IPGRI

Neglected and Underutilized Plant Species

Strategic Action Plan

of the International Plant Genetic Resources Institute

The International Plant Genetic Resources Institute (IPGRI) is an autonomous international scientific organization, supported by the Consultative Group on International Agricultural Research (CGIAR). IPGRI's mandate is to advance the conservation and use of genetic diversity for the well-being of present and future generations. IPGRI has its headquarters in Maccarese, near Rome, Italy, with offices in more than 20 other countries worldwide. The Institute operates through three programmes: (1) the Plant Genetic Resources Programme, (2) the CGIAR Genetic Resources Support Programme and (3) the International Network for the Improvement of Banana and Plantain (INIBAP).

The international status of IPGRI is conferred under an Establishment Agreement which, by January 2002, had been signed and ratified by the Governments of Algeria, Australia, Belgium, Benin, Bolivia, Brazil, Burkina Faso, Cameroon, Chile, China, Congo, Costa Rica, Côte d'Ivoire, Cyprus, Czech Republic, Denmark, Ecuador, Egypt, Greece, Guinea, Hungary, India, Indonesia, Iran, Israel, Italy, Jordan, Kenya, Malaysia, Mauritania, Morocco, Norway, Pakistan, Panama, Peru, Poland, Portugal, Romania, Russia, Senegal, Slovakia, Sudan, Switzerland, Syria, Tunisia, Turkey, Uganda and Ukraine.

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IPGRI
Via dei Tre Denari 472/a
00057 Maccarese
Rome, Italy

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ACKNOWLEDGEMENTS

This Strategy has been developed by IPGRI through a wide consultation among experts from IPGRI's Headquarters and Regional Offices. IPGRI wishes to express its sincere thanks to all for their thoughtful contributions. Special recognition is due to Stefano Padulosi, Toby Hodgkin and Pablo Eyzaguirre for leading the production of this Strategic Action Plan.

EXECUTIVE SUMMARY

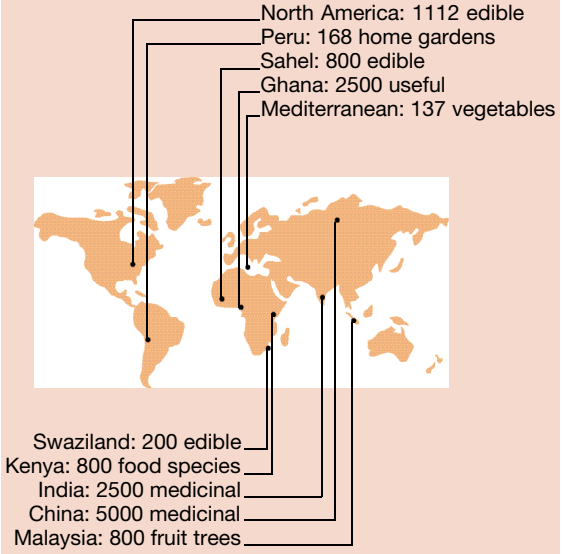
Global food security and economic growth now depend on a declining number of plant species. This has placed the future supply of food and rural incomes at risk. To fulfil its global mandate to conserve and use the world's plant genetic resources for the development and welfare of present and future generations IPGRI is committed to promoting greater awareness of the important part that 'minor crops' play in securing the livelihoods of people around the world.

Deficiency of vitamin A affects more than 100 million children less than 5 years old and causes one-third of deaths in this age group. It is the main cause of blindness in children from developing countries.

Ethnobotanic surveys confirm that hundreds of such crops are still to be found in many countries, representing an enormous wealth of agrobiodiversity that has the potential to contribute to improved incomes, food security and nutrition. We must broaden the focus of research and development so that it includes a much wider range of crop species. IPGRI is uniquely suited to this work, thanks to the wide experience it already has of working with neglected and underutilized species. It will focus on four major areas where neglected and underutilized species can contribute to sustainable agriculture:

Food security and better nutrition. Many neglected and underutilized species are nutritionally rich and are adapted to low-input agriculture. The use of these species, whether wild, managed or cultivated, can have immediate consequences on the food security and well-being of the poor.

National agrobiodiversity endowments



Increased incomes for the rural poor. Growing demand from consumers in developed and developing countries for diversity and novelty in foods is creating new market niches for neglected and underutilized species. These market opportunities can generate additional income.

Ecosystem stability. Climate change and the degradation of land and water resources have led to a growing interest in crops and species that are adapted to difficult environments such as poor soil, degraded vegetation, drought and desert margins.

Cultural diversity. The use of plants has long been an intimate part of local cultures and traditions. Many neglected and underutilized species play a role in keeping cultural diversity alive.

Vitamin A is found in high concentrations in many neglected and underutilized species such as these fruits.

