



Success story of breeding with Crop Wild Relatives

The Brassica case study at the University of Catania



Introduction

Brassica oleracea L., including cabbage, cauliflower, and broccoli ($2n = 18$), easily intercross with several wild species native to the Mediterranean area, such as *B. drepanensis* (Caruel) Damanti, *B. incana* Ten., *B. macrocarpa* (Guss.), *B. rupestris* Raf., and *B. villosa* Biv. These crop wild relatives (CWRs) are valuable sources of traits for resilience and health-promoting compounds.

Objectives

Brassica macrocarpa Guss., endemic to the Egadi Islands, Sicily, is classified as critically endangered in the IUCN Red List of Threatened Species due to its very narrow extent of occurrence, limited area of occupancy, and risk of decline caused by potential human disturbance of its habitat. The University of Catania (UNICT) tested its use in interspecific hybridization with broccoli, taking as reference the success of the commercial hybrid

Beneforte, obtained by crossing a commercial line with *B. villosa* to increase the content of health-promoting compounds. The aim is to propose new genotypes with higher levels of bioactive compounds, addressing the needs of farmers and breeders for crops with improved health value and environmental resilience, while contributing to the conservation of valuable crop wild relatives.





Results

During the first year of the COUSIN project, we successfully identified elite genotypes combining high levels of bioactive compounds, such as polyphenols and glucosinolates, with strong antioxidant capacity, showing that nutritional traits can be added to breeding programs without reducing crop performance. The F₁ hybrids from crosses between commercial broccoli cultivars and *B. macrocarpa* had the highest total levels of these compounds, particularly in glucosinolates. The incorporation of CWRs traits such as for *B. macrocarpa*, known for its glucosinolate richness and drought stress tolerance, offers a dual advantage for the development of functional foods and resilient crops, especially under climatic change.

Recommendations

COUSIN is the European Union-funded project on the use and conservation of wild species for more sustainable, resilient, and nutritionally valuable agriculture. The underutilised genetic and phytochemical diversities of the *B. oleracea* complex species (n=9) populations, widespread in the Mediterranean countries, along with the derived dynamic populations, as indicated in EU Regulation 848/2018 on the organic agriculture, offer a powerful strategy for breeding next generation *B. oleracea* cultivars with enhanced agronomic traits and improved health-promoting properties. These results provide useful insights for farmers and breeders in selecting and developing crops under changing environmental conditions.

Further readings

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