




Global
Facilitation
Unit
for Underutilized
Species

Inviting all the world's crops to the table

*supporting traditional
crops to supply
future needs*



Mobilizing the potential of underutilized plant species that have been overlooked by research and development is a powerful way to give visibility and voice to the poor and marginalized while strengthening nutritional security and income generation, and fostering cultural richness and self esteem.

“Inviting all the world’s crops to the table” was prepared by the Global Facilitation Unit for Underutilized Species (GFU), in cooperation with Bioversity International. This publication is another effort of GFU to raise awareness of the importance of underutilized plant species for improving peoples’ livelihoods. It underscores the findings of the Chennai Platform for Action, which grew out of an international consultation held in Chennai, India, in April 2005. This meeting, organized by GFU, Bioversity International and the M.S. Swaminathan Research Foundation was attended by policymakers and experts from 25 countries around the world and formulated approaches to maximize the contribution of agricultural biodiversity to reducing hunger and poverty.

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Introduction

It has only been in the last decade that policymakers and the public have started to awaken to the fact that quality of life is dependent not only on quantity of food but also on high quality food from diverse sources. It took the drastic simplification of global agriculture with its shrinking basket of agricultural choices and looming population growth figures to get their attention.

With this awareness has come a recognition that a huge proportion of the world's lesser known traditional food crops have been left out of the agricultural advances of recent decades, neglected by scientists, who concentrate on only a few of the major staples. Yet these traditional crops have great potential for providing the world's population with a choice of nutritious foods and other needed products.

This booklet has been prepared to present a positive look at what supporting the development of neglected and underutilized crops and refilling the agricultural basket can mean in terms of health, income, culture and the global environment. By highlighting just a few examples of what these crops have to offer, the story becomes quite clear: when crops are ignored by research and not adopted by commercial farmers, the entire world loses.

Gaining the perspective: 10,000 years of crop biodiversity

GIVE OR TAKE A MILLENNIUM OR TWO, it has been 10,000 years since humans gave up their hunter-gatherer ways. They grasped the idea of not only gathering wild grains to eat but also of saving and planting the seeds. That way, they could remain in one general location for a while, secure in the knowledge that their seeds would grow where they had been planted, yielding a crop to feed the family and providing new seeds they could plant for the following season. This reduced the time they spent foraging, allowing them to concentrate on building their communities.

In the ensuing millennia, the scenario did not change very much, although the settled communities grew larger and more types of wild foods were found dependable enough to be domesticated. Farmers grew what they needed, saving seeds to plant for the following season. When communities moved from place to place, they took their seeds with them, although they also found new grains, berries, fruits, tubers or edible grasses to domesticate in their new locations.

They learned to save the seeds of the crops they deemed the easiest to process or store or the most likely to survive the growing season or even those that simply tasted the best. They also discovered that plants could provide medicines, fibre, feed, fuel and shelter. They found out that some foods made them healthier and that, if they grew more than they needed, they could barter or sell the extra. Along the way, they adopted other plants for religious or cultural rituals.

Thus with their seed selection, these early farmers were not only providing for future meals, they were improving the family's health and income, satisfying social needs and, at the same time, shaping the direction of the world's agriculture by conserving what we now know as crop genetic diversity – the genetic materials of the world's food and forage plants.

Science entered the picture a few centuries ago, providing tools that allowed plant breeders to choose the best traits of crop varieties – their hardiness, their taste, their high yields – and combine them with varieties that had other interesting traits, thus creating new agricultural products that were even better at feeding families and communities, even those in risky or fragile environments.

In recent decades, researchers began actively collecting seeds and plant materials from farmers and from the wild in order to conserve them. Gene banks around the world now house millions of these samples, which plant breeders are able to draw upon as they look for new ways to combine genetic traits and improve yields as well as the nutritional value of crops. Although the majority of research concentrates on major food crops, we know that with the advances of plant breeding, any species has the potential to bring an important trait to the mix.

Counting the crops

Our planet has some 250,000 identified plant species. Over the millennia only about 7,000 have been cultivated or collected for food. In fact, today, fewer than 150 species are under commercial cultivation and, of those, 30 species provide 95 percent of our food energy needs. Reducing it even further, only three – wheat, maize and rice – provide half. What has happened to the others? Why have we lost all of these food choices? Humanity moved on, and for a variety of reasons, those crops were left behind.

Right now, we are feeding a population of more than 6 billion people, which is expected to rise to more than 9 billion within 40 years, from a base of only 30 crop species. This is an untenable situation. A wide food crop base is crucial for supporting local economies, traditions and cultures and, above all, for being able to provide farmers with options for dealing with whatever agricultural problems may emerge in the

Women are the main custodians of agricultural biodiversity and traditional knowledge





Broad agricultural biodiversity is needed to feed the future

future.

Already we have seen that the world's climate is changing. Changing weather conditions that cause variations in rainfall and air temperature not only lead to alterations in growing patterns, they set up new conditions that could lead to the emergence of new pests and diseases. In this situation, traditional crops have a comparative advantage over commodity crops because their high adaptability and resilience to stress are crucial in climate change coping strategies.

Neglected and underutilized: the crops we left behind

IN THE RECENT PAST, as populations have expanded and dispersed, a global trading system has evolved to provide for the food needs of people who migrated away from rural areas and now depend on supermarkets rather than on their own gardens or community markets. This has led to an increased focus on the crop species that can meet the demands of a hungry world while still meeting the harvesting, processing, packaging and transporting requirements of the global food trade.

Along with globalization, the liberalization of trade regulations has put even more pressure on producers to increase the production of food products that have competitive prices for global markets. To satisfy demand, plant breeders have concentrated on improving varieties and providing seeds for the major crops popular with urban consumers in developed countries. But this has been done at the expense of the traditional crops that are most often used by poor subsistence farmers for whom having a range of locally adapted crops is crucial to survival. Even crops that were once widely grown have fallen into disuse because farmers find they are not competitive with the major commercial crops. Now we have a situation in which more and more people are eating the same food because that is all that is available from commercial food producers.

Building respect for the world's ...

... neglected, underutilized, minor, orphan, underexploited, underdeveloped, lost, new, novel, promising, alternative, local, traditional, niche ...
... crops

Crops that are not part of the agricultural mainstream go by many names. However, it does not matter whether we call them neglected, underutilized, minor, orphan, underexploited, underdeveloped, lost, new, novel, promising, alternative, local, traditional or niche – or whether those names have different nuances. The overriding issues concerning their conservation, development and use are the same. They may be the country cousins of today's commercial agricultural crops, but they still have a lot to give and they should be invited to the table.

For the purpose of this publication, underutilized species are defined as species with underexploited potential for contributing to food security, health and nutrition, income generation and environmental services.

These species:

- represent an enormous wealth of agrobiodiversity;

- are strongly linked to the cultural heritage of their places of origin;
- are mainly local and traditional crops (with their ecotypes and landraces) or wild species whose distribution, biology, cultivation and uses are poorly documented;
- tend to be adapted to specific agro-ecological niches and marginal land;
- have weak or no formal seed supply systems;
- are recognized as having traditional uses in localized areas;
- are collected from the wild or produced in traditional production systems with little or no external inputs;
- receive little attention from research, extension services, farmers, policymakers and decisionmakers, donors, technology providers or consumers;
- may be highly nutritious or have medicinal properties or other uses.

Traditional crops make broad contributions

Health and nutrition

Traditional remedies from local plants

According to the World Health Organization (WHO), 80 percent of the people in the world rely on traditional remedies to treat their illnesses either because they are too poor to afford modern medicines or because they trust traditional remedies more than modern drugs. These traditional remedies are the herbal and plant salves and creams and medicines developed by local people during thousands of years of trial and error. Through experimenting, they found the most effective local plants to cure illnesses. Now, with scientific advancements, we can identify the chemical properties of the plants and understand better how they work. Many modern drugs used today are based on plants that owe their existence to local people who have conserved them and developed extensive knowledge of their healing powers over thousands of years. Society has to provide support to enable local communities to continue their roles as custodians of this precious heritage and, at the same time, to ensure that wild species are harvested in a sustainable way.