The primary challenge in conserving and using genetic resources of neglected and underutilized species is to secure their survival and environmental adaptation at the same time as providing increased incomes for the poor. IPGRI advocates urgent action to conserve, improve, enhance and deploy these genetic resources. The key partners in this effort will be the local farming communities that have developed and are using these species. IPGRI's goal is to strengthen the capacity of stakeholders to defend and enhance the biological assets of the rural poor.

To reach this goal IPGRI has set out three main objectives:

Develop priority-setting approaches and help stakeholders to establish priorities for research, development and conservation actions on neglected and underutilized species.

Enhance the conservation and use of plant genetic resources of neglected and underutilized species through complementary approaches to genetic resources from production to consumption.

Strengthen the efforts of other actors working on the documentation, evaluation, improvement, processing and marketing of neglected and underutilized species.

These objectives will be achieved by: gathering and sharing information; priority-setting; promoting production and use; maintaining diversity; marketing; strengthening partnerships and capacities; developing effective policies for NUS; and improving public awareness.

This strategy is a guide for IPGRI and its partners in what is a very challenging and relatively new field of research. It will be revised and improved as the work progresses and more light is shed on how best to tackle the conservation and use of neglected and underutilized species. IPGRI is confident that as the work proceeds what seems an ambitious task today will be attainable tomorrow.

BROADENING THE SPECIES PORTFOLIO FOR FOOD SECURITY AND DEVELOPMENT

The declining number of species upon which global food security and economic growth depend has placed the future supply of food and rural incomes at risk. The shrinking portfolio of species and varieties used in agriculture reduces the ability of farmers to adapt to ecosystem changes, new environments, needs and opportunities.

Agricultural development and food security depend, in part, on our ability to broaden the range of agricultural and forestry species in an effective and sustainable way. This means finding ways to protect and enhance locally important species so that they can be deployed more widely in agriculture and environmental management. It means finding ways to expand the use of local crops in order to tap the hidden potential contained in these genetic resources. Current trends of global environmental and socioeconomic changes enjoin us to act now because, as crop populations and knowledge of their uses and traits disappear, the continuing neglect and under-use of many valuable agricultural species is eroding their genetic base.

A healthy diet depends on a diversity of foods rich in vitamins and minerals. NUS (such as these leafy vegetables) are untapped sources of important micronutrients.

IPGRI's global mandate to conserve and use the world's plant genetic resources for the development and welfare of present and future generations entails a commitment to promote greater awareness of the role that 'minor crops' play in securing the livelihoods of people around the world. IPGRI's scientific capacity, partnerships and *modus operandi* can contribute to the creation of new opportunities to rescue the genetic resource base of many crops that have been neglected or little used in development and to maximize their contribution to global food security and the welfare of the poor. This Strategic Action Plan outlines the challenging tasks required to address these goals as a guide for IPGRI and its partners in the coming years.

BACKGROUND

During their history human beings have used some 40 000 to 100 000 plant species for food, fibre, forage, fuel, crafts, industrial, cultural and medicinal purposes. At least 7000 cultivated species are still in use today around the world. However, over the past 500 years, with increased contacts between disparate human populations and the development of a global trading system, 30 or so crop species have become the basis of most of the world's agriculture. The focus of research and crop improvement on a few widely used species has helped meet the food needs of the rapidly growing human population, but it has narrowed dramatically the number of species upon which global food security and agricultural incomes depend. With more than half of humanity's needs for energy and protein being met by only three crops—maize, wheat and rice—and with the increasing speed and intensity of social and environmental change, humankind is vulnerable. We need urgent action to promote a more diverse portfolio of species used in agriculture.

Strawberry tree (*Arbutus unedo*) displayed at a local market in Italy and leafy vegetables harvested at a home garden in Kenya: examples of the vast biodiversity present in neglected and underutilized species, currently poorly addressed by research and conservation.

The impact of the narrowing species base of global food security is likely to be felt most by the rural poor, particularly in marginal areas where people are faced with a restricted set of livelihood options. Many neglected and underutilized species occupy important niches, adapted to the risky and fragile conditions of rural communities. They have a comparative advantage in marginal lands where they have been selected to withstand stress and to contribute to sustainable production with minimal inputs. They also contribute to the diversity and the stability of agro-ecosystems. These species also often have a strategic role in fragile ecosystems, such as those found in arid and semi-arid lands, in mountains, steppes and tropical forests. To address the needs of these resources we must broaden the focus of research and development so that it includes a much wider range of crop species, with the ultimate objective of increasing their sustainable productivity.

Ethnobotanic surveys confirm that hundreds of such species are still to be found in many countries, representing an enormous wealth of agrobiodiversity that has the potential to contribute to improved incomes, food security and nutrition. However, these locally important species are frequently neglected by science. Lack of attention from research and development has meant that their potential value to

human well-being and incomes is underexploited. This neglect can also lead to the genetic erosion of their diversity and usefulness, further restricting development options for the rural poor. Research to increase the value of these species and to make them more widely available would broaden the agricultural resource base and increase the livelihood options for rural communities. Many of the species that research and development have ignored are rich in cultural value. Local communities consider them essential elements not only in their diet but also in their food culture and rituals. The link between cultural values and plant resources can be important in empowering communities to conserve and develop their biological and cultural assets.

