

# NEGLECTED AND UNDERUTILIZED SPECIES

## Potential and Importance for Sustainable Food and Nutrition Security

### Overview

Rural populations in developing countries face food insecurity and malnutrition despite being often surrounded by extraordinary biodiversity, including neglected and underutilized species (NUS). In developing countries, low quality monotonous diets are common and the risk of micronutrient deficiencies is high. At the same time, global supply of food energy is dependent on only a small number of cultivated species. Food Security is often seen as the amount of energy available from staple food production, but the quality of diets in terms of nutrients and food components is not taken into account. The international community increasingly recognizes the role of agro-biodiversity and NUS in their contributions to Sustainable Food and Nutrition Security (SFNS). The integration of NUS in development projects can contribute substantially to SFNS in numerous ways.

### NUS can...

- **Serve as safety net in times of food shortage**
- **Contribute to resilience against food insecurity**
- **Improve the nutritional status of poor households**
- **Generate income**
- **Reduce yield risks due to higher resistance to environmental stress**
- **Contribute to empowerment of women**
- **Strengthen and reinforce cultural identity**

In the framework of Welthungerhilfe's Strategy 2012-2016 with the primary goal of improving SFNS, the conservation and promotion of NUS should be part of an integrated approach for combating malnutrition in all its forms. NUS contribute to SFNS through all four dimensions: As they are growing wild or semi-domesticated, they are available independently of harvest or market con-

### 1. What are "Neglected and Underutilized Species (NUS)"?

NUS are species to which little attention is paid or which are entirely ignored by agricultural researchers, plant breeders and policymakers. Typically, NUS are not traded as commodities. They are wild or semi-domesticated varieties of legumes, grains, fruits, vegetables and mushrooms, as well as non-timber forest species adapted to particular, often quite local, environments. Many of these varieties and species, along with a wealth of traditional knowledge about their cultivation and use, are being lost at an alarming rate. The term "orphan crops" also applies to this description. But also wild animal foods such as crabs, snails, insects or fish can contribute tremendously to SFNS.

### 2. Why do NUS receive more attention recently?

Over the last ten years, an increasing number of projects have directed their attention to the significance of NUS in improving SFNS. At present, only 150 out of the 30,000 ever identified edible plant species are commercially cultivated. Just four of these (rice, wheat, maize and potato) account for 60% of the human energy supply. The current over-reliance on a handful of major staple crops has inherent agronomic, ecological, nutritional and economic risks and is unsustainable in the long run. Agriculture and the food industry have made remarkable advances in the past decades. However, their development has not fulfilled health and nutritional needs, and moreover they have generated substantial losses in agricultural biodiversity.

Simultaneously, several regions are experiencing unprecedented weather events caused by climate change and habitat depletion, in turn putting at risk global food and nutrition

security. Recent climate change assessments have identified low levels of adaptive capacity as one of the main drivers of vulnerability in Africa. This coincidence of food crises with increasing environmental degradation suggests an urgent need for novel analyses and new paradigms. Wider use of today's NUS provides more options to build heterogeneity into uniform cropping systems and will enhance resilience to environmental stress.

### 3. Examples for NUS

The following plants are examples for NUS that grow close to people's homes and can help, amongst other interventions, to improve nutrition, increase incomes and improve agroforestry systems. They deserve wider attention in project interventions.

#### 3.1 Moringa (*Moringa oleifera*)



Picture 1: Leaves of the Moringa Tree (Source: Bioversity International)

Moringa is potentially one of the Earth's most valuable plants. In addition to serving as a reliable source of diverse foods, the tree provides lamp oil, wood, paper, liquid fuel and skin treatments. One of the most innovative uses has been the treatment of water. The tree comprises four different edible parts: pods, leaves, seeds and roots. The pods are popular because of their taste and high values of protein, minerals and vitamin C. The leaves contain high amounts of vitamin A, C and more calcium than most other greens. Due to the high iron levels, doctors prescribe them for anaemic patients. Moringa is widely used in Africa and many countries in Asia and should be further promoted.

