FIELD GUIDE FOR FARMER FIELD SCHOOLS ON NUTRITION AND LOCAL FOOD PLANTS

This field guide is based on the document originally developed by the Sowing Diversity = Harvesting Security program (www.sdhsprogram.org) and its consortium partners after the General Methodological Workshop (2017) of Phase I (2014-2018). It is complemented by Farmer Field School experiences in Zimbabwe, Peru, Myanmar and Vietnam in Phase I, further extended by the Oxfam Novib team and revised by Phase II partners at the start of Phase II (2019-2022).

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Foreword

This draft document aims at providing a guideline for the development of farmer field school (FFS) curricula on nutrition and local food plants with a gender approach, which is the main part of the work on nutrition (third Pillar) of the "Sowing Diversity=Harvesting Security" Program (hereafter, SD=HS). SD=HS is a global program, currently implemented by Oxfam Country Offices and implementing partners in eight countries, namely the National Agricultural and Forestry Research Institute (NAFRI) and Agricultural Research Center (ARC) in Laos, Local Initiatives for Biodiversity, Research and Development (Li Bird) in Nepal, Asociación de Organizaciones de los Cuchumatanes (ASOCUCH) in Guatemala, Participatory Ecological Land Use Management (PELUM) and Eastern and Southern Africa Small Scale Farmers' Forum (ESAFF) in Uganda, Zambia Alliance for Agroecology and Biodiversity (ZAAB) in Zambia, Community Technology Development Trust) in Zambia and Zimbabwe, a local organization in Peru (in process of evaluation), and the Centre for Chinese Agricultural Policy (CCAP) and the Farmers' Seed Network (FSN) in China. SD=HS is coordinated by Oxfam Novib. The objective of the program's work on nutrition has been defined as: to strengthen coping strategies of communities by increasing the intake of nutritious food based on local biodiversity and improved management of local food plants (with a special focus on neglected and underutilized species, or NUS).

This document starts with an explanation of the FFS approach, followed by an introduction to the main concepts and topics related to nutrition, local food plants and gender. Then, the two levels in the FFS implementation process are elaborated: the first one is the preparatory work and capacity building at the level of the implementing organization, the second one regards FFS implementation at the community level. The four elements corresponding to the second level are elaborated under the following: (1) organizing a FFS, (2) FFS diagnostic and knowledge sharing activities, (3) curriculum preparation and (4) curriculum implementation, including reflections and lessons learned. Afterwards, the special topics are detailed. Finally, more detailed information on the capacity building at institutional level is provided.

As the reader will notice, the scope of the work on Nutrition and Local Food Plants is potentially very wide, and many crops and/or undomesticated plant species can be selected for FFS activities. Therefore, this FFS Guide provides a basket of options, from which trainers and FFS participants may select most relevant and attractive activities. In other words, this FFS Field Guide calls for adaptation to national and local needs and preferences. This FFS Field Guide complements and also shares some topics with the corresponding FFS Guide on Participatory Plant Breeding, published under the SD=HS aegis.

This field guide, as its name suggests, is intended to be used by facilitators (trainers)[1] whilst conducting FFS activities in the field. It has been made as concise and practical as possible. It includes elements especially relevant for the Training of Trainers (ToT), which discusses topics that facilitators of FFS need to familiarize themselves with prior to commencing the FFS cycle, and through later refresher courses.

[1] The persons trained to guide a FFS group throughout the FFS cycle are here called facilitators, and are equivalent to the trainers delivered by the Training of Trainers.

To develop this field guide, parts of the “Field Guide on Farmer Field Schools in Lares: the role of women in nutrition, conservation and use of neglected and underutilized species”, prepared by Asociación ANDES (Peru) as part of the SD=HS program during Phase I (2014-2018), were used for two special topics. Also, the experiences in Zimbabwe, Vietnam, Myanmar and Peru, extensively documented with the help of our partners Community Technology Development Trust (CTDT), Southeast Asia Regional Initiatives for Community Empowerment (SEARICE), Metta Development Foundation and Asociación ANDES, have been included in this document. In addition, many unquoted sources of development and scientific literature as well as policy documents have been used in this Guide.

We are grateful for the funding support from the Swedish International Development Cooperation Agency (Sida) that funded the first and second phases of the program, and the Dutch National Postcode Lottery (NPL) that provided additional funding for the first phase of the program.

Acronyms

FAO	Food and Agriculture Organization of the United Nations
FFS	Farmer Field School
NUS	Neglected and Underutilized Species
SD=HS	Sowing Diversity = Harvesting Security
ToT	Training of Trainers

1. Introduction

The Farmer Field School (FFS) approach is rooted in the conviction that the strongest way to learn is through experience. The FFS is therefore not about "teaching" farmers. It is about facilitating exercises and experiments by and with farmers in which they make their own observations and draw their own conclusions, and about assisting farmers by providing external support, materials and technical capacity where needed, through the involvement of public research institutions and government agencies. In FFS, local knowledge and skills are respected as the strongest foundation on which to build new knowledge and skills. Most importantly, this new knowledge is developed in the FFS and owned by the farmers.

The FFS has the intention to be "holistic", in understanding that farmers are best motivated and will only remain committed to the FFS if it addresses issues that are closest to their livelihoods (the gut), that are intellectually interesting (the mind), and that are emotionally relevant (the heart). All participatory approaches need to address these motivational requirements.

These principles strongly contribute to the building of critical thinking and self-confidence, and to an increased capacity for experimentation and decision making. Farmers build their own knowledge by discussing and evaluating the status of nutrition in their community, by identifying, managing, cultivating and preparing food from the plants that may enrich their diets in affluent and lean periods of the year, and by analyzing and challenging how gender roles and responsibilities interfere with these activities. Farmers also become more aware of the structures in their societies that keep them poor and that form a threat to the sustainability of their work in managing their agro-ecosystems and utilizing plant diversity for their daily diets. Ultimately, the aim of this FFS is to link the work on the improvement of nutrition and on the conservation and utilization of agro-ecosystems and, in particular, neglected and underutilized species to strengthen the capacities of farmers and their communities so that they can contribute to social change.

1.1. Topics and concepts of the FFS on Nutrition and Local Food Plants

Why is it important and innovative to establish and implement FFS on Nutrition and Local Food Plants with a gender approach? Firstly, women play a key role in safeguarding the nutrition of their families. Secondly, it is often poorly recognized that a portfolio of local food plants is (potentially) available for the diet to diversify the food and nutrient sources of the family. Several local food plants, in particular neglected and underutilized species (NUS), are very rich in particular nutrients that might be absent from the staple crops in the diet, most notably cereals and legumes. Thirdly, gender relations and conditions mediate the relations amongst people, and between people and the environment, and these also determine the access, knowledge, values, use and management related to plant genetic resources. In particular, mainly women keep the knowledge to locate, identify and process wild food plants as well as to grow minor crops, including vegetables and fruits. In order to improve and ensure food and nutrition security, the FFS on Nutrition and Local Food Plants helps farmers to take a closer look at their diets and at the multiple links between nutrition, local food plants and gender, thereby contributing in particular to

the empowerment of women and the conservation and the sustainable use of a wide diversity of plant genetic resources. Some of these relationships between nutrition, local food plants and gender have been depicted in Figure 1 below.

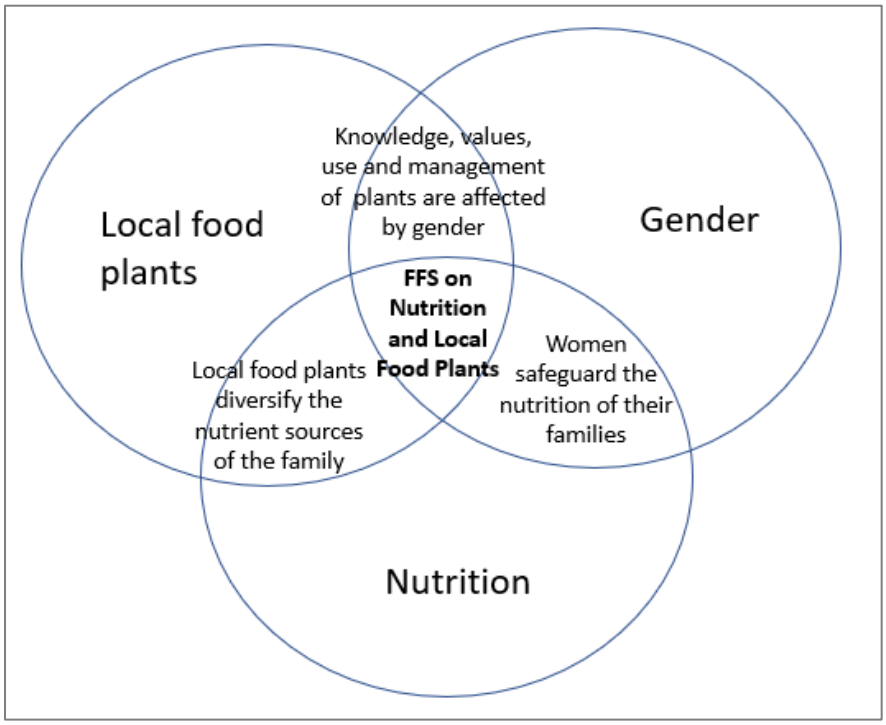

Figure 1: Intersecting nutrition, local food plants, and gender.

Ultimately, the FFS on Nutrition and Local Food Plants aims at contributing to the SD=HS objective on improving the quality and diversity of the diet, and reducing the length and severity of the food scarcity season.

Despite a range of interventions and action research initiatives on food and nutrition security, results from action research that looks at the role of traditional knowledge on locally-based biodiversity for nutrition are limited. SD=HS' work on Nutrition and Local Food Plants aims to contribute at resolving this shortcoming by designing methodologies that bridge traditional and technical knowledge, empower women and strengthen women-led networks of seed and knowledge exchange. This is with the purpose to improve nutrition and to develop coping strategies to cope with the food scarcity period by the use of local biodiversity, in particular NUS. FFS on Nutrition and Local Food Plants may play a key role in achieving this goal.

The FFS approach addressing Nutrition and Local Food Plants is highly participatory and interactive, and ensures the empowerment of farmers through experiential learning. In the FFS on Nutrition and Local Food Plants, farmers are facilitated to address the major problems that prevent local food plant consumption, ranging from disappearing knowledge to limiting social norms and changing food habits, in order to increase the use of NUS and other local food plants for the purpose of developing more diverse

diets and improving nutrition. The FFS model provides approaches, methodologies and tools needed to ensure that farmers are able to gather and analyze data, and draw their own conclusions, building on traditional knowledge systems and using new knowledge shared with them. Female farmers play a central and pivotal role in the FFS on Nutrition and Local Food Plants, but male farmers are engaged in the FFS processes as well to ensure that results of the FFS find their way sustainably into household decision making, family diets and food cultures.

The following sub-sections of this chapter will further introduce the three main topics of the Field Guide Nutrition and Local Food Plants.

1.2. Nutrition

Despite concerted worldwide efforts to reduce hunger, currently 795 million people approximately are undernourished (FAO figures 2015). In addition, more than two billion people are afflicted by one or more nutrient deficiencies (FAO figures 2012), caused by diets lacking essential vitamins and minerals required for proper growth and development, such as vitamin A, iron, zinc and calcium. At the same time more than 1.9 billion adults are overweight (WHO figures 2016). During the 2009 FAO World Summit on Food Security, therefore, it was clearly stated that food security cannot be achieved without adequate nutritional value in terms of protein, energy, vitamins and minerals for all household members at all times. The concept of food security changed into the concept of food and nutrition security.

Malnutrition remains one of the greatest global health challenges, and women and children are its most visible and vulnerable victims. Malnutrition is a broad term commonly used as an alternative to undernutrition but technically it also refers to overnutrition. People are malnourished if: (a) their diet does not provide adequate calories and protein for their growth and maintenance, (b) they are unable to fully utilize the food they eat due to illness, or (c) they consume too many calories (overnutrition). In all cases, malnutrition is closely linked to disease – as both cause and effect.

Poor health has major impacts on agricultural labor and, therefore, productivity. Ill health affects the rural household economy, not only due to a reduction of the income resulting from decreased yields, but also due to increased expenditures related to medical care or hiring of additional labor. Poor health also impacts on farmers' ability to innovate and develop new farming systems, which might be necessary for adapting to climate change. These trends particularly affect women, who are often both the primary producers and primary caretakers, and who suffer specifically from malnutrition.

There is strong evidence, mostly generated by economists, showing that eliminating malnutrition in young children in Africa and Asia can substantially boost the gross national product, prevent child death, improve school attainment, increase wages, and reduce poverty. It also indicates that well-nourished children – once they become adults – are more likely to break the inter-generational cycle of poverty.

What causes malnutrition?

Malnutrition is the insufficient, excessive or imbalanced consumption of food. Nutritional status is determined by three broad underlying factors: food, health and care. The first factor refers to availability of and access to sufficient, safe, nutritious and diverse food, in order to support healthy and active lives. However, only having plenty of healthy food available, accessible and utilized, is not enough. The second factor refers to the capacity to efficiently metabolize nutrient rich foods, which depends on (a) the health environment in terms of potential pathogens and environmental contaminants, (b) water quality, and (c) access to sanitation and health facilities. The third factor refers to caring practices, including child feeding practices at home, support and cognitive stimulation of children, and care and support to mothers during pregnancy and lactation. The overall underlying causes of malnutrition have been attributed to the socio-economic and political context in which people live, including in relation to land rights and access to resources.

Nutrition in the food scarcity period

Food security comprises four elements, namely availability, access, utilization and stability (FAO's definition, 2008). Availability refers to the supply side of food (has sufficient volumes of food been produced?); access refers to having the physical access to food (e.g. land entitlements or sufficient economic means to buy food); utilization addresses if the food consumed covers the necessary nutritional requirements for a healthy life; stability implies that the availability, access and adequate utilization of food is ensured throughout the year and at all times. However, for many people the availability of food is driven by seasonal cycles, and access to food is worsening particularly in the pre-harvest months. During this food scarcity period, household food stocks from the last harvest have begun to dwindle. This may result in food shortages within the local market, meaning that the food that is still available is sold at an inflated price.

During food scarcity[2] periods the nutrition security of the family is at stake. Rural households are forced to resort to a number of coping strategies to deal with food scarcity, such as reducing the diversity and quantity or number of their meals, which may result in macro- and micronutrient deficiencies. Other strategies such as mortgaging or selling the land and other household assets result in further spiraling into poverty. The psychological effects of these challenges are intense, as all family members often experience high levels of anxiety and stress during this period. Women are especially affected, as their responsibilities often comprise food production, income-generating activities and care for other household members (including food preparation). The challenges experienced at specific periods of the year generate seasonal patterns of hunger and undernutrition, which can nowadays be aggravated by climate change. However, seasonal hunger tends to be overlooked by statistics and policy makers, and may only get attention during natural or human-made calamities. Increasing the availability and access to nutritious local food plants, particularly during the period of food scarcity, is a key SD=HS intervention to ensure the food and nutrition security of Indigenous Peoples and Small-Holder Farmers (IPSHF).

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[2] Scarcity refers to the absence of sufficient resources to support human needs. The Food and Agriculture Organization issues (FAO) guidelines establishing basic human caloric and nutritional needs for infants, children, pregnant women, and other adults.

What is nutrition-sensitive agriculture?

Nutrition-sensitive agricultural production seeks to maximize agriculture's contribution to the quality of the diet and hence to nutrition security. This strategy focuses on the multiple benefits derived from the value of diverse food for a nutritious diet, health and productivity. Agriculture and nutritional values are very closely interrelated, and local food plants, specially NUS, can be at the center of this interface. For instance, intercropping nutrient-rich vegetables in a cereal field can improve the diversity and quality of food that is produced and consumed at the household level, saving cash income for other purposes. NUS can also be sold. Also, good agricultural practices increase yield, which in turn increases the income that can be spent on quality food.

Interventions that aimed to contribute to improved food security have generally focused on ways to increase agricultural production and productivity of staple crops (often cereals) and commercial cash crops. While enhanced agricultural productivity of staple and commercial crops is important, merely producing more food, or improving market access to sell surpluses, does not automatically lead to food security or improved nutrition status. Likewise, increasing farmers' income does not automatically lead to improved well-being of family members in terms of nutrition, health, and care. In our perspective, it is necessary that farming systems enable and ensure an adequate, nutritious diet of all members of the rural family, including by the incorporation of NUS.

1.3. Local food plants

Local food plants are plants known and/or used by local communities as food. Local food plants include a wide range of species, ranging from domesticates (staples and minor crops), to semi-domesticated species and wild food plants. Local food plants not only grow in agricultural fields (where they can grow e.g. as crops or weeds), but also in multiple environments such as home gardens, roadsides, aquatic ecosystems and forests. The diversity of local food plants plays a key role in diversifying the diet and the consumption of a wide array of nutrients for rural households. The knowledge of local food plants is held by IPSHF, and is to a large extent related to the biodiversity of their surrounding environments. NUS are a key component of local food plants.

Local food plants are an important component of agrobiodiversity or agricultural biodiversity. Agrobiodiversity is a broader concept, which – according to the FAO (1998 definition) and CBD (COP 5 Decision V5) – not only includes local food plants and animals consumed as food, but also non-harvested species in the farming systems and surrounding environments that support the production of food (e.g. soil microbiota and pollinators).

1.3.1. Neglected and underutilized species (NUS)

From approximately 30,000 edible plant species that have been identified by humankind over time, and more than 7,000 that have been consumed as food during the history of humanity, nowadays only 30 crops account for 95% of human food energy intake, four of which (rice, wheat, maize and potato) cover

60% of our caloric needs. However, our global plant kingdoms host plenty of edible plant species with a high potential to diversify our diets, to address main nutritional requirements and shortcomings, to mitigate risks in agricultural production, and to provide rural households with additional income from the commercialization of the NUS at their disposal, while strengthening the cultural identity of the producers. In particular, NUS have been defined as useful plant species that consist of a large group of domesticated, semi-domesticated and wild edible species, which are "marginalized, if not entirely ignored by researchers, breeders and policy makers", according to the NUS expert Stefano Padulosi.

The scientific and commercial lack of interest in NUS mainly exists because the people, for whom these species are particularly important, are marginalized. People who grow and utilize these crops and wild species are often impoverished. The SD=HS program has elaborated the NUS concept into a working "definition" consisting of the following elements:

- NUS are important to the food and nutrition security of IPSHF, particularly in relation to women's integrated biodiversity management strategies (addressing plants occurring under *in situ* conditions)
- NUS are part of people's cultural identity and their use is embedded in traditional social relations and knowledge systems (e.g. folk taxonomy, collection, management, processing of NUS); NUS often have multiple uses for human well-being (e.g. food, medicinal and spiritual purposes)
- There is little or no research, commercial interest or interest for *ex situ* conservation of NUS species
- There is lack of technical knowledge, availability and access to seeds and other plant parts for the propagation and multiplication of NUS
- NUS include domesticated, semi-domesticated, and wild species
- NUS are often adapted to local environmental conditions, i.e. produced in traditional agricultural systems or gathered in marginal areas; thus they may be sourced from a diverse range of anthropogenic and non-anthropogenic environments: e.g. on-farm (agricultural fields, agroforestry and silvo-pastoral systems, fallow fields, home gardens), grasslands, forests, wetlands, riversides, mangroves, and roadsides.

The concept of NUS is bound by time and space. What is considered a NUS now, can be a commercial food crop in the future. Crops such as rucola, quinoa and teff have gone through these stages. A currently or recently common crop can lose the interest of its growers and users, and over time become a NUS, as happened to many local vegetables worldwide.

The concept of NUS is also culturally defined as it originates from the global scientific community. Local farmers and FFS participants may have difficulties in grasping the meaning of the term or in grouping certain crops and plants under NUS, primarily since some of these (domesticated) crops and (wild) plant species do play a recognized role in their farm lands and food systems. What is a NUS to the scientific community may not be a NUS in certain communities, and what is foreign and therefore underutilized in some communities may be major crops at the global level. To escape from this complex situation, we do regard all plants that play an additional and often minor role in local agriculture and food systems as potential topics for experimentation in the context of the FFS on Nutrition and Local Food Plants.

However, as soon as activities take the form of crop variety selection and improvement this will be included in the FFS on Participatory Plant Breeding, which is supported by an specific FFS Field Guide.

Three groups of actors play a role in the neglect and underutilization of NUS: scientists and policy makers, private sector, and local farmers. For example, a local type of legumes that is widely cultivated in specific communities but is uncommon in other parts of the region and the country is apparently not neglected by all local farmers but may be neglected by policy makers. Small grain cereals (e.g. pearl millet and sorghum) are not neglected by local farmers in the drier zones of Zimbabwe but may be neglected by urban markets. In this context it is important to distinguish between different types and levels of markets, i.e. the local, national and global markets. Some NUS are present in local markets, very few may occur in national markets, whereas none are key commodities in global markets.

1.4. Gender, food and nutrition

Unlike sex which is biologically determined, gender is a social construct that "defines what it means to be a man or woman, boy or girl in a given society – it carries specific roles, status and expectations within households, communities and cultures", according to the CARE International Gender Network. Gender not only mediates the interactions of humans amongst themselves but also with their environment, including the rules governing the access, use, knowledge and management of natural resources. In many cultures there are big gender inequalities in relation to the access and control of resources, including land and food, with major consequences for the nutrition of women and children. Therefore, gender inequality is a key issue, as many societies are organized in a way that the right to own property and productive assets are biased against women, and usually traditions, cultural norms and law reinforce their marginalization.

For example, the State of Food Insecurity in the World published by the FAO in 2013 highlighted that only five per cent of women farmers in a study spanning 97 countries have access to extension services, and only 15 per cent of extension agents are women. Yet, despite the wide-spread lack of formal education, women are often custodians of agro-ecosystems, soil, water and seeds as well as traditional farming practices. There is strong evidence that empowering women contributes not only to their own food and nutrition security, but even more to that of their families. However, it is also important to raise levels of knowledge and awareness about nutrition among men and boys at household and community levels, in order to ensure that the empowerment of women is sustainable.

The four elements of food security form a useful entry point for a gender analysis in relation to food and nutrition:

- Food availability. Women – and often girls – bear major responsibilities in all aspects of agricultural production, processing and distribution, food preparation, and fuel and water collection, which directly contribute to food availability.
- Access to food. Women's productive capacity is often undermined by their lack of access to production factors such as land, seeds and/or credit; in addition, low literacy and numeracy rates

among women increase the likelihood that women farmers are excluded from agricultural and other training activities. Even when food is available and affordable, gender inequalities regularly affect its equitable distribution within the household.

- Utilization of food. The varying needs of girls and women across their life cycle for specific nutrients and additional calories during childhood and adolescence, pregnancy and breast-feeding, and during menopause, are often ignored.
- Stability of food systems. Food systems are governed by global macroeconomic processes and many suffer from environmental degradation, which disproportionately affects women.

In order to obtain a broader insight into the relations between gender, food and nutrition, it is necessary to take into account the perspective of the Right to Food in the 1948 Universal Declaration of Human Rights, which not only emphasizes that the access to nutritious food is a human right, but also that food has to be acceptable within a given culture. Under agreed international law, governments are bound to respect, protect and fulfil the right to food. This implies that they have the obligation to ensure that all individuals, including women and children, landless people and indigenous peoples, have sufficient access to nutritious food, as well as full and equal access to economic resources, including the right to inheritance and ownership of land and other property, access to credit, natural resources, economic opportunities (including decent wage and employment) and appropriate technology, enabling the access to food; and take measures to eliminate discrimination against women in rural areas to ensure that they fully participate in and benefit from rural development.

Discrimination of women is often the result of social norms and customs, linked to certain stereotypes about gender roles. Discrimination is reflected in women's unequal bargaining position and uneven division of labor within households, as well as women's marginalized role in decision-making at all levels. Discrimination of women also often impacts the Right to Food of their children, thus affecting their nutritional status, physical and mental development, and incomes when becoming adults. The types of discrimination that women and girls face are interrelated (Figure 2) and each type directly affects their Right to Food. The roots of women's marginalization are structural, and include the inequal right to productive assets, often enshrined in law, and supported by tradition and culture.

It is an urgent need to elaborate and implement the Right to Food in a truly gender-transformative way that does not only note gender inequalities but also challenges and attempts structures in order to remove these, often through social reform. According to Olivier De Schutter, this involves tackling discrimination against women, encompassing four complementary requirements:

- Relieving women of the burdens of the "care" economy, so they will have more time for accessing economic opportunities, thereby enhancing their economic independency and strengthening their bargaining position in the household;
- Empowering women and subverting the gendered division of roles, which implies a transformation of existing gender divisions by redistributing duties within the household to achieve full equality;

- Mainstreaming gender sensitivity, so that all public policies that address food security safeguard that greater attention is paid to women, and that women's insights are central to the design, implementation and evaluation of intervention programs;
- A multi-sectoral and rights-based strategy, where ministries of health, education, employment, social affairs and agriculture all measure progress using indicators based on the normative components of the Right to Food and disaggregated by ethnicity, age and gender.