Obesity and malnutrition: solving an oxymoron with support from underutilized species

The globalization of the food trade has created major health problems not just in the developed but also in the developing world where people are gravitating towards inexpensive, often imported, fast foods. As a result of these high-carbohydrate, low quality diets, for the first time, many countries are facing huge increases in heart disease, diabetes and obesity and the fatter they get, the less healthy they are. Obesity has reached nearly epidemic proportions in many countries. For example, in Brazil today, 37 percent of adults are overweight or obese, compared to 20 percent in 1975; in Mexico, it is 70 percent, an increase of almost 9 percent since 2000; and in China, it is already 27 percent

– more than doubled from 13 percent in 1991. Many of the world's island states have had enormous increases in heart disease as local people, drawn to the tourism industry, have abandoned their farms and moved to the tourist centres in search of salaried jobs, leaving their traditional diets behind. Their adoption of commercial, processed foods has been accompanied by enormous increases in diet-related diseases.

While the West is questioning its carbohydrate-rich diets and accepting that a varied diet is good for health, the developing world is increasingly attracted to fashionable modern foods and abandoning its traditionally diverse diets.

The term “hidden hunger” has been coined to identify the condition of people who may eat enough calories every

day to survive, but are missing the vitamins, minerals and other micronutrients they need to sustain a healthy and productive life. The UN Food and Agriculture Organization (FAO) has determined that more than 850 million people are chronically hungry. This figure is well known, while there is less awareness that some 2 billion people, especially women and children in sub-Saharan Africa, suffer from hidden hunger.

Diverse diets are good for human health and nutrition, and healthy people who value the diversity that surrounds them are more likely to preserve it. Farmers who benefit directly from biodiversity are more likely to conserve it.

The irony is that the developing world is blessed with an array of locally-adapted plants that are highly nutritious and have been grown by local people for millennia. Yet many of today's farmers choose to plant improved varieties of commercial crops because they think they will have more dependable harvests and ready-made markets. By the same token, today's plant scientists focus their research on improving crop varieties they assume farmers will want to plant. Now add the consumers, many of whom believe that modern processed foods are better than the commonplace greens they used to grow in their own gardens or purchase in local markets. Often, their local crops have the stigma of being perceived as “poor people's food” while imported food is prestigious and desirable. If this paragraph were animated, it would show a revolving circle – of farmers, scientists and consumers caught in a loop, illustrating both why local crops have been neglected by researchers and why they have been marginalized, if grown at all, by farmers.

Dietary diversity to achieve the Millennium Development Goals

At the dawn of the new millennium, 189 Heads of State and Government joined together to sign the Millennium Development Goals, eight goals to be achieved by the year 2015. The very first of those goals is to eradicate extreme poverty and hunger. Supporting the conservation and development of traditional crops is a crucial ingredient for reaching that goal. In reality,

however, the potential to achieve all eight of the goals – including empowering women, reducing child mortality and improving maternal health – could be enhanced by activities that promote the conservation and use of crops containing not only genetic traits that could prove beneficial for medicines and food, but also the dietary diversity needed to live healthy lives.

As a result, consumers are missing the opportunity to fill hidden hunger gaps in their diets with a range of diverse foods. We have made great strides in producing the quantity of food needed to feed growing populations, but by narrowing the focus, we have compromised on the quality. With more and more of the world's food coming from fewer and fewer species, there has been a dramatic loss of diversity in the fields and many traditional varieties have already been lost forever. This means that as populations become both fatter and more undernourished, they are losing options for improving their diets with healthy and nutritious food.

Income generation

WHEN A TRADITIONAL CROP leaves the landscape, cast to the sidelines by farmers who decide they no longer want to grow it, there's a reason. Maybe the market value for the crop is too low or processing the crop is too complicated to make its cultivation worthwhile. Perhaps climate patterns have changed, making the crop harder to grow, or the farmer cannot find quality seeds, or the seeds cost more than those for major commercial crops.

Each of these cases is indicative of a more generic problem: all too often, scientists and agricultural extensionists – who could advise farmers on how to improve yields or how to market their products – do not pay any attention to traditional crops. Instead, they tend to concentrate on a few major cash and staple crops. Of course, the development of these staples has been crucial in the short-term for increasing production enough to feed growing populations. However, in the long-term, this narrow focus has created a situation in which our food security depends on very few crops, which are traded globally and at very low prices.

For poor farmers in marginal areas who have traditionally depended on many different crops for subsistence and exchange, this has not been a positive development. Many have been encouraged to give up their traditional species and varieties to grow particular varieties of cash crops, unaware of the potential pitfalls of fluctuating market prices. As they have left behind their traditional crops that were perfectly adapted to their local ecosystems, they have also left behind the diversity that allowed them to be self-reliant and provided them with safety nets – if one crop was unsuccessful, there were others to fall back on.



Because these traditional crops have never been widely used, scientists have not taken the initiative to look into their commercial potential, have not studied their genetic traits – traits that enable the crops to survive in marginal areas and which, if further developed, could also help other farmers in other areas – nor has their potential to improve incomes been appreciated.

The Maya Nut (*Brosimum alicastrum*) is a tree that can produce up to 200 kg of food a year without needing fertilizers or pesticides. The story of this tree is an example of how increased awareness can make an enormous difference. The Maya Nut was facing extinction but now, because of the efforts of The Equilibrium Fund, a non-governmental organization (NGO) that works with indigenous and marginalized women,

Markets bring underutilized crops to the world's table

more than 7,000 women in 320 communities in Honduras, Guatemala, El Salvador, Nicaragua and Mexico have been made aware of the amazing production capacity of the Maya Nut. They also have become involved in the conservation and marketing of Maya Nut products such as drinks and sweets. Many have formed micro-enterprises and have gone on to train other local people in the use and marketing of the Maya Nut. The potential for the Maya Nut was first recognized by a researcher working in the area, who then founded The Equilibrium Fund. To date, throughout the region, more than 300,000 new Maya Nut trees have been planted as part of a rainforest reforestation programme. The women in the project area in Honduras have created a cookbook of Maya Nut recipes and the tree is once again secure in the landscape. This is not a unique story.

Forests around the world provide income sources for local communities, such as in the case of India, where non-timber forest products are estimated to generate employment for more than 10 million people a year. Increased market opportunities can generate additional income for poor farmers where these crops have a comparative advantage over staples or major crops. They also offer better nutrition and dietary diversity for local people plus they have market potential in the developed world where consumers are interested in their nutritional value but also are attracted to their novelty. Modern technologies can transform crops and other plants into diverse products and extend their shelf life.

The challenge is to convince producers and consumers of the value of traditional foods and a diverse diet. Underutilized crops are usually sold in local markets. Surveys show that urban shoppers consider food sold at market stalls to be substandard and unsafe, and that many people are so far removed from their rural roots that they do not even know how to prepare the foods. To combat this scenario in Kenya, an NGO helped local farmers meet quality control standards for traditional leafy vegetables in the fields and also created packaging that included recipes. Now, the vegetables are sold in supermarkets, sales have increased eleven fold in just two years, farmers have improved income and consumers have access to better nutrition at lower prices. This case illustrates how important it is for local people to have support from those who understand their processing needs, can recommend the appropriate technologies and also help them find the niches for marketing their products.

Culture and religion

Local crops build local pride

In ancient temples and religious centres around the world, walls are often carved with images of fruits and vegetables. Unearthed pottery vases have designs with imprints of grains. Religious symbols take the shape of crops to celebrate planting and harvest seasons. Even ancient farm tools that have been replaced by more modern instruments often remain in places of honour in villages.

