



Editorial

Neglected and Underutilized Plant Species in Horticultural and Ornamental Systems: Perspectives for Biodiversity, Nutraceuticals and Agricultural Sustainability

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Citation: Mauro, R.P.; Nicoletto, C.; Sabatino, L. Neglected and Underutilized Plant Species in Horticultural and Ornamental Systems: Perspectives for Biodiversity, Nutraceuticals and Agricultural Sustainability. *Horticulturae* **2022**, *8*, 356. <https://doi.org/10.3390/horticulturae8050356>

Received: 18 April 2022

Accepted: 19 April 2022

Published: 20 April 2022

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Dear Colleagues,

We are pleased to present this reprint of a Special Issue of *Horticulturae*, dedicated to the multifaceted topic of neglected and underutilized plant species (NUS) in horticultural and ornamental systems. Over the last few decades, this topic has received growing attention from the scientific community, due to the fact that it is a possible option that could be used to face the agricultural challenge of producing more foods and services within a framework of greater sustainability. Indeed, in the future, global urbanization processes, climate change and the reduction in natural resources are expected to emphasize the vulnerability of the mainstream agricultural system, which currently satisfies the needs of an ever-increasing world population by leveraging a restricted number of cash crops. In this context, NUS would be able to promote agro-biodiversity, improve the resilience of the agro-ecosystems toward environmental stressors, foster the assumption of nutraceuticals and the diversification of dietary patterns, and provide important local services (environmental, economic, and socio-cultural) as ornamentals or in landscape design. However, there are manifold barriers continue to hamper the reshaping of NUS utilization out from their niche role, many of which stem from our poor knowledge about their biological and technical features.

For the above reasons, this Special Issue aimed to help fill the knowledge gaps concerning NUS in horticultural and ornamental systems, as well as in landscape design, by gathering original research papers, short communications, and review articles dealing with relevant phenomena related to:

- ✓ Biodiversity and conservation;
- ✓ Genetics and breeding;
- ✓ Characterization, propagation, and ecophysiology;
- ✓ Cultivation techniques and systems;
- ✓ Landscape protection and restoration;
- ✓ Product and process innovations;
- ✓ Biochemistry and composition;
- ✓ Postharvest factors that affect their end-use quality.

Overall, the Special Issue collected 14 contributions (3 reviews and 11 original research papers).

In their review article, Meena et al. [1] describe the ethnobotany, medicinal and nutritional values, biodiversity conservation and utilization strategies of 19 important and underutilized climate-resilient fruit crops (Indian jujube, Indian gooseberry, lasora, bael,

kair, karonda, tamarind, wood apple, custard apple, jamun, jharber, mahua, pilu, khejri, mulberry, chironji, manila tamarind, timroo, and khirni) from arid and semi-arid regions, as they have many advantages in terms of how easy they are to grow and their hardiness and resilience to climate changes compared with major commercially grown crops.

The review of Scarano et al. [2] focuses on both cultivated or spontaneously growing NUS from the Apulia region (southern Italy) that show interesting adaptive, nutritional, and economical potential which can be exploited and properly improved in the future.

Another review article written by Han et al. [3] highlights the importance of *S. aethiopicum* due to its role in crop diversification and in reducing hidden hunger. The authors also stress its nutritive and medicinal benefits, its agricultural sustainability, and future efforts for breeding and the genetic improvement of the solanaceae.

Among the experimental articles, the contribution of Singh et al. [4] reports on three experiments that were carried out to explore the integrated approaches toward nematode control in pomegranate. All of the evaluated genotypes and varieties were found to be susceptible to root knot nematodes, but the severity of an attack varied among them. Hence, more detailed screening is needed in larger populations, although some strategies can be adopted to reduce the attacks.

Amoruso et al. [5] report the effect of salinity (150 mM NaCl) on the growth, quality, and shelf-life of fresh-cut sea fennel grown on a floating system compared to a control condition (9 mM NaCl). The authors found that leaves from plants exposed to salinity had lower NO_3^- , K^+ , and Ca^{2+} contents and an increased Cl^- and Na^+ concentration compared with the control. Sensory quality was similar in both treatments, except that leaves from the NaCl treatment had a salty taste that was easily detected by panelists. This suggests that a saline-nutrient solution applied in hydroponics is a suitable system for sea fennel growth. The product behavior during the postharvest storage was also reported.