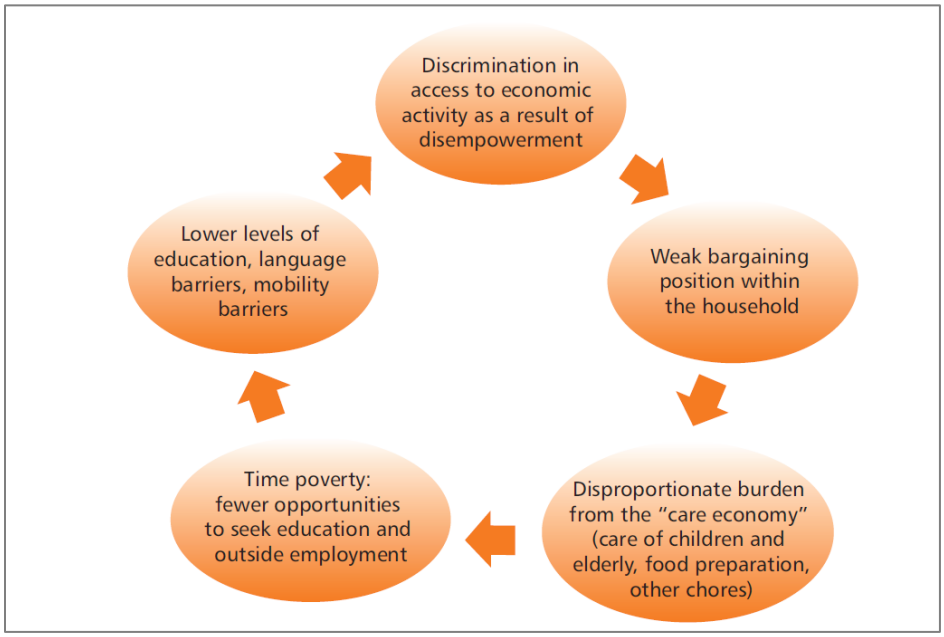


Figure 2: The cycle of discrimination faced by women (Report submitted by the Special Rapporteur on the Right To Food, Olivier De Schutter)

SD=HS aims to encourage women not only to use the right to food as a key advocacy tool to hold national governments to account, but also to embrace and realize the right to food through the exercise of their power. The FFS aims to build critical and empowered women to participate in the task of social transformation, in addition to addressing the challenges of food and nutrition security and the better use of agrobiodiversity for their diets.

2. General overview of the FFS on nutrition and local food plants

This document aims to guide the development of context-specific FFS curricula on Nutrition and Local Food Plants (i.e. specific to the regional context). Clarifying what the FFS on Nutrition and Local Food Plants aims to address, and building the human capacity to implement the FFS on Nutrition and Local Food Plants, as well as its operationalization, agreeing on its potential research and development foci, and its range of approaches tools and activities, form the topics for discussion at the first, institutional level. Clarity on the following issues below will be built up step-by-step in the actual implementation of the FFS on Nutrition and Local Food Plants (community level). The FFS participants will discuss:

- Which are the themes of the specific FFS on Nutrition and Local Food Plants
- Which research and development goals are set
- The activities and tools to reach those goals, taking into account that the FFS on Nutrition and Local Food Plants may encompass a wide range of activities, including agronomic and environmental ones (e.g. germination plots, field trials; mapping distribution of wild NUS), as well as cultural components (e.g. the development of recipes to be tested and ranked by food groups, gender roles)

To successfully undertake a FFS, two partly subsequent and partly parallel, closely interlinked "levels" in implementing the FFS on Nutrition and Local Food Plants can be distinguished: the first level is formed by the Training of the Trainers, and focuses on capacity building at the institutional/organizational level, the second level concerns FFS implementation in the community (Figure 3). It is important to clearly understand the distinction and interaction between the two "levels", so as not to confuse the activities at the institutional level with the activities of the actual FFS in the community. However, both are closely interlinked and interdependent. The first level is necessary to enable the second one, which is the central activity.

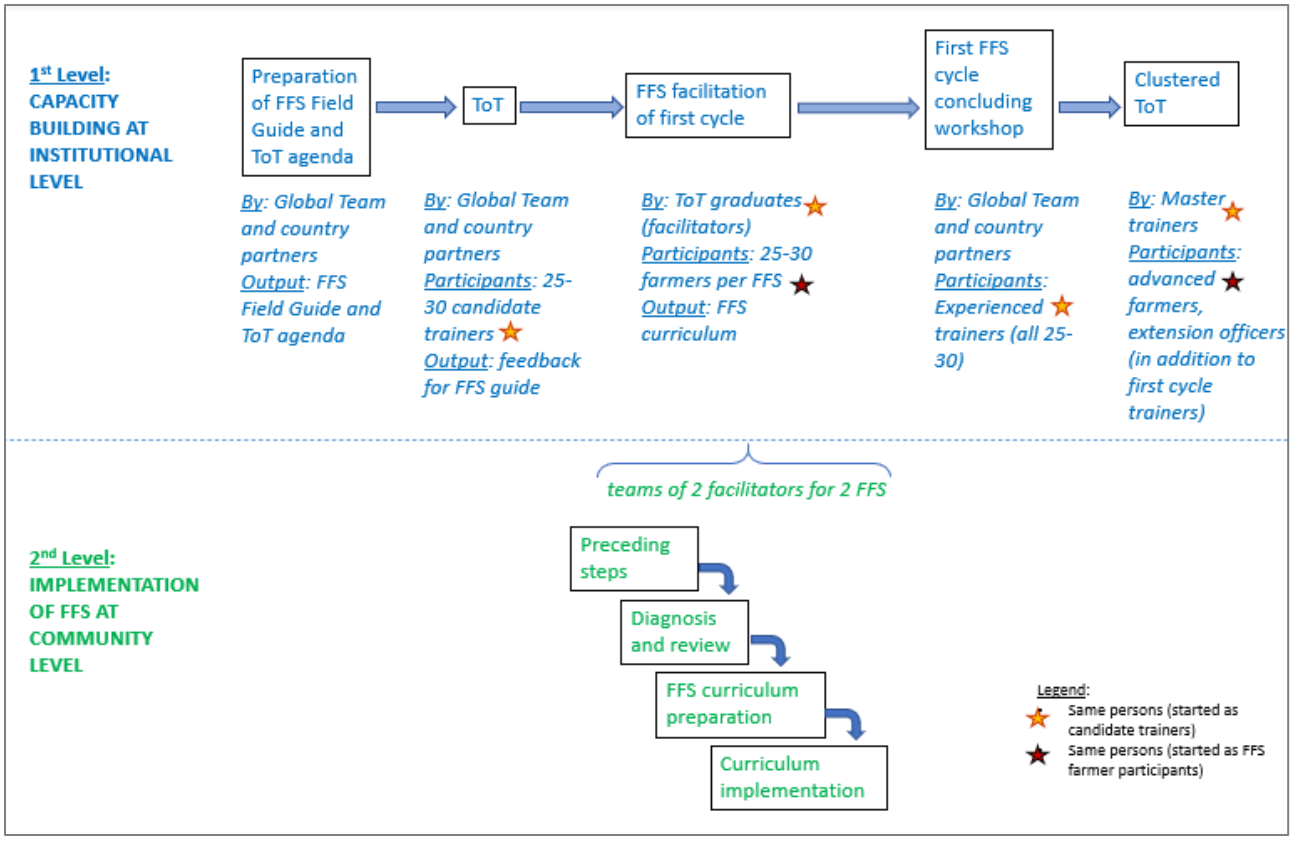


Figure 3: The two parallel and complementary levels of FFS on Nutrition and Local Food Plants.

2.1. The Training of Trainers: capacity building at the institutional level

For easy reference and sourcing, all guidance referring to the Trainings of the Trainers in this guide is placed in boxes. All boxes are intended to be used by facilitators, and not to be presented to the participants during the FFS activities.

Box 1: Capacity building at institutional level

This level focuses on: (a) the understanding of the development theory of activities focusing on Nutrition and Local Food Plants, with a gender approach, as it needs information to be adapted to the conditions in each country; and (b) an understanding of the baselines on both local food plants and household diets that provide a context of food patterns in the community at the onset of the FFS. The ToT will further adapt and develop the FFS Field Guide through its own agenda and meetings. This allows the FFS Field Guide to be continuously improved and expanded based on the discussions in the ToT and on the experiences gained during the actual FFS implementation of FFS at the community level. Throughout this process, the adequate involvement of various key stakeholders such as community leaders, experts holding traditional knowledge on NUS, botanists and nutrition experts is a key for success.

The ToT forms the central preparation at the institutional level for the development of the FFS programs in the selected communities. The objectives of a ToT are thus – in addition to adapting a first draft FFS Field Guide - to create a first team of facilitators to guide a series of FFS on Nutrition and Local Food Plants at the community level, and to provide feedback on the current draft FFS Field Guide for the facilitators to use. The results of the baseline surveys will also help guide the first ToT on Nutrition and Local Food Plants. The next chapter will explain in more detail each of the steps to be set in developing the first level ToT activities.

Serious limitations may occur in developing the curriculum for the FFS on Nutrition and Local Food Plants. Whereas the FFS on Participatory Plant Breeding, which is focused on field crops, can rely on an established scientific background and on plenty of experiences and literature related to broader development goals, in the FFS on Nutrition and Local Food Plants we may deal with less knowledge, whether in relation to nutrition or to NUS.

In addition, the specific work plans chosen by the selected communities may diverge between communities, some focussing more on food preparation, while other communities may focus on the management and strengthened utilisation of local food plants.

2.2. The second level: FFS implementation at the community level

This is the central and most important activity, the actual FFS. The second level is prepared and enabled by the first level. The implementation of the FFS can be divided in four subsequent elements: preceding steps, the diagnosis and review phase (to ensure that the FFS will be based on farmers' priorities, real needs and their perceptions), curriculum preparation and curriculum implementation. The activities of the FFS will be determined by the needs and preferences of the participants as well as by the problems and bottlenecks that are identified during the FFS diagnosis and review phase; the nature of the bottlenecks determines the specific development and research objectives of the FFS.

The results and experiences of the FFS cycle will be the basis and reference for the FFS activities that will be conducted in the next FFS cycle. For instance, in the next cycle the FFS could be revised (new members may join and some members may leave, leadership positions may change), the diagnosis and review phase (or parts of it) could be revised or repeated in order to identify and address new challenges, and an adapted curriculum could be developed on the basis of these challenges. So, the FFS is highly dynamic and responsive in nature (Figure 4).

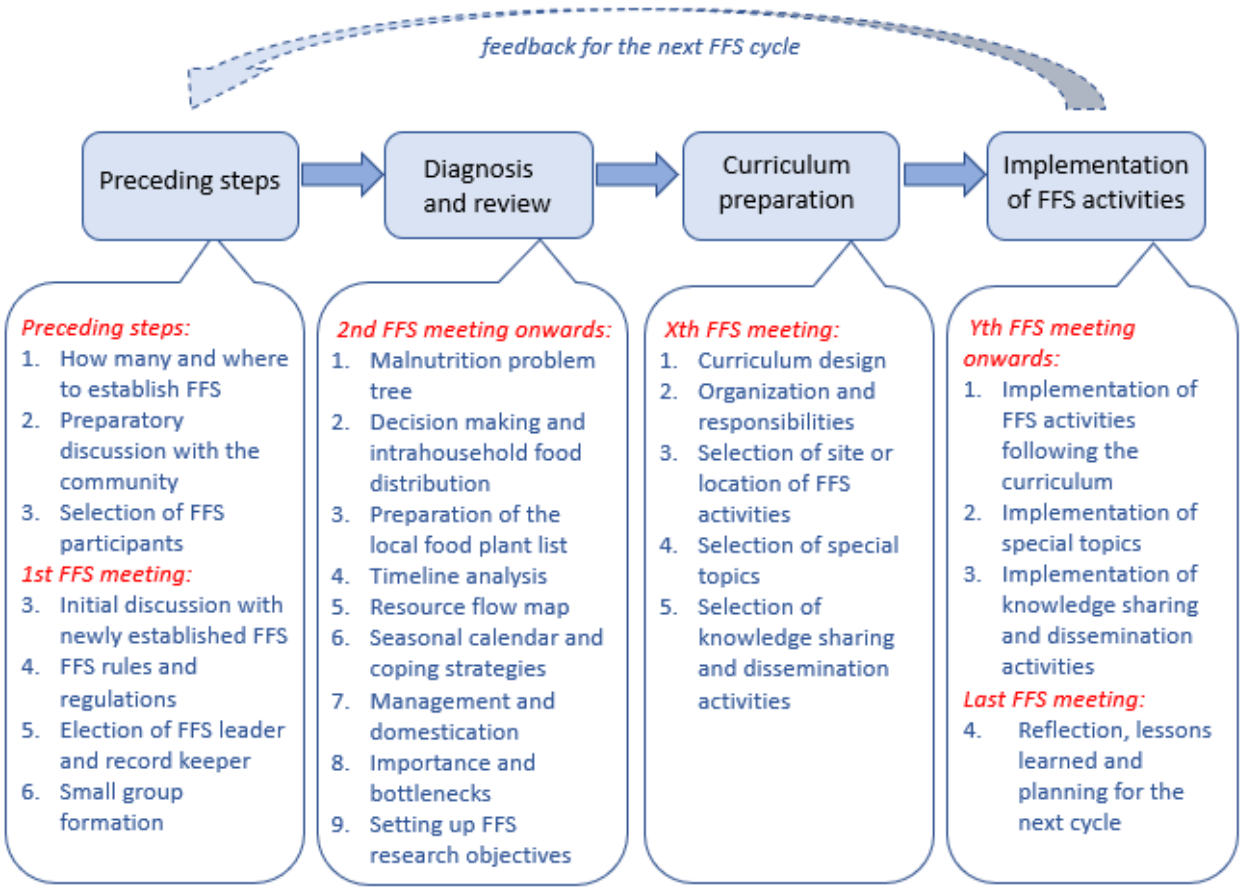


Figure 4: The four elements of FFS implementation at community level.

The FFS on Nutrition, NUS, and gender refers to "FFS cycles" because not all local food plants are cultivated in the growing season and may instead be available in other periods of the year, whereas other activities (e.g. food preparation) can also be undertaken beyond the growing season. The timing and length of the FFS on Nutrition and Local Food Plants will depend on the bottlenecks that are selected to be addressed and their associated research objectives and activities. In the case of agronomic research questions, it will be logical to follow the cropping season in the case of crops, whereas in the case of wild food plants the FFS curriculum should take into account the phenology of the species addressed and/or the timing when the edible parts of the involved plants are best harvested. In contrast, in the case of activities that strengthen the cultural components of (groups of) plants (e.g. cooking demonstrations, development of recipe books), seasonality – although affecting the availability of plant edible parts – will be less important.

A correct documentation and reporting system (using new technologies and simplified forms) should be established to ensure the bi-directional flow of information and feedback from sub-groups and FFS groups to facilitators, extension services and/or local partner organizations, and *vice versa*. It should also include response mechanisms to address any issues and problems arising during FFS implementation. Also, it may be helpful to involve scientists (in particular agronomists, biologists and nutritionists) or technicians that

could help looking for solutions to specific problems, when possible, as well as chefs that can assist in food preparation and the development of new recipes.

3. Timeline for the FFS curriculum

The following chapters describe the elements corresponding to the FFS implementation at community level and provide an (incomplete) list of activities that can be undertaken during the FFS on Nutrition and Local Food Plants. In addition to the activities corresponding to the FFS curriculum, a number of Special Topics has been included following the main body of this guide. These have been organized in two columns in Table 1 below: the left-hand column under Special Topics contains crucial topics directly bearing on the organization of the FFS, the right-hand column under Special Topics lists activities and issues that are of a technical nature or that deal with reflections on the social processes in an FFS. The topics in this right-hand column are more general and less closely linked to specific FFS activities.

Table 1: Field Guide chapters ordered on the timeline (the numbers indicate the chapter or sub-chapter where the information is found in this Field Guide).

Timeline	**Which activities?**		
	FFS Curriculum	**Special Topics**	
		Technical	**Organizational**
FFS preparations	0: Capacity Building at the institutional level; more on the Training of the Trainers 0: Organizing a FFS on Nutrition and Local Food Plants		
Further preparatory work at the community level	0: The diagnostic and review phase 0: Curriculum preparation	8.1: Nutrition and food diagram exercise	
FFS implementation	0: FFS implementation of activities (e.g. cooking demonstrations, seed storage), including reflections, lessons learned and planning for the next cycle	8.2: Maternal and child nutrition 8.3: Promoting knowledge on hygiene, sanitation, and water (WASH) 8.4: Keeping local food plants in Community Seed Bank facilities 8.6: Gender equity	8.5: Local food celebration day 8.7: Group Dynamics Exercises 8.8: Curriculum evaluation

3.1. Specific challenges of FFS on Nutrition and Local Food Plants

An important challenge in developing the FFS approach on Nutrition and Local Food Plants is that modern scientific information on local food plants is relatively weak (i.e. there is not enough scientific information about different aspects related to local food plants, including management, agronomy, nutritional aspects, contribution to health, culinary properties, etc.). It is important to undertake actions to correct this weakness.

Another important challenge is that there are as yet few modules that the FFS on Nutrition and Local Food Plants can build on. FFS in many areas of work have relative "simple" foci, e.g. soil nutrient management, pest management, agronomy for specific crops, or even as specific as control of fruit flies on bitter gourds. Commonly, a FFS focuses on one type of intervention and research focus only (e.g. IPM on rice, PPB on maize), although in some FFS the number of crops or activities addressed can be higher (e.g. the FFS of SD=HS in PPB distinguishes between participatory variety enhancement, participatory variety selection, participatory plant breeding and biodiversity plots). The FFS on Nutrition and Local Food Plants which deals with local food plants and their role in nutrition by taking a gender approach – is even more complex and can easily lead to multiple and divergent types of interventions and research foci.

4. Organizing a FFS on nutrition and local food plants

This chapter provides a general explanation of the organization of a FFS on Nutrition and Local Food Plants. It starts by presenting steps preceding the actual implementation of FFS reviews and activities, followed by the description of the weekly meetings and a short overview of a full FFS cycle.

4.1. Preceding steps and first meeting

The following paragraphs explain what has to be taken into account for the establishment and start of FFS on Nutrition and Local Food Plants, including the identification of how many FFS will take place, the preparatory discussion with the community, selection of participants, initial discussion with the newly established FFS, FFS rules and regulations, election of leader and record keeper, and small-group formation.

4.1.1. How many and where to establish FFS

The first step is to define how many and where FFS will be established. For that purpose, it is necessary to take into account the topics of the FFS (in this case nutrition, local food plants, and gender), the available budget, the expected number of project beneficiaries, and the distribution of needs within the rural population. Various criteria may be used to select the communities where FFS will be offered. For example:

- A higher incidence of families that are nutritionally insecure, or having higher numbers of female-headed households.
- A history in FFS in a given community, which may be helpful for organizing a FFS on Nutrition and Local Food Plants.
- Local government and community seniors/elders supporting the organization of the FFS.
- Well reachable for staff of the implementing organization, for the FFS facilitators, as well as other experts involved in the implementation of the FFS.
- Nutrition capturing the interest of the community.
- Local food plants, particularly NUS, having the interest of the community, and their associated traditional knowledge still being available in the community.
- Openness to appreciate the role of women in securing nutrition and in the management of local food plants, including openness from the male members in the community.

4.1.2. Preparatory discussions with the community

Initial discussions should be conducted to acquire insights into the occurrence of local food plants, the food habits and culture, the communities' food and nutritional status, the traditional knowledge on local food plants and the interest in creating new food items. This is usually achieved by means of informal meetings with key community leaders and small (engendered) focus group discussions with farmers in the community, as well as by the dietary household surveys.

Before an FFS is formed, thus before the onset of activities, the FFS facilitator(s) come(s) together with interested members of the community. In this discussion, the facilitator:

- Is expected to sketch a general picture of what the FFS on Nutrition and Local Food Plants will look like for the (potential) FFS participants.
- Should explain how the FFS will be managed, for instance, give the villagers an idea of the tasks and responsibilities of the participants in the FFS. In this context, the facilitator also needs to describe the participatory and learning principles of the FFS.
- Provide a short description of the potential research and development objectives of the FFS (i.e. better nutrition and improved diets, improved management of local food plants).

The FFS facilitator also needs to discuss that in a school without walls (the FFS) the occurrence of local food plants in the environment and their role in the diet are the sources of learning and education, and that the FFS will ensure that data is gathered and analyzed by small groups of farmers and reported to the FFS after every FFS session. Finally, the facilitator should also explain that the occurrence of local food plants is influenced by the (changing) environment.

4.1.3. Selection of FFS participants

Participant selection should be guided by clear and transparent criteria that are defined and agreed with the communities beforehand. Participants should be selected for their willingness to consistently participate in the full cycle of the FFS and share the acquired knowledge with the other members in the community. Appreciation for gender equity and social inclusion is essential and this recognition should be built into the FFS.

The ideal number of FFS participants is between 25 and 30 farmers from the same village. It is necessary to pay attention to the good representation of women among the participants, given that they play a key role in the use, preparation and management of local food plants. However, it is also important to ensure the participation of men, in order to increase their awareness about the importance of local food plants, particularly NUS, for nutrition, thus creating an enabling environment for behavioral change at household and community levels. Finally, special attention should be paid to the inclusion of any socially disadvantaged people as well as youth that would be interested in joining the group.

4.1.4. Initial discussion with the newly established FFS group

After presenting the objectives and concepts of the FFS on Nutrition and Local Food Plants, the facilitator should explain FFS participants that FFS meetings usually start with an opening plenary where the activities of the day are discussed, followed by work in sub-groups (see below), and a closing plenary, as follows:

- FFS activities will be done by small groups and reported in plenary: e.g. a FFS cycle-long surveillance and analysis of local food plant occurrence and qualities, the role of weather and climate, discussions on the role of NUS in the local culture; preparation of food items.

- Group dynamics will be addressed in plenary to maintain a spirit of liveliness and competition. Team building and leadership training form a major part of the FFS. Some group dynamics exercises are detailed in Special Topic 8.7 of this facilitators' Field Guide.
- The closing plenary includes the presentation of sub-group findings, discussions of problems encountered and their potential solutions, group agreements and a planning for the next meeting. FFS usually feature weekly (or bi-weekly) meetings.
- Special topics will feature in some sessions, e.g. maternal and child nutrition, discussion on the nutritional components of local food plants with science and health officers, etc.
- Final evaluation of the FFS activities will take place at the end of the cycle, first by the small subgroups, then in the plenary. Through reports and discussions all FFS participants will jointly come up with an evaluation of the various activities and the improved use of local food plants.

The facilitator should also announce and explain that FFS include the following activities at the start of the FFS:

- Evaluation of the local diets and their strengths and weaknesses in the affluent and scarcity periods.
- Documentation and analysis of the traditional knowledge of local food plants.
- Evaluation of the distribution and proper management of local food plants.
- Initiatives to improve the diet by preparation of more diverse food items.
- Discussion and initiatives on the promotion of diets containing more local food plants.
- Analysis of the divergent roles of women and men in safeguarding local food and nutrition security, and ways to create new gender roles.

The first meeting should also include the elaboration of farmers' and facilitators' respective roles and responsibilities (Box 2). The FFS facilitator should ensure that his/her role is on guiding the learning process, rather than 'teaching', providing answers or enforcing the rules and regulations of the FFS. The facilitator should be at the background, listening to the participants and observing the process, reflecting and encouraging farmers to further explore their own ideas. However, in the first FFS meeting the facilitator should also present the topic of nutrition, local food plants and gender, and explain the different FFS elements, processes and special topics. Facilitators are advised to carefully review the following box on non-formal education methods used in FFS, and on the FFS described as a 'school without walls'.

Box 2: Non-formal education methods used in FFS

The following methods of informal education are used in FFS:

- Discovery-based learning techniques (including Participatory Action Research, the analysis of the local diet and the contribution of crops and NUS to the diet, traditional knowledge on local food plants, the description and proper management of local food plants, the ways to prepare more healthy food, the distinct roles of women and men);
- Experiential learning methods (including setting up of experiments, analysis of findings and sharing of experiences among participants, facilitators and technical resource persons);

- Participatory approaches (including group discussions, collective decision-making and team-building exercises).

These methods are applied jointly and coherently.

