Promoting the identification, conservation and use of wild plants for food and agriculture in the Mediterranean: the Fao global plan of action

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PROMOTING THE IDENTIFICATION, CONSERVATION AND USE OF WILD PLANTS FOR FOOD AND AGRICULTURE IN THE MEDITERRANEAN: THE FAO GLOBAL PLAN OF ACTION

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ABSTRACT

The Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture was adopted by 150 countries at the FAO Fourth International Technical Conference on Plant Genetic Resources for Food and Agriculture held in Leipzig, Germany in June 1996. The preparation of this Global Plan of Action was requested by governments through Agenda 21 and the FAO Commission on Genetic Resources for Food and Agriculture. This plan was developed through a participatory, country-driven process involving preparation and submission of more than 150 detailed Country Reports by Governments, and the holding of eleven regional and sub-regional meetings at which Governments and a range of international and non-governmental organizations were represented. In addition the information in the Country Reports was synthesised in a series of Sub-Regional Synthesis Reports and also in a Report on the State of World's Plant Genetic Resources which assessed the current state of conservation and utilization of plant genetic resources worldwide, and provided an underlying technical basis for the Global Plan of Action.

The reports and meetings held during the preparatory process called attention to the fact that while a small number of species provide a large proportion of global food needs, hundreds of other species, including wild species, are utilized at a local level and contribute substantially to household food and livelihood security. Knowledge concerning the uses and management of these species is likewise often localized and specialized. Many wild and under-utilized plants have potential for more widespread use. For some, their promotion as new crops could contribute to food security, agricultural diversification, and income generation. However, current programmes for conservation, research and development tend to neglect these species.

The Global Plan of Action contains three activities of direct relevance to the identifcation, conservation and sustainable use of wild plants for food and agriculture:

- concerning identification, activity 1: "Surveying and inventoring plant genetic resources for food and agriculture
- concerning conservation, activity 4: "Promoting in situ conservation of wild crop relatives and wild plants for food production; and
- concerning use, activity 12: "Promoting Development and Commercialization of Under-utilized Crops and Species.

Of the twenty priority activities identified in the Global Plan of Action, several other priority activities relating to capacity building and national planning structures were also highly relevant to integrated approaches towards the identification, conservation and use of wild plants for food and agriculture.

INTRODUCTION

While a small number of species provide a large proportion of global food needs, hundreds of other species, including wild species, are utilized at a local level and contribute substantially to household food and livelihood security (See Table 1) (Prescott-Allen & Prescott-Allen 1990; Hawksworth and Kalin-Arroy 1995). Knowledge concerning the uses and management of these species is likewise often localized and specialized (Haq 1995). Many wild and under-utilized plants have potential for more widespread use. For some, their promotion as new crops could contribute to food security, agricultural diversification, and income generation (Vietmeyer 1986; Anthony & Haq 1995). However, current programmes for conservation, research and development generally tend to neglect these species.

To date, most of the developments in conventional agricultural and forestry have concentrated on 'major crops', with little attention to the minor and under-utilized crops and wild plants of economic potential (Bertram 1993). New crops include the already established crops being adapted in new environments and those being developed from previously unexploited plants (Wallis & al. 1989). Resolution 3 of the Nairobi Conference for the Adoption of the Agreed Text of the Convention on Biological Diversity specifically notes that national action strategies and programmes for sustainable agriculture should include 'promotion of crop diversification in agricultural systems where appropriate, including new plants with potential value as food crops', and 'promotion of utilization of, as well research on, poorly known but potentially useful plants and crops, where appropriate'.

TABLE 1: UTILIZATION OF PLANT GENETIC DIVERSITY IN FOOD AND AGRICULTURE (FAO 1996A)

Category of Plant Species	Estimated Number of Species
Described plant species	250 000
Edible plant species	30 000
Used in food and agriculture	7 000
Important on a national scale	103
Supply 95% of the world's calorific intake	30

When assessing the current state of conservation and utilization of plant genetic resources (PGR) for the FAO's report on the State of World's Plant Genetic Resources (FAO 1996a), for the Fourth International Technical Conference on Plant Genetic Resources, it was evident that the under-utilized crops and wild plants had the potential for more widespread use and that their promotion would contribute to food security, agricultural diversification and income generation, particularly in areas where the cultivation of major crops is economically marginal.

It was also confirmed that wild relatives have made, and increasingly will make, enormously useful contributions to plant improvement, especially through their use in enhancement and broadening of the genetic base of cultivated plants (FAO 1996a, 1996b). Many wild relatives have co-evolved with pests and diseases in their centres of diversity, and as a result of both biotic and abiotic selection pressures are unique sources of useful genes (Harlan 1981). One particularly outstanding example is that of the tomato (*Lycopersicon esculentum*). The following wild species have been used as donors of genes for fungus resistance (*L. hirsutum*, *L. pimpinellifolium*); virus resistance (*L. chilense*, *L. peruvianum*); nematode resistance (*L. peruvianum*); insect resistance (*L. hirsutum*); fruit quality (*L. chmielewskii*); and adaptation to adverse environments (*L. cheesmanii*) (Esquinas-Alcazar 1981). Some further examples are given in Box 1.