A GROWING AWARENESS OF THE IMPORTANCE OF AGROBIODIVERSITY

The establishment in the 1970s of a global system for the conservation of plant genetic resources occurred partly in response to the spread of high-yielding varieties, which were displacing many of the locally adapted traditional cultivars and wild relatives. Nonetheless, this effort focused on crops of greatest economic importance.

More recently, increasing awareness of the value of biodiversity and plant genetic resources to the future of agriculture in the face of growing environmental and socioeconomic changes has focused attention on the fact that the world is conserving only a small fraction of the rich agrobiodiversity on which people rely.

This awareness was translated into a global commitment to the conservation and increased use of neglected and under-used species in the FAO Global Plan of Action for the conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (see Activity 12: 'Promoting development and commercialization of underutilized crops and species'). In 1999, at an international workshop held in Chennai, India, the Consultative Group on International Agricultural Research (CGIAR) also recognized the contribution that neglected and underutilized species make to food security, rural incomes and combating poverty. Development agencies too are increasingly supportive of initiatives on neglected and underutilized species and have funded collaborative work with IPGRI (e.g. Department of Development Cooperation, Italian Ministry of Foreign Affairs, the German Agency for Technical Cooperation (GTZ) of the Federal Ministry of Economic Cooperation (BMZ)). Current collaboration with IPGRI in this area includes BMZ's support for a Global Facilitation Unit for Underutilized Species, the IFAD-supported global project on neglected and underutilized species, which focuses on nutrition and income generation, the Dutch-supported project on leafy vegetables in sub-Saharan Africa, the Asian Development Bank–supported project on tropical fruit trees in South East Asia and support from the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), France, for work to document and characterize American native fruit species.

WHAT ARE NEGLECTED AND UNDERUTILIZED SPECIES?

Neglected and underutilized species are often considered 'minor crops' because they are less important than staple crops and agricultural commodities in terms of global production and market value. However, from the standpoint of the rural poor who depend on many of these species for their food security, nutrition and incomes, they are hardly minor.

- Of local importance in consumption and production systems
- Highly adapted to agro-ecological niches/marginal areas
- Receive scarce attention by national agricultural and biodiversity conservation policies, research and development
- Represented by ecotypes/landraces
- Cultivated and utilized relying on indigenous knowledge
- Scarcely represented in *ex situ* collections

Common features of neglected and underutilized species.

Given IPGRI's focus on development we prefer to say that these species are neglected by science and development; some therefore call them 'orphan crops'. They may also be underutilized in terms of their potential to contribute to the incomes and well-being of the poor and to global food security in general.

Neglected crops are those grown primarily in their centres of origin by traditional farmers, where they are still important for the subsistence of local communities. Some species may be widely distributed around the world but tend to occupy special niches in the local ecology and in local production and consumption systems. While these crops continue to be maintained by sociocultural preferences and the ways they are used, they remain inadequately documented and neglected by formal research and conservation.

Underutilized crops were once grown more widely or intensively but are falling into disuse for a variety of agronomic, genetic, economic and cultural reasons. Farmers and consumers are using these crops less because they are in some way not competitive with other species in the same agricultural environment. The decline of these crops may erode the genetic base and prevent distinctive and valuable traits being used in crop adaptation and improvement.

THE CONTRIBUTIONS AND POTENTIAL OF NEGLECTED AND UNDERUTILIZED SPECIES (NUS)

We focus on four major areas where NUS can make significant contributions to sustainable agriculture:

Food security and better nutrition. Many neglected and underutilized species are nutritionally rich and are adapted to low-input agriculture. The erosion of these species, whether wild, managed or cultivated, can have immediate consequences on the food security and well-being of the poor. Their enhanced use can bring about better nutrition. For example, many underutilized fruits and vegetables contain more vitamin C and pro-vitamin A than widely available commercial species and varieties. Neglected grains such as quinoa (*Chenopodium quinoa*) or fonio (*Digitaria exilis*), have better protein quality than most major cereals. The bambara groundnut (*Vigna subterranea*), from Africa, is rich in protein (24%), with higher levels of the essential amino acid methionine than most other grain legumes. All regions and food cultures have examples of nutritionally rich and culturally valued species that suffer neglect and may be falling into disuse. Focusing attention on neglected and underutilized species is an effective way to help maintain a diverse and healthy diet and to combat micronutrient deficiencies, the so-called 'hidden hunger', and other dietary deficiencies particularly among the rural poor and the more vulnerable social groups in developing countries.

The majority of the world's population is too poor to afford synthetic drugs to treat their illnesses. Sustainable conservation and use of medicinal plants is a strategic element of IPGRI's Agenda on NUS.

Innovative and simple technologies, like this used in Peru for processing *Chenopodium quinoa* (quinoa), help to reduce arduous work. Such inexpensive tools provide farmers and local communities opportunities to add value to NUS products and contribute to raising incomes.