FFS as a 'school without walls'

The FFS is a participatory, interactive and innovative approach that empowers farmers through field-based or community-based experiential learning to realise problem solving and/or to apply testing new technologies and approaches. In the FFS, farmers identify problems and test possible solutions collectively, minimizing any risks that new practices could involve. Learning is continuous and based on cycles, thus giving space to farmers to adapt individually and collectively to changing problems, environments and contexts. The FFS is a 'school without walls', using non-formal educational methods for adult learning within the participants' community, including participatory action research, group discussions and team-building exercises. Experiential learning is based on group observation, discussion, presentation, analysis and on making decisions collectively. As a consequence, the FFS curriculum is ultimately defined by farmers themselves.

The FFS has a major focus on the development of farmer's knowledge and skills, i.e. management, decision making, team work, leadership, critical and problem-solving skills. The FFS also bridges traditional and modern scientific knowledge. The presentation of the FFS results to other farmers builds confidence, which is particularly necessary for vulnerable and marginalized groups, like women and minority groups. In FFSs there are no hierarchies between farmers and facilitators, and all members should be encouraged to participate equally.

The FFS involves education and training of adults within their own community and in their own fields. It does not necessarily make use of school buildings. In fact, much of the training takes place in the field or other localities in the communities. Hence the name 'school without walls.'

4.1.5. Election of FFS leader and record keeper

The organization of the FFS group happens in the first FFS meeting. The first meeting should include the elaboration of farmers' and facilitators' respective roles and responsibilities, which is essential to ensure the good development of the FFS in the short, medium and long term.

The plenary FFS elects a FFS leader and record keeper for the entire FFS at the community level. The FFS leader shall:

- Convene and initiate the FFS on Nutrition and Local Food Plants.
- Encourage small group activities.
- Ensure that all participants are active and that all tasks and responsibilities of the FFS are fulfilled.

- Encourage the discussion of problems occurring during the FFS and the identification of possible solutions.

The record-keeper writes the minutes of all meetings, including the results of the activities and agreed action points.

4.1.6. Subgroup formation

The FFS participants should preferably be organized in five subgroups (5-6 persons per sub-group), each subgroup with a leader and a reporter, and each allocated its own activities. At this stage, it should be decided whether or not to form women-only groups. This will be important given women's roles in food preparation and management of local food plants. The baseline information obtained in advance from household surveys could also be useful for defining the type of group segregation that is best adjusted to the characteristics of the FFS group.

Subgroups are created to optimally involve all participants, so that all participants feel comfortable to express their ideas, preferences and play an active role, and to improve the functioning of the FFS. In a big group full participation is not easy to reach and discussions are usually dominated by a few, whereas in smaller groups participation is easier, each person can be assigned tasks and group dynamics are easier. Therefore, small groups better ensure collective learning, which – according to the FFS pedagogy – is empowering. In particular, the following considerations are important:

- Farmers learn more and become stronger through collective action.
- Small groups are the key units for data gathering, analysis and reporting, given that each sub-group will conduct the exercises independently.
- Tasks and responsibilities are a collective responsibility within each small group.
- Team building, cohesion and a feeling of belonging can be established easier in small groups.
- New leaders and high-potential farmers emerge more easily from small group activities, where more opportunities for participation exist.
- The small groups are responsible for documentation of all experiments, results and analysis.
- The small groups must have a team leader and reporter, identified by the members of the sub-group. The leader will chair the discussions and the reporter will write down the results of the exercises. These roles could rotate among the sub-group participants, so everybody can gain experience and develop leadership skills. The FFS facilitator should rotate among the sub-groups to assist the leaders who might not have sufficient experience guiding FFS exercises.

Each sub-group can choose a team "name" and logo or even a slogan as part of team spirit building.

4.1.7. FFS rules

It is important to have clear rules to ensure the efficient organization of the work and the successful development of activities. These rules and regulations must be set by the participants themselves. The pedagogy establishes that FFS participants are in control, make their own rules and should be responsible in managing the FFS. It is the only way to create a "disciplined" FFS.

It is not easy for the facilitators to manage a ToT if the trainees are not self-governing. The trainees are expected to observe the effectiveness of the regulations set by themselves, and establish their own mechanisms for enforcing their implementation. FFS facilitators should not "police" the FFS.

The set of rules and regulations could be carried out in small groups. Then each group presents their recommendations for these rules in plenary. The role of the facilitators is simply to facilitate the presentation, discussion and agreement on the rules.

4.2. Description of the once-per week/3 hours FFS activities

Each FFS meeting will start with a plenary and include a roll call and a discussion of the activities of the day according to the FFS curriculum (including any relevant special topics, if the facilitator has planned to address these). The small groups will then take up the planned activities, and, when ready the group reports will be presented in plenary. The plenary will make decisions and prepare plans for the next week and discuss any problems that arise and the solutions to them.

4.3. Short overview of a full-cycle FFS on Nutrition and Local Food Plants

Find below a hypothetical overview of weekly activities, showing the sequence of FFS activities during the season (Table 2). The detailed explanation of general and specific activities will be presented in the following chapters.

Table 2: Example of a FFS curriculum indicating the weekly activities corresponding to the elements of the FFS development.

Weeks	General Activities	Specific activities
Preceding steps	Organization of the FFS	How many and where to establish FFS Preparatory discussion with the community Selection of FFS participants
Week 1	Organization of the FFS	Initial discussion with newly established FFS Election of FFS leader and record keeper Small group formation FFS rules and regulations

Week 2	Diagnostic and review exercises	Malnutrition problem tree Intrahousehold food distribution
Week 3	Diagnostic and review exercises	Preparation of the local food plant list Timeline analysis
Week 4	Diagnostic and review exercises	Resource flow map Seasonal calendar and coping strategies
Week 5	Diagnostic and review exercises	Management and domestication Importance and bottlenecks
Week 6	Diagnostic and review exercises	Setting FFS research objectives Planning of activities
Week 6	Curriculum preparation	Curriculum design Organization and responsibilities Selection of site or location of FFS activities Selection of special topics Selection of knowledge sharing and dissemination activities
Week 7	Implementation of FFS activities on germination trials	Acquiring/sourcing additional plant materials
Week 8		Field work for site preparation
Week 9		Establishment and sowing of FFS plots for germination trials
Week 10		Managing plots and field observations
Week 11	Special topics	Nutrition and food diagram exercise (special topic)
Week 12	Implementation of FFS activities on cooking experiments	Formation of cooking clubs Recipe development Involvement of chefs
Week 13	....	....
Week 14 ...	....	....
Week ...	....	....
Week 19	Special topic	Local food celebration day (special topic)
Week 20	Review and reflections, and special topic	Reflections, lessons learned and planning for next cycle Curriculum evaluation (special topic)

5. The diagnostic and review phase

The diagnostic and review phase is a crucial step to ensure that the FFS addresses the primary needs and objectives identified by the farmers in the community. This phase is not only called diagnosis, but also review because it is based on a learning process that ensures farmer's sharing of traditional knowledge and experiences on local food plants and nutrition, and because it allows the evaluation of their agricultural and household practices. The commitment of farmers to the FFS project can only be ensured if it focuses on and satisfies their needs and preferences, and strengthens their traditional knowledge and culture, which are unique to each FFS and embedded in the socio-cultural, economic, environmental and political context in which the community operates. The diagnosis and review phase in the FFS on Nutrition and Local Food Plants, as a shared learning process, has the following objectives:

- To identify and reflect on the main problems of malnutrition and uneven intra-household food distribution and their consequences for the food and nutrition security of families and the community as a whole.
- To exchange experiences and explore how local food plants can strengthen the coping strategies of households during the food scarcity season, and increase the diversity and quality of the diet.
- To share traditional knowledge on local food plants, particularly NUS, which is important for realizing their importance, motivating their use, countering any loss of knowledge and stigma against their consumption, and for strengthening culinary cultural identity. The exercises not only will facilitate knowledge sharing between men and women, but also across generations.
- To discuss and prioritize the main bottlenecks that prevent the consumption of certain local food plants, and to identify potential solutions to tackle them; this will be the basis to select the types of FFS activities that will be implemented in the next phase.

In case a household survey has been conducted in the communities where the FFS will take place, this information should be used as baseline information. Such information may also include information on the socio-demographic characteristics of the community, its productive activities and sources of income, food consumption and dietary patterns, and in particular the consumption of local food plants in the scarcity and sufficiency periods of the year. Such baseline information will provide the starting point for a collective diagnosis and the joint development of the FFS agenda, as well as the benchmark against which the later outputs of the project will be measured. Establishing and using the baseline also ensures that the FFS intervention is realistic and well grounded, and that it is specifically responsive to the needs of women. The baseline information also informs the partner organization and the facilitators. The local diagnosis and review is "owned" by the FFS members and is the basis for their motivation and sustained participation.

The diagnosis and review encompass a set of participatory exercises that will be conducted in a small number of subsequent FFS meetings. More meetings can be scheduled if time is not enough. Thus, the FFS sessions corresponding to this phase will start in the second FFS meeting (the first founding meeting establishing the FFS was already conducted before, see previous chapter). In each FFS diagnosis and review meeting one or more review exercises can take place, depending on their duration. The diagnosis

and review phase will finish with the identification of the bottlenecks or barriers that constrain the use of local food plants and – based on these barriers - the definition of the research and development objectives that will lead the curriculum preparation and FFS activities that will be implemented (the curriculum preparation and FFS activities are explained in the next chapters).

The work in sub-groups followed by a plenary in which sub-groups share and consolidate their conclusions is crucial in this phase. This is the main way to ensure the participation of all members of the FFS, and to divide the local food plant species among sub-groups for a deeper and faster revision (doing all local food plants in a plenary would take much longer, be exhausting and capture the knowledge of a few only). For the purpose of performing the diagnosis and review it is recommended that the small sub-groups are composed either of women or men (not mixed). The sub-groups may also establish and analyze the access to assets and available livelihood strategies, given that these may influence the problems farmers identify and set limits and conditions to their potential solutions.

5.1. Malnutrition problem tree exercise

The malnutrition problem tree exercise will provide a visual overview and in-depth understanding of the root causes and consequences of the shortcomings in the nutritional status of the community (Figure 5). Malnutrition is a multi-faceted condition, with a variety of factors influencing this condition, including access to food, diversity and quality of the diet, health, agricultural practices and women's empowerment, amongst others. Understanding the underlying causes of malnutrition will help individuals and families to improve their nutritional status.

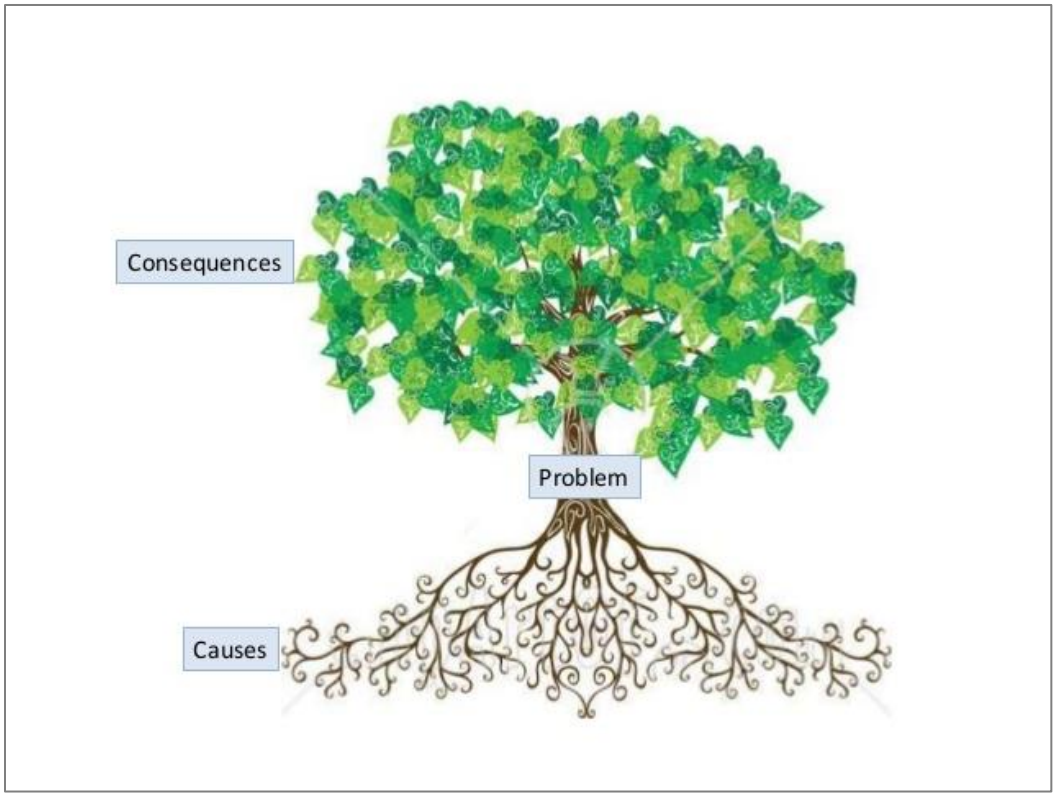


Figure 5: Problem tree. The trunk represents the problem, in this case malnutrition, the roots the causes and the branches the consequences or appearances of the problem.

Objectives:

a. To understand the different views that FFS participants have on what defines adequate nutrition, and a diverse and quality diet
b. To assess what are the causes of malnutrition from farmers' perspectives
c. To discuss what are the consequences of malnutrition from farmers' perspectives
d. To evaluate how local food plants can contribute to address the main causes of malnutrition

Recommended duration: 1 hour 30 minutes

Materials required: large sheets, paper, markers, pencils

Description:

Step 1: Explaining malnutrition

The facilitator or invited health/nutrition worker will explain the major causes and consequences of malnutrition at country or regional level, using existing training materials on malnutrition, often prepared by the Ministry of Health. This person will also introduce the concept of dietary diversity and explain the different food groups, and why it is important to consume food from the different groups; followed by an explanation of what is dietary quality. Furthermore, the person will explain that undernutrition is

dangerous, because a weak body cannot easily fight infections and can fall ill more easily. Once a person gets sick, she or he may become even more malnourished. This step will be a trigger event (an eye opener), so that farmers recognize and acknowledge low dietary diversity and malnutrition as related problems to address.

During the development of the exercise, the inputs from the local health/nutrition worker on specific community nutrition issues, such as the prevalence of malnutrition (which types of malnutrition and who are most at risk) are essential. The local health/nutrition worker could be asked to join the exercise but with the strict instruction of not influencing the outcomes of the discussions. In addition, if conducted the facilitator would present the main results of the household baseline survey conducted in the community (these related to diets and household vulnerability).

Step 2: Reflecting on the malnutrition tree

Invite the participants to look at or think about a tree. Then, ask the following questions:

- What makes trees strong?
- How do they become strong?
- Which parts of the tree do we see?
- Which ones are invisible?
- Why are the roots of the tree important?

Explain that the roots of the tree are essential to give it strength and nutrients, and to help it grow. Also explain that if the tree has weak roots, the tree may not grow well. Indicate that this session will be about identifying and explaining the root causes of malnutrition. For that purpose, participants will be asked to draw a tree to find out the roots of malnutrition, which could lead to consequences such as anemia, low birth weight or vitamin deficiency.

Step 3: Drawing the tree

Divide the participants into sub-groups of 4-5 participants and give each sub-group a piece of paper and markers. Ask the participants to complete the following tasks, guiding them with sub-questions to help with the reflections.

a. Draw a tree and label the trunk of the tree “malnutrition” (or a more specific, contextually appropriate nutrition issue, such as anemia, low birth weight or vitamin deficiency).
b. Draw the branches and leaves (the parts we can see). Label the branches with the signs of malnutrition. Ask participants:
    - What are the signs showing that a person is malnourished?
    - What are the short-term and long-term results/consequences of such malnourishment?
c. Draw the roots of the tree and label them “causes of malnutrition”. Tell the groups that they must determine the real causes of malnutrition. To that end challenge the group by asking continuously “yes, but why?” until a satisfactory answer is given.
d. Ensure that the participants reflect on their (lack of) dietary diversity as one of the underlying causes of malnutrition. Ask participants:

- Which food groups are lacking in the diet?
- Do community families have a variety of foods consumed within each food group?
- Are their meals sufficiently diverse?
- If dietary diversity is low, why is that so?
- Has dietary diversity increased or decreased over time?

It may be useful to provide one example in plenary before dividing into subgroups. The example should not be on nutrition but on another topic (e.g. low literacy rates) in order to not influence the outputs that will be provided by the participants on the malnutrition issue.

Step 4: Reviewing the answers

Bring the sub-groups together and ask each sub-group to present the results of their discussions in plenary.

Step 5: Reflecting on the results

Ask participants in plenary:

- What are the signs and signals of malnutrition that are common to the drawings of all sub-groups?
- What are the major causes of malnutrition listed by all sub-groups?
- In which period of the year do families have less resources to ensure a proper nutrition?
- Are there some families in the community that have less access to nutritious food and to be more prone to be malnourished? Why?
- Are there some household members more prone to be malnourished? Who? Why?

To address malnutrition, we need to look into the household level, community level, and even beyond to higher levels. Ask participants to identify which root causes they already try to address:

- What are you doing to improve household and community nutrition?
- Which root causes of malnutrition local food plants could help to address? How could these problems be addressed with the increased consumption of local food plants?
- What else can be done to improve nutrition?
    - Which causes could be addressed at the household level?
    - Which ones could be addressed at the community level?
    - Which ones could be addressed through the FFS?
    - Which underlying causes should be brought to the attention of local authorities and policy makers?

At this point in the exercise one could use the information from local nutrition and health departments as a reference, and validate the observed nutrition problems against the departmental data, and – in case of differences with the results of the FFS discussions - analyze why communities have different perceptions of the nutrition problem.

Step 6. Summarizing the key points

Summarize the key causes and consequences of malnutrition identified by farmers. Write down the results and make photographs of the tree diagrams. Note down the suggested actions. Write in each photo and report the name of the FFS and the date.

5.2. Decision making with respect to intrahousehold food distribution

Research has shown that agricultural outputs, dietary diversity, and nutritional status are optimal when women actively participate in decision-making related to food consumption and agricultural production. In this exercise, farmers (both female and male) will analyze who makes decisions in relation to household food distribution, how intra-household power relations affect food distribution, and who may be disadvantaged in terms of food distribution.

Objectives:

a. To reflect on who makes decisions in the household regarding food preparation and consumption
b. To analyze how food is distributed within the household and what could be the effects on nutrition, particularly of children, pregnant and breast-feeding women
c. To explore and expose gender- and position-based inequalities within the household, including their potential impact on the nutritional status of individual family members within the household and the community.

Recommended duration: 2 hours

Materials required: large sheets, paper, markers and pencils (it is optional to take notes on the large sheets, depending on the literacy of the group), a pot with raw staple (e.g. rice, potatoes, etc.), local vegetables, meat (e.g. beef, chicken, fish, etc. of different sizes; alternatively they can be drawn on paper and cut), three eggs, 6 plates. The food items should be the ones commonly consumed in the community.

Description:

Step 1: Understanding household decision-making in relation to food

Reflect with participants on the decision-making process within the household in relation to food, in order to warm up for the next steps of the exercise. Ask these questions in sub-groups followed by a plenary where sub-groups will present their main findings:

- How often is food prepared (e.g. breakfast, lunch, dinner, other times)?
- Who decides in the household what will be prepared for breakfast, lunch and dinner (or other types of meals that are consumed at home)?
- Who is responsible for preparing food?
- Who decides how much food must be cooked?
- Who is responsible for bringing the staple, vegetables and fruits to the house for preparing food?
    - Does the responsible person differ when bringing foods from different places (i.e. the forest, fields and home gardens)?

    - Who decides which vegetables and fruits to harvest or gather?
- Who is responsible for buying food for preparing household meals?
    - Who decides what food to buy?
    - Who decides how much money to spend for buying food?
- How do reactions of (other) household members regarding the food items that are cooked (and their quantities) influence these decisions?
- Who decides in the household who eats what and how much?
- Who is the first responsible for feeding the children in the household?
- Who else takes care of the nutrition of the children?

Step 2: Intra-household food distribution, setting up the scene

Explain that this session will look at who has decision-making authority in a household, and who may be advantaged or disadvantaged in terms of food distribution. A household is a group of family members that share the daily meals (eat together from the same pot).

By exception, this role game will be executed in plenary, and not in sub-groups. Ask for six volunteers to come forward to play a role game. The role game consists of setting up a household that is representative within the community (i.e. representative in terms of number of children, presence of grandparents or in-law family, etc.). For example, one volunteer could act as the husband, the other as wife, and the others as mother-in-law, father-in-law, a ten year old son, and a three-year old daughter. Remember this is just a role play.

Ask the volunteers to sit down, so all participants can see them, and put an empty plate in front of each one. Read out loud to the entire group: "It is dinner time. The wife (or mother-in-law, depending on the answers to the questions of the previous exercise) has cooked rice (or local staple), some fish of different sizes (or other type of meat that is the most commonly consumed), three eggs, and some vegetables."

Step 3: Acting out the scene

Give the food items to the volunteer playing the wife (or the person responsible for distributing the food, depending on the answers to the previous questions) and ask her to distribute the food among the family members as it is commonly done in the community.

Step 4: Discussing the scene

Ask the volunteers:

- Is everybody happy with what and how much they got?
- Who are the winners\losers?

Reflect with the participants on the intra-household food distribution by asking these questions:

- Have you seen this kind of food distribution before? Is it familiar to you?
- Why did some people get more or better food than others?
- Who got the eggs? Who got the meat? Why?
- Who was served first? Who was served last? Why?
- Are there any differences between household members on how often they eat? Why?

- What is the effect of this example of distributing food on the nutrition of different household members?
- Do you think that people in the household have different needs for food? Who, what kind of food?
- Do you think children in the community are well-nourished? What is good in their food and what is lacking?
- Do you think pregnant and breast-feeding women in the community are well-nourished? What is good in their food and what is lacking?

Step 5: Reflecting on gender- and position-based inequalities

Ask the volunteers to stand up. Ask participants to indicate their position of power in the household by moving them into a line, one standing behind the other, for each of the next questions. Volunteers have to re-organize themselves in the line for each question (the position of power of household members might change per question). Ask the different sub-groups to discuss each of the following questions (and share their answers in plenary):

- Who are the most and least powerful in terms of decision-making?
- Who are the most and least powerful in terms of their ability to raise income from economic activities (i.e. to buy food)?
- Who are the most and least powerful in terms of access to food?
- Why are some members of the household more powerful\powerless? What gives them power?
- What is the effect of social status and inequalities on individual health and well-being? (Differentiate between men, women, girls and boys.)
- What is the effect of such inequalities in terms of children's health and well-being? Also ask them to consider pregnancy and breast-feeding.

Step 6: Highlighting key points in relation to inequalities

Based on the results of the previous steps, discuss with participants the following:

- Issues of social exclusion and injustice need to be recognized, explored and addressed not only in the community, but also within the household.
- There is often a great deal of inequality in many households and, as a result, some family members are seriously disadvantaged in comparison to others, i.e. in their access to nutritious food, which affects their health and well-being. Often, discrimination occurs based on gender and age.
- When people feel that they are making a valuable contribution to the household and to the community, they have a good sense of self-esteem.
- A person's sense of self-esteem begins to develop during childhood, based on how they are treated by their family, by community members, at school, by religious leaders, etc. Boys and girls will grow up feeling equally valued and respected if these peer groups treat them like equally valued individuals who deserve attention, and if they experience equal opportunities to be well-nourished and healthy.
- Individuals, households and communities must embrace practices that encourage equal participation, inclusion, transparency and accountability, based on the respect for human rights.

Step 6. Summarizing the key points

Summarize the main results of the exercise. Write them down and make photographs of the large sheets (if any). Write in each photo and report the name of the FFS and the date.

5.3. Preparation of the local food plant list

In this exercise FFS participants will define the list of approximately 25 local food plants they will work with during the coming sessions of the diagnosis and review phase. Although farmers might identify many more local food plants, it is important to focus on a group of about 25-30 species. Otherwise the coming exercises would be too much time demanding. It is highly recommended that species that play a key role for nutrition are part of the list.

Objective:

a. To prepare a list of 25-30 local food plants that will be the focus of the next diagnosis and review sessions.

Recommended duration: 1 hour

Materials required: large sheets, paper, markers and pencils, sheet with the names of the nutritional local food plants taken from the baseline results

Description:

Step 1: Discussing the definition of local food plants

Before farmers list the plants, the facilitator has to explain the meaning of local food plants: "*Local food plants are plants known and/or used by local communities as food. Local food plants include a wide range of species, ranging from domesticates (staples and minor crops), to semi-domesticated species and wild food plants. Local food plants not only grow in agricultural fields (where they can grow e.g. as crops or weeds), but also in various other environments such as home gardens, roadsides, aquatic ecosystems and forests. The diversity of local food plants plays a key role in diversifying the diet and the consumption of a wide array of nutrients for rural households. The knowledge of local food plants is hold by IPSHF, and is to a large extent related to the biodiversity of their surrounding environments*" (chapter 1.3)

Step 2: Listing local food plants

Each sub-group will write down in a big paper sheet a list of all local food plants they know. Then, they will be asked to vote for the most important ones for household nutrition, in order to select 15 plants from this initial list. Each sub-group will reflect on each of the 15 plants: Does this species has to be consumed in moderation? Can it be consumed by children? Does it grow in a place where pesticides are sprayed? Does it need a special processing to remove toxic compounds? Species that might contain toxic compounds will be removed from the list and replaced (according to the results of the votes).