Box 1: Examples of introgression of valuable agronomic traits from wild relatives of crops (FAO 1996a)

- Resistance in cultivated potato (*Solanum tuberosum*) against cyst nematodes has been introduced from the potato wild relative *Solanum demissum*
- Stem rust resistance in cultivated wheat (*Triticum aestivum*) has been introduced from the wild relative *Triticum timopheevi* and from *Agropyron* spp.
- Resistance in cultivated rice to grassy stunt virus of rice, *Oryza sativa* , has been introduced from the wild rice *Oryza nivara,* and resistance to brown planthopper by *Oryza officinalis.*
- Some wheat varieties are protected from eyespot fungus by resistance genes from the wild grass, *Aegilops ventricosa*
- In Africa and India, cassava yields have been increased up to 18 times with the disease resistance provided by genes from wild Brazilian cassava.
- Disease resistance provided by wild Asian species of sugarcane have contributed to saving the US sugarcane industry from collapse.
- In the Mediterranean rainfed area genes from the wheat wild relative *Triticum polonicum* contributed low fertilizer input qualities to the durum wheat cultivar Sebou.
- A wild relative of sorghum *S. virgatum* has provided the source of resistance to greenbugs in cultivated varieties

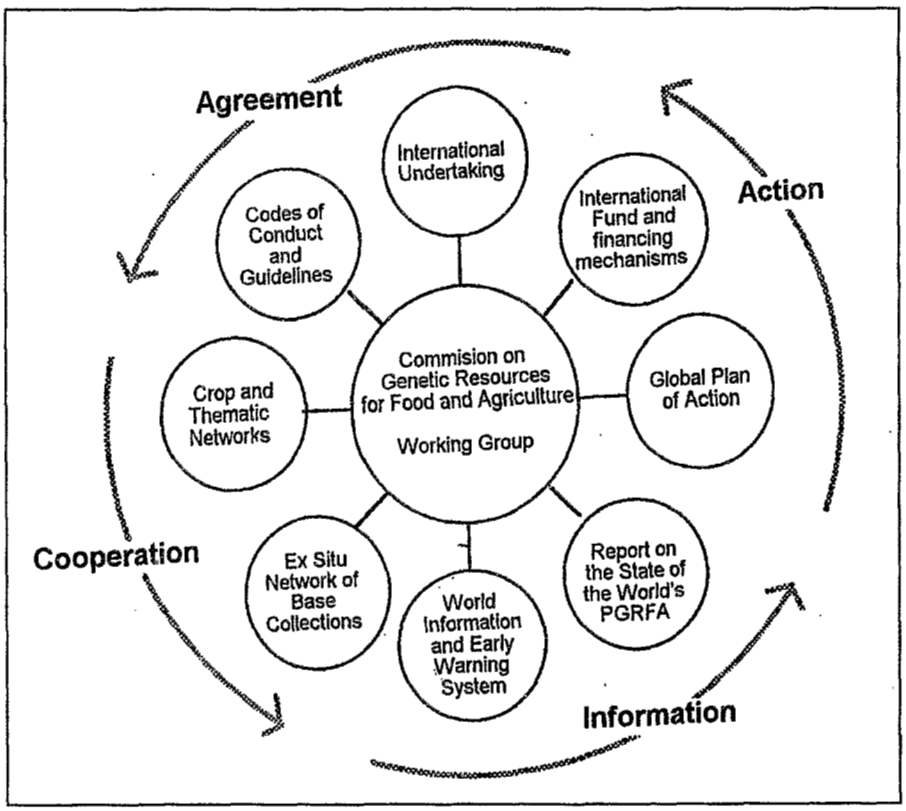
The State of the World Report also indicated that, apart from the vital importance of wild relatives to plant breeding, many wild plant species are also important, both nutritionally and culturally, to the livelihood security of many people. In this context, it was considered that the term 'wild' may sometimes be misleading because it implies the total absence of human influence and management. There may be no obvious or strict divide between 'domesticated' and 'wild' food species; rather it may be more of a continuum resulting from co-evolutionary relationships between humans and plant species. Many plant species and populations that have been considered to be wild are actually carefully nurtured by people, albeit less intensively than those cultivated in their fields (Gómez-Pompa & Kaus 1992). A number of countries, such as Ethiopia and Sudan, reported the use of wild food plants during periods of famine and especially during the hunger season that precedes crop harvests (Chambers & al. 1981). Such foods form an integral part of the daily diets of many poor rural households. Wild foods are a source of important vitamins, minerals and other nutrients which complement the staple crops eaten by many of the more vulnerable people, including children and the elderly. The importance of a wide range of wild plant species, including roots and tubers, leafy vegetables and fruits is recorded in many of the Country Reports and Sub-regional Synthesis Reports. Such wild resources also represent ready sources of income for cash-poor households and may provide a significant proportion of total household income, particularly where farming is marginal (Putter 1992).

