



# Agroforestry Network

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## AGROFORESTRY, FOOD SECURITY AND NUTRITION

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Malnutrition is a major global challenge, not least in the parts of the world that also suffer from poverty. At the same time, the climate crisis and other environmental changes disproportionately affect people in the Global South. Scaling up agroforestry can contribute to food and nutrition security, while contributing to more sustainable and resilient food production systems. This brief focuses on the role of agroforestry for food security and nutrition, including the importance of gender equality and recognition of indigenous and local knowledge and traditional crop varieties.

Today, malnutrition affects every country in the world (VGFSyN, 2020). Undernutrition and micronutrient (minerals and vitamins) deficiencies decreased during the first decade of the 2000s but have been on the rise again since 2015. Meanwhile, overweight and obesity have increased dramatically, with a rise in non-communicable diseases as one consequence (FAO et al., 2019).

It is estimated that over 820 million people in the world suffer from hunger (FAO et al., 2019). In sub-Saharan Africa, for example, this is exacerbated by numerous obstacles to producing and accessing diverse and nutritious food, for instance lack of water, loss of soil fertility and deforestation (Jamnadass et al., 2013). Moreover, many smallholder farmers are facing slowdowns in economic development. In times of crises, food diversity is often negatively affected by an increased focus on producing cheap and energy rich – but nutrient poor – staple foods, leading to increased food insecurity and malnutrition (FAO et al., 2019).

Providing sufficient amounts of nutritious food for healthy diets, produced from sustainable food systems, is urgent as the world's human population is projected to reach 10 billion people by 2050 (FAO, 2019; Willett et al., 2019). At the same time, global food production is one of the main drivers of global climate and environmental change (IPBES, 2019). Reducing the environmental impact of food production systems, as well as all forms of malnutrition, requires substantial changes to both food production methods and consumption patterns (Gordon et al., 2017).

Agroforestry is an agricultural practice that can complement insufficient food production and increase the biodiversity in existing agricultural systems by integrating trees and bushes on land used for crop production and/or animal husbandry. It is not a new practice: mixing trees and crops has been common throughout human history. Agroforestry can contribute to reduced deforestation and land degradation, combat climate change, promote biodiversity and support a multitude of ecosystem services, such as water regulation and soil fertility (Agroforestry Network, 2020). In addition, agroforestry increases farm resilience, provides smallholder farmers with more reliable livelihoods (Wilson and Lovell, 2016) and strengthens the resilience of vulnerable groups in times of crisis (e.g. Mbow et al., 2014). The benefits of agroforestry have been recognised in global policy and in a large number of international assessments and scientific studies (Wilson and Lovell, 2016; IPCC, 2019; IPBES, 2019).

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### DEVELOPING FRUIT TREE PORTFOLIOS

Around 74% of fruits produced globally are harvested from trees. Fruit trees integrated into agroforestry practices can provide year-round harvest of a variety of healthy nutrient-dense foods. In many parts of sub-Saharan Africa, however, fruit production and consumption are insufficient and often seasonal.

Scientists at World Agroforestry (ICRAF) have developed a way of creating 'fruit tree portfolios' which, in partnership with farmers, identify the species most suitable for local production (McMullin et al., 2019). The portfolio for western and eastern Kenya was developed to promote the integration of fruit into local food systems and reduce the challenge of seasonal availability.

The study focused on socio-ecologically appropriate and nutritionally important fruit tree species to meet local consumption needs, and includes 31 fruit tree species (9 native) on farms in western Kenya and 51 (27 native) in eastern Kenya. They mapped the diversity of seasonal farm fruit trees, and identified households' dietary differences, food consumption patterns and months of food insecurity. Using these parameters, ICRAF has developed context-specific recommendations involving the promotion of 11 fruit tree species for the management of micronutrients.

Adapted from ICRAF's blog post 'Fruit-tree portfolios' for nutrition and health: a new approach, author Rob Finlayson. Published October 4, 2019.

*"A sufficient intake of fruits can alleviate micronutrient deficiencies and reduce the risks of associated diseases."*

Stepha McMullin, World Agroforestry (ICRAF)

### **IMPROVED NUTRITION AND DIETARY DIVERSITY WITH AGROFORESTRY**

Today's food production systems could in theory provide enough calories per capita to feed everyone in the world (Searchinger et al., 2019; IPCC, 2019). However, the access to healthy diets with enough micronutrients to meet everybody's health requirements is a challenge. Agroforestry has the potential to contribute to a diversification of diets through increased production and availability of nutritious crops, fruits, nuts and leaves (Swallow and Ochola, 2006). In general, people on all continents need to increase their intake of fruits and nuts, whole grains, legumes and vegetables (Willett et al., 2019) as complements to staple foods like rice, wheat and maize. Many nutritious but currently

underutilised foods can be produced in and potentially promoted through agroforestry systems.

Tackling food insecurity and malnutrition requires an increased focus on food quality, for example by promoting diversified production systems such as agroforestry and other agroecological approaches. Policies that promote volume production of food need to be revised with a strong emphasis on securing nutritious produce, for example by promoting production of crops that are high in nutrients and not only high in yield (Gordon et al., 2017).

Traditionally cultivated crop species and varieties are often richer in nutrients, fibres and protein compared to conven-



Tree tomatoes. Photo: Linda Andersson

tional, high-yielding crops (Jamnadass et al., 2013). Such native varieties have long been harvested from forests by local indigenous communities, but in many places this practice is now threatened by deforestation (Seneviratne et al., 2015), as well as by farmers' preferences and what is considered marketable. Agroforestry offers a path where local knowledge and stewardship of these species and varieties can be reinstated and coupled with the production of other crops. Planting of indigenous fruit trees, for example, is increasingly seen as beneficial due to the high nutritional value of the fruits and especially as they tend to be appreciated by children (Styger et al., 1999).