Each sub-group will present their list in plenary. The facilitator will write down in another big paper sheet the compilation of all plants selected by all sub-groups. Given that this list most likely have more than 25 species, the plants listed by most sub-groups will be included in the final list.

Step 3: Reflecting on the local food plant list

The facilitator will introduce in plenary the list of local food plants prepared during the baseline (with information from household surveys and literature review), and explained their importance. This list includes species with high nutritional value, that (1) may help to tackle the main nutritional problems in the region, (2) may be important during the food scarcity season, (3) contribute to food groups that lack in the diet, (4) do not have toxicity, and – optionally – with a health enhancement component. Farmers will reflect in sub-groups the following:

- Have these plants been included in our final list?
- Regarding the species presented by the facilitator that have not been included in the FFS list: Would we like to add [some of] them to our list?

Farmers will present and discuss their views in plenary. Depending on the outcomes of their discussion, additional nutritional species will be added to the final list of local food plants that will be used in the coming exercises.

Step 6. Summarizing the key points

Summarize the main results of the exercise. Write them down and make photographs of the large sheets (if any). Write in each photo and report the name of the FFS and the date.

5.4. Timeline analysis of local food plants and nutrition

In this exercise farmers will assess how consumption patterns of local food plants and nutrition have changed in the past years (the past two or three decades; at least two generations) in relation to major community events and changes in socio-economic and environmental conditions. The timeline analysis provides insight into past and current circumstances and developments to help set realistic research and development objectives.

Objectives:

a. To analyze the changes in local food plant consumption and nutrition over time
b. To gain insights on why the changes happened, i.e. what were the external and internal driving factors (agro-ecosystems, health and diets, socio-economics, the environment and climate change)

Recommended duration: 2 hours

Materials required: large sheets, paper, color cardboards, markers and pencils

Description:

Step 1: Setting the timeline

Explain to participants the objective of the exercise, indicating that they will analyze the major trends over time in the use of local food plants in their community, particularly in relation to changes in their consumption and diet, as influenced by major community events. For that purpose, it is suggested to set the timeline to 30 years ago, which encompasses approximately two generations, but participants – if they prefer -could define the starting point of the timeline. Ask the participants to think about a major event that occurred about 30 years ago to set as starting point of reference.

Divide the FFS group into sub-groups. Provide a sheet to each sub-group. Draw a line on the sheet, write the starting point on one extreme and the present year on the other extreme. Add years along the axis. Ask participants to indicate important historical events on the timeline, such as a droughts, elections, agricultural subsidies, the building of a road, etc.

Step 2: Identifying major community events

Distribute cardboards to the participants in all sub-groups and ask them to write events that happened in the community related to the following themes (one event per card):

- Agro-ecosystems: new pest and crop diseases, new irrigation systems,, introduction of fertilizers and pesticides, modern seeds, loss of soil productivity, new institutions/actors and other sources of knowledge and technologies working in agriculture
- Health and diets: major changes in diets, changes in the food scarcity season, new institutions/actors working on health and nutrition, food programs
- Socio-economics: changing access and roles of barter and money markets, road infrastructure, aid programs, migration
- Political: major policy decisions affecting the local livelihoods (from local to national)
- Environment: loss of forest and lakes, droughts, floods and other extreme weather events.

Ask participants to place each card along the timeline in chronological order.

Step 3: Describing the impact of major community changes on the use of local food plants and nutrition

Ask participants to write in cardboards (e.g. using a different color than in the previous exercise) any significant changes in relation to the access and use of local food plants (in particular plants from the list selected in the previous exercise). Some examples of changes are reduced abundance of a species because of deforestation, reduced consumption of a species because it is related to backwardness and poverty by the youth, increased consumption of a plant because of promotion by rural extension. Encourage them to include plants that used to be cultivated or gathered but are not present anymore in the community. Also ask participants to write down in cardboards any major changes on the nutritional status of the community.

Ask them to place the cards along the timeline according to the date when the change happened. Reflect with participants why these changes happened, and their relation to the major community changes listed in the previous step of this exercise. The results of the subgroup discussions can be captured in Table 3. In addition, make photographs of each sub-group's sheet. Write in each photo and report the name of the FFS and the date.

Table 3: Changes in the community and their relation to local food plants and nutrition.

Context and trends	Past situation	Current situation	Impact on the nutritional status of the community	Impact on the use of local food plants
Agroecosystems				
Health and diets				
Socio-economics				
Environment				

Step 4: Discussing results of the analysis with the plenary group

Discuss the results of the analysis in plenary. Has the consumption of local food plants consumed in the village changed in the last years (refer to timeline)? What were the major events that affected the consumption of local food plants? What were the major events that affected the nutritional status in the community? Did subgroups come up with different developments or analyses? What are problems or challenges in the current situation? Can the plenary come up with potential solutions to challenges that they wish to investigate and address? Can the plenary group think of types of local food plants they wish to grow more, improve or use more that would better fit their current needs?

Step 5. Summarizing the key points

Summarize the main results of the exercise. Write them down and make photographs of the large sheets. Write in each photo and report the name of the FFS and the date. The results of the timeline analysis will be useful during future exercises and as 'benchmark' at the end of the FFS cycle.

5.5. Resource flow map of local food plants

This exercise is a next step in setting up the local food plant baseline, this time focusing on the occurrence and distribution of NUS in the community. The NUS resource flow map will be used for the planning of

activities and for the subsequent identification of bottlenecks for their production, harvesting or collection and consumption (Chapter xx).

Objective:

a. To describe the local food plants, according to their place of growth, users, edible parts, level of utilization, perceived nutritional and medicinal values, presence of stigma, and stress-tolerance quality

Recommended duration: 2 hours

Materials required: large sheets, paper, markers and pencils, sheet with the names of the 25-30 local food plants selected in the "Preparation of the local food plant list" exercise

Description:

Step 1: Distributing the local food plant species among sub-groups

Explain the objectives and procedure of the exercise to the participants. Distribute the 25-30 local food plants from the list of local food plants agreed by participants in the previous exercise ("Preparation of the local food plant list") among sub-groups. Each sub-group will work with 5-6 local food plants during this exercise. The distribution is necessary to avoid over-loading sub-groups with many species and completing very complex resource flow maps.

Step 2: Drawing the food system map

Give each sub-group a large sheet and ask them to draw a house (including the home garden), farm, forest, river and other features and sites in the environment where they can regularly obtain local food plants. Ensure that they include the market place. When necessary, the facilitator could start the process of drawing, and could then let the participants take over. It is helpful to start drawing from a point of reference that is well known to all participants, e.g. a road, river, or a tree which is right in front of the meeting place.

Step 3: Filling-in the resource flow map

For each local food plant in a sub-group's list, ask participants to draw one arrow in the map indicating where it was taken from (e.g. forest) pointing the arrow in the direction of the home (
Figure ***6***6). Explain that participants can use more than one arrow per species if it is found in different places. Ensure during this and the coming steps of the exercise that the knowledge of both men and women is captured. Ask participants to specify for each plant, next to its respective arrow, the following:

- Who harvests or gathers each plant? For that purpose participants can use different symbols or colors for men, women and children (placing a symbol next to each arrow)
- Which are its edible parts? (i.e. roots/tubers, stem, leaves, flower, fruits, shoots, seed, stalk of flower, whole aerial parts)
- What is its seasonal availability? (e.g. all year, dry season, rainy season)
- Does it have any perceived nutritional and medicinal values? Which ones?

- Are people reluctant to eat it? Why?
- Does it have any stress-tolerance qualities? (i.e. flood tolerant, drought tolerant, pest resistant).

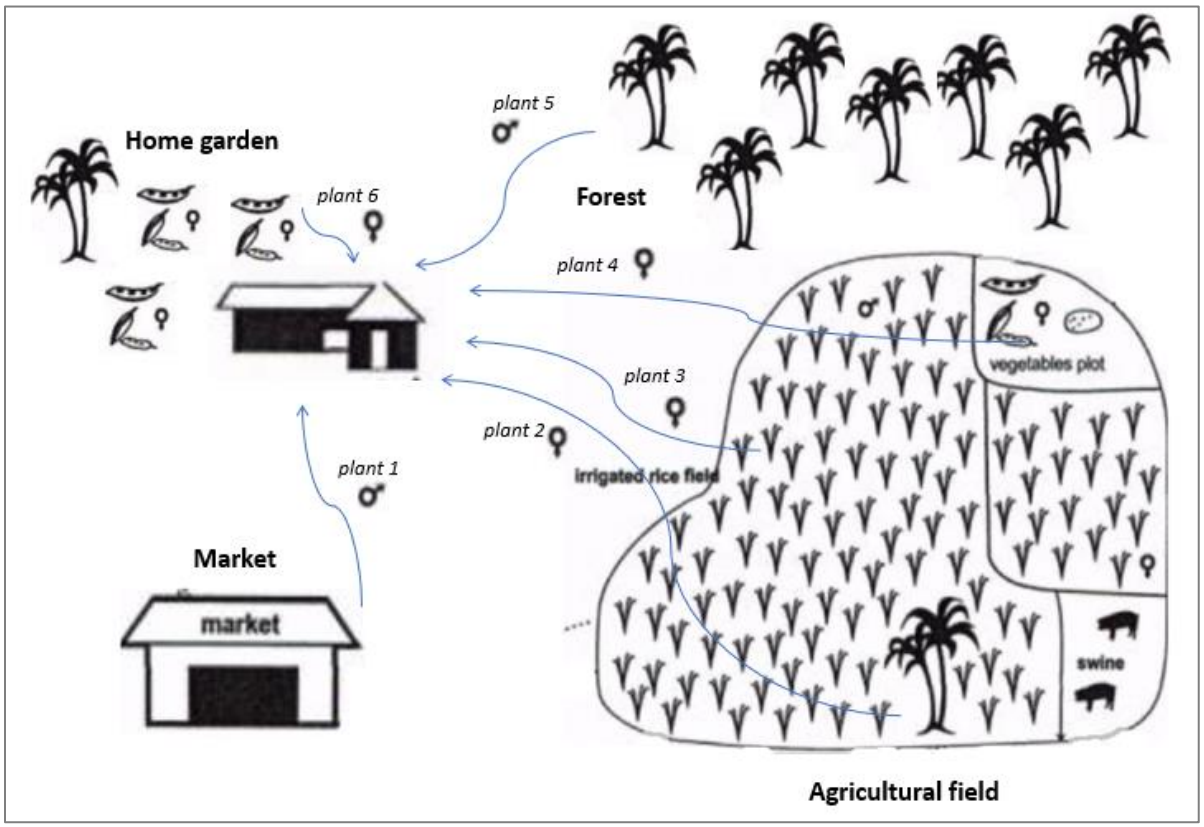


Figure 6: Example of a community resource flow map of local food plants.

Step 4: Reflecting on the importance of each plant species

Ask sub-groups to present their resource flow maps in plenary. While presenting the results, capture the importance of each plant species according to how useful it is for the local household. For instance, as staple food substitute (carbohydrate source), as adaptation measure to climate change, as an income source, as food for health improvement (perceived nutritional and medicinal values), or as important for local culture. FFS participants may introduce additional characteristics of local food plants into the discussion. Encourage that farmers include their own categories of importance.

Step 5. Summarizing the key points in the local food plant register

Write down the results and make photographs of the maps. Write in each photo and report the name of the FFS and the date. At the end of the exercise, the facilitator will prepare a register translating the results of the resource flow map of all sub-groups (for the 25-30 species) into a matrix (Table 4). The facilitator must confirm that the information is accurate and complete, ensuring that there are no empty cells in the matrix.

Table 4: Example of local food plant register.

Plant name	Where is it found?	Who harvests or gathers it?	Edible parts	Seasonal availability	Level of utilization	Perceived nutritional and medicinal values	Are people reluctant to eat it? Why?	Stress-tolerance qualities

5.6. Seasonal calendar and coping strategies

In this exercise FFS participants will prepare the seasonal calendar of the community, including crop seasonality, seasonality of food insecurity, and the coping strategies they use during the food scarcity season; in order to highlight the role of local food plant diversity to strengthen the coping strategies households apply during times of stress.

Objectives:

a. To describe the seasonal calendar of the community, reflecting on the food scarcity period and its main characteristics
b. To discuss the coping strategies households apply during the food scarcity period, and their different degrees of severity
c. To discuss and reflect on the role of local food plants as part of the coping strategies, identifying these species that grow during the food scarcity season, and these that can be preserved to ensure their availability during times of stress.

Recommended duration: 2 hours

Materials required: large sheets, color cards, paper, markers and pencils, , sheet with the names of the 25-30 local food plants selected in the "Preparation of the local food plant list" exercise.

Description:

Step 1: Setting the calendar

Explain the exercise and divide in sub-groups. Ask participants when do they consider a year starts, and set this month as the starting point of the year-calendar. Draw an horizontal line on the top of a large sheet starting with the month indicated by the participants. Indicate the 12 months of the year along the line. Then ask them to indicate the seasons and other periods in the year they also distinguish. Indicate all periods below the line.

Step 2: Filling-in the calendar

Ask FFS participants the following (indicate all periods below the line):

- When are the periods of the year when they have a higher income (from farm and off-farm activities)?
- When are the periods of the year when they spend more of their money and resources on food?
- When are the periods they do not have sufficient access to good quality food?
- When are the affluent period and food scarcity season?
- When is the harvest of major crops?
- What are the main characteristics of the food scarcity season?

Invite sub-groups to present their results in plenary. Reflect with farmers what are the main characteristics of the food scarcity season. List them in a separate large sheet.

Step 3: Listing the coping strategies

Explain participants that now the focus will be on the food scarcity season, explain the exercise and divide them in sub-groups. Ask them what are the main strategies they use in order to cope with food scarcity, and write each strategy in a separate cards. Prompt if they have any strategies related to changes in the type of the diet, consumption of less preferred food, consumption of lesser-quality foods, reduction in portion size, feeding children instead of adults, feeding working family members at the expense of non-working members, buying food on credit, selling assets to buy food, borrowing money, forced temporary migration, sending children to eat with friends or relatives, increased gathering of wild food plants, increased hunting or fishing, consumption of parts of crops that are not consumed in the sufficiency period, consumption of crop residues, consumption of plants that are stigmatized (e.g. symbol of poverty, backwardness), reciprocal exchange of food for labour, reducing non-food expenses to buy food.

Step 4: Reflecting on the severity of the coping strategies

Ask participants in each sub-group to sort the coping strategy cards according to their severity. It is recommended to use three degrees of severity, where the most severe strategies are these used during most extreme scarcity periods and the least severe strategies are used under least extreme conditions (see Figure 77). Make a photo of the results of each sub-group and write the results down.

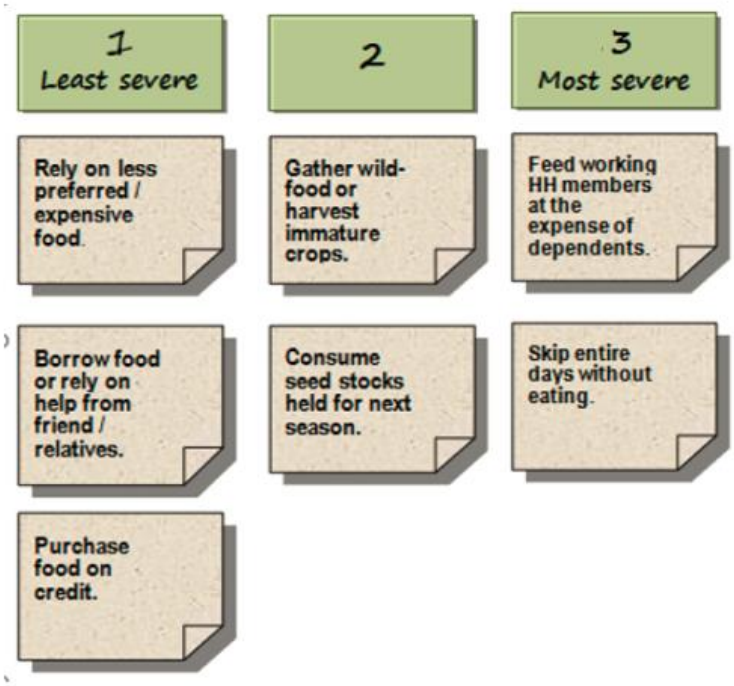


Figure 7: Example of coping strategies sorted according to degrees of severity (adapted from Maxwell & Caldwell, 2008).

Step 5: Discussing and reflecting on the role of local food plants

Ask participants to which coping strategies local food plants [could] contribute, and indicate that with an asterisk on the respective coping strategy cards. Discuss the results of steps 3, 4 and 5 in plenary.

Distribute the 25-30 local food plants from the list of local food plants agreed by participants in the previous exercise ("Preparation of the local food plant list") among sub-groups. Each sub-group will work with 5-6 local food plants during this exercise. They can choose to work on the same 5-6 plants they assessed during the "Resource flow map of local food plants" exercise. Ask participants to go back to the seasonal calendar and write down below the food scarcity period the names of the local food plants from their list that are consumed during this time. Then ask them to write down (on a separate row) the names of the local food plants that are available during the food affluency period but could be preserved to increase their availability during the food scarcity season. Discuss in plenary how local food plants could strengthen their coping strategies by increasing the consumption of local food plants.

Step 6: Summarizing the key points

Write down the results and make photographs of the calendar and card sorting. Write in each photo and report the name of the FFS and the date.

5.7. Management and domestication of local food plants

This exercise explores which species are domesticated, semi-domesticated and wild, placing them along a continuum of human management. Following the principle that management is not exclusive to domesticated species but there are different degrees of management, it further explores which management practices are applied to semi-domesticated and wild species, and what are the main management problems farmers face in their management.

Objectives:

a. To distinguish domesticated, semi-domesticated and wild local food plants
b. To discuss which are the management practices associated to semi-domesticated and wild species
c. To explore which are the main management problems related to semi-domesticated and wild local food plants

Recommended duration: 1 hour 30 minutes

Materials required: large sheets, color cards, paper, markers and pencils, sheet with the names of the 25-30 local food plants selected in the "Preparation of the local food plant list" exercise.

Description:

Step 1: Setting the local definitions of 'domesticated' and 'wild'

The facilitator starts asking in plenary what they understand to be a 'wild plant', and takes notes in a large paper sheet. Then he asks what do they understand to be a 'domesticated plant' (or crop), and takes notes in the sheet. It is important to capture what farmers understand as 'wild' and 'domesticated' local food plants, given that traditional knowledge is the basis in which the FFS will be built. After this short introductory plenary discussion, the facilitator explains that local food plants occur along a continuum of different degrees of intensity of human management (Figure).

Figure 8: Local food plants occur along a continuum of different degrees of intensity of human management.

Box 3: Management of semi-domesticated and wild local food plants (general insights for the facilitator)

Plant management, according to González-Insuasti and Caballero, can be defined as "the set of actions or practices directly or indirectly performed by humans to favor availability of populations or individual

phenotypes within populations of useful plant species". Management practices – including transplanting, watering, protecting, fertilizing, pruning, weeding, and mulching – can be selective (when particular plant individuals or populations are purposively selected to favor their phenotypes or characteristics) or non-selective, and a species may be managed simultaneously in different ways in different locations (or by different families). Management practices can take place *in situ*, i.e., in the original place occupied by the plant, or *ex situ*, when transplanted to another place. For example, transplanting a plant from an agricultural field to a home garden is a type of management. Domestication processes have (indirectly) promoted management practices such as propagation, protection, transplanting, and selective harvesting, which are important in order to ensure the availability of and access to useful plants that are in risk of decreasing or even disappearing. This plays a key role in the conservation of plant genetic resources.

The management of local food plants occurs along a continuum of different degrees of management intensity, from truly wild species (i.e. that do not require any type of management) to domesticated species (i.e. that are more dependent on human management for survival). This continuum is bi-directional, and does not necessarily involve preordained steps toward greater management intensity and, ultimately, domestication. In other words, a wild plant may be protected, transplanted, cared for and even cultivated without becoming a domesticated species, and for many species the transition from cultivation to domestication does not fully occur. For instance, while some plants that used to be intensely managed in the past are only tolerated or slightly protected at present, other wild food species are becoming domesticated ones.

<u>Step 2: Placing the local food plants along the management continuum</u>

Distribute the 25-30 local food plants from the list of local food plants agreed by participants in the previous exercise ("Preparation of the local food plant list") among sub-groups. Each sub-group will work with 5-6 local food plants during this exercise. They can choose to work on the same 5-6 plants they assessed during the "Resource flow map of local food plants" and/or the "Seasonal calendar and coping strategies" exercise. Write the name of each plant in a separate color card.

Ask participants to discuss the management practices associated to each assigned local food plant, taking into account that one plant could be managed by none, one or more types of practices. It is important that the facilitator does not interfere in the answers (there are no good or bad answers), given that at this stage it is necessary to capture and discuss traditional knowledge and local management practices. Write down the results on a large sheet. Please consider the following management practices (and add any practice missing in the list below if needed):

- Transplanting of planting material from one place to the other (could be in the same environment – e.g. from home garden to home garden – or from one environment to another – e.g. from agricultural field to home garden). List the places or environments where they obtain the planting material, and the environments where they plant it. Planting material not only includes seeds, but also non-reproductive parts of the plant (i.e. vegetative propagation).

- Watering, could be exclusively watering the plant, or as part of watering a group of plants from different species that grow together.
- Protecting, for example, putting a stick so the plant can climb on it (for vines), placing a small fence around a plant so the animals cannot eat it, placing a plant pot on a higher place so the chicken cannot damage it, among others.
- Fertilizing, could be exclusively fertilizing the plant, or as part of fertilizing a group of plants from different species that grow together.
- Pruning.
- Weeding.
- Mulching.

Ask participants to discuss in which environment(s) each management practice takes please. Then ask participants to draw in a large paper sheet an arrow that represents management intensity (see Figure 8), which starts from 'truly wild' species, 'wild and managed' species and 'domesticated' (crops). Semi-domesticated species are those that are in the middle of the continuum, thus equivalent to 'wild and managed'. Ask participants to place the cards with the names of the plants along the continuum taking into account that:

- Domesticated species are these that include [about] all types of management practices, given that they are more dependent on human management for survival.
- Wild and managed species (or semi-domesticated) are these that are locally classified as 'wild' and require one or more types of management practices.
- Truly wild species are these that do not require any type of management.

Step 3: Discussing the main management problems along the continuum

Ask participants to reflect on and discuss the main management problems associated to the groups of plants along the continuum. Do all wild and managed species share the same management problems? Or does it depend on their abundance (i.e. whether a species is rare or has a weedy behavior), and growth place? Are the harvesting techniques used sustainable?

Ask sub-groups to present and discuss their results in plenary.

Step 4: Summarizing the key points

Write down the results and make photographs of the large paper sheets. Write in each photo and report the name of the FFS and the date.

5.8. Identification of the importance and bottlenecks for the use of local food plants

In this exercise the participants will identify the major criteria of importance for the selection and use of local food plants alongside the bottlenecks and barriers that limit their consumption. This information will be necessary for setting the FFS objectives, research goals and subsequent curriculum preparation and implementation.

Objective:

a. To define the main criteria of importance associated to the use of local food plants
b. To identify the bottlenecks or barriers that limit the consumption of local food plants

Recommended duration: 1 hour and 30 minutes

Materials required: large sheets, paper, markers and pencils, sheet with the names of the 25-30 local food plants selected in the "Preparation of the local food plant list" exercise, results from the previous exercises.

Description:

Step 1: Defining the criteria of importance for the selection of local food plants

Distribute the 25-30 local food plants from the list of local food plants agreed by participants in the previous exercise ("Preparation of the local food plant list") among sub-groups. Each sub-group will work with 5-6 local food plants during this exercise. They can choose to work on the same 5-6 plants they assessed during previous exercises. Ask participants to list the main criteria of importance corresponding to each plant, and write them down in large sheets. One plant could have one or more criteria of importance.