When drawing up the FAO's Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (FAO 1996b), a number of activities relevant to the identification, conservation and sustainable use of minor, underutilized, wild and semi-wild plant's for food and agriculture were included. In this paper, we wish to highlight the main features of this global assessment and the resulting plan of action as they relate to these plant species.

FAO INTERNATIONAL TECHNICAL CONFERENCE AND ITS PREPARATORY PROCESS

The International Technical Conference on Plant Genetic Resources took place in Leipzig, Germany, 17– 23 June 1996. The Conference, convened by FAO, was attended by representatives of 150 countries, and numerous intergovernmental, non-governmental and private sector organizations. The Conference received the first Report on the State of the World's Plant Genetic Resources for Food and Agriculture and adopted the first Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture. These two documents are components of the FAO Global System for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (Table 2).

THE FAO GLOBAL SYSTEM
for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture



The State of the World's Plant Genetic Resources and the Global Plan of Action were prepared through a participatory, country-driven preparatory process. National focal points were designated by 149 countries to coordinate national preparation and planning, and to liaise with the FAO Secretariat. Over 150 countries submitted detailed Country Reports in which they assessed their current situation in regard to: indigenous plant genetic resources; national conservation activities (*ex situ* and *in situ*); in-country uses of plant genetic resources; national goals, policies, programmes and legislation; and international collaboration. In addition, countries identified national needs and opportunities, and made specific proposals for the Global Plan of Action.

From the Country Reports, sub-regional synthesis reports were prepared which provided the basis for discussions at the 11 inter-governmental regional and sub-regional meetings held

between July 1995 and December 1995. Each meeting formulated and adopted recommendations for the Global Plan of Action. International organizations including the Consultative Group on International Agriculture Research (CGIAR), the International Centre for Under-utilized Crops and numerous non-governmental organizations were actively involved in the preparatory process.

THE MEDITERRANEAN REGION

A sub-regional meeting for the Mediterranean area, preparatory to the International Technical Conference on Plant Genetic Resources, was held in Tunis, Tunisia, from 16-19 October 1995. Representatives from the South and East Mediterranean, and from the southern part of Europe, as well as observers from international and non-governmental organizations, attended the meeting. The meeting endorsed a sub-regional synthesis report prepared on the basis of the main findings of the Country Reports from the East and South Mediterranean (IPGRI/FAO 1996). This synthesis report highlighted the fact that the Mediterranean sub-region is very rich in plant genetic resources for food and agriculture. It has a flora of at least 32,000 species of higher plants, a high proportion of which are endemic to the region (Table 3). However an estimated 10% of plant species are currently considered to be threatened.

TABLE 3: FLORA AND ENDEMISM IN THE EAST AND SOUTH MEDITERRANEAN SUB-REGION

Country	Number of plant species	Number of endemics	Number of Threatened species
Algeria	3200	250	145
Cyprus	1760	134	43
Egypt	2112	70	91
Jordan	2500		752
Lebanon	2100	210	5
Libya	1900	134	58
Mauritania	1100		3
Morocco	4500	600	194
Palestine	3000		980
Syria	2100	210	11
Tunisia	2150	170	26
Turkey	9000	3000	1944

(Source: World Conservation Monitoring Centre 1992 and Country Reports)

The Mediterranean sub-region is particularly important as it includes the centres of diversity of a number of globally important crop plants including many cereals, food legumes, vegetables, forages, fruit trees and nuts (Harlan 1995). Many traditional landraces, wild crop relatives and other wild plant species from the sub-region continue to provide important new sources of important traits to improve agricultural production and food security worldwide. However, it is now thought that most of this diversity is threatened by genetic erosion due to desertification as well as agricultural development, urbanization, and habitat destruction by overgrazing and forest clearing. For instance, wild progenitors of some food legumes, such as chickpea (*Cicer reticulatum* in Turkey and *Cicer atlanticum* in Morocco) are almost extinct and are now exclusively confined to steep rocky slopes where grazing pressure is not as severe (IPGRI/FAO 1996).

Wild relatives and wild ancestors of many plant species of importance to food and agriculture are found in the Mediterranean sub-region. These include wild relatives of important cereals, food legumes, vegetables, forage species and ornamentals, including:

