# Introduction

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Interest in the wild relatives of cultivated plants has developed notably during the past decade. The reasons are not hard to find. On the one hand, an increasing preoccupation with the conservation of biological diversity has led to a closer scrutiny of the various groups of organisms which are of particular value in human activities – and the relatives of our cultivated plants, animals and microorganisms are certainly included here – and on the other hand, a similar preoccupation with the problems of maintaining the world's food supply has focussed attention on ways and means of seeking genetic material that might enhance productivity, disease resistance, tolerance of arid conditions and similar features, and an obvious source of this is in the wild relatives of our cultivated plants.

Already in 1988 IBPGR (today IPGRI), IUCN and WWF drew attention to the need to intensify efforts to conserve the wild relatives of the world's main food crops and produced a booklet *Conserving the Wild Relatives of Crops* (E. Hoyt, IBPGR, IUCN, WWF, Rome and Gland, 1988) and noted that research and conservation of the thousands of local crops or wild-collected species that are part of domestic economies, especially in developing countries, is a neglected field. In Europe a remarkably larger number of plants are cultivated, apart from the staples, and both they and their wild relatives are the groups with which we are concerned in this volume.

The context of the workshops whose results are reported here changed quite dramatically even during the short period between 1989 when the first Council of Europe activity in this area began and 1997 when this volume is published. Most notable have been two events: the first was the coming into effect on 29 December 1993 of the Convention on Biological Diversity that had been signed during the UN Conference on Environment and Development at Rio de Janeiro in 1992. This firmly placed biodiversity on the international and poltical scene and required countries to consider ways of inventorying and monitoring their biological resources and take the necessary steps to ensure their conservation and sustainable use. The Convention specifically mentions 'wild relatives of domesticated or cultivated species' in the indicative list of categories of the components of biological diversity to be identified and monitored given in Annex 1. The second event was the International Technical Conference on Plant Genetic Resources held in Leipzig, 17-23 June 1996. In the 'Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture' approved at

Leipzig, the promotion of *in situ* conservation of wild crop relatives and wild plants for food production was included as one of the priority activities and other related priority activities also implicated wild relatives of crops. Thus the importance of the need for conservation and sustainable use of wild relatives is recognized by both the biodiversity and agriculture sectors in intergovernmental programmes.

The conservation of wild relatives of crops, in contrast to that of cultivars, is best undertaken in their natural habitats or ecosystems whenever this is feasible. This means *in situ* as opposed to *ex situ* conservation which immediately poses a serious problem in that most experience of *in situ* conservation has been gained by protected area managers whose primary concern is to maintain the functioning of the ecosystems represented in the areas under protection, rather than the conservation of target species within these ecosystems. In fact, we have little experience of *in situ* conservation of target species since this has not been a priority for either the conservation or agricultural sector. This reflects a dichotomy that has developed in ecology and conservation between species and ecosystem perspectives. As pointed out by Lawton and Jones (1993), for almost three decades ecosystem and population ecology have ploughed their own independent furrows and developed their own paradigms, approaches and questions. Yet the linkages between species and ecosystems are all too obvious, especially when one considers the case of wild relatives. This is reflected too in the focus on species by the Species Survival Commission and on ecosystems by the Commission on National Parks and Protected Areas, both components of IUCN - The World Conservation Union.

In practice, it is widely recognized today that conservation requires the adoption of integrated or complementary strategies. This means considering each case separately and adopting adopting whatever approach or combination of approaches – *in situ*, *ex situ*, *in vitro*, habitat farming, reintroduction and so on – that is appropriate to ensure the effective conservation of the species concerned. Thus while, as just noted, conserving wild relatives in their natural surroundings is to be preferred, in cases where the natural habitat is severly reduced or fragmented and the species' populations consequently diminished, inviable or suffering from genetic erosion, it may well be necessary to collect material for *ex situ* storage in the form of seed, vegetative propagules, tissue or cell culture. Also where the species are subjected to serious threats, prudence dictates that *ex situ* stocks should be sored as an insurance policy. In some cases when the populations are so reduced as to be no longer self-maintaining and not likely to survive much longer, reinforcement of the population by introducing plants raised *ex situ* may be desirable. In some cases reintroduction into new but similar habitats may be desirable.

