

Genetic conservation and crop diversity: Preserving heritage varieties through conventional breeding.

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Introduction

The diversity of crops is not only essential for food security but also crucial for maintaining a resilient and adaptable agricultural system in the face of changing environmental conditions. Conventional breeding methods play a vital role in preserving heritage crop varieties and ensuring genetic conservation. In this article, we delve into the significance of crop diversity, the challenges it faces, and how conventional breeding techniques contribute to the preservation of heritage varieties.

Crop diversity, also known as agrobiodiversity, refers to the variety of plant species, varieties, and genetic resources that are cultivated for food, fiber, and other agricultural products. Diversity within crops is essential for several reasons. Different crop varieties exhibit varying levels of tolerance to pests, diseases, and changing climatic conditions. A diverse crop pool increases the likelihood of having resilient varieties that can withstand extreme weather events and shifting climate patterns. Diverse crops provide a wider range of nutrients, vitamins, and minerals. Consuming a variety of foods derived from different crop species contributes to improved nutrition and reduces the risk of dietary deficiencies [1].

Crop diversity supports healthy ecosystems by promoting beneficial interactions among plants, pollinators, and other organisms. It contributes to soil fertility, reduces the need for chemical inputs, and enhances overall ecosystem resilience. Crop diversity serves as a genetic reservoir for future breeding efforts. Traits found in heritage varieties can be reintroduced into modern cultivars to improve yield, resistance to diseases, and other desirable characteristics.

Modern agriculture has often favored the cultivation of a few high-yielding varieties, leading to the decline of traditional and locally adapted crop varieties. This monoculture farming system increases vulnerability to pests, diseases, and market fluctuations. Traditional farming practices and knowledge related to heritage varieties are disappearing as communities transition to modern agricultural methods. This loss of indigenous knowledge further endangers these varieties. Market preferences for uniform, standardized crops with longer shelf lives can lead to the neglect of heritage varieties that may have unique flavours, colors, or nutritional profiles [2].

Conventional breeding methods involve crossing different varieties of plants to combine desirable traits and create improved offspring. This approach has been used for centuries to develop new crop varieties and is now a powerful tool for preserving heritage varieties and their genetic diversity. Here's how conventional breeding contributes to genetic conservation. Conventional breeding allows for the transfer of valuable traits from heritage varieties to modern cultivars. This can include traits such as disease resistance, drought tolerance, and nutritional content. Many heritage varieties hold cultural and historical significance for local communities. By incorporating these varieties into modern breeding programs, their cultural importance can be recognized and preserved. Conventional breeding can bring attention to and reintroduce neglected or underutilized crops, which might have valuable attributes that can address contemporary agricultural challenges.

Breeding programs can use heritage varieties to develop new cultivars that are adapted to changing environmental conditions. This includes creating crops that are more resilient to emerging pests, diseases, and altered climate patterns [3].

While conventional breeding offers promising avenues for genetic conservation, there are challenges that need to be addressed. Developing new crop varieties through conventional breeding can be a time-consuming process that requires significant resources. Funding and research support are essential to sustain breeding efforts.

Stringent regulations related to the release and commercialization of new crop varieties can hinder the adoption of heritage-based cultivars. Effective collaboration between researchers, farmers, and communities is crucial to ensure that heritage varieties are properly identified, characterized, and integrated into breeding programs.

Several examples illustrate the successful preservation of heritage varieties through conventional breeding:

In Ethiopia, landrace wheat varieties have been identified and utilized for breeding programs aimed at developing wheat cultivars with enhanced resistance to stem rust, a devastating disease. In India, traditional rice varieties with traits such as drought tolerance and pest resistance have been used in breeding programs to develop improved rice cultivars suited to changing climatic conditions [4, 5].

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Conclusion

The preservation of heritage crop varieties is not only a matter of agricultural diversity but also a way to honor cultural heritage and enhance the resilience of agricultural systems. Conventional breeding methods provide a powerful tool for incorporating valuable traits from heritage varieties into modern cultivars, contributing to genetic conservation and sustainable agricultural practices. As we face global challenges such as climate change and food security, the importance of maintaining and utilizing crop diversity becomes increasingly evident. By embracing conventional breeding and recognizing the value of heritage varieties, we can safeguard agricultural resilience and ensure a more sustainable future for generations to come.

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