- Wheat (wild einkorn *Triticum boeoticum*, wild emmer wheat *T. dicoccoides*); goat grass Aegilops *(A. ovata, A. triuncialis, A. ventricosa, A. triaristata, A neglecta, A. geniculata)*; barley, (*Hordeum spontaneum, H. bulbosum, H. marinum, H. leporinum and H. murinum*); oats (*Avena maroccana, A. agadiriana, A. atlantica, A. ventricosa, A. weistii, A. eriantha, A. barbata, A. murphyi, A. longiglumis, A. hirtula, A. sterilis,* etc.) and rye (*Secale* sp.).
- The wild and weedy forms of food legumes which occur in the sub-region are mainly those of lentil (*Lens orientalis, L. nigricans, L. ervoides, L. montbretii, L. odemensis*); pea (*Pisum humileare, P. elatius*) and chickpea (*Cicer reticulotum, C. judaicum, C. pinnatifidum, C. echinospermum, C. bijugum and C. atlanticum*).
- The wild relatives of Brassica (*B. cretica* complex); wild Raphanus raphanistrum; wild celery (*Apium graveolens*); wild beet (*B. maritima* and other *Beta* spp.); wild watermelon (*Citrullus colocynthis*); wild cardoon/artichoke (*Cynara cardunculus*); wild carrots (*Daucus* spp.); wild rockets (*Eruca* spp.) wild lettuce (*Lactuca* spp.) and wild mustard (*Sinapis* spp.) are some of the wild species commonly used as vegetable or salad plants and/or which originated from the sub-region. Many other wild plant species are used as salad and vegetable plants, but are not further utilized or developed for socio-economic development purposes.
- Some wild relatives of forage grasses and legumes which commonly occur in the sub-region include: those of alfalfa (*Medicago sativa*); annual medics (40 species: *Medicago aculeata, M. intertexta, M. laciniata, M. littoralis, M. macrocarpa, M. murex, M. noeana, M. orbicularis, M. polymorpha, M. radiata, M. rigidula, M. rotata, M. secundiflora, M. sauvagei, M. scutellata, M. tornata, M. truncatula, M. tunetana*, etc.); lupin (*L. atlanticus, L. angustifolius, L. cosentinii*); Egyptian or berseem clover (*Trifolium alexandrium*); strawberry clover (*T. fragiferum*); white clover (*T. repens*); subterranean clover (*T. subterraneum*); Phalaris *(P. aquatica, P. minor)*; fodder peas (*Lathyrus articulatus, L. clymenum, L. gorgoni, L. ochrus, L. odoratus, L. sativus, L. tingitanus*, etc.); the French honeysuckle (*Hedysarum coronarium*); vetches *(Vicia articulata, V. ervilia, V. narbonensis, V. sativa, V. villosa, V. hybrida, V. palaestina*, etc.); grasses (*Festuca, Eragrostis, Stipa*) and other fodder crops (*Astragalus, Bituminaria, Lotus, Ononis*, etc).
- Wild progenitors of ornamental species such as Allium, Anemone, Arum, Centaurea, Chionodoxa, Cistus, Colchicum, Crocus, Cyclamen , Delphinium, Dianthus, Eranthis, Fritillaria, Galanthus, Gladiolus, Gypsophila, Helleborus, Hyacinthus, Iris, Laurus, Leucojum, Lilium, Muscari, Myrtus, Narcissus, Nectaroscordum, Nerium, Ophrys, Orchis, Ornithogalum, Paeonia, Pancratium, Retama, Rosa, Scilla, Scorzonera, Silene, Sternbergia, Tulipa, Viola are indigenous to the sub-region. Unfortunately the population sizes of some of these species are rapidly decreasing as a result of economic developmental activities, the use of herbicides and non-sustainable exploitation.

Many indigenous fruit trees and nuts are also found in the sub-region. A large number of these woody plants are valuable genetic resources as food crops because of their resistance to insects and diseases. Such species as chestnut (*Castanea sativa*) and walnut (*Juglans regia*) are valuable fruit genetic resources. Wild apple (*Malus* spp.), wild pear (*Pyrus* spp.), wild plum (*Prunus* spp.), wild pistachios *(Pistachia atlantica, P. lentiscus, P. palaestina, P. terebinthus,)*, wild hazel nuts (*Corylus* spp.), wild cornell cherry (*Cornus sanguinea*), wild almond (*Amygdalus* spp.) are some of the many wild relatives of fruit trees to be found in the sub-region. Most of those wild relatives are utilized as rootstocks. There are also wild relatives of other fruits like wild strawberry (*Fragaria* spp.) and wild blackberries (*Rubus* spp.). The sub-region is also the land of oil trees such as olives (*Olea europea*) and argan (*Argania spinosa*). The latter is endemic to Morocco and has a limited area of distribution. Some other trees are considered as industrial plants such as *Rhus coriaria (*which is rich in tannin), and the carob tree, *Ceratonia siliqua* (used in the food industry).