It wasn't so long ago – before the growth of the industrial age drove many rural people into urban areas – that most countries were completely dependent on agriculture. People were so bound to the land that their traditions and culture were linked to what they grew and ate. Special foods were, and still are in many places, associated with personal and community ceremonies such as births, weddings or funerals.

Communities evolved as a result of agriculture. After all, agriculture required people to work together, to organize themselves to share labour and resources, to set land boundaries and to barter for extra needs. This is the culture of agri-culture. Only now, the cultural side of agriculture is under threat, mainly because many of the traditions – meaning both the foods for ceremonies and the agricultural practices that brought people together – are disappearing.

The modernization of agriculture has been necessary. With more and more people to feed from the same resource base, it has been crucial to find ways to increase yields. However, in their move to modernize, many agricultural communities gave up the most important traditions of their heritage. Changes in lifestyle, accompanied by the simplification of diets and food cultures, are eroding the world's traditional culinary heritage.

For thousands of years, farming communities nurtured, conserved, improved and sustained their traditional crops, passing their seeds and their knowledge from generation to generation. With the march toward modernity, many farming communities moved away from traditions and subsistence farming, adopting commercial crops with market value. Of course, the move was forward and it was critical for family survival. But, when they cast aside their traditional crops, farmers not only lost dietary diversity, they gave up links to their history, devaluing their own culture.

Now, there is a move back to tradition, and it comes in part from the developed world. The increase in ecotourism in developing countries is just one indication of the developed world's search for naturalness in food preparation and growing regard for the herbs, traditional healing and indigenous knowledge of rural peoples. This interest from the outside has rekindled the pride of local people, raised their awareness of what they are losing and many are pulling their traditional plants back from the brink of oblivion.

One non-tangible aspect of the movement to ensure the conservation and respect for underutilized species is the feeling that comes from an appreciation of the cultural heritage of plants. When people outside their culture, such as ecotourists, recognize the value of rural traditions, it gives local people a feeling of pride and raises their self esteem. When they discover they have something of importance to offer or share – something they themselves are responsible for, such as their unique farm production – they feel a greater sense of empowerment.

This has prompted a wave of new initiatives celebrating traditional foods. For example, organizations in the Philippines, concerned that, as people become more affluent and urbanized, they will lose touch with their cultural heritage, have established rural gardens right in the centre of urban areas to promote appreciation for both the rural culture and rural farmers.

Environmental Services

WHEN YOU LOOK at the world's forests, wilderness areas, farmers' fields or even backyard gardens, you may not realize it, but there's a lot of work going on behind the scenes. Bees are pollinating, micro-organisms are helping maintain soil fertility, insects that are natural enemies of invasive plant pests are making their homes, and trees are absorbing carbon from the atmosphere. These so called "environmental services" are one of the biggest and most economically important job sectors on earth.

If monetary amounts were assigned to these services, they would add up to trillions of dollars a year. In 1997, the gross national product of all the countries on earth totalled US\$18 trillion. That same year, the total of all the ecosystem services was estimated at US\$33 trillion.

Looking at the services that have been provided by nature throughout the millennia, it is easy to see that they are becoming ever more important. Intensive agricultural practices are taking their toll on the environment and natural resources; industry and transportation are polluting the atmosphere. Around the world, governments and leaders are looking for ways to mitigate the effects of climate change, which are already having major impacts on weather patterns and, in turn, on agricultural production.

That is why it is crucial that we protect the diversity of the agricultural systems that provide these environmental services. It makes sense that having the broadest array of biodiversity possible will provide more options for dealing with whatever natural or human-made problems may arise. This means having a range of trees, shrubs and grasses to provide habitats, send down root systems to stop erosion and retain the soil's water retention capacity or to add nitrogen to the soil. It also means having a broad diversity of plant species and varieties so as to benefit from their unique set of genetic traits. These are traits that make plants drought tolerant, disease resistant or able to grow in extreme climates or in poor soil. In addition, the more species there are in an ecosystem, the more interaction there will be, which adds to soil fertility and nutrient cycles.

Environmental services have had a lot of attention lately, because the ability of trees to sequester carbon has the potential to offset the greenhouse gas emissions that are contributing to climate change. But, plant biodiversity also performs a crucial service in contributing to agro-ecosystem stability by helping to mitigate the effects of environmental changes. If a change in average temperature alters weather cycles or fosters the onset of a new plant pest, then having a broad diversity of plants will mean there is a better chance that some will have the traits that allow them to survive.

Despite the fact that governments and international organizations are keenly aware of the importance of these environmental services, natural ecosystems continue to be degraded or lost at an alarming rate, with nearly two-thirds of the world's environmental services now under threat. To day, climate change has focused the world's attention on the carbon issue, but it is equally critical to make sure that crop diversity and its maintenance are factored into mitigation planning.

Individual crops tell their stories

Although we use the term “underutilized” when referring to crops that have been basically ignored by scientists and plant breeders, for the farmers who have continued to maintain these crops in their fields and gardens or to harvest them from the wild, they are anything but underutilized.

In this section, we highlight an array of diverse crops from diverse regions with diverse uses. These may not be considered commercial crops, but they still are extremely important to the farmers and communities that rely on them for food, nutrition or livelihoods. The point is to illustrate that with just a small amount of attention – be it a new technology for improving yields or simplifying processing or even the kind of marketing advice that will help move the crops into a larger arena – the benefits of many crops that are currently neglected could be enhanced, expanded and shared to benefit local people and, in some cases, all of humanity.

Pomegranate

Prehistoric cultivation to modern panacea

THE HISTORY of the pomegranate (*Punica granatum*) follows the same lines as the development of civilization. From prehistoric settlers who transplanted wild varieties to their homesteads, through the ancient Egyptians and then the Greeks and Romans, the pomegranate has always been more than simply a nutritious food item.

Many civilizations have praised the wondrous traits of the pomegranate. More than for its taste, the pomegranate was revered for its beauty and considered a symbol of fertility. Images of the fruit adorn the walls of many ancient places of worship and the illustrated manuscripts of many religions. It is mentioned specifically in both the Bible and the Koran, was taken along by ancient Arab travellers to quench their thirst during journeys across the desert, and now is cultivated all over the world.

From its origins in civilizations around the Mediterranean Basin, pomegranates spread into Central Asia and the Caucasus, India and China with domestication happening spontaneously and independently in several regions. Today it is present

in cuisines and traditional remedies in many cultures. Long linked to folk medicines and credited with curing everything from baldness to sore throats and conjunctivitis, pomegranate is now being hailed by modern medicine as a panacea fruit that can also reduce the risk of heart disease.

In addition to eating it fresh or processing its fruits and juices into jellies, sauces and flavourings, parts of the plant are used traditionally for tanning leather and as a source of dye for wool and silk. Extracts of the bark, leaves and rind serve as astringents to treat dysentery, the dried bark of the root and stem contains alkaloids that are active against tapeworms, and powdered flower buds treat bronchitis. In addition, the juice of wild pomegranates is considered beneficial for treating leprosy. Yet, in spite of the many services the pomegranate has provided and the great esteem in which it is held, its wild relatives are under threat. As with many other traditional species, the pomegranate faces environmental degradation. But there is another element to this story.

Starting in the 1930s, the Garrigala Experimental Station for Plant Genetic Resources in Turkmenistan began collecting pomegranate varieties from around the world. The collection shows the incredible diversity and valuable traits of the plant including frost resistance, high yields, long shelf life, resistance to pests and diseases, high vitamin C content and antioxidant qualities. Today, the Garrigala gene bank contains more than 1,100 varieties of pomegranate from 27 countries on four continents. Of these, 371 are from the former Soviet Union.

Although countless scientists and plant researchers over the decades have dedicated untold energy and expertise to pulling this collection together and conserving pomegranate diversity in a place where it might be safe, the collection now is at risk. Since the birth of the Central Asian Republics, the Garrigala Station has faced increasing financial problems. Due to lack of funds, most of the varieties in the collection have not been properly documented and there are questions as to whether the collection will be lost if there is no funding to protect it. Even though many varieties of pomegranates are cultivated all over the world – in tropical, subtropical and temperate zones – many of the varieties in the Garrigala collection have already been lost from the fields and only exist in this collection.