Two studies presented by Lamani et al. [6,7] focus on wood apple (*Limonia acidissima* L.), an underutilized fruit-yielding tree native to India and Sri Lanka. In their first paper, the authors analyzed the fatty acid composition, tocopherols, and physico-chemical characterization of wood apple seed oil and the nutritional profile of seed cake, determined using gas chromatography–mass spectrometry (GC-MS). They found interesting results in terms of oleic, alpha-linoleic, and linoleic acid content along with tocopherols and total phenols. Data on seed oil and cake showed that they are a good source of natural functional ingredients with several health benefits. In the second paper, the authors analyzed the nutritional status of wood apple fruit pulp. They report that the pulp is rich in total carbohydrates, total proteins, oil, fiber, and ash. By using HPLC and GC methods, the article reports a comprehensive characterization of sugars, organic acids, and fatty acids contained in fruit pulp.

In the experiment conducted by Consentino et al. [8], five landraces of *Lagenaria siceraria* L. were subjected to foliar applications of seaweed extracts to improve yield and quality characteristics. The authors report that treated plants produced higher marketable fruit yields, fruit mean masses, young shoot yields, and numbers of young shoots than untreated ones. Relevant increments were also recorded for nitrogen use efficiency and fruits' mineral composition and nutraceutical profile.

Wei et al. [9] investigated the characteristics of suitable habitats for the endangered tree fern, *Sphaeropteris lepifera* (J. Sm. ex Hook.) R.M. Tryon, based on fieldwork, ecological niche modeling, and regression approaches. The ecological niche models indicated several climatic, orographic, and biological features that affect the distribution of *S. lepifera*, thus providing important information for the restoration of this species in the wild.

The possibility of converting *Ginkgo biloba* seeds from an unwanted and unused environmental pollutant into a source of beneficial compounds in Bulgaria was the subject of the article by Tomova et al. [10]. The authors applied various analytical and chromatographic methods to quantify the major constituents and ten biologically active compounds in methanol seed extract. The study revealed that seeds of locally grown Ginkgo trees could be used as a source of biologically active substances, as their composition is similar to that from other geographical areas.

The micro-scale production of microgreens is spreading due to the simplicity of their management, rapid cycle, harvest index, and phytochemical value of the edible product. In this context, two Mediterranean NUS, i.e., purslane (*Portulaca oleracea* L.) and borage (*Borago officinalis* L.), offer opportunities to produce nutrient-dense foods as novel vegetable products. For these reasons, Corrado et al. [11] characterized the microgreens of both species, finding that purslane has significant amounts of phenolics and ascorbic acid, and a potential high β -carotene bioavailability, while borage microgreens have a very high fresh yield and a more composite and balanced phenolic profile. Overall, they provide insight into the implementation of NUS market-chains and into the development of added-value food products.

Soil salinization is one of the major threats that affect crop production worldwide. For this reason, NUS could represent an opportunity to find crops tolerant to salt-affected cultivation systems. Starting from this assumption, Alexopoulos et al. [12] studied the effects of increasing salinity in the nutrient solution in dandelion (*Taraxacum officinale* (L.) Weber ex F.H.Wigg.) and common brighteyes (*Reichardia picroides* (L.) Roth) grown under greenhouse conditions. The results revealed that both species are severely affected by high salinity; however, *R. picroides* showed promising results regarding its commercial cultivation under moderate salinity levels, as it exhibited a more effective adaptation mechanism against saline conditions, as evidenced by the higher accumulation of osmolytes such as proline and the higher shoot K content.

Salt stress was also investigated by Sogoni et al. [13]. They studied the effects of NaCl concentration in dune spinach (*Tetragonia decumbens* Mill.) nutrient solution. Dune spinach is an edible, neglected halophyte largely distributed along the coastal regions from southern Namibia to the Eastern Cape. The authors found that this species can be grown and irrigated with brackish water (incorporating up to 50 mM NaCl), as plants showed significant increases in growth parameters, antioxidant power (FRAP essay), along with concentrations of phenolics, nitrogen, phosphorus, and sodium.

Climate change, natural disturbances and human activities are factors that affect plant biodiversity worldwide, meaning the development of conservation and management strategies for the most endangered species is becoming an urgent need. For this reason, Li et al. [14] genotyped 480 individuals of Korean pine (*Pinus koraiensis* (Sieb. et Zucc)) belonging to 16 natural populations present in North-Eastern China by using fifteen polymorphically expressed sequence tag-simple sequence repeat (EST-SSR) markers to evaluate their genetic diversity, population structure, and differentiation. The results provide new genetic information for future genome-wide association studies (GWAS), marker-assisted selection (MAS), and genomic selection (GS) in natural *P. koraiensis* breeding programs. These findings can improve conservation and management strategies for this valuable species.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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