Additionally more than 500 species are used as important medicinal or aromatic species in the sub-region. Many of these are in danger of extinction mainly because of human activity in collecting these plants for domestic and industrial use. A great number of these plants are endemic: *Achillea, Acanthus, Aconitum, Alkanna, Allium, Althea, Amygdalus, Anabasis, Angelica, Arbutus, Artemisia, Asparagus, Asperula, Brassica, Calotropis, Capparis, Carum, Ceratonia, Colchicum, Convallaria, Crataegus, Delphinium, Digitalis, Ephedra, Euphorbia, Equisetum, Foeniculum, Ferula, Ferulago, Fragaria, Galanthus, Gentiana, Glycirrhiza, Gypsophila, Helichrysum, Helleborus, Herniaria, Hyoscyamus, Inula, Ixiolirion, Lamium, Lavandula, Laurus, Leucojum, Linum, Liquidambar, Lycopodium, Malva, Marrubium, Matricaria, Melilotus, Mentha, Narcissus, Nepeta, Nigella, Orchidaceae, Origanum, Paeonia, Peganum, Papaver, Pimpinella, Pistacia, Prangos, Primula, Quercus, Rhamnus, Rhus, Rosa, Rosmarinus, Rubia, Ruscus, Salvia, Satureja, Saponaria, Scolymus, Sideritis, Symphytum, Tanacetum, Teucrium, Thymbra, Thymus, Trigonella, Ulmaria, Vaccinium, Valeriana, Veratrum, Verbascum, Viola, Zizyphus.*

The 1995 Tunis meeting noted that in both Europe and the South and East Mediterranean there exists, on the one hand, high-potential areas where the policy is to promote high input sustainable agriculture, predominantly for competitive export markets and on the other hand, marginal areas where mostly small scale farming is practised, and where policy may be directed primarily at maintaining the livelihoods of rural populations and preventing environmental degradation. The role of useful wild and semi-wild species as part of livelihood strategies in the latter marginal areas may be particularly important.

However the Tunis meeting noted that many such useful species which are used in everyday life and which contribute greatly to diet diversification in many local areas have never been properly collected, characterized or evaluated for further development. This is especially the case for instance of underutilized species which offer the opportunity for additional income to farmers and create opportunities for agricultural diversification. The importance of developing under-utilized stress-tolerant plants, and of promoting the use of medicinal plants, were particularly emphasized.

The need for more attention to under-utilized crops was identified at most of the other sub-regional meetings held in preparation for the International Technical Conference. The countries of the West and Central African sub-regions, for example, identified a large number of under-utilized species which are important to the livelihoods of local populations, including at least seven cereal species, eight legumes, four roots and tubers, eight oil crops, thirty-one fruits and nuts, seventeen vegetables and spices, four beverages, thirty-eight medicinal plants and forty-four genera of forages.

THE GLOBAL PLAN OF ACTION

The Global Plan of Action for conservation and sustainable utilization of plant genetic resources represents a synthesis and elaboration of recommendations made in the country reports and the sub-regional meetings (FAO 1996b). The final text of the Plan was negotiated and adopted by over 150 governments at the Leipzig International Technical Conference on Plant Genetic Resources held in June 1996. The major focus areas of the Global Plan of Action are (a) *in situ* Conservation and Development, (b) *ex situ* Conservation, (c) Utilization of PGR, and (d) Institutions and Capacity Building. Within these four areas of focus, the Global Plan of Action has twenty interlinked priority activities (Table 4), each of which contains a range of recommendations.

TABLE 4: LIST OF PRIORITY ACTIVITIES IDENTIFIED IN THE GLOBAL PLAN OF ACTION

***In situ* Conservation and Development**

1. Surveying and inventorying plant genetic resources for food and agriculture
2. Supporting on-farm management and improvement of plant genetic resources for food and agriculture
3. Assisting farmers in disaster situations to restore agricultural systems
4. Promoting *in situ* conservation of wild crop relatives and wild plants for food production

***Ex situ* conservation**

5. Sustaining existing *ex situ* collections
6. Regenerating threatened *ex situ* accessions
7. Supporting planned and targeted collecting of plant genetic resources for food and agriculture
8. Expanding *ex situ* conservation activities

Utilization of plant genetic resources

9. Expanding the characterization, evaluation and number of core collections to facilitate use
10. Increasing genetic enhancement and base-broadening efforts
11. Promoting sustainable agriculture through diversification of crop production and broader diversity in crops
12. Promoting development and commercialization of under-utilized crops and species
13. Supporting seed production and distribution
14. Developing new markets for local varieties and "diversity-rich" products

Institutions and capacity building

15. Building strong national programmes
16. Promoting networks for plant genetic resources for food and agriculture
17. Constructing comprehensive information systems for plant genetic resources for food and agriculture
18. Developing monitoring and early warning systems for loss of plant genetic resources for food and agriculture
19. Expanding and improving education and training
20. Promoting public awareness of the value of plant genetic resources for food and agriculture conservation and use

The main aims of the Global Plan of Action are:

- to ensure the conservation of plant genetic resources for food and agriculture (PGRFA) as a basis for food security;
- to promote sustainable utilization of plant genetic resources for food and agriculture, in order to foster development and to reduce hunger and poverty particularly in developing countries;
- to promote a fair and equitable sharing of the benefits arising from the use of plant genetic resources for food and agriculture, recognizing the desirability of sharing equitably benefits arising from the use of traditional knowledge, innovations and practices relevant to the conservation of PGRFA and their sustainable use.
- to assist countries and institutions responsible for conserving and using PGRFA to identify priorities for action.
- to strengthen, in particular, national programmes, as well as regional and international programmes, including education and training, for the conservation and utilization of PGRFA and to enhance institutional capacity.