In 2001, Bioversity International started fundraising activities to support Garrigala, not only for administrative costs to maintain the gene bank but also for funding such things as translating the existing documentation from Russian into English and for public information campaigns on the endangered pomegranate populations.

One of the big crises facing the agricultural sector today is the number of traditional crops that have been neglected by science or underutilized by farmers and run the risk of disappearing, if they haven't already disappeared. Even though the cultivated pomegranate is not under immediate threat, the threat is growing in parts of the world where climatic conditions are changing. Scientists may some day have to draw upon some of the genetic traits contained in pomegranates housed in gene banks – if they are still to be found.



Pomegranate – a millenium-old fruit that still quenches thirsts of health-conscious people

Emmer

Isolated fields to upscale consumers

EMMER (*Triticum dicoccon*), a hulled wheat that was domesticated more than 10,000 years ago, has suddenly gone from “*staple*” to “*chic*”. Brought to Italy after Julius Caesar’s invasion of Egypt in 47 BCE and named Pharaoh’s wheat (*farro* in Italian), it was a staple at every level of Roman society and sustained the Roman army. Interestingly, the crop is also the source of the Italian word for flour – *farina*.

But from this auspicious beginning in Italy, emmer suffered the same fate as many other traditional cereals. It, as well as other hulled wheat species such as einkorn (*T. monococcum*) and spelt (*T. spelta*) which had been grown by farmers in northern Europe, fell from favour.

Scientists theorize two main reasons for emmer’s decline in popularity. Economic pressure sent farmers looking for grains that would have higher yields and be easier to process, and rural consumers went looking for commercially processed foods they considered more modern than their traditional hulled wheat. By the 1970s, emmer production in Italy was reduced

environmentally friendly, healthy food, emmer made the transition from forgotten to gourmet.

Its reputation grew mainly through direct marketing from farmers to the tourists who vacation in the Italian countryside, looking for idyllic rural holidays away from mainstream hotels. Throughout Italy, owners of farms and country estates have added tourist apartments and small retail outlets to sell the products of their farming operations. They serve their guests the food the farms produce and then sell them products they can take back home.

As with other traditional crops, there has not been a great deal of research done on emmer, but what exists clearly shows that emmer has high levels of fibre, protein and vitamins and it can be eaten safely by people who are gluten intolerant.

Through word of mouth, farm-bought items, such as biscuits and pasta made from emmer, have developed a strong following. Once consumed only by the rural communities who cultivated it, emmer and emmer products are now easily available in traditional Italian food shops and even

Hulled wheats – emmer, einkorn and spelt – are no longer the food of the poor. Now they occupy a position as exclusive and trendy foods for which concerned consumers are prepared to pay premium prices.

to only a few thousand square metres in two small mountainous production areas in central Italy.

However, by 2006, the number had increased enormously, to more than 2,000 ha. Modern consumers had rediscovered traditional crops.

Through a combination of increased ecotourism and the new interest of European consumers in eating

modern supermarkets. In the two-year period from 1998 to 2000, the market grew by 15 percent each year and the farm-gate prices for the raw material increased by 30 percent each year.

With increased demand, emmer production has spread beyond traditional growing areas. It adapts well to marginal lands and, at the same time, provides reliable yields, something that modern wheat varieties

Photo: Y.



Emmer – an ancient cereal comes back to life

cannot do. Increased demand has piqued the interest of the research community, and some small breeding programmes have produced new varieties that compete well with traditional varieties. The fact that emmer is usually cultivated without chemical fertilizers and pesticides makes it even more appealing to consumers.

However, there is a new, disturbing element to add to this story. Emmer has typically been grown by poor farmers in mountainous regions who tend to plant a mixture of varieties in their fields. Today, because modern marketing requires uniformity, traditional farmers are under pressure to adapt their planting programmes or they stand to lose the market for the crop that they and their forefathers have been responsible for conserving over the centuries.

Leafy vegetables

Reintroducing African consumers to their own traditions

DURING THE colonial era, many native African people came to believe that their traditional foods, clothing, religions and medicine were inferior to the novelties brought by the colonial powers. Although that era is over, the fallout continues in terms of the eating habits of many families in sub-Saharan Africa.

Not long ago, the only vegetables found in the urban supermarkets of Kenya were species brought over during the colonial era. Supermarkets

Kenyan diet from time immemorial, even though there were some 200 species to choose from, which had higher nutritional value than the introduced choices such as cabbage, carrots or kale. The fact remained that there was no consumer demand.

Since the mid-1990s, Bioversity International has led a campaign to reverse this trend. It has been a slow process because there was initially a lot of information to gather and a lot of mind-changing to do. In addition to rejecting traditional vegetables

that usually came to the markets from home, rather than commercial, gardens were not grown under proper hygienic conditions.

In response, Bioversity and its partners worked to modernize systems for producing quality seeds for these vegetables and to develop agronomic techniques to ensure larger or more sustainable yields. A key concern was to introduce modern cultivation so the public could be assured of safety standards.

At the same time, public awareness campaigns began promoting the nutritional and health value of the vegetables. Women farmers were particularly receptive to producing the vegetables once they recognized the health benefits for their own families. When producers began to market the excess production, they enjoyed the benefits of additional income.

Eventually, through the support of the Kenyan NGO, Farm Concern International, farmers began supplying a supermarket chain. The loss of knowledge about the use of the product was overcome by designing packaging that contained recipes.

Although this story took place in Kenya, it could be repeated in every country. The results in Kenya have been beyond anyone's imagination, with supermarkets increasing their sales of leafy vegetables by more than 1100 percent and farmers able to use the income to improve their lives and their lands.

Cleome gynandra, Corchorus spp., Gnetum africanum and G. buchholzianum, Solanum nigrum, Amaranthus spp.: now becoming popular in supermarkets.

had no interest in stocking their shelves with the traditional leafy vegetables that had been part of the

because they weren't considered modern, consumers also said they were more difficult to prepare.

A Bioversity project focusing specifically on leafy vegetables began with an inventory of these species in sub-Saharan Africa – estimated at between 800 and 1,000. These are the vegetables that have traditionally been used in rural areas as side dishes to the starchy staples eaten throughout Africa. The inventory also identified issues that were hindering their cultivation, conservation and marketing. Of the 210 species identified in Kenya alone, only 10 were found in markets, and those were usually local markets frequented by a few regular customers.

A survey found that consumers felt the “modern” vegetable crops had more prestige. Traditional vegetables had been absent from public view for so long that the average person no longer knew how to prepare them. There was also a fear that the leafy vegetables



Leafy vegetables ensure nutritional security in many countries across Africa

Andean Grains

Incan “mother grain” still nurturing consumers

N YEARS past, in parts of Bolivia, Peru and Ecuador in the high Andes, patients with broken bones were given a unique prescription: eat plenty of quinoa and apply a plaster made of quinoa flour and water. Although part of folk medicine tradition, modern scientific testing bears out the accuracy of the treatment. Quinoa has a very high calcium content.

Quinoa (*Chenopodium quinoa*) is a grain that has found a new life, thanks to its positioning as a “super grain” by health-conscious shoppers and to the development of processing techniques that allow the isolated Andean communities to grow enough for export.

Quinoa has been cultivated for 7,000 years. Called the “mother grain” by the ancient Incas, it sustained their population until the Spanish conquerors arrived in 1532 and replaced their cultivations with wheat and barley. But the Incas still managed to find their quinoa growing wild at high altitudes, keeping it hidden from the Spaniards and, as is now appreciated, maintaining quinoa diversity for future generations.