Increased incomes for the rural poor. The growing demand from consumers in developed and developing countries for diversity and novelty in foods is creating new market niches for neglected and underutilized species. These market opportunities can generate additional income for poor farmers in less-favoured environments where these crops have comparative advantages over major staples or commercial crops. In addition, the ability of modern technologies to transform crops and other plants into diverse products and to extend their shelf-life has created new opportunities to develop new uses and thus to market these species and their products. For example, breadfruit (*Artocarpus altilis*), a multipurpose tree popular across the Pacific and Caribbean regions, is a starchy food species whose many food, fodder and non-food uses as timber, traditional medicine and insect repellent, have scarcely been tapped.

Ecosystem stability. Climate change and the degradation of land and water resources have led to a growing interest in crops and species that are adapted to difficult environments such as desert margins, those with poor soil or degraded vegetation, or subject to drought. Lathyrus, quinoa, fonio, bambara groundnut and Andean roots and tubers are examples of neglected or underutilized species that are adapted to difficult conditions. NUS can also occupy specialized micro-environments within farming systems. Examples include several species of squash and gourd, edible aroids such as taro and tannia, and many herbs. Because they can tolerate stresses and occupy specialized niches, NUS often increase the overall productivity and stability of agro-ecosystems. A good example is the sago palm (*Metroxylon sagu*). This is found across South East Asia and Oceania and has been described as humankind's oldest food plant. Its advocates praise it as an economically acceptable plant that is environmentally sustainable and uniquely versatile.

Many neglected and underutilized species play a role in keeping alive cultural diversity associated with food habits such as this traditional Spanish festival organized to celebrate the hulled wheat harvest.

Cultural diversity. The use of plants has long been an intimate part of local cultures and traditions. Many neglected and underutilized species play a role in keeping alive cultural diversity associated with food habits, health practices, religious rituals and social exchanges. The vast diversity of neglected and underutilized food crops should not be seen solely as a source of nutrition. Their unique array of diversity in taste, colour, texture, modes of preparation and so on represents a rich component of the cultural food-based social language and an important instrument in the organization and maintenance of local systems of communication. Many neglected and underutilized species have their greatest cultural value at the local level, which makes greater attention to NUS an important way of supporting cultural diversity in a world of increasing globalization. Food culture—which encompasses taste preferences, cooking, presentation and ritual uses—is an integral part of IPGRI's work to maintain and promote NUS, making our lives more interesting and enjoyable.

SECURING THE GENETIC RESOURCE BASE OF NEGLECTED AND UNDERUTILIZED SPECIES

A secure genetic resource base of neglected and underutilized species, particularly in developing countries, is crucial to maintain the 'safety net' of options for diversified food and natural products.

One threat to this safety net is the rapid globalization of agricultural trade, whereby a few agricultural commodities are consolidating their market positions and further narrowing the base of crop genetic resources. Conversely, these same trends could present opportunities for producers in developing countries to market NUS products and create new sources of income. Neglected and underutilized species can become valuable commodities for the poor, who have used them to survive for centuries as subsistence crops in difficult and low-input production environments. The primary challenge in conserving and using NUS genetic resources is to fulfil the dual role of securing their survival and environmental adaptation while providing increased incomes for the poor.

On-farm conservation plays a critical role in the safeguarding of genetic diversity and knowledge of NUS. This old farmer from Uzbekistan has maintained hundreds of samples of vegetables and cereals in his seed store. IPGRI seeks to support such farmers.

Conservation of NUS has largely been neglected so far. *Ex situ* material (seeds, field or *in vitro* collections) is very limited.

The successful improvement of major crops has depended to a significant extent on the use of collected and conserved genetic diversity. Today, more than six million accessions of plant genetic resources for food and agriculture are stored in around 1500 germplasm collections around the world. Although the number of these *ex situ* accessions is impressive, approximately 80% are of major crops and their close wild relatives; only 20% are of neglected and underutilized species, which are represented on average by just 8.2 accessions per species. Thousands of species, which make up a substantial part of the world's plant genetic resources for food and agriculture, have still to be collected, characterized, evaluated and conserved for use. In order to make full use of the environmental and income potential of neglected and underutilized species IPGRI advocates urgent action to conserve, improve, enhance and deploy NUS genetic resources. The key partners in this effort will be the local farming communities that have developed and are using NUS in their production systems and cultural practices. Formal plant genetic resources institutions and many others that promote their increased use will contribute complementary actions, including both *ex situ* and *in situ* conservation and use.

IPGRI'S EXPERIENCE

IPGRI has promoted, coordinated and carried out several activities at national and international levels for the improved conservation and use of neglected and underutilized species.

Projects implemented in partnership with national programmes all over the world have involved more than 50 species thus far, covering a wide range of crops, from fruit trees to roots and tubers to multipurpose tree species and medicinal and aromatic plants. The following is a summary of this research work, grouped by main themes.

