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Crop wild relatives: more common ground for breeders and ecologists

Improved plant varieties can contribute to a range of ecosystem services, including carbon sequestration, reduction of soil erosion, and improvement of soil quality. Brummer *et al.* (*Front Ecol Environ* 2011; **9**[10]: 561–68) therefore recommended new partnerships between ecologists and plant breeders. In their stimulating contribution the authors have, however, neglected to include an important, but currently highly undervalued, potential partnership between ecologists and plant breeders. This partnership concerns the in situ conservation of crop wild relatives (CWRs) and their population genetic diversity. CWRs are wild plant taxa, phylogenetically closely related to species of direct socioeconomic importance, and have been intensively used for crop improvement during the past century (Heywood *et al.* 2007). Between 1986 and 2006, not fewer than 60 wild species have contributed more than 100 beneficial traits, mainly related to disease resistance and abiotic stress tolerance, to 13 major crops – including wheat, rice, tomato, and potato (Hajjar and Hodgkin 2007). It has been estimated that 30% of the increase in crop yields since 1945 has been achieved through crossing with wild relatives, representing a worldwide value of US\$115 billion per year (Pimentel *et al.* 1997). One marked example is resistance genes against potato blight (*Phytophthora infestans*), present in the wild potato species *Solanum demissum* and *Solanum bulbocastanum* that have been naturally crossed and genetically engineered, respectively, into the cultivated potato genome. The importance of CWRs could continue to increase in the near future as plant breeders attempt to address the threats of global change and meet food security needs. At the same time, increasing availability of molecular techniques will allow the introduction of genes from even more remote relatives into crop species. Unfortunately, among plant ecologists and conservation biologists, the conservation of CWRs has been hardly a priority so far. In the scientific conservation literature, CWRs have been almost completely ignored, even though many are rare or imperiled (Bilz *et al.* 2011). Until now, leading conservation journals – *Biological Conservation*, *Conservation Biology*, *Conservation Genetics*, and *Biodiversity and Conservation* – have published only six articles that include the Thomson Reuters Web of Science search term “crop wild relative*”. We found only six additional relevant records in these journals when using the more advanced search query Topic = (((wild OR ancestor* OR relative*) NEAR crop*) AND conserv*), and only 12 additional records when expanding the source base to all ecological titles. This suggests that the community of ecologists and conservation biologists lacks familiarity with the terminology, or worse, that there is little active interest in the conservation of the wild congeners of domesticated crops. One reason may be that conservation biologists have mainly used standards other than utilitarian criteria to set conservation priorities. On the other hand, crop scientists have traditionally focused on ex situ conservation of crop varieties, in seed banks and gene banks. Ex situ conservation, however, is not always the most appropriate strategy for protecting the wild gene pools of CWRs because of problems with representative sampling, genetic drift, inbreeding, seed recalcitrance, and absence of selective forces in ex situ collections (Schoen and Brown 2001). Ecology and conservation biology possess the conceptual framework, the expertise, and the methodological toolbox to describe and explain population-level processes such as genetic erosion, drift, and introgression, which are of direct importance for maintaining diversity of wild gene pools, as we have recently demonstrated for wild arabica coffee in the Afromontane rainforests of Ethiopia (Aerts *et al.* 2011). It seems, however, that the ecological community is not fully aware of the importance of CWRs. We therefore agree with Brummer *et al.* that both crop scientists and ecologists would benefit from increased exchange of concepts, knowledge, and data. Such collaborations will not only improve sustainable agricultural production in the long term, but will also lead to a more broadly based societal acceptance of ecology and biodiversity conservation.

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Datasets archived in Lirias.