Over the centuries, Andean farmers continued to grow quinoa, adapting and selecting varieties to reduce their vulnerability. However, modern agricultural practices of focusing on a few commercial crops with market value have also reached these mountainous areas. In Peru, the government began to import large amounts of wheat back in the 1940s and sold it at subsidized prices. As a result, quinoa cultivation dropped from 111,000 acres to 32,000 acres. This, combined with the high esteem that indigenous populations assigned to modern, imported crops, furthered the decline of quinoa. It lost its grandeur and became just another subsistence crop for the poor.

Today, with scientific recognition that quinoa has a protein level equal, if not superior, to powdered milk, plus a high calcium content, it is returning to “mother grain” status in some parts of the Andes. Because the farming practices of these areas for the most part fit within the guidelines for organic farming, research and development efforts are encouraging the production and consumption of organic quinoa and also stimulating its export. Researchers are feeling their way because farmers are focusing on those varieties that suit the export market (like the “quinoa real” variety) above those that offer greater food security and sustainable harvests to local people.

It can take up to six hours to process 12 kg of quinoa because the grains have a toxic, bitter coating called saponin that protects it from birds and the intense rays of the sun, but must be removed for the grain to be edible for humans. Thanks to funding from the USA Congressional Hunger Center, Bioversity has collaborated with a researcher from the Mickey-Leland Fellowship to assess the status of diversity and use of quinoa in the remote Uyuni Salt Flat region, 4,000 meters above sea level in Bolivia.

The outcome of this study has raised great concerns over the genetic erosion of quinoa in the area. In spite of the fact that quinoa has become a boom crop, in reality, the boom is in two or three high-yielding varieties that meet market needs. Dozens of other local varieties with remarkable nutrition and resilience traits are being ignored.

Lack of suitable processing technology for the local producers is one of reasons for the drop in local consumption of quinoa. Because quinoa processing is drudgery for the women who have responsibility for processing the seeds, they often



Quinoa's many varieties – conservation is needed to safeguard this rainbow of choices

choose to grow and process other crops. However, a local mechanic has invented a small machine that can reduce the processing time for 12 kg from six hours to seven minutes.

The machine is now being promoted through the Bolivian research foundation, PROINPA. Although the machine is too expensive for an individual family to buy, the farmers join forces to buy and share the benefits of the machine, each paying a user's fee according to the amount of quinoa they process.

Not only does the machine reduce the burden on women, it also has the potential to improve community health by facilitating the consumption of a nutritious grain. Additionally, the communal processing activities provide an opportunity for neighbours to be together socially.

Sumac

Spicing the life of consumers while saving soil in Tuscan forests

THERE ARE many examples of cultivated crops that have been abandoned over time.

The case of sumac goes a step further because the story of the downfall of sumac is even recorded in the proceedings of the Italian Parliament.

Sumac (*Rhus coriaria*), a shrub from the Mediterranean, has been used since Roman times. Its seeds were used as a spice and its roots, bark and leaves were used by the tanning industry to cure leather. The word sumac is traced to the Aramaic language and means “red” referring to the colour of its berries. In modern Hebrew, sumac means “spice”, while its species name, *coriaria*, comes from the Latin word for leather, *corium*.

As a tanning agent, sumac was much appreciated over the centuries because it produced white or lightly coloured soft and supple leathers. Leather treated with sumac resisted aging, darkening and decay. However, the modern leather industry has developed other technologies and less

expensive tannins, so sumac is rarely used these days for tanning.

Nevertheless, as a spice, sumac remains an important ingredient of Middle Eastern cuisine. Since at least the time of Discorides, who wrote of sumac’s medicinal properties some 2,000 years ago, sumac has been crushed and sprinkled or made into a sauce in combination with other spices, and served with rice, meats and salads. The Romans used it because of its tart, tangy flavour in the centuries before the introduction of lemons from the Arabs, which took place in Sicily around 1000 CE. Today, a typical Middle East breakfast consists of sumac combined with sesame seeds, thyme, salt, pepper and olive oil (a famous mixture called “*zahatar*” in Arabic) and served over freshly baked bread.

In addition, sumac is an excellent substitute for salt, recommended for those suffering from hypertension. It also has been used as a traditional medicine to treat dysentery and even as an anti-tumour medicine.

The story of the decline of sumac is typical. In spite of its dual role as a spice and a tanning agent, the tanning industry left it behind and, even though it is still widely used as a spice, the production comes mainly from wild stands. In Syria, where it is a highly popular spice, there are no cultivated sumac fields. Domestication, selection and crop improvement do not exist and knowledge of cultivation practices, multiplication and conservation of the genetic diversity of wild populations of sumac is scarce. This is also the case in the Near East, including Turkey, where the sumac spice is also very popular.

In nineteenth century Italy, sumac was a profitable export crop with farmers guided by a manual on sumac cultivation written in 1874. Today, it is grown only in limited areas of Sicily, in spite of the fact that there have been efforts to reintroduce it. That is why in 1961, during a session of Parliament, Italian deputies called on the government to give greater attention to the cultivation of sumac and other local crops as a way to strengthen the Italian gross domestic product.



Efforts to reintroduce sumac cultivation as a spice have continued with limited success in Italy. However, there is another opportunity to promote sumac. It is now being used for reforestation projects in Italy’s Tuscany region, not because of its taste or tannins, but because of its soil conservation properties.

Processing of sumac fruits for the irresistible *zahatar* spice

Henna

Beyond cosmetics – from art form to medicine to income generator

AN INITIAL glance at a henna bush (*Lawsonia inermis*), whether growing in the wild or cultivated in a hedgerow, gives no indication of the dramatic and artistic uses it offers to those who harvest and use its leaves and flowers. Henna is a perennial shrub that grows to more than 3 metres tall, with pale bark and white or pink aromatic flowers.

Henna, the world's first known cosmetic, has been used for ritual body painting and decorating since prehistoric days some 5,000 years ago. In India, its use is depicted in murals painted on cave walls.

Scientists are divided over the origins of henna. Some think it originated in ancient India while others suggest it originated in the Middle East and North Africa and was brought to India in the twelfth century by Egyptian moguls. Over the centuries, its use developed into an intricate art form filled with symbolism.

ANTHONY VAN DER BEEK/ANONYMOUS FOR HARKTUNE/SCIENCE



Henna – a source of cosmetics and medicine

In India and Egypt as well as other Arabic countries, henna has been most notably used to dye hair, nails, hands and feet. Traditionally it is a woman's art, calling for intricate designs. It has also been used to dye fabric and horses' tails. Both Egyptian and Indian cultures used oil from henna leaves and flowers as perfumes.

At the same time, henna was also considered a traditional medicine with an incredible variety of uses. Historically, the leaves were powdered and used to treat skin problems and headaches. Asian folk medicine used them for dandruff, eczema, scabies, fungus and ulcers. The flowers were used externally to combat excessive perspiration and orally to induce sleep and cure headaches, as a diuretic, to treat stomach ulcers and even to treat leprosy.

Today, henna is produced in India, Pakistan, Yemen, Morocco, Egypt,

Iran and the Sudan. Farmers in hot, arid regions of India find henna a reliable cash crop, especially during drought and extreme heat when river levels drop too low for irrigation of other crops. At the same time, henna holds dry, fragile topsoil in place.

Although large quantities are produced at home for local markets, there is also an export market, albeit much smaller. For instance, in 1998, the Rajasthan area of India cultivated 22,000 hectares with henna and produced 21,000 tonnes of high quality leaves for local processing. One hectare can produce 1,000 to 1,500 kg of leaves and just 2 hectares of henna leaves can support one person.

The marketing of traditional henna products has proven successful outside of its traditional use areas. There is increasing interest in using it in modern products because it is natural, which is ever more important to consumers in the West.

ANTHONY VAN DER BEEK/ANONYMOUS FOR HARKTUNE/SCIENCE



Henna – source of colour art of the ages

Forest berries

Rescuing forgotten or neglected fruits

BILBERRIES (*Vaccinium myrtillus*) have almost disappeared from European landscapes, but a group of activists is working to get them back. For centuries, cultivated fruits and wild berries were the most important food sources for the people of Europe. There was an enormous diversity of cultivated species and varieties. Today, much of that diversity is gone, either lost forever to extinction or merely cast aside as farmers concentrate on growing major commercial fruits such as apples and pears.