This is the moment to go back to the outcomes of the previous exercises, where farmers discussed how they would like to improve their diet and nutritional status, and the role that local food plants may play to accomplish that (both in scarcity and sufficiency periods): these outcomes could inform the selection of criteria determining the use of local food plants. The results of the "Resource flow map" and "Seasonal calendar and coping strategies" are particularly important to be revised while conducting this exercise. Some examples of criteria of importance are the following:

- Alternative food source during food scarcity period
- Good taste or smell
- Attractive appearance
- Nutritional value
- Medicinal value
- Specific importance for children, pregnant women or elderly
- Role in specific ceremonies or cultural festivities
- Importance for cultural identity.

Step 2: Defining the bottlenecks for the consumption of local food plants

Ask participants to list the bottlenecks or barriers that limit the consumption of each local food plant. When reflecting, use the results of previous exercises, in particular "Management and domestication". When limited seed availability (or problems with the vegetative propagation of the species through cuttings or roots and tubers) was listed as a bottleneck, discuss this further to evaluate together with

participants the reproduction cycle and/or seed characteristics of the species. This will help to obtain a better understanding of the source of the problem and facilitate setting well-informed FFS objectives. Write down the bottlenecks in the large paper sheets, next to the positive criteria associated with each species. One plant could show one or more bottlenecks limiting or preventing its use.

Once they finish the exercise, ask sub-groups to share and discuss their results in plenary. Ask participants to reflect. Does everybody in the FFS agree on the positive properties and the use bottlenecks assigned to each local food plant? Is there anything that they would like to add to the results of the exercise? It is important that all farmers agree on the final list of positive criteria and the bottlenecks for all local food plants, since this information will be a basis for the next exercise "Setting FFS research objectives".

Box 4. Examples of bottlenecks that reduce the consumption of local food plants

The following list of types of bottlenecks was prepared based on the results from SD=HS Phase 1, which included experiences form Zimbabwe, Peru, Myanmar and Vietnam (examples are provided between brackets).

- Reduced abundance (*Becoming scarce due to dwindling utilization or to climate change*).
- Social stigmatization (*Not eaten by men because it grows on the sides of the roads*).
- Harvesting practices (*Lack of knowledge on maturity*).
- Sensory characteristics (*Bitter taste*).
- Availability and access (*Cannot be grown in summer*).
- Cultivation (*Lack of knowledge on agronomic practices*).
- Propagation (*Lack of knowledge on breaking seed dormancy*).
- Seed conservation (*Lack of knowledge on seed management and storage*).
- Health concerns (*Too much consumption causes stomach pain*).
- Cooking (*Preparation takes too much time*).
- Preservation (*Difficult to store*).
- Knowledge on nutritional value (*Lack of nutritional information*).
- Commercialization (*Not available on the market*).

<u>Step 3: Summarizing the key points</u>

Write down the positive selection criteria and the bottlenecks applying to each plant species. It is important to capture which of these are gender-specific, and for which gender group specific local food plants are particularly relevant (men, women, elderly, youth).

Make photographs of the paper sheets. Write in each photo and report the name of the FFS and the date.

5.9. Setting FFS research objectives

Based on the results from the previous exercises, the participants will define and prioritize the objectives that they would like to achieve, and which corresponding research activities they will conduct as part of the FFS. Figure 9 explains how the results of the different diagnosis and review exercises will be used for setting the objectives. Therefore, it is necessary that the facilitator has this information at hand. The research objectives could be set for groups of species or single species. In addition, participants should consider their own knowledge and skills needed to meet the research objectives, and which new knowledge and skills need to be developed for the anticipated research.

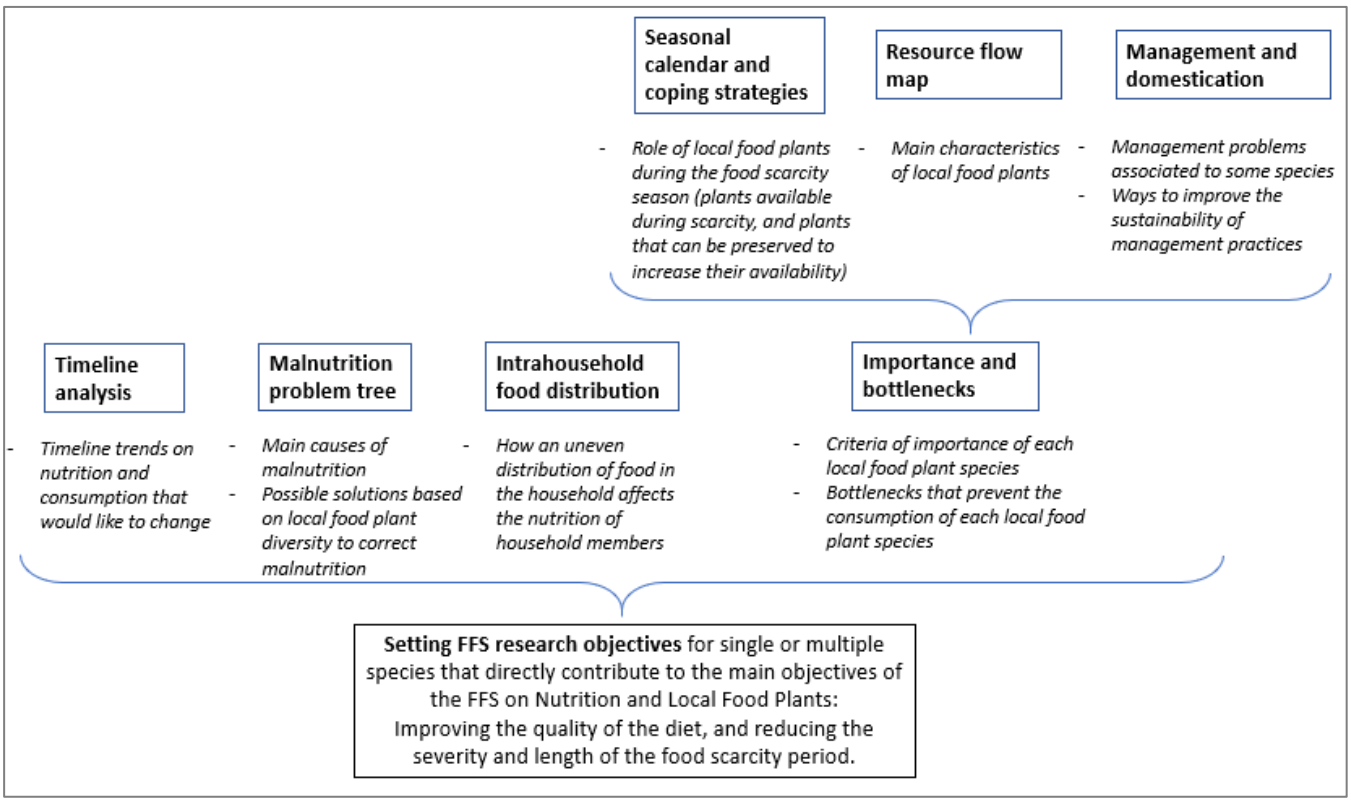


Figure 9: How the results of the diagnosis and review phase are used for setting the FFS objectives, that ultimately contribute to achieve the objectives of the FFS on Nutrition and Local Food Plants.

Objectives:

a. To identify and prioritize the FFS research objectives of the FFS cycle.
b. To identify the FFS activities that have to be conducted in order to achieve the objectives.

Recommended duration: 2 hours.

Materials required: large sheets, paper, markers and pencils, results from the FFS diagnosis and review exercises as indicated in Figure 9 (ensure having the corresponding information for each one of the 25-30 local food plants).

Description:

Step 1: Identifying the research and development objectives

Explain the exercise and divide in sub-groups. Ask participants to reflect on the main results of the exercises "Malnutrition problem tree", "Intrahousehold food distribution" and "Timeline analysis", and to propose potential research objectives based on local food plants that could help to tackle the main problems identified. Write them in a large sheet. This first group of research objectives most likely will be based on groups of species.

Ask participants to reflect on the main results of the exercises "Seasonal calendar and coping strategies", "Management and domestication" and "Importance and bottlenecks", which are more applied to single species. Revise the main results for each individual species, particularly the bottlenecks that prevent their consumption, and propose potential research objectives that would help to tackle the respective bottlenecks. Write them in the large sheet. This second group of research objectives most likely will be for single species; but different species – which share similar bottlenecks – could also share similar research objectives.

Box 5: Types of bottlenecks identified during SD=HS Phase 1 (2014-2018) and their corresponding research objectives (based on the results of Zimbabwe, Vietnam, Myanmar and Peru).

Bottleneck	Corresponding research objectives
Reduced abundance	Harvesting practices
Social stigmatization	Cooking and processing for cooking Propagation Seed and knowledge exchange
Harvesting practices	Harvesting practices
Sensory characteristics	Cooking and processing for cooking
Availability and access	Propagation Seed conservation Seed and knowledge exchange Preservation
Cultivation	Cultivation
Propagation	Propagation
Seed conservation	Seed conservation
Health concerns	Cooking and processing for cooking
Cooking	Cooking and processing for cooking
Preservation	Preservation
Knowledge on nutritional value	Seed and knowledge exchange
Commercialisation	Commercialisation

Step 2: Prioritizing the research objectives for the first FFS cycle

If appropriate, explain to participants that it may be difficult to address all objectives in one single FFS cycle. In some cases several FFS cycles might be needed to achieve a particular objective for a particular local food plant. Ask the participants to discuss in sub-groups which objective(s) and plant species they would like to address in the coming FFS cycle. Can all objectives listed be addressed, or are indeed more FFS cycles needed? Encourage each sub-group to choose from three to five research objectives to present and discuss in plenary, based on the relevance of the research objective; and – in the case of objectives corresponding to single species – based on the importance of the plant (see the results of previous exercise "Importance and bottlenecks").

Ask sub-groups to present and discuss their results in plenary. In plenary, participants will be encouraged to agree on the main research objectives of the next FFS cycle. Ensure that the objectives are feasible and achievable using the FFS approach. Throughout the exercise ensure that both men and women participate, and that the ideas and priorities of both are taken into account.

Step 3: Identifying the FFS activities

Once the research objectives for the next FFS cycle have been selected, ask participants to discuss in sub-groups which activities would have to be carried out in order to achieve the desired results satisfactorily. Write the answers in a large paper sheet. Ask sub-groups to present in plenary, and prepare in a large sheet a consolidated list of activities based on the inputs of all sub-groups. Are all activities relevant for achieving the objectives? Are they all feasible? Which technical/scientific knowledge, information and skills are needed by participants in order to successfully conduct the activities? Do they have guidelines in this FFS Field Guide (Chapter 7)? Please have in mind that guidelines for new FFS activities could be added to this Field Guide based on the experiences during the implementation of the FFS.

The sheet should also include tasks to be carried out during the weekly FFS meetings and outside the FFS meetings, these necessary to implement the FFS activity successfully and achieve the FFS objectives (such as the purchase of material (e.g. seeds) and/or the coordination with other institutions or authorities). Reflect with participants, are any additional tasks needed? Are they listed in the right order? . Explain that participants should consider their own knowledge and skills needed to meet the objectives, and which new knowledge and skills need to be developed.

Box 6: Examples of research objectives, FFS activities and results

The following table presents some examples for FFS facilitators, prepared based on the experience of CTDT in Zimbabwe during SD=HS Phase 1 (2014-2018). It compares research objectives, FFS activities and results by local food plant species, based on their bottlenecks.

Local food plant name	Bottlenecks	Research objectives	FFS activities Phase 1	Results SD=HS Phase 1
Cleome gynandra ('Nyevhe')	Does not germinate easily	To explore the germination rates after different seed treatments	Designing experimental plots with the following treatments: (1) regular farmer practice (2) hot water (3) use of ash (4) dry planting (5) scarification	Dry-planted seed germinated poorly Germination was better with all other treatments
	The leaves are too small and difficult to harvest It takes a long time to cook It has a bitter taste Limited recipes available	To explore new ways of preparation with cooking demonstrations	Testing different recipes to improve taste (e.g. adding fresh milk, 'mova' or pumpkin leaves) Harvesting leaves from the top, middle and bottom of the plant, cooking them separately and noting the time needed to cook	Improved taste with different recipes and shorter preparation time
	Consumption associated to persons with HIV/AIDS	To prepare new recipes To discuss openly around the issue of HIV/AIDS occurrence in the community	Including cooking demonstrations in FFS and food fairs Collaborating with health centres to raise awareness and counter stigmatization Disseminating information through food fairs	Increased awareness of the role of 'nyevhe' for the diet. Lobbying will continue in the next FFS cycle involving health departments and other stakeholders
	Reduced seed availability	To multiply the seeds	Harvesting seed samples from different locations in the plant	Only 40% of the FFS managed to harvest the seed; in other FFS the crop in other FFS wilted before reaching maturity stage
	Bad smell *Sweetness* *Red color*	To explore new ways of preparation with cooking demonstrations	Implementing cooking demonstrations to test new recipes that improve smell, taste and colour (e.g. mixing	Only two recipes managed to remove bad smell and color, whereas the vegetable remained sweet

			with other vegetables like 'muboora')	
	Bad taste *Regarded as poor man's food or weed* *Not easy to process* *Consumption associated to persons with HIV/AIDS*	To explore new ways of preparation with cooking demonstrations To prepare new recipes	Cooking using different recipes Participating in food fairs to share knowledge and information	Only adults appreciated the taste improvement in the new recipes, youths did not like the taste and color
	Reduced seed availability	To multiply the seeds	Bulking and storing seeds in seed banks	Not successful, it wilted before reaching maturity stage; corrective measures needed
	Red color *Not palatable* *Bad taste*	To explore new ways of preparation with cooking demonstrations To prepare new recipes	Implementing cooking demonstrations to test new recipes that improve taste and color Disseminating information through food fairs	Cooking demos were successfully conducted, although processing needs to be improved to enhance palatability

Step 4. Summarizing the key points

Write down the results of the exercise. Make photographs of the sheets. Write in each photo and report the name of the FFS and the date.

6. Curriculum preparation

The FFS curriculum is the workplan or agenda for one full FFS cycle, consisting of weekly sessions, indicating the topics that will be covered, when and how, as well as which special topics can be addressed. In order to be able to start FFS preparations, first the FFS research objectives should be set and, accordingly, the activities should be identified. Before proceeding to the development of the FFS workplan or agenda, it is necessary to look for expert advice during the implementation of FFS activities (e.g. if the activity chosen is cooking new recipes, then the advice of a nutritionist or chef would be required; if the activity chosen is breaking seed dormancy, then the advice of an agronomist would be needed), given that a FFS is a platform where traditional and scientific/technical knowledge come together in a dialogue.

6.1. Curriculum design

The FFS curriculum provides a list of weekly activities that will be conducted by the FFS group (for an example of a curriculum please refer to Table 2 in Chapter 4.3). The FFS curriculum will certainly differ between individual FFS depending on the objectives and FFS activities defined by the participants (which are generally based on the bottlenecks identified). The FFS facilitators planning the FFS program have to estimate:

- How many sessions are needed (depending on the final list of activities)
- What will be the special topics addressed,
- At which stages technical and scientific support may be required
- Which materials are needed and which logistics are involved
- And what is the budget available.

Box 7: List of potential FFS activities to be implemented during the FFS cycle.

The following list presents potential activities for the FFS on Nutrition and Local Food Plants, prepared on the basis of the results of SD=HS Phase 1 (2014-2018) (i.e. potential research objectives identified by farmers from Zimbabwe, Myanmar, Vietnam and Peru). The research objectives were divided into the six groups below, and these correspond to the bottlenecks identified during Phase 1 (see Box 5). The activities that are addressed in this FFS Guide are indicated with an asterisk (*). The guidelines for these activities are provided in Chapter 7.

If farmers identify additional [groups of] activities that also contribute to the objectives of the FFS (to improve the quality of the diet, and to decrease the length and severity of the food scarcity period) these can be added to the list and guidelines could be suggested to be added to this manual.

The list below also indicated whether a group of activities is applicable for research objectives defined for multiple species or single species.

1. Improved cultivation and management of local food plants [*single species*]
   a. Growing Site selection

b. Sowing protocol optimisation *

c. Crop management protocols (e.g. fertilizing, watering, pruning, mulching, protecting, pest and disease management)

d. Soil and water management

e. Use of field equipment

2. Proper harvesting [*single species*]

a. Crop harvesting strategies and techniques (for edible parts, for seeds)

b. Harvesting protocols for wild food plants *

3. Seed storage and propagation of local food plants [*single species*]

a. Proper seed storage *

b. Vegetative propagation (i.e. what plant part germinates better) *

c. Sexual propagation (i.e. breaking seed dormancy) *

4. Home garden design and management [*groups of species*]

5. Processing of local food plants and cooking local dishes [*single species or groups of species*]

a. Processing of harvested produce

b. Preservation and storage of produce *

c. Cooking demonstrations (including preparation of recipe books, in collaboration with nutritionists to calculate the nutritional contribution of the recipes) *

6. Seed and knowledge documentation and exchange [*groups of species*]

a. Food and seed fairs, including knowledge exchange *

b. School activities for knowledge and awareness *

In elaborating the FFS workplan explained in this section, special attention has to be given to the weekly activities that will have to be carried out in the implementation phase. It is necessary to ensure that the plan is realistic and feasible and that it includes women's interests and objectives.

6.2. Organization and responsibilities

It is necessary to define the organization and responsibilities of the FFS group and sub-groups required for the implementation of FFS activities. Sub-groups should list the activities that they intend to carry out during the FFS cycle and decide on their priorities and planning. For that, it would be useful to ask each sub-group to write down the activities on a large paper sheet using the format shown in Table 5.

Table 5: Format for planning FFS activities for the coming FFS cycle.

No.	Main activity	Timing & Duration	Responsible people	Equipment needed
1				
2				
3				
4				
5				

When each subgroup presents its work plan in plenary, it is important to ask participants to reflect on the following:

- Which preparations are needed for the implementation of the planned activities?
- How will the group members undertake weekly observations and data gathering for each activity, If needed?
- Which activity will demand most of the sub-group's time and work?
- Do participants have sufficient land (field, home garden) or a kitchen with all utensils they need to conduct the selected activities?
- Are all necessary materials to conduct the activities available?
- Which pre-cycle activities should be undertaken to ensure that everything is in place to start with the corresponding FFS activities at the proper time?
- Are women's needs and preferences addressed?
- Which activities may not be amenable to women's participation? How can these hindrances be overcome?
- Who is responsible for supervising the activities?
- Has the support or advice of experts, when required for conducting the activities (e.g. nutritionist, chef, agronomist) been ensured?

6.3. Selection of site or location of FFS activity

The field site(s) for the FFS activities should be selected taking into account the FFS objective and in particular the activities planned, as discussed in the previous exercises. The FFS sites can change per session, depending on the type of activities that will be conducted. Potential locations for the individual FFS sessions could be the following:

- A field where local food plants are cultivated or are growing spontaneously associated to staple crops.
- A home garden where local food plants are growing or cultivated.
- The forest (or other natural sites in the environment) where local food plants are collected.
- The kitchen or cooking facilities where local food plants are processed and dishes are prepared.

In choosing the location of the FFS site for a particular session, it is important to consider that the local seasonal conditions, the type of agro-ecosystem and the land ownership status (private, communal) are all factors that will affect the development of FFS activities. The agro-ecological conditions of the plots should be appropriate for the interests of both men and women. Also, it is necessary to ensure that the FFS site is easily and safely accessible within a walking distance for all FFS participants, in particular women and elderly. A kitchen or cooking facilities should be well equipped, allow for proper hygiene measures, allow the participation of sub-groups, and facilitate tasting experiments.

6.4. Selection of special topics

Special topics are complementary topics that provide additional information which is useful not only for the development of the FFS activities, but also for addressing the main concerns that emerged during the diagnosis and review phase (e.g. how to address the local causes of malnutrition). Examples of special topics are provided in Chapter 8.

The implementation of FFS activities may include special topics ideally to be identified at the time of agreement on the local FFS curriculum. Special topics have to be prepared in advance, i.e. prior to the development of these activities, and in coordination with technical experts if needed. For example, where the FFS conducted in Phase 1 included a special topic on seed dormancy, information and support on ways to manipulate seed germination was provided by technicians before starting the establishment of germination plots. Other special topics might be less strictly related to the actual implementation of FFS activities, but essential to cover any knowledge gaps identified during the diagnosis and review phase. For example, the FFS in Peru included a special topic on maternal and child nutrition in order to provide information that participants needed for tackling the local causes of malnutrition identified during the malnutrition problem tree exercise. The following is the list of special topics that have been developed in this FFS Guide (Chapter 8):

1. Nutrition and food diagram exercise
2. Maternal and child nutrition
3. Promoting knowledge on hygiene, sanitation, and water (WASH)
4. Keeping local food plants in Community Seed Bank facilities
5. Local food celebration day
6. Group dynamics
7. Gender equity (includes the following components: basic concepts of gender, gender related proverbs and stereotypes, gender-specific activity clock, access and control, social inclusion)
8. Curriculum evaluation.

6.5. Selection of knowledge sharing and dissemination activities

In addition to the FFS activities listed in the curricula, FFS field days (see Special Topic 8.5.) and exchange visits may be organized for sharing knowledge and experiences with other FFS and relevant stakeholders (Figure 60). Such activities may also encourage farmers from other communities to create their own FFS. They have to be included in the preparation of the FFS curriculum.

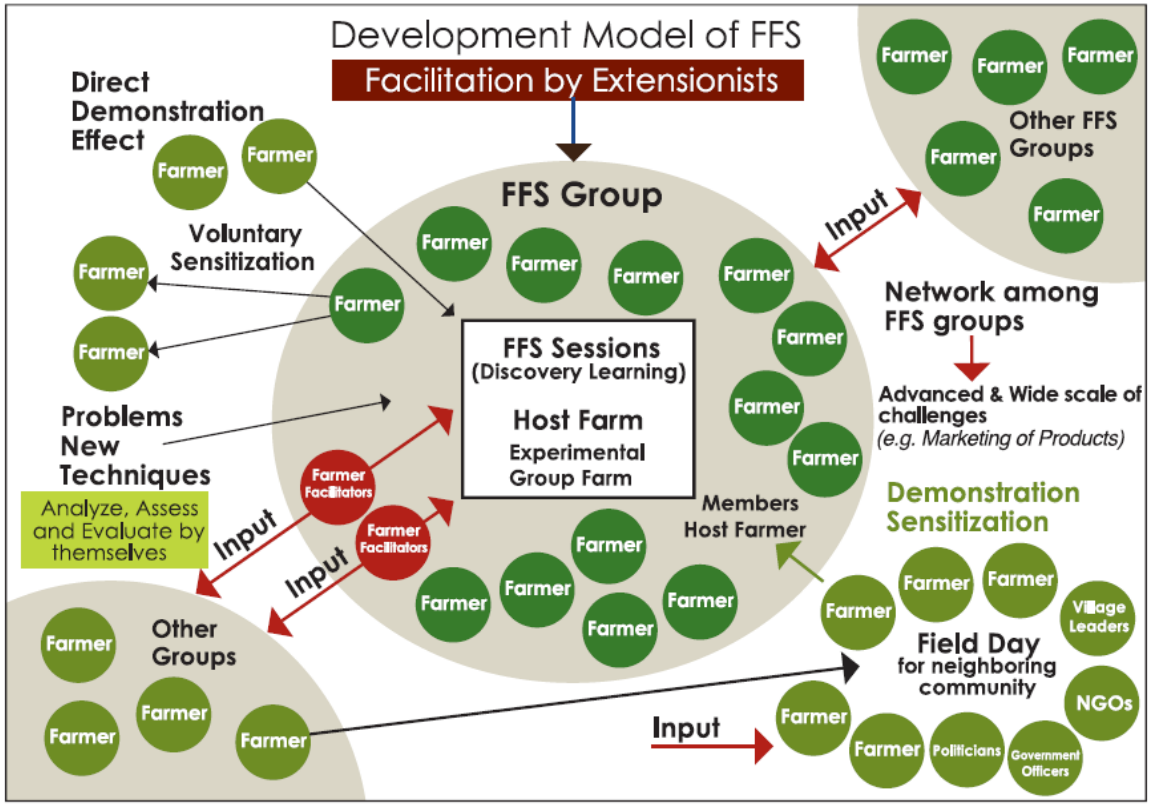


Figure 6: Development model of FFSs. Source: FAO Farmer Field School Implementation Guide. Farm forestry and livelihood development.

For example, in farmer field days organized in Zimbabwe and Vietnam during Phase 1, farmers showcased the FFS study plots and displayed local NUS seeds, and participated in cooking demonstrations with a focus on the nutritional values of NUS. Visitors were encouraged to diversify their diet for a better nutrition security while preserving agro-biodiversity. Other field days provided farmers an opportunity to share their results and experiences in seed propagation and sustainable harvesting of NUS, as well as effective post-harvest processing.