While all of the priority areas of the Global Plan of Action are of importance, more specifically, three of the priority activities within the Global Plan of Action are of obvious and direct relevance to the identification, conservation and use of wild plants for food and agriculture. These are:

- Priority Activity 1: 'Surveying and inventoring of plant genetic resoures for food and agriculture';
- Priority Activity 4: 'Promoting *in situ* conservation of wild crop relatives and wild plants for food production';
- Priority Activity 12: 'Promoting Development and Commercialization of Under-utilized Crops and Species' as one of the twenty priority activities.

Priority Activity (1) Surveying and Inventorying Plant Genetic Resources for Food and Agriculture

Many countries have recognized the need for a complete national inventory of cultivated plant genetic resources, wild relatives, ecosystems and the traditional knowledge associated with them. Such inventories are needed in order to develop appropriate conservation strategies and to ensure an optimum balance between *in situ* conservation and collecting for *ex situ* conservation. Rational conservation (both *in situ* and *ex situ*) therefore ideally begins with the surveying and inventorying of existing resources. In order to elaborate policies and strategies for the conservation and utilization of plant genetic resources for food and agriculture, national programmes need to know what resources exist in their countries. Recognizing this the first priority activity of the Global Plan of Action had three main objectives, namely:

- To identify. locate, inventory and as feasible assess any threats to those species, ecotypes, cultivars and populations of plants relevant to food and agriculture, especially those that are of anticipated use.
- To facilitate the development of complementary conservation strategies and national policies related to the conservation of plant genetic resources for food and agriculture.
- To develop useful methodologies for surveying and inventorying plant genetic resources for food and agriculture.

The content of most of the 149 Country Reports indicate that little systematic surveying and inventorying work has been done in this regard for many crops and their wild relatives. The State of the World Report discovered that very few, if any, protected areas possess adequate inventories of wild plant species of importance to food and agriculture and were almost never designed with these species in mind. As a minimal starting point the GPA recommended that existing information sources should be used in further research to determine to what extent wild relatives of domesticated species are already in protected areas.

The GPA recognized that many countries may financial and technical support to survey and inventory plant genetic resources for food and agriculture. This may especially be the case for both advanced technologies and methodologies. For instance it was indicated that countries may need assistance in having appropriate access to existing and planned Geographic Information System facilities. Particularly in the case of many underutilized and minor crops, local and indigenous knowledge should be recognized as important components of surveying and inventorying activities and should be properly considered in all such efforts. For this reason training and capacity-building should be undertaken not only in essential areas such as taxonomy and population biology, but also in ethnobotany and agro-ecological surveying.

Priority Activity (4) Promoting *in situ* Conservation of Wild Crop Relatives and Wild Plants for Food Production

Natural ecosystems hold important plant genetic resources for food and agriculture, including endemic and threatened wild crop relatives and wild plants for food production. It is now evident that many are not managed sustainably. The genetic diversity within these wild species, because of ongoing evolutionary interactions which select for and generate new genetic variation, is potentially an economically important component of natural ecosystems and cannot easily be maintained under static *ex situ* storage conditions. If evolutionary processes relating to these wild species are to be maintained, these unique populations of wild genetic resources must be protected *in situ* especially when they are under threat.

Worldwide, protected areas number 9,800 and cover approximately 926 million hectares of the earth's surface (IUCN 1994). Although some *in situ* conservation efforts have focused on forestry species, many protected areas lack clearly defined objectives for the protection of ecosystems, agricultural systems, wild relatives of crops, or even threatened forestry species. Conservation of indigenous wild species of agricultural importance *in situ,* therefore, generally occurs as an unplanned result of nature protection. Most of the world's national parks and other protected areas, were established with little specific concern for the conservation of wild crop relatives and wild plants for food production. This is not surprising as most of the world's national parks and other protected areas were set up for conservation of wildlife, but rarely, if ever, to conserve plants of importance for food and agriculture. Management plans for protected areas are not usually enough to conserve genetic diversity for these wild species in order to complement other conservation approaches.

Through this priority activity, the Global Plan of action aims to promote conservation of genetic resources of wild crop relatives and wild plants for food production in protected areas and on other lands not explicitly listed as protected areas. It has the following objectives:

- to initiate planning and management practices which take into account wild crop relatives and wild plants for food production.
- to clearly identify which wild crop relatives and wild plants for food production need to be protected *in situ.*
- to gain knowledge of the uses, in particular by women, of wild plants for food production as sources of income and food.
- to create a better understanding of the contributions of plant genetic resources for food and agriculture to local economies, food security, and environmental health.
- to improve management and planning and promote complementarity between conservation and sustainable use in parks and protected areas by *inter alia* broadening the participation of local communities in these processes.
- to establish better communication and coordination between various institutes and organizations engaged in *in situ* conservation and land use management, nationally and regionally
- to conserve genetic diversity for these species to complement other conservation approaches.