The bilberry – also known as black-heart or whortleberry and by dozens of local names – is one of the fruits that has lost its way in Europe. Yet, bilberries were traditionally collected from the wild in Scotland, Ireland and Poland and Scandinavia. In fact, in Scandinavia, it was considered “everyman’s right” to collect bilberries, regardless of land ownership. In Ireland where it is known as *fraughan*, it was traditionally collected at the first harvest festival of the year. The belief was that a good *fraughan* harvest meant the rest of the harvests would go well.

The story of the bilberries indicates the type of fascinating folklore that Europe is at risk of losing along with

its berries. They are closely related to the North American blueberries and huckleberries, although they grow in singles or pairs on the bush instead of clusters like blueberries. In addition to being used for jams, juices and liqueurs, bilberries also have medicinal uses.

British pilots of the Royal Air Force in World War II claimed that bilberries improved their night vision, although their claims were never scientifically proven. Nevertheless, studies have shown that the berry can reduce or reverse the effects of degenerative eye disorders. Because there has been so little research, the extent of bilberries’ potential contribution to nutrition and eyesight has not yet been determined.

There are dozens of other berries that did not make the leap from wild harvest to commercial cultivation and now are rare finds, if found at all. Conservation efforts in Europe, for the most part, concentrate on widespread, commercially viable fruit species and pay less attention to species such as cornelian cherry (*Cornus mas*), strawberry tree (*Arbutus unedo*), Russian olive (*Eleagnus angustifolia*) or azarole (*Crataegus azarolus*). There is no widespread cooperation and networking at the European level and only rare exchanges among conservationists and breeders.

However, as policymakers and consumers have become more aware of the importance of cataloguing these vanishing berries, they are finding ways to link and coordinate some of the conservation efforts that are taking place with individual species in Europe. Safeguard for Agricultural Varieties in Europe (SAVE) has set up monitoring operations to support rescue efforts targeting endangered



Cornelian cherry on sale in Anatolia region, Turkey

European plant species and animal breeds.

Other organizations have begun cataloguing neglected and forgotten fruits and berries to find ways to improve local nutrition and income. For example, WHO reported in 2005 that because of chronic diseases linked to poor diets and lifestyle changes, Russians will suffer US\$303.2 billion in lost income over the next ten years due to increased incidences of diabetes and heart disease. The same is true in Europe’s developing and transition economies.

Biodiversity International is currently working on a project with research centres in Luxembourg and the Russian Federation to study some fruit collections in the N.I. Vavilov Institute of St. Petersburg, including the berries. The goal is to identify potentially healthy, high nutrition products and raise greater interest for bringing these crops back into the public arena and enhance their cultivation and markets.



Strawberry tree fruits ready for pick

African Eggplant

The “garden egg” looks for a wider market

LATE IN the 1500s, British traders introduced a West African type of aubergine (*Solanum aethiopicum*) to London. It was a small, white fruit the size of a chicken egg, and eventually picked up the name “African eggplant”. At the same time, another larger, purple and misshapen fruit appeared in Europe from the Americas. It happened to be a botanical relative of the African eggplant.

Eventually, the African egg plant disappeared from Western cuisine but the other (*S. melongena*) remained and kept the misnomer “eggplant”, as it still known today in North America. Meanwhile, the African type maintained its importance in Africa, where it is now known as the “garden egg”.

The garden egg is consumed on a daily basis by rural and urban families and provides income for many rural households. It also has higher drought and heat tolerance as well as lower susceptibility to pests and diseases than the conventional aubergine. Yet, in spite of its importance and popularity in Africa, there is limited knowledge about the plant, and its

hundred of varieties have not been catalogued.

As one of its activities for promoting wider use of traditional species, the Global Facilitation Unit for Underutilized Species (GFU) commissioned a study of garden egg in Ghana, where the crop is especially important, looking into both farm and market information. Producers were interviewed, as were people involved in the garden egg market chain, including farmers, wholesalers, retailers and exporters.

A well-developed market chain has emerged to cover domestic demand and occasionally, traders cross borders into neighbouring countries or other parts of the region. The interest in expanding trade into Europe has led to the further development of the market chain.

Even with the potential for improving international trade, researchers in Ghana have shown little interest in the garden egg, and no official certified variety has been released for commercial cultivation. Some specialized farmers select and improve their own cultivars, but the

majority use garden egg seeds that are available locally or from farmers' exchanges.

Garden eggs can be profitable. For instance, in Tanzania, farmers who planted improved varieties



Marketing of the garden egg provides employment and income to rural communities

had such success at the markets they were able to establish small enterprises, offering employment to local people and improving living standards.

But there are risks from seasonal production gluts, pests and diseases that attack the crop in the field, and from labour costs. The fruit must be harvested twice a week, early in the morning to avoid losing freshness. In terms of retailing, there are problems with colour, shape and taste variability that affect its potential for export to mass markets.

The GFU study found that, unlike many other underutilized species, there is some knowledge about garden eggs, although the knowledge appears to be relatively recent in Ghana and has not filtered down to users. Whether the garden egg is going to have a future depends on how much effort the research and development community is willing to invest in this traditional African crop.



An African eggplant variety that illustrates why it is known as the “garden egg”

A 6,500-year history and still critical to farmers' survival

THE REMOTE hillsides of some of the poorest areas of India and Nepal are not where you would expect to find micro-enterprises run by women entrepreneurs who offer specialty food items for both local and urban markets. But that's exactly what has happened, thanks to one of the world's oldest and most versatile grains – millets.

In these South Asian hills, some 20 million people, most of whom survive on incomes of less than US\$1.00 a day, have relied on traditional millets throughout the centuries. Many varieties of millets, including finger millet (*Eleusine coracana*), Italian millet (*Setaria italica*) and proso millet (*Panicum miliaceum*), grow well in these semi-arid and mountainous environments and provide both family food and barter for local markets.

Yet, in spite of millets' traditional importance here, they have been marginalized in recent

decades because of the so-called modernization of agriculture. In their attempts to seize emerging opportunities from commodity crops, farmers have concentrated on growing commercial crops such as rice, wheat and maize to sell, rather than the traditional crops that they previously grew for family subsistence and local barter. Unfortunately, this idea never met expectations for increasing income, and the livelihood security of families even decreased because they lost the benefit of being able to use millet crops for bartering.

"Neglected no more", an IFAD-funded Bioversity project designed to bring neglected crops such as millets back into the daily lives of the rural poor, has been crucial in helping these farmers return to their traditional crops by working with them to determine which varieties work best and introducing them to better production methods. In fact, new cultivation methods enhanced grain yield by 23 to 34 percent. Adding the entrepreneurship element to the project enabled the communities to get the highest return from their increased production.

Entrepreneurial activities have focused on village women, who are usually responsible for the processing and marketing of millet. One of the perceived advantages of the "modern" crops was their greater ease of processing. However, this turned out to be at a high cost, to both the livelihood security and better nutrition the family traditionally received from traditional millets.

Thus, the entrepreneurship segment of the project concentrated initially on introducing the women to equipment

that would reduce the drudgery associated with traditional household processing. With the establishment of self-help groups and access to micro-credit activities, the women learned to add value to their millets by producing specialty items such as millet flour, semolina malt and snack foods for sale in both local and urban markets. The processing activities generated employment opportunities and income.

The project concentrated on 700 families in the two countries, and now those families are passing on what they learned to other people in their communities through workshops, seminars and local fairs. Not only are these farmers improving their incomes, they have become part of a larger scenario of keeping traditional varieties of millets from being cast aside. Now they are being conserved on family farms of India and Nepal. Millets have a history of cultivation that stretches back more than 6,500 years and, as this project demonstrates, it remains a crucial ingredient for food security on the mountainsides of Asia.



