of UCs into agricultural systems and to conduct adaptive agrobiodiversity management using tools and methodologies developed by the **RADIANT** project.

Farmers, researchers and communities involved in growing underutilized crops play a crucial part in contributing to the ecosystem services in these areas. They are helping ensure the continued availability and use of certain UCs, now and in the future. This has global implications for the conservation and sustainable use of the plants upon which the world relies for nutrition and agriculture.



RADIANT collaborates closely with the FAO International Treaty on Plant Genetic Resources for Food and Agriculture (International Treaty or ITPGRFA). The International Treaty works with farmers, scientists, and policymakers worldwide to save, share, and safeguard the plants that feed the world. This includes the conservation and sustainable use of both traditional and underutilized crops, assigning Digital Object Identifiers (DOIs)² to plant genetic material, and facilitating the global exchange of data and resources vital to sustainable agriculture. The International Treaty Secretariat provides training and support to the project teams to facilitate inclusion of plant genetic material in its Multilateral System (MLS)³ and for the assignment of DOIs, ensuring long-term access and traceability within global conservation frameworks.

RADIANT has developed a range of tools and initiatives to support the wider use and understanding of underutilized crops:

- Agrobiodiversity Toolbox: A set of tools and platforms developed within the

RADIANT project, available in multiple languages through a dedicated Agrobiodiversity Toolbox.

- The **RADIANT** App: A digital platform connecting farmers, consumers, and stakeholders across the value chain. It promotes education and awareness on underutilized crops, offering insights into nutrition, sustainable practices, and the latest agricultural innovations, while building an informed and engaged community.
- The Underutilized Crops Cluster (UCC): A community of best practice promoting the integration of UCs into sustainable farming. Through pilot farms, research collaboration, and targeted communication, the UCC aims to improve UC performance and support ecosystem services such as soil health, biodiversity, and nutritious diets. It brings together researchers, NGOs, educators, industry professionals, and policymakers to co-develop a next-generation, open-data-based theory of change.

² DOIs (Digital Object Identifiers) are used as Permanent Unique Identifiers (PUID) within the Global Information System (GLIS), established under Article 17 of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). GLIS promotes the use of DOIs as a common standard to uniquely and permanently identify PGRFA and to facilitate interoperability. Further information is available in the Digital Object Identifiers (DOI) section and the FAQs of the International Treaty, published by the Food and Agriculture Organization of the United Nations (FAO).

³ The Multilateral System is the International Treaty's innovative solution to access and benefit-sharing. It includes 64 of the world's most important crops that together account for 80 percent of all human consumption derived from plants. On joining the International Treaty, countries agree to make their genetic diversity and related information about the crops stored in their public gene banks available to all through the Multilateral System. This mechanism offers scientific institutions, farmers, plant breeders and the private sector the opportunity to work with, and potentially improve, the materials stored in gene banks or used in breeding programmes. The Multilateral System provides opportunities for both developing and developed countries that share technical know-how to use their materials and laboratories to build on what farmers have accomplished in their fields.

AURORA FARMS

The RADIANT project has 20 pilot sites, the AURORA Farms, spanning the major biogeographical regions (Atlantic/Boreal; Mediterranean; Continental) of Europe. The primary goal of these AURORA Farms is to capitalize on native agrobiodiversity via dynamic value chains⁴ in exemplary ways. The diversity of the AURORA Farms allows RADIANT to showcase several strategies for integration of UCs for food, non-food applications, and across a range of cropping systems, including mixed, arable, organic, conservation agriculture, agroforestry, orchards and horticulture.

1. UoN – University of Nottingham (UK)

Bambara groundnut, a semi-arid African legume used for food and nutritional security. It is processed into flour and snacks and eaten as a pulse. Also, they showcase winged bean to complement/replace soybean for seed protein and foxtail millet, a highly drought tolerant cereal widely used for food in China, and forage in Eastern Europe.

2. ESSRG – Environmental and Social Sciences Research Group (Hungary)

Einkorn wheat (Alakor), Emmer (Tönke), Khorasan wheat (Kamut) variety mixtures, heterogenous populations. Includes a bakery and artisan bread production.

3. ESSRG – Environmental and Social Sciences Research Group (Hungary)

Mixed vegetables, herbs and cut flowers cultivated in a mulched permanent bed system. Direct farm sales, with products sold for family level self-sufficiency. Suitable for continental and temperate regions.

4. CSIC – Agencia Estatal Consejo Superior Inv Cientificas (Spain)

Lentil, faba bean, grass pea, and pea for food. CSIC develops cultivars adapted to European farming systems, combining good quality with stress and disease resistance. UCs covered

include types whose yield is sold fresh for direct consumption, and dry products (grains) for processing, including fractionation. This dynamic value chain includes SMEs, farmers, local associations, which operate in temperate semi-arid environments.

5. AUA – Agricultural University of Athens (Greece)

Wild- and leafy-greens used in highly efficient production systems and evaluated for nutritional value and post-harvest processing characteristics.

6. UNITO – University of Turin (Italy)

Tomato landraces grow using novel bio stimulants and biofertilizers to reduce the impact of abiotic stress (such as is induced by climate change impacts). Includes the physiological and molecular characterization of stress-resilient landraces. This involves local networks, SMEs, and regional networks (Greek and Italian Government).

7. CUT – Echnologiko Panepistimio Kyprou (Cyprus)

Tomato landraces and wild leafy vegetables with improved seed germinability and abiotic stress resilience intended to be introduced to highly efficient and innovative production systems.