#### 3.2 Bambara Groundnut (*Vigna subterranea*)



Picture 2: The Bambara Groundnut (Source: FAO)

The origin of the Bambara groundnut is West Africa and the region of cultivation is Sub-Saharan Africa's warm tropics. It represents the third most important grain legume in semi-arid Africa. Bambara Groundnut has a variety of uses. The seeds can be processed and blended into many traditional African dishes. In West Africa, the nuts are eaten as a snack, roasted and salted, or as a meal, boiled similar to other

beans. The high protein level (similar to legumes) makes this groundnut not only a low cost cash crop for subsistence farmers, but also a valuable weapon in the fight against protein-energy malnutrition. Likewise other legumes Bambara groundnut provides good quality protein to poor families who cannot afford animal protein sources.

#### 3.3 Safou (*Dacryodes edulis*)



Picture 3: The Safou fruit (Source: FAO)

Native to the forests of West and Central Africa, Safou is known as the "butterfruit" for its rich and oily pulp. It is quickly becoming an important cash crop for small farmers in Africa and has proven useful in both agroforestry and preventing hunger. When boiled for a long time, a healthy oil, made primarily of unsaturated fats, can be extracted from the pulp and seeds. Moreover, Safou is high in protein, vitamins and minerals. It thus offers a great potential to help alleviate hunger and malnutrition.

#### 3.4 Parkia Biglobosa: Source of "Local Maggi"



Picture 4 African Locust tree - Dawadawa/Soumbala

*Parkia biglobosa* (African locust bean, Néré) is a perennial leguminous multipurpose tree native to West Africa with a height up to 25 m. Mature pods contain up to 30 seeds which are fermented to make "dawadawa" or "Soumbala" balls, a black, strong-smelling, tasty seasoning food. Small amounts are crumbled during cooking into traditional soups and stews ("local maggi"). Dawadawa is rich in high quality protein, fats and vitamin B2, and therefore its use is promoted for improved supplementary food for young children. The leaves of the tree are sometimes eaten as vegetable after boiling and mixed with other foods. Young flower buds are added to mixed salads. Roasted seeds are used as a coffee substitute. The mealy pulp from the fruits is eaten or is mixed with water to make a sweet and refreshing drink that is rich in carbohydrates and vitamins. Unfortunately, in the past years, likewise other traditional foods, the use of Dawadawa has increasingly been replaced by industrialized "Maggi cubes" with a low nutrient value but which are associated with



“modern“ lifestyle. The promotion of traditional foods thus contributes to not only to improved nutrition but at the same time protects the ecologically valuable trees often growing in farmers fields and strengthens traditional culture.

### 3.5. Other examples

- **Quinoa**, a grain crop native to the Andean region, was first domesticated 3,000 to 4,000 years ago for human consumption, is regarded as “Super food “ due to its high content in essential amino acids. The grain is a good source of dietary fiber and phosphorus and is high in magnesium and iron and calcium, t
- **Underutilized pulses and legumes**, i.e. pigeon peas, velvet beans, moth beans, rice bean, Kikuyu bean etc. providing good quality proteins, are often drought resistant and well adapted to harsher weather conditions.
- **Indigenous roots and tubers** especially in forest areas such as yams, taro, Cocoyam, edible canna, etc. provide good sources of carbohydrates, proteins and micronutrients.
- Hundreds of varieties of **indigenous green leafy vegetables** worldwide such as Amaranthus, Kale, Spinach, Cassava leaves, Sweet potato leaves, Watercress, etc. are good sources for Vit. A, C, and K. and can be used to overcome malnutrition especially micronutrient deficiencies, cheaply and permanently
- **Minor millets** in India (ginger millet, little millet, foxtail millet, barnyard millet, proso millet and kodo) are reliable crops and thrive under difficult conditions; they are very high in nutrients and have a low glycemic index.
- **Tropical fruits** such as Mango, Tamarind, Malabar Tamarind (Garcinia), Rambutan and Citrus grown in Malaysia, India, Indonesia and Thailand, have been successfully promoted through improved management and conservation of tropical fruit tree genetic resources; propagation, value addition of local food culture, marketing local food culture and product diversification, as well as enhancing farmers incentives to maintain these species on farm.