3. PUNJICA

Improved cultivation practices have increased yields of finger millet in southern India

Medicinal plants

Traditional herbal remedies treat most of the world's ills

THE PRODUCTS offered by today's modern pharmacies are not altogether different from what has been offered by traditional healers throughout the millennia. A study of the top 150 prescription drugs in the USA found that less than half were purely synthetic and that 57 percent contained at least one major active compound based on plant material. Another study found that 25 percent of modern medicines are descended from traditional plant remedies.

Although this awareness, along with evidence of the enormous potential commercial value of medicinal plants, has led to global efforts to protect intellectual property rights on the use of such species, the real issue actually precedes the rights. The real issue is protecting the plants themselves.

Most plants used for medicines are native to poor countries in tropical regions where few, if any, research and development efforts have been concerned with traditional plants. At the same time, because of social changes in rural areas, traditional and indigenous knowledge about these plants is weakening or even disappearing. As a result, medicinal plants may end up disappearing before their potential value can be investigated.

Amla (*Emblica officinalis*), indigenous to South Asia and also known as the "Indian gooseberry", thrives throughout tropical India. It is cited in ancient literature for its medicinal uses and is still used extensively today as an ingredient in herbal health preparations. Traditional healers have used amla as a diuretic, laxative, antibiotic and for treating chronic dysentery, jaundice and coughs and even to stall the ageing process.

Today, researchers are especially interested in it because of its high



Herbal remedies on sale in a traditional shop in Aleppo, Syria

vitamin C content – one fruit is said to have more vitamin C than a dozen oranges. In fact, for a so-called "underutilized species", there has been quite a bit of research on amla, which has led to improved varieties.

In South Asia alone, there are more than 8,000 plant species with known medicinal value. India's ayurvedic medical practices date back to 5,000 BCE and still remain an important source of health and livelihoods for millions. Modern practitioners who recognize the importance of this healing resource have embarked on innovative projects to ensure that the genetic resources of such species are not lost to deforestation, species adulteration or total extinction.

Capitalizing on the medicinal plant market requires more than traditional knowledge. Farmers must learn the techniques and technologies for growing quality materials. Arya

Vaidya Sala, a century-old charitable institution in India, is one of the organizations working to ensure the sustainable supply of medical materials by creating ecological awareness and improved income options for local communities. With support from Canada's International Development Research Centre, it has created the Medicinal Plants Germplasm Bank for cataloguing and conserving medicinal plants while serving as a resource centre for plant materials during shortages.

Fighting famine and protecting the earth

THE MOST important traditional cereal source for pastoralists in the Sahel is an ever-changing mixture of many wild grassland grains known as “kreb”. Kreb can contain a dozen or so different wild grains, varying from season to season and field to field according to soil and weather conditions and farmers’ needs. Careful grassland management has allowed local pastoralists to harvest grains as well as graze animals.

Kreb was so important that elders forbid grazing in certain pastures in order to allow the plants to produce seeds. Owners of any animals found grazing in these pastures were fined heavily.

According to the UN Food and Agriculture Organization, kreb is one of the most sustainable and organized food production systems in the world. In the last century, a single household could harvest 1,000 kg of highly nutritious kreb grains per season. Protein levels in these grasses can reach levels of 17 to 21 percent. They contain amino acids that are lacking in other common staples, making them more nutritious than most commercially farmed cereals.

Yet, today, kreb is dismissed as a “famine food”, food for the extremely poor to keep them from starvation. Just as with many other traditional foods, kreb has fallen victim to changing times with new emphasis on

commercially viable cultivated crops. In addition, changes in customary land tenure agreements and population pressures have reduced access to grasslands and, at the same time, led many pastoralists to adopt a sedentary lifestyle which does not lend itself to seeding and harvesting grains from grasslands.

As use of kreb becomes more sporadic, the loss is being felt on many levels. For the people who must survive on the unpredictable and often unfriendly Sahelian terrains for their food, kreb has always been a reliable food source. Because the diverse grains are all adapted to the local conditions, there is no need for chemical fertilizers or pesticides. In addition, the grasses provide protection for the soil, improve its fertility, reduce runoff, form a barrier against desertification and, because of their adaptive traits, have potential to help in the development of other grassland and forage crops.

For those who still produce kreb, the process has changed very little over the centuries. Women usually handle the harvest, sweeping baskets through the grasses to collect the seeds that they then dry and pound into flour. In spite of the fact that kreb does not have the importance it once had, it still has a place in local markets as well as the potential to be marketed as a niche product both locally and for export. Its high nutritional content as well as its connection to the



Kreb, a mixture of grains from several wild grasses, is a reliable source of food in the Sahel

nomads of the African plains would be sure to appeal to health-conscious consumers who would also appreciate the environmentally friendly aspects of kreb.

Mixing seeds to create kreb

Kreb is a mixture of seeds from a variety of grasses. The following is a list of those most commonly used for the mixture.

Dactyloctenium aegyptium, *Sorghum sudanicus*, *Echinochloa pyramidalis*, *Echinochloa stagnina*, *Echinochloa colona*, *Cenchrus catharticus*, *Cenchrus biflorus*, *Urochloa sp.*, *Eragrostis tremula*, *Eragrostis tef*, *Eleusine indica*, *Brachiaria regularis*, *Panicum turgidum*, *Panicum laetum*, *Panicum coloratum*, *Panicum antidotale*, *Cyperus sp.*

Finding a place in the global arena

Underutilized crop species: further marginalized by international agreements

THE LOSS OF THE WORLD'S crop genetic diversity is not only one of the direst dilemmas the world is facing today, it is the one that has the most pressing deadline for action. In just the last century, more than three quarters of all known food crops disappeared from the world's landscapes. From the mountainous regions of Asia to the savannahs of Africa, the rainforests of Latin America and the idyllic islands of the Pacific, no place has been exempt from the disastrous loss of agricultural assets, which now seems to be picking up speed.

The reasons are many, from changing lifestyles to changing climates, but the result is the same. Each time a plant variety or species vanishes, there is nothing to fill the space it leaves behind. It takes with it all of the genetic traits that it amassed during its existence on earth; traits that cannot be recreated or replaced. We will never know what we have already lost.

For decades, the international community has debated and negotiated crucial issues related to crop genetic diversity in an effort to set up a global system that will ensure that important plant diversity is conserved and used sustainably. The system now exists.

The majority of the world's nations have agreed to the Global Plan of Action for Plant Genetic Resources for Food and Agriculture and the International Treaty on Plant Genetic Resources for Food and Agriculture and they are supporting the Global Crop Diversity Trust – three major building blocks of a global strategy to reduce the level of crop diversity erosion.

- The Global Plan of Action identifies the 20 most important actions that need to be taken for the conservation and use of plant genetic resources for food and agriculture.
- The International Treaty on Plant Genetic Resources for Food and Agriculture sets up a multilateral system for facilitated access to a negotiated selection of plant genetic resources of 64 food crops and forages, and for the fair and equitable sharing of the benefits arising from their use. These crops are listed in Annex 1 of the Treaty and, with the exception of a few minor food species such as *Artocarpus* spp., *Eruca* spp., *Diplotaxis* spp., *Xanthosoma* spp., *Eleusine coracana*, and some legumes and grass species, the majority are major food and feed crops.
- The Global Crop Diversity Trust is a funding mechanism that will ensure that crop diversity collections of global importance receive the financial support they need for conservation activities.

The vast range of underutilized species does not benefit from the Multilateral System and the protection provided by the Trust, although they would fall under the general provisions relating to conservation of plant genetic resources for food and agriculture set out in Article 5 of the Treaty, and their importance is explicitly recognized under Article 6, which calls for the expanded use of local and locally adapted crops, varieties and underutilized species.