Participatory selection of NUS verieties is implemented with the close participation of women—tireless custodians of genetic diversity and associated indigenous knowledge.

Participatory research. IPGRI has taken part in various activities, including socioeconomic and ethnobotanical research to document and support the role of local cultures and institutions that use NUS. Participants pay special attention to defending the community knowledge-base on use and local food cultures, forging links to nutrition programmes and strengthening links among primary stakeholders from production to consumption. One way to develop the potential of NUS is through new, diversity-based crop improvement, including participatory plant-breeding approaches in which IPGRI has experience through its work with on-farm conservation.

Assessing diversity. IPGRI is contributing to greater understanding of the genetic diversity within neglected and underutilized species, including its value and current status. This includes support for studies of ecogeographical distribution and genetic erosion. IPGRI works to develop methodologies that can be easily and widely applied to assess risks of genetic erosion as well as methods to document the potential value of genetic diversity in NUS through better characterization and evaluation, including the use of DNA marker technologies.

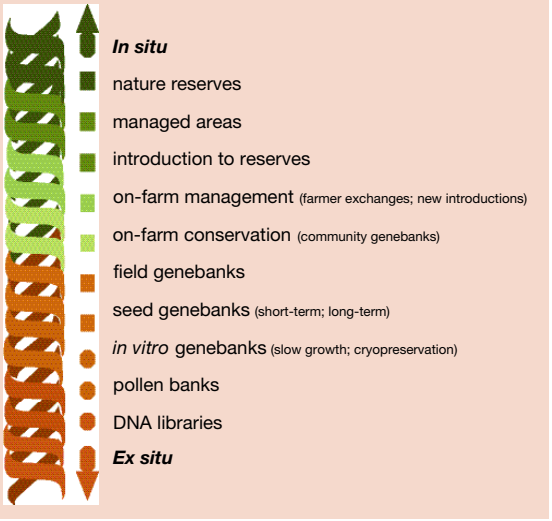
Complementary conservation and use. Despite the pressures, genetic resources of neglected and underutilized species are still being maintained in rural communities around the world, and the role of local

communities in conservation will remain crucial. IPGRI's activities range from strengthening the contribution of home gardens to conservation by promoting greater deployment of these species in farming systems and in post-harvest processing and marketing, thus supporting conservation through use. IPGRI is using geographical information systems to locate new sites for the cultivation of NUS and also works to ensure the effective maintenance and use of NUS accessions that have been collected and conserved in *ex situ* gene banks. This is an essential tool to support crop improvement and to safeguard crucial genetic traits that may not currently find a place in existing systems of production and consumption.

Dissemination of information. IPGRI has produced more than 80 publications on NUS. These include 24 monographs that have been recognized as an important resource for the global community. Produced with the support of BMZ/GTZ in Germany, these monographs provide information about the taxonomy, biology, crop improvement and conservation needs of key species, along with lists of scientists working in the field (see www.ipgri.cgiar.org/nus).

Fostering synergy across levels: linking local and global communities. IPGRI hosts and supports the German-funded Global Facilitating Unit for Underutilized Species to mobilize, facilitate and, where requested, to coordinate work undertaken by partners in regional or crop networks, development agencies, scientific organizations, universities and other stakeholders worldwide. This unit addresses the identification, assessment, improvement, development, sustainable use and marketing of these species and the commodities derived from them, to enhance their contribution to sustainable development. It encourages the development of common strategies, tools, approaches and priority-setting that can be applied to different species and to different contexts and situations. Given the fact that research and development capacity is weak or nonexistent for many NUS, networking among countries that share an interest in a priority species will be an important means to build capacity regionally and globally.

Complementarity in conservation efforts between *ex situ* and *in situ* approaches is essential to ensure the sustainable maintenance of plant genetic resources for the benefit of today's and tomorrow's generations.



Legal and policy frameworks and public awareness. IPGRI is active in support of global plans, treaties and fora that recognize neglected and underutilized species as important elements in national and global policies for agriculture, nutrition, health, environment and development. Key opportunities for policy and public awareness are the International Treaty on PGRFA and the Global Plan of Action for PGRFA under FAO, the Convention on Biological Diversity, and the many regional and national bodies that establish policies and regulate access to, use of and rights in NUS genetic resources.

Partners in a global effort. Many actors work to promote the use of neglected and underutilized species. These include UN agencies such as FAO and conventions (e.g. CBD) with global mandates for agriculture, biodiversity and sustainable development. They can be regional organizations concerned with the distinctive, economically and culturally important species of a region. They also include institutions in developed countries working on so-called 'new crops', or 'orphan crops' and many NGOs and other groups.

Gathering samples of wild sage (*Salvia officinalis*) in Lebanon.