To achieve these objectives the GPA strongly recommended that the the sustainable management of wild crop relatives and wild plants for food production and/or species gathered wild for food be included among the purposes and priorities of national parks and protected areas, and other managed resource areas. To address other lands not explicitly listed as protected areas, but containing valuable wild plant species, it was suggested that the integration of conservation and management of plant genetic resources for food and agriculture be included in national land use plans. The review of existing environmental impact statement requirements to

incorporate an assessment of the likely effect of the proposed activity on local biodiversity for food and agriculture, particularly on wild crop relatives was also recommended.

As a guiding theme the GPA recommended that protected area policies should promote and sustain rather than restrict those human activities that maintain and enhance genetic diversity within and among plant species. Both participatory planning and implementation approaches to protected area management should be encouraged to reconcile the sometimes conflicting goals of conservation and local livelihood security. It is extremely important that local communities are encouraged and supported in their efforts to conserve and manage wild crop relatives and wild plants for food production. However they are often excluded from active participation in decisions relating to such local conservation and management. The creation of advisory panels at the appropriate levels, that involve farmers, indigenous communities, plant genetic resources scientists, local government officials, and community leaders, to guide management of protected areas was recommended. In particular it was recognized that women are a valuable source of information on the feasibility of *in situ* conservation and management practices and that there was a need for government agencies to assist local communities in their efforts to identify, catalogue and manage wild crop relatives and wild foods.

Priority Activity (12) Promoting Development and Commercialization of Under-utilized Crops and Species

While a small number of plant species provide a large proportion of global food needs, hundreds of other species are utilised at a local level, either through cultivation or harvesting. These under-utilised species contribute substantially to household food and livelihood security; they are often managed or harvested by women. Knowledge concerning the uses and management of these species is likewise often localized and specialized. Many under-utilised plants have potential for more widespread use, and their promotion could contribute to food security, agricultural diversification, and income generation, particularly in areas where the cultivation of major crops is economically marginal. However, current programmes for conservation, research and development tend to neglect these species.

In addition it is expected that in the future agricultural systems will need to incorporate a broader range of crops including *inter alia* crops which produce raw materials or are sources of energy. As a precaution, some actions are warranted now to encourage and facilitate the use of more diversity in the varieties and species used on farms. Innovative approaches in plant breeding for the purposes of domesticating new crops, the development of new plant varieties and the promotion of higher levels of genetic diversity in crops and on farms, such as planting mixtures of adapted varieties and multicropping of species, are recognized as means for adding stability in agricultural systems and promoting agricultural production and food security.

The main objectives identified by governments for this priority activity were;

- To contribute to agricultural diversification, increased food security, and improved farmers' livelihoods
- To promote the conservation and sustainable management of under-utilised species and their genetic resources.
- To develop appropriate conservation strategies and sustainable management practices for under-utilised species; to improve selected species
- To improve the marketing of under-utilised crops.

To achieve these objectives the plan recommends that governments and their national agricultural research systems, taking into account the views of farmers' organizations and their communities, are encouraged to promote policies and activities consistent with the sustainable use, management and development of under-utilized species, including land use policies. This

recommendation was considered particularly relevant to those under-utilized species with potential to make significant contributions to local economies and food security.

The Plan also recommended that training and capacity building for scientists and extension specialists and for farmers and local communities, with particular emphasis on women, should be provided in: (a) identifying under-utilised species with potential for increased sustainable use; (b)developing and implementing sustainable management practices for under-utilized species of importance to food and agriculture; (c) developing post-harvest processing methods to overcome marketing constraints; (d) developing novel and appropriate marketing methods. In addition it was proposed that further research should be undertaken to develop sustainable management practices for under-utilized species of importance to food and agriculture.

A strong role was envisaged for regional, crop specific or thematic networks (e.g *in situ* conservation networks, wild foods utiulization networks, farming systems networks etc) to promote the development of under-utilized crops and species, for commercial and livelihood strengthening objectives. It was recommended that regional networks together with national programmes and in cooperation with international agricultural research centres, NGOs and other relevant organizations, should regularly review the status of under-utilised plant species in their region, in order to: (a) identify possibilities for greater sustainable use; (b) identify common research and development needs; (c) facilitate and, as appropriate, coordinate requests for relevant financial and technical assistance.

Many plants of local importance for food and agriculture have been virtually neglected by traditional genebanks. However it is important to realize that for many wild species *ex situ* storage may not be an economically viable option due to the complexity of life cycles or lack of knowledge of what storage and regeneration methodologies to apply to them. Botanic gardens, field genebanks, and the use of new technologies, including *in vitro* methods, could be developed more fully to complement and expand conservation of plant genetic resources for food and agriculture. The GPA recommends that botanic gardens and field genebanks should be strengthened, particularly in relation to their capacity to conserve species neglected by more agriculturally-related facilities. Simple, low-cost botanic gardens, arboreta and field genebanks associated with universities, schools and other institutions should, as appropriate, be strengthened and encouraged to promote education and public awareness.