In any case, they continue to disappear from home gardens and the fields of rural communities. The global system for protecting crop diversity, established by the Plan of Action, the Treaty and the Trust, may not be enough to prevent the further marginalization of traditional crops. Although not globally notable, they can be essential at local levels. That is why it is critical for policymakers to consider traditional crops before they disappear forever.

This situation could be improved by expanding the number of crops in Annex 1 to include a wide range of neglected and underutilized species. Realistically

Bambara groundnut – a neglected highly nutritious pulse from sub-Saharan Africa





Self-help group from Tamil Nadu State, India

PHOTOGRAPH

however, the Treaty is only just starting to feel its way forward with the 64 crops in Annex 1 and it is not yet ready to take on thousands of additional, neglected crops. Additionally, it might be argued that locally important crops are outside the scope of the Multilateral System set up by an international treaty. However, a policy framework could be developed that could work in parallel to the Treaty and cover the conservation and sustainable use of neglected and underutilized species.

There is a major need for a concerted effort to raise awareness of the importance of neglected and underutilized crops for both nutrition and poverty alleviation. This, accompanied by information about their perilous situation, should encourage national governments to support their conservation. At the same time, conservation and development of traditional crops could be factored into poverty reduction strategies along with national legislation or policies that recognize the value of traditional crops and food.

The way forward: areas for action

It cannot be said strongly enough how crucial it is to ensure that neglected and underutilized species find a place of their own. We need to have government and private sector commitment and the support of the world's consumers to work toward the type of multilateral policies and programmes that will establish a supportive system of collaboration to conserve them and facilitate their use.

There is a possibility that these crops will become even further marginalized by the conservation and use systems being set up for more mainstream crops. We cannot let that happen.

Action is needed in the following domains:

- **Safe guarding traditions and local knowledge:** Widespread erosion of local traditions and knowledge is the root cause of the loss of hundreds of species worldwide. Such a loss can be stemmed with appropriate interventions such as proper and timely documentation of indigenous knowledge, empowerment of local communities to increase their self esteem, and recognition that their identity and culture also are maintained through the continued use of local species.
- **Conservation of genetic diversity:** Ups and downs in the popularity of a crop are a common feature in crop usage patterns over time. The ultimate appreciation of a crop by people is the result of several factors such as the utility of the crop to satisfy specific needs, convenience provided by the crop compared to competitors, fashion trends, and people's cultural and historical background. The loss of genetic diversity should be prevented through proper conservation measures *ex-situ* (seed gene banks or field collections) and *in-situ* (on farms and home gardens).
- **Supportive research:** The various values of crops (economic, nutritional, medicinal, cultural, etc.) call for greater attention by research and development communities. However, detailed studies to provide scientific and empirical evidence are needed to better substantiate and advocate for the conservation and sustainable use of these species and hence contribute to their valorization over time, helping to create synergy among the agriculture, health and the environment sectors.
- **Creating awareness:** Concerted efforts are needed to raise awareness of the importance of underutilized crops for both nutrition and poverty alleviation. Nowadays, consumers play a pivotal role in defining the level of use or neglect of agricultural biodiversity by initiating new trends in consumption or following trends promoted by the food industry or the media. Such a role can be strengthened by creating awareness of the value of these crops and their contributions to enhanced livelihoods.
- **Enabling policies:** The perilous situation faced by most neglected and underutilized species should encourage national governments to support their conservation. The conservation and development of underutilized crops could be factored into poverty reduction strategies along with national legislation or policies that would help communities make use of the potential of these crops.

Broadening the livelihoods of people

Global Facilitation Unit for Underutilized Species

A portal to people, projects and policy

The Global Facilitation Unit for Underutilized Species (GFU) was created in 2002 with funds from Germany, under the umbrella of the Global Forum on Agricultural Research (GFAR). It serves as a one-stop clearing house to bring together interested specialists and share up-to-date information on neglected and underutilized plant species.

Through its interactive Web site, portal, newsletter, accessible databases and awareness-raising activities, the GFU has built a broad alliance of researchers, policymakers, agricultural producers and consumers. The GFU keeps them informed of new developments and opportunities in the field and provides constructive recommendations for creating legal and policy environments in which underutilized species can be better used for the benefit of the poor.

Often policymakers take no notice or are simply unaware of the fact that new policies and regulations in areas such as environment, health and trade as well as agriculture may have negative effects on underutilized species. For example, the European Union (EU) Novel Food Regulation, established for consumer protection, declares that any foods not imported in a significant way before 1997 must undergo analyses to prove their safety, which, of course, is cost-prohibitive for niche products using traditional species from developing countries. Thus, with its partners, GFU has drawn up suggested amendments to the regulation that would make export of minor crops into the EU more affordable.

GFU also sets up displays, makes presentations and organizes side events at national and international meetings that illustrate the positive results such crops could have for the livelihoods of poor communities. A GFU display of commercial products made from underutilized crops by niche producers in the developing world – such as shoes and clothing made from Manila hemp and bottled fruit juices from the Amazon – shows the potential commercial viability of these crops and their products.

Currently, the GFU online databases provide access to information about more than 300 species, as well as information on hundreds of experts, institutions, projects and financing opportunities. As a multi-institutional initiative of GFAR, Bioversity International, International Fund for Agricultural Development

(IFAD), UN Food and Agriculture Organization (FAO), International Centre for Underutilised Crops (ICUC) and the German Federal Ministry for Economic Cooperation and Development (BMZ), GFU calls on its partners' expertise and identifies best practices for tapping the potential of promising species, evaluating marketing opportunities, developing guidelines for underutilized species value chains and, through partnership with Wageningen International (WI) and Bioversity International, designing appropriate training activity opportunities.



Neglected No More: IFAD-Bioversity project

UN-supported initiative to develop neglected and underutilized species

Simply helping to save plants from extinction is not enough. It is also critical to find the ways that those plants might also help people. “Neglected no more”, an IFAD-supported project for enhancing the contribution of underutilized crops to food security and rural income, takes a 360-degree view of minor species, but always with people at the centre of the picture.

The first phase of the project (2002 – 2004) sponsored dozens of activities to raise the visibility of neglected species, constituting the most comprehensive effort to date to enhance their use. The second phase, now underway, is looking at the cultural aspects of traditional plants and how they can help raise the self esteem and pride of local communities.

From its beginning, the project worked to identify important traditional crops and then to increase opportunities for improving their production, processing and marketing. Something as simple as asking women to share recipes for traditional dishes and then publishing them in a book provided an opportunity to promote the use of Andean grains and millets. The project also worked with the Egyptian Ministry of Agriculture to construct a greenhouse for mass-producing seedlings of medicinal and aromatic plants and, as a result, local farmers gained access to new planting materials of underutilized species. By organizing biodiversity fairs to celebrate farmers who maintain a diversity of traditional crops on their farms, the project gave farmers the opportunity to exchange materials among themselves, further spreading the on-farm use of the crops.

The first phase of the project, with partners in places ranging from the Andean region to South Asia, included scientists, NGOs, universities, research organizations, regional networks, farmers’ associations, women’s associations and private companies. The global scope of activity created an unprecedented opportunity for cross-regional exchange of experiences. Through synthesizing and distributing information gathered through the regional activities and sponsoring policy seminars to review and develop new cultivation standards for grains, the project has raised visibility of underutilized species at local, national and international levels.

Building on this success, IFAD is now funding a second phase of the project to determine if the methodologies developed in the first phase are viable in other sites and communities. The second phase also will look at how awareness of the importance of traditional plants can increase self

esteem and empower local communities. For example, women are often marginalized in traditional communities, but when they are given the opportunity to work on crops they know very well and share information on their care and use, it gives them a feeling of pride in their knowledge and skills. At the same time, promoting new opportunities such as ecotourism will raise the visibility of local traditions and local foods, making them a source of community pride.



Community members in Puno, Peru, participate in a training session to learn about organic practices for Andean grains





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GFU is a Global Partnership
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Bioversity International was an initiating
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