## 4. The various potentials of NUS for SFNS

NUS offer tremendous opportunities to improve people’s diets and to strengthen the potential for income generation not only for farmers, but also for all the other actors engaged in the associated value chains. Many of these foods are highly nutritious and offer tremendous opportunities to enhance food security and nutrition, stem the dangerous decline in biodiversity and improve livelihoods for rural people. The use of indigenous food resources empowers indigenous communities - women in particular, reaffirms people’s identity by placing a value on traditional food and the associated culture, and makes agricultural production and livelihood systems more resilient in the face of climate change.

### 4.1 NUS as a safety net

Often known as “famine food”, farmers have returned to and relied on NUS throughout history whenever major staple crops have failed. NUS can provide a safety net during periods of stress, following disasters and other emergencies. This was demonstrated in several Asian countries following the

2004 Tsunami and in West Africa and other regions following drought, war and civil strife. Another category of NUS, non-timber forest products (NTFPs), receives attention in strategies to alleviate poverty in forest margin or forest dwelling communities. NTFPs include fruits and nuts, vegetables, fish and game, medicinal plants, resins, essences and a range of barks and fibers such as bamboo. Because often NTFPs have low cash values and are consumed within communities rather than offered for sale, they provide nutritious food in times of shortage as an important safety net.

### 4.2 Income Generation from NUS

Several studies and projects have highlighted the consistent contribution of NUS to generating income in both domestic and international markets. Vegetables in general are of considerable commercial value and therefore an important source of household income. A few NTFPs already have a commercial value, contribute significantly to rural cash incomes and are entry points for rural development strategies. These include rattan and bamboo, resins, various fruits and nuts, and medicinal plants.

### 4.3 NUS and Nutrition

Underutilized vegetables and legume crops are an essential source of vitamins, minerals and proteins, and thus a valuable component to attain nutritional security. According to analyses in several regions, the concentration of certain nutrients was significantly higher in local underutilized vegetables than in exotic vegetables. The consumption of traditional leafy vegetables (‘wild or leafy greens’) as an important source of micronutrients is attracting a great deal of attention, notably in the tropics. Often they provide rural poor with most of their daily requirements of essential vitamins and minerals, particularly folate, and vitamins A, B complex, C and E. In many cases they also have medicinal properties and form part of local health care systems. What is known of the nutritional composition of bush meat suggests that these provide an equivalent or even greater quality than domestic meats with less fat and more protein. Additionally, NUS provide flavouring in local cuisine. Dietary diversification is widely accepted as a cost-effective and sustainable way to improving malnutrition in all its forms. NUS constitute the bedrock of the diversity in traditional and indigenous food systems.

### 4.4 Resistance of NUS to Environmental Stress

Although NUS characteristically have lower yields than the main staple crops, they often compensate for this by being more resistant to environmental challenges and providing dependable harvests in unfavourable climatic conditions or on difficult soils. This adaptive capacity is one of the key traits of many NUS. They are often grown in poor areas where difficult agro ecological conditions predominate, and where smallholder farmers do not have the means to adopt the high-input agricultural practices geared to major staple crops. Traditional varieties are often best adapted to marginal ecosystems and heterogeneous environments, and the most resistant to local pests and diseases.

### 4.5 Women Empowerment through NUS

Farming families in poor rural areas consume NUS and use them as medicine and source of income generation. In many areas and cultures, women are the main custodians of these crops and the associated traditional knowledge while men often concentrate on producing staple and commercial crops.