7. FFS implementation of activities

The implementation phase can start as soon as the curriculum for the FFS cycle has been agreed. The implementation phase includes the selection and preparation of the site(s), implementation of objective-related activities, addressing special topics, and knowledge sharing and dissemination activities. The FFS cycle ends with a session for reflections, lessons learned and planning for the next cycle.

The implementation of activities (after the selection of the site or sites) will follow the timeframe presented and agreed for the FFS curriculum. It is important that the FFS facilitators ensure that the materials required are available on time, organize the field logistics, coordinate with experts and local institutions, and ensure that the budget will suffice for the implementation of all activities. The FFS facilitators have to encourage that both men and women participate in the FFS activities, and their views and opinions are included. It is also important that both men and women take leadership positions in the plenary group and the sub-groups.

7.1. Guidelines for FFS activities

The following provides broad guidelines for possible FFS activities for the implementation phase. As shown in Box 7 (section 6.1), more activities can be implemented in the FFS.

7.1.1. Sowing local food plants

Objectives: To promote good sowing practices, so that local food plants can be sexually propagated in home gardens and fields in an efficient manner. This activity contributes to the FFS objective of improving farmers' coping strategies in the food scarcity period. FFS sessions on sowing can be used to address bottlenecks related to: availability of and access to seed of local food plants, difficulties in plant propagation, reduced abundance in the wild.

Types of local food plants: This topic is relevant for species in which sexual propagation is the best option and for which seeds are readily available.

Location for the activity: The sessions can take place in indoor locations serving as plant nurseries, with appropriate conditions of light, moisture, and temperature favourable for seed germination (e.g. in household homes, greenhouses, etc.).

Materials required: Water, containers (pots), trays, paper towels, mulch, growing media (soil, moss, etc.).

Stakeholders involved: The sessions should particularly target the household members who usually take care of the home gardens and the fields.

Description:

Before the first FFS session:

1. Collect information for the selected species (or if not available, for closely related ones) on the expected germination percentage and on common sowing practices. If applicable, collect information on the type of seed dormancy of the species, and on treatments that can be used to break it (also refer to "Seed germination" in this FFS guide).

First FFS session:

2. Opening questions to explore the situation before the FFS:
    a. How many of you normally sow the seeds of this species? (Count by show of hands)
    b. Which methods do you use for sowing the seeds?
    c. How many of you encounter problems when sowing? (Count by show of hands)
    d. What problems do you usually encounter when sowing?
    e. For those who do not sow the seeds of this species, what is the reason?

    Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session.
3. Provide information on the different factors influencing germination (light, water and oxygen, temperature). If possible, provide information on the requirements of the selected species for these parameters.
4. Discuss with the participants which methods they know and use in general for sowing, and for which type of seeds these different methods are more suitable. Also discuss if they would like to explore other possibilities.
5. Select one or more sowing methods which are suitable for the food plants of the session and discuss their advantages and disadvantages (broadcasting, placing one or more seeds in a small hole, monocropping or in combination with other species, need of shade plants).

Session 2 onwards:

6. Explain the selected method(s) step by step.
7. Test the method(s):
    a. Groups of seeds of a certain species are sown using different methods in order to compare the results. The participants can be divided in sub-groups for this activity.
    b. Over the following few weeks, observe the germination rate of each method, comparing the efficacy among the methods, including in relation to direct sowing (if possible).
    c. Draw conclusions on which methods are most effective and feasible.

Final session (can be done as soon as plants are firmly established, does not have to wait until end of growing season):

8. Closing questions to evaluate how the situation improved after the FFS:
    a. How many participants found it useful? (Count by show of hands).
    b. How many did not find it useful? (Count by show of hands) Why not?

c. For those who were already sowing these seeds, will you use the methods you learned? (Count by show of hands)
d. For those who did not sow these seeds before, how many of you will start doing it? (Count by show of hands).

Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session.

9. Reflections, lessons learned and steps to follow (see 7.2).

Background content: Seed germination is influenced by light, water and oxygen, and temperature. Each species has specific requirements for these parameters, thus the optimal sowing method should be chosen based on these requirements.

- Light: pioneer species (occupying open spaces) require high light for germination and need to be sown on the surface of the soil, whereas shade-tolerant species need to be in the darkness to germinate, hence they need to be buried. Pioneer species frequently have small (dust-like) seeds, whereas shade-tolerant species can include trees and shrubs with medium to big seeds, or herbaceous plants with small seeds.
- Water and oxygen: while water is necessary for germination, an excess of water leads to a lack of oxygen, which is needed for respiration processes. Although the species' requirements can differ, in general seeds should be kept moderately moist, allowing for a good water-oxygen balance.
- Temperature: seeds' requirements for temperatures can strongly variate, as seeds may require cold, intermediate, or warm temperatures, or alternating cold and warm temperatures (the latter particularly common in dormant seeds).

The following paragraph describes different methods for sowing. The choice of the most appropriate one depends on the seed characteristics (Figure 71).

- Broadcasting: only advisable for species for which seeds are available in abundance and which germinate easily and effectively. Can be done directly in the home garden soil.
- Direct sowing in holes: suitable to seeds that are abundant, germinate easily, and show little or no dormancy. Direct sowing is fast and it has low labor requirements. Seeds are located centrally in a hole in the soil or in dedicated (carton or plastic) containers, possibly with an orientation that allows for optimal growth; depending on their light requirements, they are covered with a certain amount of mulch, and they are gently watered so that they are pressed in the soil. Seeds can be sown in groups or singularly:
    - Multiple-seed sowing: this is the most common practice, in which several seeds are placed in the same container so that at least one or a few of them will germinate. The number of seeds to be planted in one container usually varies from two to five, but it depends on the seed's germination percentage (the higher the percentage, the lower the number of seeds). Seeds with average germinating percentages lower than 50% should not be selected for multiple-seed sowing, as many non-viable seeds in a container can lead to diseases and thus further impede germination. Thinning (removing seedlings that are growing together in a container) should be carried out as soon as multiple seeds start germinating in the same container, as their competition for light and water will hamper

optimal growth. Early thinning is also easier given the low development of the seedlings' rooting systems. It can also offer an opportunity to select the healthiest and strongest plants, which should be kept at the centre of the containers.

  - Single-seed sowing: more suitable to seeds with high germination percentages that can be directly sown in holes, or which are particularly scarce and expensive. This method has the advantage that no thinning is necessary, thus the labour requirements are lower than for multiple-seed sowing. When sufficient resources are available, oversowing is a common practice: more seeds are planted than the total number of required plants (if there is one), based on the germination percentage of the seeds. As an example, if 100 plants are required and the percentage is 80%, 20 more seeds need to be singularly sown (120 seeds in total).

- Transplanting already germinated seeds: seeds are sown in containers when their rooting system has already emerged. This method is suitable to seeds that are especially scarce or costly, or with low germination percentages and/or deep dormancy, as well as to seeds having irregular shapes, germinating in stratification, or rapidly producing roots after germination. This method includes the following steps:
  - Seeds are treated as necessary in order to break their dormancy (see "Seed germination" on the FFS guide).
  - Seeds are left germinate in bags filled with a moist medium such as moss, or between layers of wet paper towels.
  - As the seeds start to germinate, they are checked every day. As soon as the roots emerge from the seed, the seed is transplanted to a container.
  - The sprouting seeds are sown with the radicle oriented downwards, and they are covered with mulch.

  This is a labour-intensive method and it requires skills for proper planting of the seedlings; additionally, pathogens can easily affect the seeds since they are all germinating in the same bag. However, it is a very efficient method as it ensures that only viable seeds are planted, and it allows to observe the germination process and to identify factors affecting it.

- Transplanting seedlings: seeds are sown in a shallow layer of growing medium, and once they have fully germinated the seedlings are transplanted into a container - hence the sprout is more developed than in the previous method, in which only the root has emerged when the seeds are sown.
  - Seedlings are distributed over the growing medium on trays of variable depth (the right medium and depth depend on the species), covered in mulch, and located in a suitable environment for further growth and development.
  - The timing for transplanting depends on the species, but usually it should be when the cotyledons (first leaves) have emerged and the roots are still small (possibly before they reach the bottom of the tray).
  - The seedlings are gently extracted from the tray, with some of the surrounding medium, and inserted in a container in which a small hole in the soil has already been prepared. Correct root orientation is essential for the plant growth, and in some cases root pruning can be practiced before planting. Root malformations can be caused by incorrect

transplanting, resulting in hampered plant development. Skills are required to identify the right timing and to correctly transplant the seedlings without damaging them. This method is not suitable to species with taproots, whereas it can be used for plants with fibrous rooting systems, with small or fragile seeds, and with seeds having complex dormancy traits.

- Transplanting plugs: seeds germinate in trays in individual cells, and the transplanting is carried out only once the seedlings are well established (plugs). The transplanting needs to take place once the roots are firm enough to prevent damage during transportation. Plugs are transplanted to bigger containers, and mulch and water are applied. This method is the most labour-intensive and it requires skills, but it is also the most efficient one. However, it is not always successful, thus it is recommended to do small trials before it is applied on a larger scale.

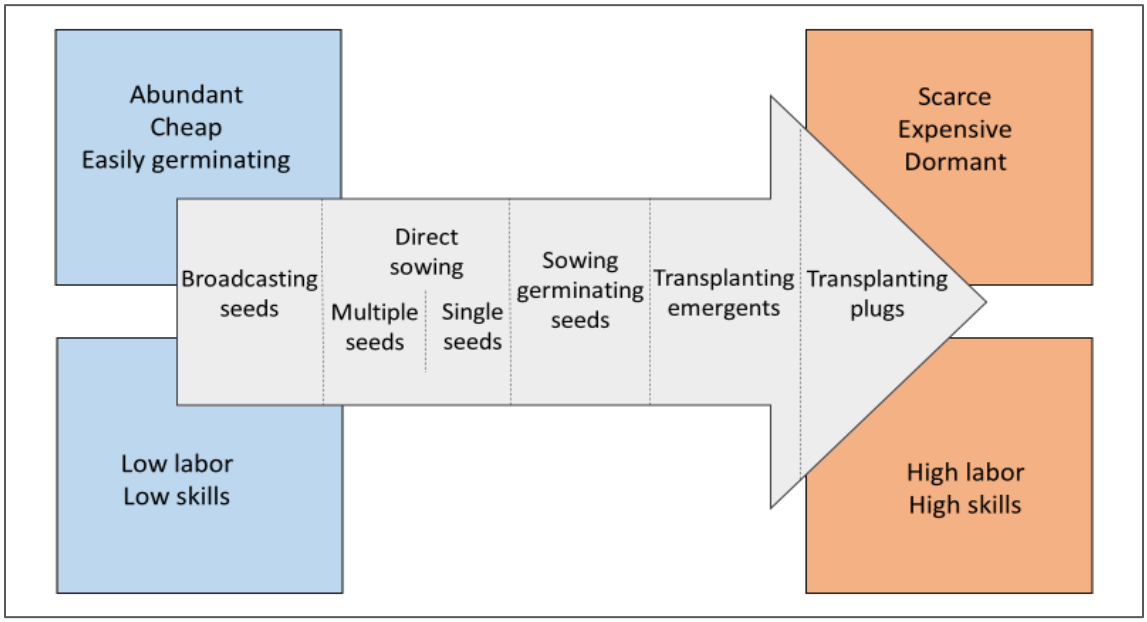


Figure 7: Sowing methods for increasing seed scarcity, price, and dormancy, in relation to labor and skill requirements.

Additional information to take into account: Although the use of mulch is always recommended in these guidelines, the recommendation does not apply to seeds requiring light to germinate. In general, the specific seeds' requirements need to be considered when applying all of the above-mentioned methods, hence gathering information before the sessions is essential.

For more information:

Tara Luna, Kim M. Wilkinson, and R. Kasten Dumroese (2014). Seed germination and sowing options. In *Tropical Nursery Manual: A guide to starting and operating a nursery for native and traditional plants. Agriculture Handbook 732* (pp. 163-183). Washington, DC: U.S. Department of Agriculture, Forest Service. Available at : https://www.fs.fed.us/rm/pubs_series/wo/wo_ah732/wo_ah732_163_183.pdf

7.1.2. Harvesting wild food plants in the wild

Objectives: To promote the consumption of wild food plants while ensuring that sustainable harvesting practices are adopted, allowing for species conservation in the wild. This activity contributes to the FFS objectives of improving dietary diversity and improving farmers' coping strategies during the food scarcity period. This topic can address bottlenecks related to: reduced abundance of wild food plants, poor knowledge on the proper harvesting and maturity stage of wild food plants and on harvesting practices.

Types of local food plants: This activity specifically refers to wild plants and mushrooms, which can be difficult to harvest due to poor knowledge on maturity, or which are declining in abundance due to an excessive harvesting pressure, or environmental changes.

Location for the activity: The activity, at least the practical sessions, should take place where the selected plants are located, i.e. forests, stream banks, etc.

Materials required: Most of the sessions are based on plenary discussions, therefore pens and paper for note taking are the main materials required. Additional possible materials are paper, pencils, and other tools for constructing a harvesting calendar.

Stakeholders involved: A sustainable harvesting rate should cause no damage to a species population; thus it depends on the species characteristics (e.g. reproductive system, growth rate, etc.). Local botanists with knowledge on wild species and ecosystems can be consulted in order to determine an acceptable harvesting rate for each species.

Description:

<u>First FFS session:</u>

1. Opening questions to explore the situation before the start of the FFS:
    a. How many of you harvest a specific wild plant (the plant focus of the FFS)? (Count by show of hands)
    b. Do you encounter any problems? (Count by show of hands).
    c. What are the main problems you encounter?
    d. For those who do not harvest the plant, what is the reason?

    Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session.
2. Explain and discuss the advantages of consuming wild plants: wild species are free to harvest and often rich in nutrients, hence they represent a low-cost option for households to improve nutrition; they are adapted to the environment, thus they often tolerate droughts, pests, or poor soil conditions; the sustainable use of wild plants, rather than the expansion of cultivated areas, can contribute to preserve natural ecosystems and to maintain plant genetic diversity.
3. Explain that it is important to collect wild species in moderation, so that they are not depleted and that natural habitats are not altered.

Prior to the following FFS sessions:

4. For the selected species that the sessions refer to, collect information on the time of the year in which it/they can be best collected and consumed.

Second FFS session onwards:

5. Discuss the importance of harvesting the plants at the right maturity stage. Explain from which morphological characteristics it is possible to recognize whether the selected species are ready to harvest. Discuss how they can be properly distinguished from similar species that are toxic or not appropriate for consumption.
6. If the session focuses on multiple species, the participants can develop a calendar for the harvesting of wild species in the area: this can be done in plenary or in sub-groups, e.g. each sub-group can focus on a different type of wild species, such as fruits/vegetables/mushrooms (this can also be an occasion to reiterate the concept of food groups and nutritional content).
7. Explain the concept of sustainable harvesting, and how the abundance or rarity of plants is connected to the sustainable harvesting rate.
8. Discuss differences between plant growth rates, reproductive systems, and life forms, and the implications of these characteristics for sustainable harvesting. Discuss the consequences of harvesting different types or parts of plants.
9. If mushrooms are among the species included in the session, add specific information on sustainable mushroom harvesting.
10. Although the sessions focus on harvesting at the right stage and at sustainable rates, it is useful to also give basic guidelines on post-harvesting handling to avoid losses, particularly referring to the immediate transportation and storage after harvesting.
11. Organize a wild food plant harvesting expedition to practice the knowledge learned during the FFS discussions. An expert could be invited to the expedition in order to help answer additional questions that may arise.

Final session:

12. Closing questions to evaluate how the knowledge on using wild food plants improved after the FFS:
    a. How many participants found it useful? (Count by show of hands).
    b. How many did not find it useful? Why not? (Count by show of hands).
    c. For those who were already harvesting in the wild? Did you learn something that will help you in doing it in a better way? (Count by show of hands)
    d. For those who did not harvest in the wild, how many of you will start doing it? (Count by show of hands).

    Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session.
13. Reflections, lessons learned and steps to follow (see 7.2).

Background content:

Several topics can be addressed during the sessions on sustainable harvesting in the wild. Here are a few points that can be of interest during the sessions:

- It is often important to harvest at maturity, as unripe products can have lower nutritional content and be difficult to digest (with the exception of species that can ripen after harvesting, for which early harvesting can reduce losses, as well as species of which the vegetative parts are consumed). Several morphological characteristics can show whether the selected species are at the right maturity stage (these can be different depending on the species, therefore appropriate documentation prior to the session is essential). Here are some general examples:
    - In cereals and legumes, maturity is often reached when the grains and pods are dry.
    - For roots and tubers, harvesting can be done when they have reached the desired size.
    - Most fruits change color and reach their maximum size at maturity.
- Rare or threatened species, i.e. those only living in specific habitats and/or having a small population size, should not be harvested in the wild but rather cultivated in home gardens, to allow for species conservation. On the contrary, direct harvesting from the wild can be acceptable for species that are very common and not at risk of depletion.
- Harvesting from plants with different growth rates, reproductive systems, and life forms, as well as harvesting different types or parts of plants, has different implications for sustainability:
    - Slow-growing plants are more susceptible to overharvesting than fast-growing ones.
    - Harvesting annual or biannual plants is generally less sustainable than harvesting perennials.
    - Harvesting of plant parts only, leaving the remaining plant to survive and regrow is preferable.
    - In principle, species populations are more affected by the harvesting of roots and bark than of fruits and leaves (although for annual plants, harvesting the fruit or seed can endanger species survival). See
    - Table *6* for more details.

Table 6: Susceptibility to overharvesting depending on the plants' life form and the harvested part modified from Schippmann et al., 2006).

	Annual	Biannual	Perennial	Shrub	Tree
Wood	-	-	-	Medium	Medium
Bark	-	-	Medium	Medium	Medium
Root	High	High	High	Medium	Medium
Leaf	Medium	Medium	Low	Low	Low
Flower	Medium	Medium	Low	Low	Low
Fruit and seed	High	High	Low	Low	Low

    - Harvesting the flowers, fruits, and seeds has a stronger impact on plants with sexual propagation than on those with vegetative propagation.

- In the case of mushrooms, as the fruiting bodies are harvested, this does not usually cause damage; but if the harvesting happens before spores are released, this can influence regeneration. Practices that favour the dispersal of spores include spreading parts of the mushroom cap, or transporting the collected mushrooms in baskets that allow for spores to fall on the ground.
- For a better preservation of the harvest, both harvesting and transportation should take place at the coolest time of the day. Before transportation, eliminate damaged produce and avoid keeping ripe and unripe fruits together. For immediate short-term storage, the produce should be collected in dry and clean containers, located in cool and dry areas with ventilation, protected from sunlight and from rodents and insects.

For more information:

Boa, E. R. (2004). 3 Management: wild edible fungi, trees, forest users. From *Wild edible fungi: a global overview of their use and importance to people* (No. 17). FAO . Available at : http://www.fao.org/3/y5489e/y5489e07.htm#P865_101496

Schippmann, U. W. E., Leaman, D., & Cunningham, A. B. (2006). A comparison of cultivation and wild collection of medicinal and aromatic plants under sustainability aspects. *Frontis*, 75-95. Available at : https://library.wur.nl/ojs/index.php/frontis/article/view/1225

FAO Zimbabwe (2015). Healthy harvest. A training manual for community workers in growing, preparing and processing nutritious food (pp. 70-75). Second edition. ISBN 978-0-7974-6229-8.

7.1.3. Seed storage

Objectives: To allow for the preservation of seeds for the following growing season(s), by promoting storage techniques that avoid seed loss and maintain seed germination capacity between seasons and over time; to contribute to species conservation through good seed storage. These objectives contribute to the FFS objective of improving farmers' coping strategies in the food scarcity period. Bottlenecks addressed: limited seed supply, lack of knowledge on seed management.

Types of local food plants: This topic is relevant for species in which sexual propagation is the major and best option and for which seed collection is feasible. Seed characteristics influence the potential for storage, thus collecting information prior to the session is essential.

Location for the activity: No specific location is required. Proximity to storage areas is desirable, so that the facilities can be visited during the sessions. If possible, select the site of a community seed bank.

Materials required: If some of the steps for seed storage are carried out or demonstrated during the sessions, specific materials can be required: e.g. trays for drying, materials such as wood or mud to show how simple storage structures are constructed.

Stakeholders involved: If specific individuals in households or in the community are responsible for seed storage, they should be particularly involved, so that they can share and improve their knowledge.

Description:

First FFS session:

1. Opening questions to explore the situation before the FFS:
    a. How many of you currently store seeds of the selected species? (Count by show of hands).
    b. In general, how do you store the seeds?
    c. Do you encounter any problems when storing the seeds? (Count by show of hands).
    d. What are the main problems you encounter?
    e. For those who do not store the seeds of the plant, what is the reason?

    Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session.
2. Explain the importance of storing seeds as a coping strategy for food shortage periods.
3. In relation to the food plant(s) that were selected for this topic, discuss different options for storage.

Second FFS session onwards:

4. Select one or more storage systems per session and discuss the pros and cons and for which of the considered food plants that would be applicable; or:
5. Select one or more local food plants per session and discuss which storage systems would be most appropriate and why.
6. Discuss in plenary topics related to seed maturity and quality, effect of physical (moisture content) and physiological (maturity) factors on seed preservation, impact and control of pests.
7. Visit existing local storage facilities (and if possible, community seed banks), discussing their qualities and possible improvements.
8. Demonstrate how to build storage facilities or how to improve existing ones; participants can also be divided in groups and work at different types of structures.

Final session:

9. Closing questions to evaluate how the situation improved after the FFS:
    a. How many participants found the sessions useful? (Count by show of hands).
    b. How many did not find them useful? Why not? (Count by show of hands)
    c. For those who were already storing seeds (before the FFS), will you implement what you learned? (Count by show of hands)
    d. For those who did not store seeds before, how many of you will start sowing this plant? (Count by show of hands).

    Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session.
10. Reflections, lessons learned and steps to follow (see 7.2).

Background content:

The following provides an overview of topics that can be addressed in relation to seed storage.

- Seed-associated factors that can influence the storage:
    - Physiological maturity: as a general rule, seeds should be harvested at maturity (i.e. when they are about to disperse).
    - High seed quality, which can allow for a longer storage life; provide examples of how the environmental conditions can influence seed quality (e.g. soil quality and nutrient availability during plant growth, weathering). Normally, seeds should not be harvested under wet conditions, since this favours fungal contamination of the seeds.
    - Type of seed: e.g. starchy seeds do less easily deteriorate than oily and protein-rich seeds.
- Pre-storage handling practices, which are the basis for good seed storage. They depend on the specific plant species considered, but a few general steps can be followed:
    - Collecting and transporting seeds: mature seeds are collected/extracted and transported to the site in which the storage will take place. For seeds contained in fruits, it is better to collect and transport the whole fruit and to extract seeds only just before storage, to avoid germination or rotting of the seeds.
    - Removing impurities such as stones, leaves, insects (immediately after seed extraction, to avoid contamination and infestation).
    - Drying: seeds are spread on trays in a low humidity environment with circulating air. A low-cost method is open-air drying, in which seeds are placed under the sun or under cover in open air and stirred regularly, although UV-light might also affect germination rates. For some plants, drying can be carried out before extracting seeds, by drying the whole plant. Although different seeds have different requirements and tolerance for desiccation, as a general rule they should reach a low moisture content for good preservation. Simple ways to determine this include biting or pressing the seeds (they should break rather than feel soft), or leaving seeds in a jar with salt (as long as the salt sticks to the jar walls, the seed moisture content is too high).
    - If the seeds have husks or shells, these are often removed manually or mechanically.
    - Remember that the initial seed quality determines to a high extent the effect of seed storage, good-quality seeds will store much better and longer than lower-quality seeds.
- Main physical factors that can influence seed viability: temperature, moisture content of seeds, relative humidity (water vapour in the air during storage). Seeds are very sensitive to changes in these three parameters which can, by themselves, affect the seed germination capacity. In addition, the combination of these three factors influence the proliferation of fungi and insects; in general, the risk is lower for low values of all three.
- Organisms that can affect seeds during storage. Discuss with the participants which storage insects are the most common (this is strongly location-specific), as well as how to recognize the signs of insect and fungal proliferation. Insects and fungi can reduce the seed stock due to feeding and growth, affect the seed germination capacity, or in some cases (e.g. termites) affect the storage structures determining seed loss. Also discuss the impact of rodents and birds, which are often causes of seed loss during storage: some rodents (especially rats) are difficult to eradicate and they can eat seeds and cause damage to the storage infrastructure, while birds are usually

mainly a problem in open storage facilities. Discuss the role of microorganisms, such as fungi and bacteria, which are responsible for most of the damage and viability loss in seed storage.