Global agencies sponsor several regional networks on NUS, e.g. FAO: Programme on the Promotion and Development of Non-Wood Forest Products, the Underutilized Tropical Fruits in Asia Networks (UTFANET), and the FAO/ICUC Southern and Eastern Africa Network on Underutilized crops (SEANUC). The International Atomic Energy Agency (FAO/IAEA) is coordinating a project to improve underutilized species for low-income countries using irradiation technologies. ICUC, the International Centre for Underutilized Crops (UK), works to increase the use of underutilized crops for food, medicine, industrial products and for environmental quality through direct promotion and improvement. CIHEAM, the Centre International de Hautes Etudes Agronomique Méditerranéennes, works through the Network on Identification, Conservation and Use of Wild Plants in the Mediterranean Region (MEDUSA) and the Working Group on Underutilized Fruit Crops. The CGIAR Future Harvest Centres, including IPGRI, carry out research to address underutilized and neglected species that may not be among their main mandated crops (e.g. IITA conserves bambara groundnut genetic resources and CIP works on Andean roots and tubers). GFAR supports the Global Facilitation Unit for Underutilized Species.

Several international plant genetic resources networks are also engaged in these efforts including TROPIGEN (the Tropical Regional Genetic Resources Network); REMERFI (the Mesoamerican Plant Genetic Resources Network); the PROSEA Foundation and more recently the PROTA Foundation (which cover plant genetic resources of South-East Asia and Africa, respectively); BAMNET (the Bambara International Network); ECP/GR (European Cooperative Programme for Crop Genetic Resources Networks); CACTCN-PGR (the Central Asia and Trans-Caucasus Network on Plant Genetic Resources); WANANET (the West Asia and North Africa Network for Plant Genetic Resources); AARINENA (Association of Agricultural Research Institutes in the Near East and North Africa); GRENEWECA (Genetic Resources Network for West and Central Africa); the Lathyrus Genetic Resources Network (LGRN) and the Taro Genetic Resources Network (TaroGen).

Institutions working in developed countries include the Center for New Crops and Plant Products of Purdue University in the USA, which convenes an international gathering of experts every 3 years to address 'new' crops, or NUS. At the local level in many countries in both the developed and developing world there are NGOs, farmers' associations, ecological and biological farming groups, processors, marketers and consumers that have begun to champion the conservation and increased use of NUS.

STRATEGIC OBJECTIVES AND ELEMENTS FOR IPGRI'S WORK ON NEGLECTED AND UNDERUTILIZED SPECIES

IPGRI's mission is to conserve the world's plant genetic resources for the present and future benefit of humanity. This entails a strong commitment to conserve and promote the use of all species that contribute to human welfare and that can be used to eliminate poverty and malnutrition.

Rocket (*Eruca sativa*) is a typical NUS vegetable whose market promotion in Italy has been highly successful in both domestic and foreign markets. Sharing know-how and experiences on cultivation practices, post-harvest technologies and commercialization across the Mediterranean region is one of IPGRI's goals pursued through networking on this crop.

Given the enormity and urgency of this task, we can ill afford to ignore these valuable biological resources—neglected and underutilized species—which are essential assets of poor farmers around the world. IPGRI's strategy for neglected and underutilized species is based on the deployment of plant genetic diversity in agriculture in order to achieve more equitable and sustainable development. One of IPGRI's eight strategic choices, namely 'Increasing the use of plant genetic resources', includes work on both broadening the species portfolio within agriculture and the genetic diversity within crops and trees in production systems. This work also contributes towards the implementation of the FAO Global Plan of Action priority actions e.g. 'Promoting underutilized crops', the development of new markets for local varieties, the promotion of *in situ* and on-farm conservation, and public awareness of the value of plant genetic resources and their uses. IPGRI's efforts to safeguard these resources for the livelihood of rural communities and forest dwellers around the world are also consistent with the implementation of the Convention on Biological Diversity.

The ultimate goal of IPGRI's strategy on neglected and underutilized crops is to strengthen the capacity of stakeholders to maintain and enhance the biological assets of the rural poor by enhancing and deploying a broader range of species adapted to diverse environments and providing new opportunities for better nutrition and income generation. To reach this goal IPGRI has set out three main objectives:

Develop priority-setting approaches at the local, national and international levels and assist stakeholders to establish priorities for research, development and conservation actions on neglected and

underutilized species that increase their contribution to and impact on sustainable agriculture and livelihoods of the rural poor, and broaden the bases of food security.

Enhance the conservation and use of plant genetic resources of neglected and underutilized species through complementary approaches to genetic resources from production to consumption.

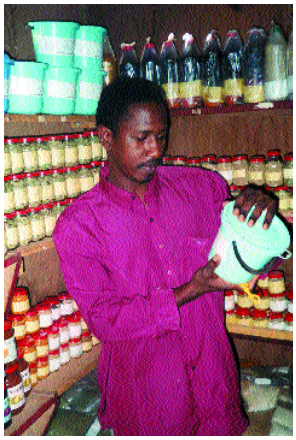
Strengthen the efforts of other actors working on the documentation, evaluation, improvement, processing and marketing of neglected or underutilized species.