CONCLUSION: THE INSTITUTIONAL AND CAPACITY CONTEXT NEEDED TO PROMOTE EFFECTIVELY THE IDENTIFICATION, CONSERVATION AND USE OF WILD PLANTS FOR FOOD AND AGRICULTURE.

Each of the many disparate activities, that are required for the meaningful conservation and sustainable use of wild plants species of importance to food and agriculture, will be less effective if each separate project or programme is performed in isolation from others. To have a meaningful impact on the identification, conservation and sustainable use of wild plants it will be necessary to reach a threshold capacity at the national level beyond which positive impacts can be realized. This cannot be achieved by any one stakeholder group in isolation and will require strategic multi-stakeholder planning and coordinated action to reach clearly defined national objectives.

The wide range of human stakeholders for which wild plant species are important range from men and women farmers, rural people, plant breeders and other researchers. Each of these groups or sectors often operate in their own sphere with little communication or coordination between their activities. In addition there are sectoral divisions depending on whether the stakeholder is situated in the public sector (e.g government), the semi-public sector (e.g university) or in the private sector (e.g company). Even this categorization often misses those

many resource poor farmers and rural people who operate outside of the monetary economy in the informal sector, yet may be extremely dependent on wild resources for their livelihoods. The importance of coordination at the national and regional levels has been highlighted by most countries in their country reports, particular in relation to bringing together the formal and informal sectors, in a manner which contributes to socio-economic development.

The preparatory process leading to the Global Plan of Action starkly highlighted the need for better coordination and strategic planning at the national level, which to be effective would need to involve all the relevant stakeholders. At the national level there is a need for countries to establish appropriate policy and institutional frameworks, including mechanisms for coordinated planning and action, and a programme strategy. In order to meet the challenges of the future, national capacity will need to be strengthened, especially in training. Regional, crop specific and thematic networks are crucial, particularly for countries that suffer from limited capacity. Raising public awareness should be a high priority activity so as to generate support for all genetic resources work at national and international levels. These constraints led to the promotion in the GPA of national PGRFA programmes, involving multi-stakeholder national PGRFA committees which would provide a structural instrument for strategic national planning and coordination for the conservation and sustainable utilization of all PGRFA.

The ultimate purpose of national programmes for the conservation and sustainable utilization of PGRFA, identified during the preparatory process, is to contribute to national development and sustainable agriculture. Box 2 summarizes the purpose, function and typical activities of national programmes. Within this context, national programmes should aim to identify and address national requirements for PGRFA. To achieve these aims, national programmes need the capacity to carry out three basic functions:

(1) elaboration of national policies, plans and strategies to meet well defined country objectives for PGRFA conservation and sustainable utilization;

(2) co-ordination of activities within the country, facilitating participation and co-operation between all stakeholders; and

(3) provision of a focal point to foster regional and international collaboration.

Box 2: National PGRFA Programmes

Purpose

- to contribute to national development, food security, sustainable agriculture and the maintenance of biodiversity through the conservation and utilization of PGRFA

Functions

- develop national polices and strategies
- co-ordinate national activities, involve all stakeholders and promote linkages
- provide basic building blocks for regional and international collaboration

Activities

- inventorying, exploration, collecting
- conservation *in situ* and *ex situ*
- characterization and evaluation
- genetic enhancement
- crop improvement
- seed/variety production & distribution
- documentation & dissemination of information
- training & capacity building
- research
- fund raising
- development of legislation
- regulation of access and exchange of genetic resources
- public awareness

Partners

- ministries and government departments (i.e. agriculture, forestry, natural resources, environme science and technology, planning, research and education)
- universities, research and other educational institutions
- NGOs, farmers' organizations, women's groups
- private sector and parastatal companies
- regional and international organizations and networks

Source: Recommendations of Sub-regional Meetings

Throughout the preparatory process, the need for co-ordination mechanisms through national committees or other bodies was consistently emphasized. There is a particular need to promote the links between the various actors involved in the conservation and use of genetic resources, including farmers' organizations, governmental institutions, research and teaching institutions, NGOs, women's groups and the private sector, all of which have complementary roles to play. In order to avoid creating additional levels of policy making, PGRFA concerns need to be integrated into existing planning and co-ordination mechanisms, within the established frameworks of national agricultural and forestry research systems. The preparatory process also emphasized the importance of providing adequate levels of funding if national programmes are to be sustainable. Finally, the need for a strong legal basis was highlighted, in order that national programmes are supported politically and institutionally at the highest level.

It is now planned that the Global Plan of Action and related follow-up processes will be established by the national governments, and other stakeholders, through a phased programme to be monitored by the members of the inter-governmental FAO Commission on Genetic Resources for Food and Agriculture. The first review dealing with the progress made at national, regional and international levels will be undertaken within four years. The tangible added benefit of the activities in the Global Plan of Action and other initiatives would be the broadening of the genetic base of food production, thereby furthering agricultural sustainability and world food security.

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