- Practices for insect and fungus control:
    - Before storage: control seed quality and eliminate infested seeds; carry out seed washing and drying shortly after seed extraction.
    - During storage: control the environment (seed moisture content is strongly determined by the relative humidity, hence seed drying is essential) and facilitate ventilation; monitor the presence of insects and fungi (keeping the storage close to farm houses can facilitate insect detection); maintain high hygiene standards around the storing area (removing vegetation or rubbish, keeping livestock away, timely cleaning empty storage containers).
- Control of rodents:
    - Provide guidelines for identifying the signs of a rodent infestation: appearance of rodents during the day, footprints and tail marks, feces, fragments of grains or of damaged materials (wood, cables), nests in corners or roof areas.
    - The main way to control rodents is to prevent their entrance in the storage area. Examples of methods to prevent rodent infestation include: placing metal plates at the base of doors; ensuring that tree branches do not hang on the storage room's roof; covering walls and floors in cement and immediately filling holes with cement; placing the storage above ground level (e.g. on poles); avoiding water stagnation close to the storage facilities; practicing good hygiene and sanitation.
- Control of birds: wire nets at windows and ventilation entries can prevent bird entrance in storage rooms.
- Control of microorganisms: reiterate the importance of cleaning the seeds before storing them, as well as of preventing high humidity and allowing for ventilation.
- Storage structures: discuss different types, including their advantages and disadvantages and the conditions in which each of them is most suitable. Most likely some traditional forms of storage are already in use, so the discussion should start from them and the session could include a visit to the storage systems used by the community. In all cases, highlight that storage facilities should be out of the sunlight and have low humidity and good air circulation. Here is a short description of the main categories of storage structures:
    - Open storages: often used as short-term drying facilities or for storing recently-harvested seeds with high moisture content. These facilities allow for quick drying, thus preventing mold proliferation, and they enable the further ripening of seeds. They are usually wooden elevated structures, thus they protect from termite invasion and they have low construction costs; however, they expose the seeds to birds and insects, as well as possibly rain or excessive sun. As another form of open storage, cobs or panicles can be hung above the roofs or over fire places, which allows for drying and protects from insects.
    - Semi-open storages: these structures are made with materials that allow for porous walls (e.g. timber, bamboo) and they are elevated on stones or poles to protect the seeds from rodents. They provide better protection from sun and rain compared to the open storage

facilities, while still enabling some level of ventilation, but they do not offer protection from insects.

- Closed storages: hermetic containers made with materials such as cement, clay or mud, in combination with wood, straw, etc. They provide good insulation, so they allow to keep stable temperatures and humidity, but they can only be used for seeds that can be dried and exhibit very low moisture contents before being stored.

Additional observations to take into account: Part of the information provided above is only relevant for medium to big amounts of seeds, for which appropriate storing facilities are needed. Smaller amounts of seeds can be preserved in jars and pots sealed with candle wax or rubber rings, which allow to keep the seeds safe from rodents at low temperatures and moisture level.

For more information:

Parimala, K., Subramanian, K., Kannan, K. M., & Vijayalakhsmi, K. (2013). Seed Storage Techniques-A Primer. *December 2013*. Available at : http://www.ciks.org/downloads/seeds/3.%20Seed%20Storage%20Techniques%20-%20A%20Primer.pdf

Hong, T. D., & Ellis, R. H. (1996). *A protocol to determine seed storage behaviour* (No. 1). Bioversity International. Available at : https://cropgenebank.sgrp.cgiar.org/images/file/learning_space/technicalbulletin1.pdf

FAO (2014). Appropriate Seed and Grain Storage Systems for Small-scale Farmers: Key Practices for DRR Implementers. ISBN 978-92-5-108334-5. Available at: http://www.fao.org/3/a-i3769e.pdf

7.1.4. Seed germination and breaking seed dormancy

Introduction: In cases where seed dormancy is identified by farmers as a major constraint in the cultivation and use of local food plants, farmers should conduct seed germination tests, preceded by expert trainings (e.g. provided as special topics). FFS participants may establish, at the start of the rainy season, demonstration plots where they apply a number of treatments to break seed dormancy, including soaking in hot water, application of ash, scarification and other conventional farmer practices. For example, in Zimbabwe farmers learned that the germination of *cleome* seeds is increased when the seeds are soaked in hot water for 10 minutes before planting. Finding proper methods to break seed dormancy is often a trial and error exercise.

Objectives: To improve farmers' understanding of seed dormancy and to promote successful treatments for activating germination, so that farmers can plant and cultivate local food plants. This activity contributes to the FFS objectives of improving dietary diversity and improving farmers' coping strategies in the food scarcity period. This topic can be used to address bottlenecks related to the more general topic: availability of and access to local food plants, difficulties in plant propagation, poor knowledge on breaking seed dormancy, reduced abundance in the wild.

Types of local food plants: This topic is relevant for any local food plant species in which sexual propagation is the best option and for which seed collection is feasible. More in particular, the sessions are focused on species exhibiting pronounced seed dormancy.

Location for the activity: The sessions can take place in the field or in home gardens, as well as in covered spaces serving as plant nurseries.

Materials required: Water, pots, materials for labelling the pots. In addition, depending on the treatments: boxes, sand, sandpaper; access to fire or heating; hydrogen peroxide, citric acid; absorbing paper.

Stakeholders involved: The sessions should particularly target the household members who take care of the home gardens and the fields.

Description:

Before the first FFS session:

1. Collect information on seed dormancy for the selected species (or if not available, for closely related ones) from the internet on whether the seed is recalcitrant, intermediate, or orthodox. If applicable, collect information on the particular characteristics of seed dormancy of the species, and on treatments that can be used to break it. The following source might be highly useful: https://www.prota4u.org/

First FFS session:

2. Opening questions to explore the situation before the FFS:
    a. How many of you normally plant the seeds of this species? (Count by show of hands)
    b. Do you encounter any problems with germination? (Count by show of hands)
    c. What problems do you encounter?
    d. Do you use any treatment for breaking seed dormancy?
    e. For those who do not plant the seeds of this plant, what is the reason?

    Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session.
3. Provide information on the different types of seeds (recalcitrant, intermediate, orthodox) and on how to identify them. If already known, explain which of these categories the selected species belong to.
4. Explain what causes seed dormancy in general, and if possible what type of dormancy the selected species have.
5. Discuss with the participants which methods they know and use for activating seed germination, and to which type of dormancy they can be applied. Also discuss if they would like to explore other possibilities.
6. Select one or more seed activation methods which are suitable for the food plants of the session and discuss why they are more suitable than others.

Session 2 onwards:

7. Explain the selected treatment(s) step by step.
8. Test the method(s):
    a. Groups of seeds of a certain species undergo different treatments and they are planted in pots (one pot per group of seeds with the same treatment; the pots need to be clearly labelled to identify the treatments used). One group of seeds should be directly planted without undergoing any treatment: this allows to identify to what extent each treatment influences germination, as well as whether some treatment slows down the germination process. The participants can be divided in sub-groups for this activity. Box 8 reports an example of germination tests implemented in Zimbabwe in phase 1 of SD=HS.
    b. Over the following few weeks, observe the germination rate of each pot and compare among the different treatments and with the no-treatment group.
    c. Draw conclusions on which methods are most effective and feasible.

Final session:

9. Closing questions to evaluate how the situation improved after the FFS:
    a. How many participants found it useful? (Count by show of hands)
    b. How many did not find it useful? Why not? (Count by show of hands)
    c. For those who were already planting the seeds of this plant, will you use the treatments for breaking seed dormancy you learned? (Count by show of hands)
    d. For those who did not plant these seeds before, how many of you will start doing it? (Count by show of hands)

    Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session.
10. Reflections, lessons learned and steps to follow (see 7.2).

Background content:

Seeds can be classified as recalcitrant, intermediate, and orthodox:

- Recalcitrant seeds germinate soon after dispersal, and they cannot be dried without losing their viability.
- Intermediate seeds can germinate soon, but to some extent they can also tolerate drying.
- Orthodox seeds can be dried without losing viability, and they may even require specific treatment in order to germinate, thus they are considered to be dormant. Seed dormancy can be due to different factors, the identification of which can help in determining the appropriate treatment. Dormancy can be classified as:
    - External seed dormancy:
        - Physical dormancy: due to hard and thick seed coats, which become permeable over years.
        - Physical and physiological dormancy: same as above, but the seed coat becomes permeable after exposure to certain temperatures.

        - Chemical dormancy: the fruits containing the seeds are rich in germination inhibitors.
        - Mechanical dormancy: the fruits have hard and woody walls that constrain seed germination.
    - Internal seed dormancy:
        - At dispersal, the seeds contain an underdeveloped embryo, hence ripening is needed before germination is possible.
        - Specific environmental conditions are needed in order to activate the germination process.
        - A combination of warm and cold conditions over a long time is required for germination.

While non-dormant seeds can be directly planted, dormant seeds require some treatment before germination is activated. The following presents an overview of treatments (summarized in Table 7):

- Cleaning: this is essential for seeds that mold easily or that require a long time for germinating, as it prevents microbial growth. Seeds should be soaked for 24 to 48 hours, possibly in running water; seeds with relatively thick coats can be treated for ten minutes with a solution of bleach or hydroxide peroxide diluted in water (at variable concentrations), as these two chemicals can also enhance germination.
- Scarification: disruption of the seed coat allowing for oxygen and water to enter. This is required for all types of external dormancy. The scarification method depends on the thickness of the coat, and it should not damage the internal parts of the seed.
    - Mechanical: the seed coat is disrupted either manually (for big seeds, carefully breaking the coat on the opposite side of the embryo) or by placing seeds in a box and gently rubbing them with sand or with a rock covered in sandpaper (for small seeds).
    - Heat: seeds are exposed to high temperatures for a certain amount of time. In wet heat scarification, seeds are added to boiling water for a few seconds (depending on the thickness of their coat) and then quickly transferred to cold water. In dry heat scarification, seeds are put in an oven until the coat cracks (temperature and time depend on the seed, close monitoring is necessary to avoid damage).
    - Chemical: for species with very thick coats, acids can be used as a treatment. Please note that some acids are potentially dangerous if correct procedures are not adopted; citric acid is a safe and relatively easily available acid, although it requires long soaking times. The needed time is species-dependent, and it can be determined by regularly removing seeds and cutting them with a knife (the seeds should be easy to cut but still firm when the soaking is sufficient).
- Soaking: seeds need to be hydrated for one to several days after undergoing cleaning (which is in some cases already enough as soaking) and scarification (when applicable). After soaking, seeds that were only physically dormant can be planted. Soaking can also contribute to remove some chemical inhibitors on or in the seeds. Seeds can be soaked in running water or in stagnant water that needs to be changed regularly (at least twice per day). Seeds should be soaked until they have reached their maximum weight (further soaking does not increase their weight).

- Germination stimulators: seeds with internal dormancy should undergo treatments with germination stimulators, among which smoking is the most feasible. Seeds are distributed on trays and located in tents in which smoke is introduced through pipes. It is essential to determine the right timing (by looking for information on whether this technique has been used before for the selected species), as excessive exposure can result in seed mortality.
- Warm, moist treatments: for seeds with internal dormancy, these treatments favour seed ripening. Seeds are kept in moist moss or sawdust at temperatures between 22 and 30˚C. Although these treatments are rarely applicable to tropical species, they can be effective in species with morphological or physiological dormancy.
- Stratification: for seeds from high-elevation areas and with internal dormancy. Seeds are placed between sheets of wet (not waterlogged) absorbing paper and put in open plastic bags or sown in containers with drainage holes.

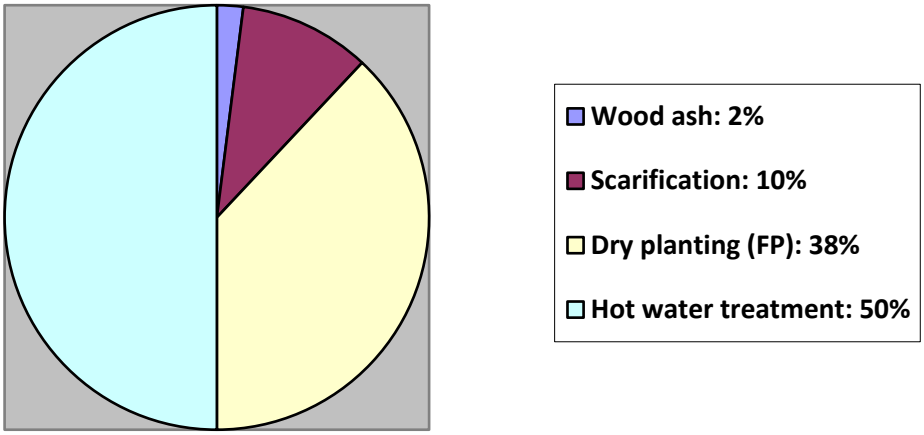
Table 7: Treatments for external and internal seed dormancy.

	Cleaning	Scarification	Soaking	Smoking	Warm, moist treatments	Stratification
External seed dormancy	X	X	X	-	-	-
Internal seed dormancy	X	X	X	X	X	Seeds from high-elevation areas

Box 8: Example of germination tests from phase 1, Zimbabwe (CTDT).

The participants used the following treatments to break seed dormancy:
- Hot water treatment
- Wood ash
- Scarification
- Dry planting (farmers' practice, FP).

To prove the effectiveness of the different methods for breaking seed dormancy, farmers were asked to carry out germination tests after the seeds of the selected species had been exposed to each of the treatment methods. The pie chart below shows the results for cleome (*Cleome gynandra* L.), in terms of germination percentages for each of the four methods.



The chart shows that the seed germination percentage for cleome was 50% with hot water treatment (the seed was placed in hot water for 10 minutes before planting), a moderately high rate compared to the other methods. The second most effective method was dry planting, followed by scarification, and finally seed treatment with wood ash.

For more information:

Tara Luna, Kim M. Wilkinson, and R. Kasten Dumroese (2014). Seed germination and sowing options. In *Tropical Nursery Manual: A guide to starting and operating a nursery for native and traditional plants. Agriculture Handbook 732* (pp. 163-183). Washington, DC: U.S. Department of Agriculture, Forest Service. Available at : https://www.fs.fed.us/rm/pubs_series/wo/wo_ah732/wo_ah732_163_183.pdf

PROTA (Plant Resources of Tropical Africa) and PROSEA (Plant Resources of South East Asia) databases, available at: https://www.prota4u.org/

7.1.5. Vegetative propagation

Objective: To increase farmers' knowledge on asexual reproduction, allowing for the vegetative propagation of local food plants in home gardens and fields. This activity contributes to the FFS objectives of improving dietary diversity and improving farmers' coping strategies in the food scarcity period. FFS sessions on vegetative propagation can be used to address bottlenecks related to: availability of and access to local food plants, difficulties in plant propagation, reduced abundance in the wild.

Types of local food plants: This topic is relevant for species with easy root formation, strong seed dormancy, or rare occurrence.

Location for the activity: The sessions on collecting samples need to take place where the selected plants grow, e.g. forests, stream banks, roadsides, etc. When the focus is on planting collected samples, this can take place in covered locations serving as plant nurseries/greenhouses, or directly in home gardens and fields, depending on the plant needs.

Materials required: For cuttings: Pruning shears and knives, white plastic bags, labels and pens, spray bottles with water for keeping the cuttings moist. To obtain plant parts containing roots only shears and knives suffice. For planting: containers (pots), soil

Stakeholders involved: The sessions should particularly target the household members who take care of the home gardens and the fields, and who keep knowledge about the plants to be collected.

Description:

Before the first FFS session:

1. Collect information for the selected species (or if not available, for closely related ones) on seed germination and rooting behavior, to determine if vegetative propagation is the most feasible and desirable option. If applicable, collect information on the type of cuttings to be used, their size, and other specific requirements for successful asexual reproduction.

First FFS session:

2. Opening questions to explore the situation before the FFS:
    a. How many of you normally propagate this species asexually? (Count by show of hands).
    b. Which methods do you use for vegetative propagation?
    c. Do you encounter any problems when propagating the species asexually? (Count by show of hands)
    d. What are the main problems you encounter?
    e. For those who do not practice this activity, what is the reason?
3. Discuss when vegetative propagation is preferable to seed reproduction, and discuss it in relation to seed dormancy (see section 7.1.4).
4. Discuss with the participants which methods they know and use for asexual propagation. Highlight that the collection of cuttings should be done respecting the genetic diversity of wild species populations (see table 6 in section 7.1.2).
5. Select one or more methods suitable for the food plants of the session and discuss their advantages and disadvantages.

Session 2 onwards:

6. Explain the selected method(s) step by step.
7. Test the method(s):
    a. Depending on what needs to be tested, different methods can be compared. Different types of cuttings can be collected from one species (i.e. stem cuttings and root cuttings, different sizes, etc.), including multiple samples of the same type so that the comparison among different cutting types has a higher validity. Different types of layering (see Background content) can be experimented and compared between each other or to the use of cuttings. If relevant, specialized plant structures (tubers, corms, stolons, etc.) can also be used and compared to cuttings or layering.

b. Over the following few weeks, observe whether rooting occurs in each method, comparing the efficacy among the methods.
c. Draw conclusions on which methods are most effective and feasible. This can also be done in relation to desired parameters, e.g. which method requires less labour and materials, which one is the fastest, etc.

Final session:

8. Closing questions to evaluate how the situation improved after the FFS:
    a. How many participants found the session useful? (Count by show of hands)
    b. How many did not find them useful? (Count by show of hands)
    c. Why not?
    d. For those who were already practicing vegetative propagation, will you use the methods learned? (Count by show of hands)
    e. For those who did not practice vegetative propagation before joining the FFS, how many of you will start doing it? (Count by show of hands).
9. Reflections, lessons learned and steps to follow (see 7.2).

Background content:

While requiring more labour than seed propagation, vegetative propagation can be the most effective method for species with strong seed dormancy or producing few viable seeds. It allows to produce a large amount of uniform plants from one single mother plant in a short time, maintaining the same genotype.

Several plant parts can be used for vegetative propagation, the most common being cuttings from stems and roots:

- Stem cuttings are the most commonly used for propagation. The optimal size for the cuttings depends on the species, and it is usually between 10 and 20 cm long with leaves being removed from the lower half. Stems usually have a polarity, for which they continue growing in the same direction in which they would on the plant. Hence, if planted in the opposite direction there will be no rooting. It is therefore necessary to distinguish the two parts, for instance cutting straight at the bottom and with an angle at the top.
- Roots can be divided into small segments containing dormant buds, so that they can develop into a new plant. If the root cutting is planted vertically, polarity needs to be taken into account, in the same way as for the stem cuttings.

Propagation using plant cuttings is based on the fact that the cuttings will produce new roots. Several factors determine whether and how the rooting can happen:

- Different species have different capacities to form roots, and they may require specific factors for rooting:
    - For some species the cuttings need to be collected in a certain time of the year, when plants are in a physiological state in which rooting is possible. As a general rule, rooting happens more easily when cuttings are collected from the plant before or after flowering.
    - The necessary size of the cuttings depends on the species and on the plant part, and some plants can have precise requirements.

    - Cuttings should be collected from healthy plants. For stem cuttings, they should not be collected from flowering shoots, and leaves or buds need to be present on the cutting.
- Cutting preparation also needs to be done properly to ensure a successful propagation:
    - Cuttings should be taken from right above a node (top) until right below a node where rooting is likely to occur (bottom).
    - Cuts should be clean to prevent the spread of diseases. This can be achieved by using sharp knives and shears, and by disinfecting the cuts with a solution of bleach and water (see materials).
    - Removing some leaves and buds right after cutting can reduce water loss, but it is essential to leave some of them on the cutting to allow for photosynthesis and leaf growth during rooting.
    - For some species, wounding can be used as a way to facilitate root formation, since it promotes the formation of a callus and it removes some of the tissues which form a barrier to rooting.
- Finally, the way cuttings are handled after collection can also influence the rooting and development of the new plants:
    - Depending on the type of plant, different species vary in their tolerance of storage between cutting and planting, which in all cases should be kept to a minimum (i.e. maximum one day).
    - Cuttings should be collected in fresh and cloudy days or in early mornings, and they should be kept cool and protected from the sun during transport and storage.
    - Cuttings should be handled with care to avoid damaging the plant tissues.
    - Cuttings should be put in white plastic bags (not transparent nor with heat-absorbing colors), labeled with origin and date. Ideally, all cuttings should be oriented with the same polarity in the bag, to reduce confusion.

In case there is an objective to produce seeds over the long term, check if the plant contains only male or female flowers If this is the case, make sure to collect cuttings from both the male and the female plant. Other methods exist for vegetative propagation, depending on the plant characteristics:

- In layering, adventitious roots are let grow directly on the plant stem before cutting, as in many species stems naturally develop roots when they get in contact with soil. It can be done in several ways; the most common one is to fold a long and flexible stem into a U shape, with the bottom of the U being fixed to the ground and covered with soil. It is also common to peg a long branch in several points to the soil surface until roots develop.
- As previously mentioned, some species have specialized structures that can be used for vegetative propagation. Many of these (e.g. tubers, rhizomes, corms) function as water and nutrient storage. Vegetative propagation using these structures is usually easy: once they are produced by the mother plant, they can just be collected and replanted, and often they can be cut in pieces that will be planted separately and will originate multiple plants. In the case of stolons, they produce new roots for the same principle as in layering, so pieces of stolon just need to be cut and planted after rooting.

For more information:

Tara Luna, 2009. Vegetative propagation. In: *Dumroese, R. Kasten; Luna, Tara; Landis, Thomas D., editors. Nursery manual for native plants: A guide for tribal nurseries - Volume 1: Nursery management.* Agriculture Handbook 730. Washington, D.C.: U.S. Department of Agriculture, Forest Service. p. 153-175. Available at:
https://www.fs.fed.us/rm/pubs_other/wo_AgricHandbook730/wo_AgricHandbook727_153_175.pdf

7.1.6. Food preservation

Objectives: To increase the availability of local food plants over a longer period of time, particularly for periods of food shortage, thus ensuring diverse nutritious meals year-round. This activity contributes to the FFS objective of strengthening farmers' coping strategies during the food scarcity period. In addition, food preservation techniques can reduce cooking time, improve taste, and in some cases the nutritional content and safety of the food, thus adding value to the product. Therefore, they can be used to address bottlenecks related to the wider issues of: food loss, availability and access to local food plants (e.g. low availability in a specific season), easy degradation of fresh produce, long cooking times, sensory characteristics. It can also contribute to address issues related to commercialization.

Types of local food plants: Different food plants and edible parts (e.g. leaves, fruits, seeds) can have different requirements in terms of processing and storage, so this needs to be considered when choosing the specific activities for the FFS.

Location for the activity: It strongly depends on the type of preservation technique adopted. The activities can take place outside (e.g. for sun drying), or in kitchens, among others.

Materials required: Depending on the selected processing procedure: cooking facilities and cooking utensils; ingredients such as sugar, salt, vinegar, oil; jars, cans, and other packaging materials; trays, solar driers, fans, electronic heating for drying.

Stakeholders involved: Farmers in the FFS; to ensure that processing and preservation are done correctly, with no risk for food safety and health or loss of product quality, experts (from the food processing sector, or chefs and health workers) should be consulted and should attend the session(s). Nutrition workers should also be consulted, particularly to provide insights on whether the nutritional qualities of the ingredients are reduced or maintained through processing (and – if reduced – on how this may be prevented to the extent possible).

Description:

First FFS session:

1. Opening questions to explore the situation before the FFS:
    a. Who preserves this(these) plant(s)? (Count by show of hands)
    b. For this(these) specific plant(s), which preservation methods do you know?

   c. Do you encounter any problems? (Count by show of hands)
   d. What are the problems you encounter?
   e. For those who do not preserve this plant(s), what is the reason?

   Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session.
2. Explain the benefits of food preservation for increasing the availability of local food plants to ensure dietary diversity and access to nutritious foods year-round.
3. Discuss with the participants which preservation techniques they already know, and which one(s) they would wish to apply for the specific food plant(s) considered. Also discuss if they would like to explore other food preservation possibilities.
4. Select one or more processing options which are suitable for the food plants of the session, and discuss why they are more suitable than others.

<u>Second FFS session onwards:</u>

5. Provide protocols for the selected processing techniques, also explaining the associated food safety and health risks and how to prevent them.
6. Let the participants apply the processing method(s) discussed. If multiple methods were selected, either several sessions could be conducted (one per method), or different sub-groups could apply different methods simultaneously and share their experiences at the end of the session.

<u>Final session:</u>

7. Closing questions to evaluate how the situation improved after the FFS:
   a. How many participants found it useful? (Count by show of hands)
   b. How many did not find it useful? Why not? (Count by show of hands)
   c. For those who were already using some preservation methods, will you apply the new knowledge? (Count by show of hands)
   d. For those who did not use any preservation methods before the FFS, are you going to start doing that? (Count by show of hands)

   Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session.
8. Reflections, lessons learned and steps to follow (see 7.2).