These objectives will be achieved through work carried out in eight major areas as follows:

1. **Gathering and sharing information.** Information plays a crucial role in enhancing the use of neglected and underutilized species. Often, little is known about the extent of their cultivation, agronomic requirements, local uses and values, and contribution to local food security and environmental sustainability. Gathering and sharing information among all stakeholders is essential to promote greater use of NUS. IPGRI has already made important contributions to documenting information on NUS and will seek to strengthen its work in this area. IPGRI will provide information on species and also on options, techniques and approaches to support improved conservation and use of NUS. At the national level, ethnobotanic surveys of NUS linked to agricultural and economic development are important first steps. Documenting and disseminating the work of specialists, including those of sister institutes of the CGIAR, will be supported. IPGRI will pay special attention to the maintenance and documentation of local knowledge systems on the uses and management of germplasm of these species. An Internet Web site will be maintained to disseminate *inter alia* information on IPGRI's and partners' activities in this area, including publications, databases and any other information related to the uses and conservation of neglected and underutilized species. The newly established Global Facilitation Unit for Underutilized Species, supported by the German Government, will advance efforts in this area.

Success in promoting a greater use of NUS rests in the broad participation of stakeholders. This lies at the heart of IPGRI's modus operandi.

2. **Priority-setting.** The large number of species that need work and the variety of needs and disciplines involved in supporting their conservation and use require the adoption of a structured approach to the selection of priority species and activities so as to make the best use of limited resources and achieve the greatest development impact. IPGRI will therefore identify and work with key stakeholders to identify priority species and actions. For any given species, there will be different stakeholders at various points in the production, processing, marketing and consumption. Working together, using participatory and gender-sensitive approaches, these stakeholders can define priorities and identify all relevant concerns. The activities and species selected will be those that can serve as models for other species of local and regional significance that are important for the livelihood of farmers in similar environments. Priority-setting processes and tools that were developed and tested at IPGRI's conference on NUS in the Mediterranean region held in Aleppo, Syria, in 1998, will be disseminated and further improved to make them more broadly applicable.



Bridging the gap between genetic diversity studies and socio-economic continuum development is essential for the successful promotion of NUS. IPGRI will work closely with relevant institutions (including the private sector) to look at ways to enhance marketing and commercialization.

3. **Promoting production and use.** Neglected and underutilized species can be more widely and effectively deployed to address malnutrition, poverty and environmental degradation. They constitute essential biological assets of the rural poor and can contribute to improving the well-being of urban populations. Building on its work with communities on diversity management on farms and in home gardens, IPGRI will collaborate with partner institutions on the enhancement and greater use of neglected and underutilized species. It will support work to assess and realize the nutritional, economic and environmental value of the species. Working with communities, IPGRI will identify strengths and weaknesses within existing production systems. It will work to improve seed-supply systems and develop methods to ensure that desired diversity is maintained in production systems. In collaboration with farmers, IPGRI will identify and improve agromorphological traits needed to enhance the use of NUS in agro-ecosystems and to meet market demands. IPGRI will also support studies of the genetic potential of NUS, crop enhancement work (especially participatory plant breeding) and work on key bottlenecks such as seed production and plant multiplication, including the development of micro-propagation techniques. In view of the fact that as crops are improved and become more commercialized loss of genetic diversity may occur,

IPGRI will take the lead in assessing both the value and the impact of crop improvements and market promotion on the distribution, use and maintenance of NUS genetic diversity.

4. **Maintaining diversity.** Little is known of the ecogeographic distribution of many neglected and underutilized species and even less of the extent and distribution of their genetic diversity. Their poor conservation and high level of genetic erosion call for coordinated efforts to safeguard these resources. Surveys, taxonomic identification and analysis of the extent and distribution of genetic diversity, together with work on local and traditional knowledge, remain priorities for many NUS. Tools to assess genetic erosion will have to be developed and applied to facilitate these processes. From this information, complementary conservation strategies will need to be developed that give priority to maintenance in production systems (*in situ* conservation), with *ex situ* conservation providing back-up systems and material for access by other users. Characterization and evaluation can, in many cases, be carried out in the production systems with the communities growing and using NUS. There may also be a need for specific studies on topics such as reproductive biology, *in vitro* conservation and ways of eliminating viruses from vegetatively propagated species.

Ruby pomegranates from Iran.

5. **Marketing.** Strengthened market systems are crucial to the promotion of neglected or underutilized species. Better commercialization translates into greater opportunities for income generation by the poor farmers who cultivate these species. The cultural value of NUS is also an important element that can support the markets for these species. IPGRI will seek strategic alliances with agencies or organizations that have experience in marketing, processing and product development of neglected species. Efforts will be directed at: (i) identifying opportunities to add value through improved preparation or processing methods and the development of low cost technologies; (ii) marketing activities including user and market-niche definition and improving price, distribution and presentation; (iii) creating and identifying opportunities to develop new products and markets; (iv) identifying ways to ensure that the nutritional contributions of selected NUS are recognized and integrated into national nutritional programmes; and (v) developing public awareness activities for crops and products at local and national levels and integrating such work in development-related activities, for example *in situ* and on-farm conservation and home gardens.