Promoting of NUS crops can therefore be particularly important for empowering women. Bioversity International (BI) also found that rural women play an important role in the conservation of agro-biodiversity. A recently concluded project, funded by IFAD, promoted sustainable conservation and use of NUS in India and Bolivia; it helped reduce processing times for quinoa and minor millets with the help of modern mechanical processing equipment, thereby encouraging women to reintroduce these nutritious crops into their families' diets.

#### 4.6 NUS and Cultural Identity

Increasingly it is being recognized that traditional food systems are intertwined with the cultural identity of indigenous peoples. Their knowledge of local ecosystems and food sources has evolved over generations. It is becoming clear that conserving traditional food systems is a powerful way to contribute toward saving local ecosystems, food sources and local gastronomic traditions. Moreover, NUS and related traditional knowledge can build and strengthen people's ownership and self-esteem.

##### The special Role of Forest Foods for SFNS

Forests and trees contribute tremendously to SFNS through the biodiversity that they harbor. Forest environments offer ample sources of animal (vertebrate and invertebrate) protein and fat, complemented by plant-derived carbohydrates from fruits, tubers and diverse options for obtaining a balance of essential vitamins and minerals from tree leaves, wild plants, mushrooms, nuts and other plant parts but also from honey, larvae, insects and wild animals. Globally, they tend to contribute only a small amount of caloric energy, but make an important contribution to diet diversity and nutrition.

Forest foods can make an essential contribution to combat "Hidden Hunger": A study on 21 African countries showed that children eat a wider variety of foods, esp. more fruit and vegetables, with increased tree cover. People eat more wild foods – including those from forests and trees – in seasons when other food is less plentiful. For many households, forests also provide important safety nets in times of scarcity.

Globally, forests hold up to 80% of terrestrial biodiversity, a repository of genetic resources that may prove crucial for adapting to climate change in the future. In addition, many forest ecosystem systems underpin food production. Wild foods today provide nutrients for millions of people, and forest ecosystem services and biodiversity are vital to sustainable

#### 5. LANN (Linking Agriculture, Natural Resources and Nutrition) in India - Promotion of wild foods

A study by Welthungerhilfe's partner organisation, Living Farms revealed an extremely high malnutrition burden in women and young children across 46 villages in a project area in Orissa State, India. More than 75% of the population depend on forests for their food and livelihoods: uncultivated food collected from forests, streams and other commons contributes approximately 35-45% to the total food basket around the year. In total 257 uncultivated food types consisting of fruits, leafy vegetables, birds, mushrooms, insects, rodents, seeds, roots and tubers, fish, crabs and oil seeds in different seasons were identified, documented and their consumption promoted. Elderly women contributed knowledge on traditional ways of preparation, cooking, processing and

conservation of these foods. Close collaboration with government officials ensured active participation in the campaign. As a result, diet diversity of households considerably improved and a strong sense of awareness for the value and protection of natural resources was created. Governmental rehabilitation programmes for malnourished children now include uncultivated foods for rehabilitation protocols.

#### 6. Recommendations and key actions

1. Include NUS in national and international strategies as well as in program development addressing malnutrition in all its forms.
2. Include indigenous vegetables and NUS into nutrition promotion activities in school health, school feeding and sanitation programmes, home gardens and the selection of recipes. Increase knowledge on nutritional benefits and cooking methods.
3. Establish national and regional inventories of priority NUS on which to focus.
4. Raise awareness of agronomic, ecological and nutritional benefits of NUS and the commercial opportunities they offer.
5. Support the development of value chains and small agribusinesses for priority NUS.
6. Strengthen collaboration and information sharing between research, extension, farmers and farmer organizations.
7. Increase support for conservation and active promotion of NUS on farms, in situ and ex situ, and strengthen systematic collection, storage and propagation of seeds.
8. Support research on NUS and their agronomic, environmental, nutritional and socio-economic contributions to SFNS as well as resilient production systems.

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