Many wild relatives occur in already designated protected areas, although detailed information is not always available due to the lack of inventories of many such areas, and it may be assumed that they are thus afforded some degree of protection. While this may be true, a hands off approach without some degree of management or intervention will not necessarily ensure the survival of particular species. This is because of the dynamic nature of both the populations and the ecosystems in which they occur. As Condit & al. (1992) put it, 'no community of species achieves, let alone remains in static equilibrium. Species continuously wax and wane in relative abundance; they even go extinct locally

and reimmigrate'. One of the main justifications for *in situ* conservation (and at the same time a failing of *ex situ* conservation) is that it allows evolutionary change to continue in the component species and populations but in addition to endogenous evolutionary (and ecological) change, a whole series of exogenous factors are also involved. To preserve the full diversity embodied in living organisms, these must be maintained in, and together with, their natural environment, *in situ*, with their proper ecological complexity and dynamics. Consequently, a combination of the natural dynamics of populations and the dynamics of succession and other factors such as spatial and environmental heterogeneity and disturbance regimes may well lead to considerable changes in the composition and structure of ecosystems over even short periods of time unless management intervention modifies or steers it to some predetermined state. This dynamism has considerable implications for conservation since it can lead to considerable species turnover and even local loss (especially of rare species) even in areas that have been set aside for conservation.

Attention needs to be paid to the various forms of intervention or management of protected areas that will be needed to achieve particular conservation goals. Such management can range from simple monitoring to active intervention such as the use of fire. An added complication is that there may well be conflicts between the management objectives of ecosystem conservation and the management regime needed to conserve populations of target species. Then there are the problems of conserving and managing species that grow naturally in successional or subseral communities or in habitats subject to human disturbance.

It is clear that in exploring the complementarity between *ex situ* and *in situ* conservation and between a species- and ecosystem-orientated approach, we need to be very clear as to our targets, purposes, objectives and, pehaps most often neglected, the timescale of concern to use the phrase of Frankel and Soulé. Certainly we may well have to rethink some of our assumptions about the possibility or feasibility of long-term conservation in nature of ecosystems or component target species in the light of the increasing pressures from global change – both climatic and anthropogenic.

One of the most serious threats to biodiversity worldwide, and especially in Europe, is fragmentation of natural ecosystems whereby human activities such as agricultural development, forestry or urbanization remove large proportions of the natural ecosystem and replace them with a greatly modified matrix, within which small remnants of the native ecosystem remain. Many of our crop wild relatives occcur in such vegetation fragments and the consequences of habitat fragmentation on the species that grew in the original continuous ecosystem is likewise to change them into subdivided, disjunct, isolated populations that are vulnerable then to extinction through demographic stochasticity, environmental stochasticity and catastrophes, loss of genetic heterozygosity and rare alleles, edge effects, invasory species, and human disturbance.

In understanding the threats faced by species in fragmented habitats, it is customary to use the framework of metapopulation theory. One of the consequences of fragmentation, therefore, may be to convert a previously more continuous population structure to a

metapopulation structure, with all or most local populations becoming so small that they have a substantial risk of extinction.

Effective conservation is dependent on accurate information and it is quite evident that much (although by no means all) of the basic information we need on taxonomy, distribution, ecology, breeding system, conservation status of wild relatives of crop species does exist but is not always accessible. It must be one of our priorities to seek this information out and make it available.

These then are some of the considerations that have to be taken into account in any attempt to conserve wild trrelativeds of crop plants. The subjects covered in this volume, reflecting the three workshops, are very diverse and range from field sampling and surveys, through assessment of genetic variation in populations and demography, to gene flow, assessment of environmental stress and management both *in situ* and *ex situ*. They require bringing together specialists from various disciplines so as to combine the underlying science with the practical management skills needed for effective conservation. The papers presented here will make a major contribution to our understanding, one the one hand of the importance of this important group of plants and on the other the complexities of maintaining them and keeping them available for the benefit of humankind, not only in Europe but globally.

**References**

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