Nutritional value of Crop Wild Relatives (CWRs)

Using barley diversity to support better food quality

Introduction

Crop wild relatives are valuable genetic resources for crop improvement, including for nutritional quality. In barley, wild and CWR-derived materials can show higher levels of key components such as protein, β-glucans, minerals and phenolic compounds than cultivated varieties. This diversity offers strong potential to improve nutritional quality and support the development of healthier and more resilient crops.

Objectives

The main objectives in modern breeding are focused on improving the production site – higher seed yields, (a)biotic stress resistance, and reduced input. With this focus, consumer-targeted traits, such as nutritional quality or health benefits, are rarely considered. Nevertheless, malnutrition is a bigger problem than hunger globally. In the future, barley production must respond to both the production and consumer site with growing demands for resilience, improved nutritional quality and sustainability.

In this context, barley CWRs represent an underused source of genetic diversity, particularly for traits related to protein content, micronutrients and other nutritionally relevant compounds. Within COUSIN, barley diversity, including CWR-derived material, is being characterised to identify nutritionally relevant traits that can support breeding activities toward healthy diets and future food applications. This work helps to map variation across barley populations and to identify promising materials for the development of more nutritious and sustainable barley-based cropping and food systems.

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Results

The nutritional composition of seeds depends on genetic background, as well as environmental factors and farming practices. The combination of all three is the research subject a COUSIN's subproject. Their nutritional analyses of CWR-derived barley populations across multiple generations (>25 years) and two farming approaches highlighted the potential of CWR. Results show clear variation in total phenolics, condensed tannins, mineral composition and β-glucan concentration. This variability helps discriminate among genotypes, environmental effects, and farming practices, and supports the identification of promising materials for further testing and breeding. The results provide a useful basis for selecting barley lines with improved nutritional quality and for linking CWR diversity with future breeding and food development efforts.

Recommendations

The results support the continued use of barley CWRs and CWR-derived materials in breeding programmes aimed at improving nutritional quality. Further work should focus on validating the most promising genotypes across environments and production systems, and on combining nutritional traits with agronomic performance and end-use quality. This approach can help breeders develop barley varieties better suited to future farming and food system needs. In the longer term, selected lines may also contribute to the development of higher-value barley-based food products.

Further reading

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