In addition to improved biodiversity and nutrition, agroforestry can also contribute to higher yields and more diverse livelihoods for farmers (Agroforestry network, 2018). Whereas relying on a single crop increases the risk of food insecurity and singular income bursts, a diversity of crops can provide a more nutritious diet, close the hunger gap between harvests of staple crops, and create opportunities to earn a more stable income (Seneviratne et al., 2015). Moreover, the deep and extensive roots of trees make them more tolerant to drought than annual crops, meaning they can provide food in dry periods when other sources are not available. Agroforestry has also been reported to improve livestock health owing to better fodder for animals, resulting in for example increased milk production (Kiptot et al., 2014). Thus, agroforestry systems can both directly and indirectly contribute to food security and help fighting hunger and poverty.

Mixing trees and crops has been common throughout human history.

programmes are promoting homegardens to support food and nutrition security, but also to reach the country's climate mitigation and adaptation goals. For instance, the National Food Production Programme 2016–2018 had a strong focus on local food production and encouraged people to grow vegetables and trees in their backyards.

Similar types of agroforestry practices are emerging around the world. Still, knowledge gaps remain, regarding for example gender, water management and commercialisation, and policy decisions are often made without concrete research verification. The researchers conclude that to reach the full potential of homegardens, techniques for sustainable water and waste management combined with knowledge about nutrition and underutilised species are needed at farm level. Also, policy needs to provide an enabling environment for farmers to build small-scale businesses and engage in long-term planning.

### SRI LANKAN HOMEGARDENS

Homegardens are smallholder agroforestry farms that constitute a majority of the total annual crop and timber production in Sri Lanka, where a diversity of trees and crops are grown in multiple layers near the family dwelling. A review paper by Focali researchers (Mattson et al., 2018) shows that homegardens can offer year-round food and nutritional security at low-cost, particularly for people living in poverty, while sustaining numerous ecosystem services and promoting climatic benefits, such as fertile soils, water regulation, and carbon sequestration. Sri Lankan governmental



A homegarden in the dry parts of Sri Lanka. Photo: Madelene Ostwald.



Winfrida Gilbert Kezeta on her agroforestry farm near Serengeti Mara National Park in Tanzania. Photo: Viveca Mellegård

## GENDER, FOOD SECURITY AND NUTRITION

Globally, undernutrition amongst mothers and children contributes to 45% of deaths in children under the age of five. To make matters worse, maternal undernutrition, low birth weight and stunted growth during childhood increase the risk of being overweight in adulthood (FAO et al., 2019).

Rural women in developing countries often have a deep knowledge of the identification, collection and preparation of highly nutritious forest products that are important complements to agricultural staples (FAO, 2013). The gender differences in knowledge of specific natural resources are attributed to the traditional gender-related division of roles and responsibilities. Women often have highly specialised knowledge of forest ecology, including conservation practices as well as different uses of trees and non-timber products (FAO, 2013). With the main responsibility for childcare, women have also been shown to pay more attention to, and be more aware of the food and medicinal values of a species (Styger et al., 1999; Westholm and Ostwald, 2019). Their knowledge of different species, soil fertility and management can serve as a basis for designing and maintaining locally adapted agroforestry systems.

Inclusion and empowerment of women in agroforestry efforts can improve nutrition, health, and food security, and thus benefit local communities. There are certainly individual differences between farms, and both men and women hold rich knowledge and skills, but some gender-related patterns can be seen related to agroforestry. Men are often more interested in agroforestry for commercial reasons (FAO, 2013), while women tend to prioritise family needs, investing more in health, sanitation and education (FAO et al., 2015).

Women are often disadvantaged in access to, and control over forest and agricultural resources, as well as in access to financial resources (FAO, 2013). Therefore, increased involvement and empowerment of women is of key importance. If given the same resources as men, female smallholder farmers can increase their yields by 20–30% (Kiptot et al., 2014), and thus potentially reduce the number of undernourished people.

## RECOMMENDATIONS FOR POLICY AND PRACTICE

- Support the development of agroforestry and other diverse production systems, rather than single crop systems, in order to meet seasonal food needs, enhance the availability of more nutritious foods and increase farm adaptive capacity
- Bridge the disconnect between nutrition and agriculture by working across sectors and creating systems that have nutritional outcomes in focus
- Promote a shift of focus from quantity production to quality and nutritional content, incentivising producers to produce nutritious food crops and plant trees
- Advocate involvement and empowerment of women in agroforestry systems for improved food and nutritional security
- Develop site-specific interventions adjusted to local knowledge, preferences, needs and constraints
- Support documentation and revitalisation of local knowledge and domestication of indigenous species and varieties for agroforestry (including material for propagation/gene bank)
- Translate available knowledge, including nutritional values of fruits and nuts, into practical guidelines, recipes, etc. to encourage consumption of the food produced
- Increase research funding towards integrated solutions such as agroforestry and other agroecological approaches, including participatory and farmer led research to address nutritional, climate, livelihood and environmental challenges combined

**Women tend to prioritise family needs, investing more in health, sanitation and education.**

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Winfrida Gilbert Kezeta is preparing lunch – a mixture of maize and beans cooked together called “Githeri” in Kiswahili – on her agroforestry farm near Serengeti Mara National Park in Tanzania. Photo: Viveca Mellegård



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