6. **Strengthening partnerships and capacities.** Safeguarding the resource base of neglected and underutilized species requires concerted actions among all stakeholders. Local people and farmers will be the most important actors in reversing the decline in use and arresting the genetic erosion of NUS. However, they will need to be supported by others. Building capacities and partnerships among all the stakeholders at national and regional levels in both formal plant genetic resources institutions and civil society organizations will be a key element of IPGRI's work. Using participatory approaches, which ensure that the interests of farmers and communities are adequately recognized, IPGRI will promote close collaboration with NARS, NGOs, CSOs, the private sector and international organizations. IPGRI's strategy will be to strengthen existing collaboration and add value to those initiatives that have already delivered relevant outputs in this field. IPGRI's catalytic role will be to focus the scattered efforts and the limited resources that are available to address priority actions to develop and conserve NUS. Strategic partners for IPGRI will be ICUC, FAO and sister Future Harvest centres whose collaboration will be coordinated through SGRP and other system-wide initiatives. IPGRI will work to bring scientists and plant genetic resources policy-makers into closer partnerships to realize the full potential of NUS and will devote particular attention to raising the capacities of national programmes to work on these species. IPGRI will include NUS components in its training programmes and in other capacity building activities. Transfer of technology and information from one region to another in the context of building capacities to use and conserve NUS will be pursued whenever possible.

Remnants of indigenous forests of pomegranate thrive in Central Asia but are threatened by genetic erosion. IPGRI is committed to supporting the conservation of these unique populations along with the largest pomegranate *ex situ* field collection (more than 1700 accessions) held at the Gari Gala Research Station, Turkmenistan. Such invaluable diversity represents a major resource for farmers which must be passed on to future generations.

7. **Developing effective policies for NUS.** The further deployment, improvement and use of NUS will require taking account of constraints and opportunities that arise from the policy environment in many countries and in the international arena. Better policies and legal frameworks are required to support the research, cultivation and commercialization of neglected and underutilized species. As these species are developed and exchanged, IPGRI will work to promote policies, laws and regulations that return benefits from increased use of NUS to the communities that have been custodians of both the genetic resources and the associated knowledge. IPGRI will also work in support of policies that safeguard access to NUS genetic resources by farmers in regions where they are important to food security and

incomes. It may well be that policies and procedures developed for major crops or commodities are not appropriate for NUS, and IPGRI will use its expertise in policy development to review and address specific aspects that are important to the sustainable use of NUS by farmers and communities.

8. **Improving public awareness.** Raising interest in neglected and underutilized species is fundamental to creating a more favourable environment for their sustained production and use. Policy-makers, research institutions, the private sector and users at large should be aware of the concrete benefits that arise from a broader use of these species and should be encouraged to share efforts towards common research goals. IPGRI's role in raising public awareness among partners has contributed to the greater awareness of, and importance given to, research and development of NUS. IPGRI will develop public awareness materials in a variety of media and for diverse audiences in order to build interest and support from public and private sectors. National and international seminars and conferences will be used as opportunities to sensitize stakeholders and the public at large to issues surrounding neglected and underutilized species. Reversing the neglect and declining use of NUS will also entail work to further the public awareness of the value and utility of these species at all levels, beginning in the local media and cultural institutions where these species are still important. Links to global media and public awareness are also important.

MOBILIZING RESOURCES

IPGRI's commitment to the improved conservation and use of neglected and underutilized species will require the institute and its partners to mobilize significant resources.

There is a growing international recognition of the importance of NUS and significant advances have been made which have led to a noteworthy increase in the resources available for this work. However, new resources will be needed, both by IPGRI and by its many partners, to ensure that international objectives can be addressed and that work on individual species in particular localities can be carried out. Major concerns in mobilizing resources must be to ensure that there are clear and identifiable benefits to farmers and consumers, that real improvements occur in the information available on NUS, and that future needs for NUS diversity are adequately safeguarded.

IPGRI looks forward to working with all stakeholders and the international donor community to ensure that the resources are made available for its work on NUS. To achieve this, IPGRI will continue to maintain its expertise in this area at international and regional levels. It will also ensure that it can bring to bear expertise from those working on important related areas such as *ex situ* and *in situ* conservation, socioeconomic aspects of diversity management, and the analysis of genetic diversity.

CONCLUSIONS

This strategy is meant to guide IPGRI and its partners in what is a very challenging, and in many regards a relatively new, field of research. This Strategic Action Plan is based on experience acquired so far and will be improved as the work progresses and more light is shed on how best to tackle the conservation and use of neglected and underutilized species. IPGRI is confident that the awareness of the role that these species play in the livelihoods of people around the world will continue to rise in the years to come and that what may seem an ambitious task today will be more attainable tomorrow, thanks to our commitment to moving this agenda forward.

FUTURE HARVEST
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