⁴ A value chain using underutilised crops comprised of five harmonised and optimised key elements: i. Producers; ii. Processors; iii. Transportation; iv. Marketing, Sales and Value creation; v. Consumers. A DVC is optimized by sharing demand and production data across all actors in the network to counter the uncertainties of non-integrated supply chains. Thus, DVCs are more resilient to disruption, and may sustain economic development across scales.

8. CRPA – Centro Ricerche Produzioni Animali (Italy)

“An Edible Park for citizens of Reggio Emilia”, including multiple UCs where innovative business models, profitability, value chain, food quality, processing, nutrition, added value and short value chain are in one place. Offers enormous potential for agrifood producers involved in food chains operating in urban or peri-urban areas. This AURORA boasts smarter logistics that shorten the distance between producers and consumers, stimulating market opportunities for local farmers and giving citizens access to fresh, healthy, and sustainably grown food.

9. UL – University of Limerick (Ireland)

Miscanthus used to regenerate degraded soils via organic matter accumulation, enhancing ecosystem resilience and boosting food production. Showcases a long (15-20-yr) rotation with arable crops.

10. JHI – James Hutton Institute (UK)

Bere barley used by Barony Mill produces Bere meal flour for local use in Bere bannocks (bread) and the flour is distributed to farm shops across Scotland. Grain used for producing malted bere grains (Crafty Maltsters, Cris Malt, Bairds); whisky (Bruichladdich, Raasay, Skapa), and beer (Arbikie, Swanney). This bere-based dynamic value chains presents the use of UCs for food and drinks.

11. UNIVPM – Università Politecnica Delle Marche (Italy)

Flint maize and common bean (Italian landraces, ancient and/or locally grown). This AURORA promotes intercropping and identifies landraces and genotypes with high suitability for this purpose. Agronomic, physiological, and molecular characterization of these genetic resources are reported.

12. ILU – Institut für Lebensmittel-und Umweltforschung (Germany)

Bermuda grass biomass cultured in Germany, and faba beans, to make starch a feedstock in non-food (industrial) applications.

13. BIOFO – Biofontinhas “THE ART OF BALANCE” (Portugal)

100 different vegetable crop species are used in a rotation by a family of botanists in the Azores. This is a farming system with no machines working the soil, where all products are used by local restaurants. The chefs use the salad-mix daily, and all other specialty items on fine dining dishes as notes of flavor.

14. FDM – Sociedade Agricola do Freixo do Meio Lda (Portugal)

The DVC model practiced here has existed since the beginning of 20th century and prioritizes the restoration of soil, and utilizes all plant types (tree, shrub and herbaceous) based on complex ecosystems plus natural- and local-fertility cycles. It has a unique multifunctional concept, where forestry, agriculture, livestock, fruit and vegetables, food-processing, distribution, and -retailing, combine to boost environmental services and energy production activities simultaneously.

15. UNISG – Univ. Degli Studi di Scienze Gastronomiche (Italy)

Wheat local varieties (70 populations, and other traditional varieties) are used in participatory and evolutionary plant breeding for sourdough bread. DVC includes producers and seed companies.

16. CONAT – Connecta Natura (Spain)

Traditional fruit trees in the mountainous region of Valencia where local associations preserve and share cultivated biodiversity and traditional agroecological knowledge.

17. HIW – HiWeiss SRL (Italy)

Multiple underutilized crops are grown using a conservation agriculture approach (continuous no-till, crop rotation and cover crops). This AURORA includes an innovative production process to isolate plant proteins, conserving their native structure and functionality, and which are used as food ingredients. By-products find new life in the bioenergy, plant protection, and plant nutrition industry.



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18. DIKOT – Mitropoulos I. – Lyras G. I.K.E. (Greece)

Several traditional legumes are processed into flour and snacks and eaten as pulse. All the products are used for food and nutritional security. Products are covered by the “Agrocert” certification.

19. IAI – Institute for Agrostrategies and Innovations (Bulgaria)

Traditional fruit tree varieties and vegetable crops grown with respect to traditional methods of the Bulgarian region. This extensive network of farmers and municipalities also includes block chain to strengthen the exchange of knowledge between farming communities, and the IT sector which enables the digitization of the underutilized crop-based dynamic value chains.

20. CRPA – Centro Ricerche Produzioni Animali (Italy)

Landraces, ecotypes and varieties of alfalfa, bean, and clover are used to improve the resilience of crops used for feed in the production of an important Protected Designation of Origin (PDO) value chain for Parmigiano Reggiano cheese. This AURORA demonstrates the improvement of the agronomic-, physiological-, and quality-traits of the currently cultivated crops to counter the current issues of climate change whilst also satisfying farm- and land-management needs. The production is based in lowland and upland areas, and the value chain is achieved using a participatory approach involving farmers, SMEs, dairies, and other stakeholders.

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Results & Dissemination Plan

The Consortium has disseminated the first results from **AURORA** farms among different actors. So far, no commercial exploitable results have been generated, but the Consortium has identified seven Key Exploitable Results (KERs) to develop business plans and promote the use of UCs .

A dissemination plan includes different measures and tools, including articles, an informative website, a policy e-booklet, published interviews, press releases, social media posts, and different stakeholder engagement activities. A key element is to involve stakeholders from different points of the value chain in diverse project events and communications. Another important part of the dissemination plan is the production of 24 Practice Abstracts, providing recommendations to end-users, such as growers, breeders, processors, chefs and consumers.



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