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Editorial

Utilizing Genetic Resources for Agronomic Trait Improvement

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Genetic resources hold the key to adapting crops to a changing climate; they are a source of many new alleles that can be used in plant breeding to improve already-existing cultivars. They will be important in the future, especially in the European Union, due to the current restrictions on new technologies, such as gene editing, and new policies on sustainable agriculture (Farm to Fork and Biodiversity Strategies). However, the actual use of genetic resources in crop improvement is limited. In this Special Issue, 21 articles have been published which address different kinds of traits that can be incorporated in new cultivars from different types of genetic resources (wild relatives, landraces, obsolete cultivars, and modern cultivars). Sixteen articles were selected for the brief discussion presented below.

Regarding wheat, some bread wheat cultivars grown in Spain (Rota, Eneas, and RGT Chiclanero) were found to be resistant to yellow rust [1], whereas in a study on bread wheat landraces' resistance to leaf and yellow rust, Martínez-Moreno et al. [2] found that resistant landraces originated from areas with higher precipitation and more uniform temperature. Most were susceptible to either of the two rust species, but one displayed resistance to both, which makes this study interesting for breeders. In another study on bread wheat in Egypt, searching for drought tolerance, the cultivars Giza 171 and Misr2 were more tolerant than the rest of the materials [3]. Studying several subspecies of tetraploid wheat (*T. turgidum*), González et al. [4] could distinguish the *dicoccum* and *turgidum* from the *durum* subspecies based on the polymorphism on the *TtDro1B* gene. The former category had shallower and smaller roots compared to the latter. Ayed et al. [5] tried to explore the genotype in terms of the environmental interaction and yield stability of 24 promising durum wheat lines (landraces, cultivars, and lines from crosses), selected by ICARDA in several African countries. Five genotypes were recommended for several semiarid regions of Tunisia. El Haddaj et al. [6] reported how crop wild relatives may be a good source of alleles for plant breeding in general as well as climate change adaptation. They described that one durum wheat accession (Zeina), originating from *T. araraticum*, was superior in its mixograph score to the best check, and three other accessions had an extraordinary Zn concentration. For barley, several entries originating from crosses of *H. spontaneum* were superior to the checks in protein, Zn content, and β-glucan content. For lentil, some accessions originating from *Lens orientalis* had a higher protein, Zn, and Fe concentration.

In maize, some of the descent lines from the cross of the Algerian landraces Sidi Maamar × Aougrout were tolerant to drought and no-nitrogen stress [7]. Sukto et al. [8] carried out mass selection in the small-ear waxy corn populations of Thailand to improve the carotenoid content and resistance to downy mildew; also in Thailand, Dermail et al. [9] crossed three supersweet corn lines with eight waxy ones to generate 48 F1 hybrids. Selection for different traits (early maturity, shorter plant stature, high yield, high flowering synchrony, good plant architecture, etc.) was carried out. In addition, a sensory blind test on sweetness, stickiness, tenderness, and overall liking was conducted to assess the quality.

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Citation: Martínez-Moreno, F.; Picó, M.B.; Díez, M.J.; Ruiz, M. Utilizing Genetic Resources for Agronomic Trait Improvement. *Agronomy* **2023**, *13*, 1113. https://doi.org/10.3390/agronomy13041113

Received: 4 April 2023
Revised: 10 April 2023
Accepted: 11 April 2023
Published: 13 April 2023

The obtained hybrid with the highest selection index, 101L/TSC-10 × KV/mon, showed potential to become a future sweet–waxy corn hybrid on the market. Fongfon et al. [10] examined the diversity of 37 landraces of purple rice collected from farmers for several traits including anthocyanin, iron, zinc, and gamma oryzanol content, when grown together as wetland rice. Most purple rice accessions were identified as tropical *japonica*, although there were some from the *indica* group. Grown in a much smaller area than the normal non-purple rice, purple rice landraces are also genetically less diverse. Some landraces had a higher anthocyanin content, which can be useful for breeding.

In a study of chickpea, several lines from the WANA region (West Asia and North Africa), including landraces and cultivars, were selected for their higher seed weight and number [11]. In another article on chickpea, Eker et al. [12] found that multi-pods per peduncle and compound leaf traits had an advantage under heat stress conditions. Bomers et al. [13] found that three accessions of runner beans (out of 113, mostly Austrian) showed a higher yield compared to the reference variety Bonela under heat stress during two seasons. Rosa-Martínez et al. [14] evaluated the traits of 16 eggplant lines with different introgressions from *Solanum incanum* (sugars, acid, phenolics, minerals, etc.). Several QTLs were found with a higher malic acid and crude protein content. Casals et al. [15] described how long-shelf-life and water-deficit-tolerance alleles can be found in tomato. A landrace and a hybrid based on the Catalan Penjar variety was employed for this study. Finally, Pérez-Méndez et al. [16] reviewed the use of wheat and rice landraces to combat climate change (forecasting the effects of greenhouse gas emissions, drought, and plant disease) and to increase biodiversity for ecosystem services. The authors concluded that modern technologies, especially remote sensing, are relevant to achieve these goals.

The importance of plant genetic resources is clear, but much remains to be done. On one hand, they must be preserved through different in situ and ex situ conservation methods. On the other hand, extensive genotypic and phenotypic information should be generated to identify genes/traits of interest, especially in the vast gene pool of wild relatives, and facilitate their introgression into advanced breeding material.

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

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