Background content:

In most cases, the processing of foods for preservation could take place in two FFS sessions (when one food preservation technique has been chosen), but a few weeks might be required before it will be possible to taste the final processed product.

The effectiveness of different preservation techniques strongly depends on the type of plant and edible plant part, as well as on other factors such as the local climate (e.g. it might not be possible to do sun drying during the rainy season).

In the following, a list of options for preservation is provided (summarized in Table 8). Short explanations are given, but experts should be consulted for more detailed procedures, to ensure that there is no risk for health, and to discuss the potential effects on the nutritional quality of the food ingredients. It is important that, before practicing any kind of processing for preservation, FFS participants wash their hands and cooking utensils, and properly wash food plants in clean water, removing damaged parts. Many of the following techniques can be combined among them or with blanching (see the point below):

- Blanching: this constitutes a pre-treatment for many kinds of processing (e.g. drying, canning). In its most common practice, blanching is carried out by cooking the fruit or vegetable in hot water, removing it after a short time (often one or a few minutes only, but the exact time depends on the amount of produce and the water temperature), and then quickly cooling it before further processing is done. It can also be done by steaming instead of boiling, to better preserve the nutritional content of food. It is important that the right timing is determined, to avoid under-blanching (it stimulates microbial proliferation at higher levels than with no blanching) and over-blanching (it causes loss of flavour and colour, as well as nutrients).
- Drying: it reduces the food water content, preventing microorganism growth and enzyme functioning. It should be carried out as quickly as possible, starting within 48 hours from harvesting (ideally within one day). In some cases, drying can improve the nutritional content of food, as it concentrates nutrients. Dried products can be eaten as such, after soaking in water, as ingredient in a multi-ingredient dish, or after being processed into powder. Drying can be done in several ways:
    - Sun drying: food is exposed to wind and sunrays, being distributed over a thin layer on the ground, or preferably on raised trays or on lines and rooftops to reduce contamination from dust and insects. Sun drying is very simple and effective but it reduces the nutritional content of food, thus drying techniques in the shade should be preferred.
    - Hot-air drying: hot air can be provided by using a fan and an electric source of heating (or waste heat from stoves, which can reduce costs).
    - Solar drying: it is similar to sun drying, but food is in enclosed in chambers heated up by the sunlight and provided with an air inlet and outlet to ensure circulation. This system is more complex and it requires more tools than sun drying, but it protects from contamination or rainfall, and it better preserves the nutritional content of food.
- Processing into flour: this is particularly suitable for tubers and cereals. After drying the tubers in thin slices or pouncing the grains, they can be milled into flour, which can be used for baking or added to meals to improve their nutritional content.
- Fermentation: under anaerobic conditions, microorganisms convert sugars into alcohol or acids, extending the shelf life of food. It can be used to prepare main dishes or condiments. It is an easy and low-cost option, and it can improve the taste of foods as well as their nutritional value, since proteins, amino acids, and vitamins are produced in the fermentation process. Moreover, it reduces cooking time and thus requirements for cooking fuel. Fermentation can go off, resulting in wrong taste or health risks, and therefore each produce should be carefully checked.
- Osmotic dehydration: slices of food are immerged in a high-concentration solution of salt or sugar, so that part of the water in the food goes out due to osmotic pressure, while some of the solute (salt, sugar) permeates the food. It can be combined with drying, so that hot air further eliminates

the water. Osmotic dehydration can have several advantages in terms of preservation of structure and texture, color (it reduces enzymatic browning), improvement of taste and acceptability.

  - Salting: it impedes the development of microorganisms by dehydrating cells, due to the osmotic effect. It can be done as wet or dry salting. In wet salting (or pickling), the food is first rubbed in salt and then submerged in brine, vinegar, alcohol, or oil. In dry salting, the food is directly packed in salt, which ensures a longer shelf life. This method is also used for meat and fish.
  - Preparation of jams and jellies: fruits (or sweet vegetables, such as tomatoes or carrots) are boiled with high percentages of sugar, which dehydrates microbial cells due to osmosis. The high temperatures destroy enzymes and microbes, and the products are sealed in sterilized jars to allow for long-term storage. Pectin can be used during cooking to ensure good texture and stability of the product.

- Preservation in jars or cans: after blanching or other processing (e.g. fermentation), the produce is stored in containers which have been previously boiled to avoid microbial contamination and can be further sterilized by the high temperatures of the produce. This method can prevent microbial growth and deactivate enzymes, but appropriate pre-processing and sterilization of jars and cans are essential to avoid dangerous microorganisms. The use of well-sealed containers (e.g. jars with rubber rings in the lid, Mason jars) is also important for preservation. Vinegar, acetic acid, or oil can be used in the jars to prevent microorganism proliferation. If poorly carried out, this method can lead to botulism (development of the bacteria *Clostridium botulinum*), causing severe and potentially fatal food poisoning. Therefore particular care is needed to correctly carry out this processing technique.
- Low-temperature techniques: they include groups of techniques based on different temperatures, such as chilling (0.6 ˚C to -2.2˚C), freezing (-8 ˚C to -40 ˚C), and the use of cold rooms (-15 ˚C to -25 ˚C). They can reduce perishability, since low temperatures reduce or stop enzymatic activity, chemical reactions, and microorganism development. Depending on the produce, they can in some cases reduce ripening, avoid shriveling and water loss, preserve color, texture, and nutrient content. However, refrigeration systems are not always affordable for farmers, and not all fruits and vegetables can be refrigerated without undergoing significant changes in color and texture. Evaporative cooling can be a better alternative to mechanical refrigeration (see next point).
- Evaporative cooling: it is based on the principle that the evaporation of water from a surface leads to cooling down. The most common way to obtain evaporative cooling is by making air pass through a wet porous material which covers a food container, so that the water evaporates and the container cools down. One example is the pot-in-pot cooling system, which is based on the use of a clay pot containing food, covered with a wet cloth, and put in a bowl with wet sand.
- Pasteurization: applicable mostly to fruit juices, it implies food heating to a certain temperature to denature enzymes and prevent microbial growth, followed by cooling down. It is very effective for preservation, but it alters the nutritional value of food by damaging thermal-sensitive vitamins and minerals, and it needs careful temperature control to be effective.

Table 8. Overview of preservation methods.

Preservation method	Type of plant/edible part	Materials required	Location	In combination with
Blanching	-Vegetables (leaves, stems, fruits, flowers) -Fresh legumes -Roots and tubers	-Access to heat -Pots -Jars -If required: vinegar, alcohol, oil	Kitchen	Drying, fermentation, wet salting, preservation in jars
Drying	-Fruits -Vegetables (leaves, stems, fruits, flowers) -Herbs -Cereals -Legumes -Seeds	-Drying trays -Solar driers -Fans and stoves/electric heating	External or internal	Blanching, processing into flour, dry salting
Processing into flour	-Tubers -Cereals	-Mill or mortar	NA	Drying
Fermentation	-Fruits and fruit juices -Vegetables (leaves, stems, fruits, flowers) -Legumes -Cereals -Seeds and nuts	-Food containers for the fermentation -Salt, sugar, vinegar -Jars	Kitchen	Blanching, wet and dry salting, preservation in jars, osmotic dehydration
Wet salting	-Vegetables (leaves, stems, fruits, flowers)	-Salt -Jars	Kitchen	Fermentation, preservation in jars
Dry salting	-Vegetables (leaves, stems, fruits, flowers)	-Salt	Kitchen or cool internal location	Drying
Preparation of jams and jellies	-Fruits -Sweet vegetables, roots, and tubers	-Access to heat -Jars -Sugar, pectin	Kitchen	Preservation in jars
Preservation in jars	-Fruits and fruit juices -Vegetables (leaves, stems, fruits, flowers) -Legumes	-Access to heat -Jars -Salt, sugar, vinegar, alcohol, oil	Kitchen	Blanching, fermentation, wet salting, jams and jellies, pasteurization

Refrigeration	-Fresh vegetables that do not deteriorate at low temperatures	-Refrigeration facilities	Internal location	NA
Evaporative cooling	-Fresh vegetables that do not deteriorate at low temperatures	-Clay pots -Wet cloth -Sand	Warm ventilated location	NA
Pasteurization	-Fruit juices -Canned produce	-Pots -Thermometer	Kitchen	Preservation in jars

Additional topics that can be discussed are food packaging and storage (e.g. underground storing, silos, etc.), which can be treated following the same general curricula steps listed above.

Additional observations to take into account: Although the preservation of food plants can allow for a diversified diet throughout the year, food processing alters the characteristics of the fresh ingredients, improving or deteriorating some of their nutritional values. Moreover, several processing techniques are based on the use of salt, sugar, or oil, thus the consumption of these processed foods should be moderate. These factors need to be highlighted during the FFS sessions, preferably with the advice of a nutritionist.

For more information:

FAO, Food and Nutrition Council of Zimbabwe, UNICEF (2013). Healthy harvest: a training manual for community workers in good nutrition and the growing, preparing, and processing of healthy food (pp. 81-86). Available at:
http://www.fao.org/fileadmin/templates/tc/tce/pdf/Healthy_Harvest_training_manual_.pdf

FAO Zimbabwe (2015). Healthy harvest. A training manual for community workers in growing, preparing and processing nutritious food (pp. 86-93). Second edition. ISBN 978-0-7974-6229-8.

Joardder, M. U., & Masud, M. H. (2019). Food Preservation Techniques in Developing Countries. In *Food Preservation in Developing Countries: Challenges and Solutions* (pp. 67-125). Springer, Cham. Available at: https://link.springer.com/chapter/10.1007/978-3-030-11530-2_4#Sec30

7.1.7. Food preparation and cooking demonstrations

Introduction: The importance of exploring ways of food preparation to obtain a better palatability and to generate an increased number of recipes based on local food plants, as an integral part of the FFS on Nutrition and Local Food Plants, cannot be overemphasized. These ways include cooking demonstrations, sometimes facilitated by local chefs. After the implementation of FFS activities, women and men can prepare a wide variety of recipes based on local food plants (e.g. cookies and cakes that children enjoy eating).

Objectives: To increase the acceptability and consumption of local food plants, by sharing traditional culinary knowledge and developing new nutritious recipes. This activity contributes to the FFS objectives

of improving dietary diversity and improving the nutritional quality of diets. Demonstrations can focus on one specific food plant, to improve its palatability, or on combining several seasonally available food plants into one or more nutritious dishes. Cooking demonstrations can be used to address bottlenecks related to: poor taste, smell, color, and texture; long cooking time; negative effect on human health with inappropriate preparation (e.g. flatulence, diarrhea); low acceptance by specific parts of the population (e.g. children, youth) and stigma (e.g. poor people's food, or associated with the treatment of patients).

Types of local food plants: All available local food plants can be used for cooking demonstrations.

Location for the activities: Cooking demonstrations can take place in kitchens, or in any place in which the necessary cooking facilities and utensils are available. They can take place in participant homes during the FFS, and/or be combined with events such as food fairs, market days, and community gatherings, in order to reach a larger public. Once a location is chosen, the set-up of the site should allow all participants to see and to actively take part to the demonstration.

Materials required: Cooking facilities (tables, fireplace, water for cooking, drinking, and washing) and utensils (pots and pans, plates and cutlery, any other necessary item).

Stakeholders involved: Local chefs and nutritionists (including from national institutions) can be involved, in order to improve the palatability and nutritional value of the recipes. If the objective is to increase the acceptability of local food plants among specific members of the community (e.g. youth), these members should be specifically targeted for active participation in the cooking demonstrations.

Description:

<u>Before the first FFS session:</u>

1. Gather information on the nutritional value of the local food plants that have been selected, and how it might change with different types of preparation.

<u>First FFS session:</u>

2. Opening questions to explore the situation before the FFS:
    a. How many of you use this (these) food plant(s) for preparing dishes? (Count by show of hands)
    b. Which recipes do you know for the selected food plant(s)?
    c. Do you encounter any problems when cooking this(these) plant(s)? (Count by show of hands)
    d. What are the main problems you encounter?
    e. For those who do not prepare dishes with this(these) plant(s), what is the reason?

3. Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session. Explain the benefits of having diverse diets for nutrition, referring to the use of different food groups in a meal.

4. Discuss with the participants which recipes they commonly use for the specific food plant(s) considered, highlighting and discussing differences in nutritional value among them. Also discuss if there are specific characteristics of the food plant(s) that the participants would like to improve (e.g. taste, color, processing, cooking time, digestibility).

Before the second FFS session:

5. Ensure that all the required facilities and utensils are in place.
6. Ensure that sufficient and diverse ingredients are available for the demonstration. Since many of the ingredients need to be fresh (consumed as soon as possible after harvesting), coordinate with the local market day if necessary. Participants can also be asked to bring ingredients themselves, so that they can share their knowledge on certain food plants with the other members.

Second FFS session onwards:

The actual cooking demonstrations take place, cooking including various ways of food preparation. Different types of demonstrations can be carried out:

7. The FFS participants bring the different ingredients and prepare and share the recipes they know (in groups). At the end, the presence of different food groups and the nutritional content of the recipes can be discussed in plenary.
8. A professional chef can prepare recipes for cooking/preparing a specific food plant, aimed at improving its sensory characteristics; in this case, participants can assist during the demonstration and/or replicate the recipe.
9. The demonstrations can also be used to answer specific questions, e.g. which parts of a certain food plant are more suitable for cooking (e.g. better taste, softness, less cooking time, etc.). In this case, different parts of a plant (e.g. leaves vs. stem, upper leaves vs. lower leaves) can be cooked/prepared in the same way in order to test them for the specific parameters, and/or different recipes can be developed to best suit the specific ingredient. It is important that the facilitator ensures that there is no toxicity in the plant parts that will be used for cooking (e.g. by looking for literature or consulting an expert).
10. Discuss how different cooking methods and different associations can influence the nutritional content of food and the bioavailability of vitamins and minerals.
11. The recipes developed throughout the sessions can be compiled in a recipe book, in which the nutritional content of the meals is highlighted (e.g. whether they are particularly rich in specific nutrients, or good/bad for certain members of the population). This can be done in parallel with the cooking demonstrations (at the end of each session), or in a separate group of sessions after the demonstrations have been done. Apart from the recipes themselves, the book can be used to share other information such as traditional uses of the plants (e.g. medicinal use or spiritual value), places where the food plants are grown/can be collected, or other types of traditional knowledge on the plants.

In all cases, a tasting of the cooked/prepared food should conclude the sessions, also to check for acceptability and palatability, and background information on nutrition should be provided. Notes should

be taken during the demonstrations, to facilitate the later writing of a recipe book. Later on, the cooking demonstrations can be repeated and the recipes shared in food and seed fairs.

Final session:

12. Closing questions to evaluate how the situation improved after the FFS:
    a. How many participants found the sessions useful? (Count by show of hands).
    b. How many did not find them useful? Why not? (Count by show of hands).
    c. For those who were already using the selected plant(s) for preparing dishes, will you apply the new knowledge? (Count by show of hands)
    d. For those who did not prepare any dishes with the plant(s), how many of you will start doing that? (Count by show of hands).

    Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session.
13. Reflections, lessons learned and steps to follow (see 7.2).

Background content:

It is essential that background information on nutrition is provided throughout the sessions, in consultation with a nutritionist. If a certain malnutrition problem is known to be frequent in the region or in the community, e.g. due to a specific nutrient deficiency, the nutritional information provided should especially aim at addressing the issue. Here are some examples of possible topics to discuss (recalling concepts from the training on nutrition that the participants have already received):

- It is important to have a varied diet that includes foods belonging to different groups: starchy foods (cereals, roots and tubers) and fats and oils, mainly as a source of energy; legumes as a source of proteins and micronutrients; animal products for proteins, micronutrients, and fats; vegetables and fruits for micronutrients and fiber. Refer to the subchapter 8.1.
- The processing and cooking of food strongly influence its nutritional content, whereas combining different ingredients in a meal can have an effect on the bioavailability and uptake of certain nutrients. Some general recommendations can be provided, such as:
    - Cooking fruits, vegetables, and herbs usually affects their nutritional content. Raw food plants can be combined in salads, eaten as a snack, or at the end of a meal (for fruit). Do respect hygiene requirements with fresh food items.
    - In the case of leafy vegetables, tearing the leaves in pieces by hand preserves the vitamin C content better than chopping them with a knife.
    - Cooking vegetables in little water, steaming them, or stir-frying them all allow for better nutrient preservation than boiling. The water used for cooking should be integrated in the meal (e.g. in sauces) to avoid wasting the nutrients.
    - Avoid undercooking for beans, meat, and eggs, and avoid overcooking for vegetables. Food should be eaten shortly after cooking, as leaving the food standing or re-heating it reduces its nutritional value and introduces or increases the risk of microbial contamination.
    - Avoid using too much salt (bad for blood pressure) or sugar (bad for the heart and teeth).

- The skin of fruits and vegetables (when edible) is often rich in nutrients, thus the use of non-peeled produce should be encouraged when possible. However, if there is a risk of contamination (e.g. from pesticides or human pathogens) the skin should be removed.
- Avoid using baking soda, as it damages most nutrients.
- Drinking tea and coffee with meals reduces iron uptake, whereas consuming foods rich in vitamin C and A can enhance it.

Additional information to take into account: good food safety habits need to be observed: correct preservation of the ingredients, hand washing before food preparation and cooking, use of clean and safe water and utensils are essential to avoid the risk of food poisoning or diseases.

For more information:

FAO, Food and Nutrition Council of Zimbabwe, UNICEF (2013). Healthy harvest: a training manual for community workers in good nutrition and the growing, preparing, and processing of healthy food (pp. 81-86). Available at: http://www.fao.org/fileadmin/templates/tc/tce/pdf/Healthy_Harvest_training_manual_.pdf

SPRING (2016). Nigeria: Complementary Feeding and Food Demonstration Training—Food Demonstration Manual. Arlington, VA: Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING) project. Available at : https://www.spring-nutrition.org/sites/default/files/training_materials/files/nigeria_complementary_feeding_food_demonstration_manual.pdf

FAO (unknown year). Briefing note on participatory cooking demonstrations in nutrition education. Available at : http://www.fao.org.pk/news/press/11/brief_notes/participatory_cooking_demonstrations.pdf

Examples of a recipe book:

RESEWO & Slow Food Foundation for Biodiversity (2008). Cooking with traditional leafy vegetables: indigenous plants in Tanzania's kitchen. ISBN 9976 910 58-4. Available at: http://www.b4fn.org/fileadmin/templates/b4fn.org/upload/documents/Reports/Cooking_with_ALVs_Tanzania.pdf

ANDES (2018). Cocinando con la agrobiodiversidad de Lares. Libro de recetas. (Cooking with Andean biodiversity, by the communities of Lares, Peru. Recipe book). Available at: https://www.sdhsprogram.org/tool/cooking-with-andean-biodiversity-by-the-communities-of-lares-peru-recipe-book/

7.1.8. Seed fairs and food fairs

Objectives: To promote the exchange of traditional knowledge on local seeds and on recipes with local food plants; to raise awareness in the community on seed and species diversity, and on how preserving this diversity is important for food security; to create opportunities for seed barter among farmers, as a way to preserve agricultural diversity. Seed and food fairs also provide a platform to influence policy makers and local authorities to formulate regulations that promote the conservation and utilization of local food plant species for healthier diets. This activity contributes to the FFS objectives of strengthening farmers' coping strategies during the food scarcity period and improving dietary diversity. Seed fairs and food fairs can be combined or focus on seed or on food items only. The can be used to address bottlenecks related to: low availability of and access to local food plants; poor knowledge on proper food preparation including cooking recipes; limited seed supply; stigma and cultural factors on specific local food plants; poor taste, smell, color, and texture of traditional dishes.

Types of local food crops: All available local food plants can be used for food preparations in the fair, and all seeds can be shown and exchanged. High diversity and presence of local food plants among the shared seeds should be encouraged.

Location for the activities: The site selection largely depends on the expected number of participants and the target audience. The fair should take place in an easily reachable location, possibly centrally located in the village or urban area in order to attract more attention; it could be a good option to choose the site in which the local market or other fairs normally takes place. The selected location should allow for the display, exchange and sales of seeds and prepared food and for the circulation of people. Short distance from the cooking facilities in which food items are prepared is desirable, unless dishes are brought ready to the fair (i.e. they are prepared at home).

Materials required: Big paper sheets; stands and tables for displaying; labels; banners and decorations to make the site eye-catching; plates and utensils for food tasting. Other materials may depend on possible side activities organized at the fair.

Stakeholders involved: All members of the community should be invited to share their seeds and their recipes. When in urban sites, the general public should be targeted by announcements in daily papers, billboards, etc. Farmers can participate individually, or show their seeds in groups. Neighboring communities can be involved if possible, as a higher number of participants will allow for more diverse seeds and food items to be shared. Cooks can be invited for preparing dishes, to promote the consumption of local food plants that are normally considered difficult to cook or poor in taste, smell, etc. Collaboration with community seed banks, local institutions working on seed conservation and policy makers can give an added value to the event. Experts on specific topics (such as nutritionists) can be invited to give short presentations.

Description:

First FFS session:

1. Opening questions to explore the situation before the FFS (note that some of these questions overlap or are similar to some of the questions included in the baseline study):
    a. How many of you usually exchange seeds with other farmers? (Count by show of hands).
    b. Do you encounter any problems when exchanging seeds? (Count by show of hands).
    c. Which problems do you encounter?
    d. For those who do not exchange seeds, what is the reason?
    e. How many different types of seeds each of you have at home (i.e. crops and crop varieties, seeds of wild food plants)? Write on big paper sheet as the participants answer; this will give an idea of the diversity farmers preserve in their households, and it will stimulate exchange. Save these numbers to discuss them again in the last session).

    Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session.
2. Explain that seed and food fairs can be a way to promote diversity in plant cultivation and in diets, and that by sharing and exchanging seeds, farmers can contribute to preserving and revaluing the local biodiversity.
3. Discuss the value of seed and food fairs as a way to share traditional knowledge and local culture and to raise the status of local food crops and associated dishes. Brainstorm with the participants on ideas for side activities to include in the fairs.

Second FFS session onwards (before the fair):

4. Select a date and location for the fair, making sure the site is available and can be used for this purpose. As the date gets closer, take into account the possible weather conditions and take measures if necessary (e.g. consider rain protection if outdoors, air circulation and availability of fans if indoors).
5. Prepare a detailed plan for the fair, including the activities to be organized on the side of seed and food sharing.
6. While the whole community will be invited to the event, the FFS members (or a subgroup of the FFS) may also function as an organizing committee. Distribute the work among the FFS participants, having groups being responsible for different tasks in the planning of the fair.
7. Distribute roles for the day of the event among FFS members or groups of members.

Final session (after the fair):

8. Closing questions to evaluate how the situation improved after the FFS:

a. How many participants found the fair a useful experience? (Count by show of hands).
b. How many did not find it useful? Why? (Count by show of hands).
c. From those who used to exchange seeds before the fair, how many did it during the fair? (Count by show of hands).
d. From those who did not use to exchange seeds before the fair, how many exchanged seeds during the fair? (Count by show of hands)
e. Would you like to organize other similar events in the future? (Count by show of hands).
f. If so, what would you do differently?
g. Go back to the big paper sheet prepared in the first FFS session, where FFS participants wrote down the number of seeds they had before participating in the fair. Ask each one of them to write down, next to the previous values, the number of new types of seed they got during the fair. Discuss the importance of seed fairs for increasing seed diversity. Make considerations on the role of the community in preserving biodiversity.

Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session.

9. Reflections, lessons learned and steps to follow (see 7.2).

Background content:

Several aspects should be considered for the organization of seed fairs and food fairs:

- Communication prior to the fair: the event should be advertised among the communities; external participants such as experts or members of government and research institutions should be notified in time; If neighboring villages or urban citizens are involved, make sure that news on the fair reaches them properly.
- Possible side activities, for example:
    - Entertaining activities for children.
    - Trainings or demonstrations on other topics addressed in the FFS, e.g. nutrition, food preservation, seed storage. Experts can be involved and/or FFS members can hold the demonstrations themselves, also as a way to consolidate the knowledge gained during the previous FFS activities.
    - Since the fair should be an occasion for sharing traditional knowledge and culture, there can be space for other expressions of the local culture, such as music or dancing. However, seeds and/or food should be the central element in the fair.
- As a way to further stimulate the participants, some sort of competition can be organized, for instance with an award for the highest diversity of seeds displayed, or for the best dish prepared.
- It would be useful to give the task of documenting the event to some members of the FFS. Documentation can include taking pictures, or noting down the different species and varieties

present at the fair. It could be good to have an approximate total number of species and varieties at the end of the fair, to make farmers more aware of the diversity they contribute to preserve.

- The fair can also be an occasion to document traditional knowledge on local food plants. Farmers during the fair can be asked about the uses of the species they brought (e.g. medicinal or ritualistic purposes), or about which species are particularly drought or flood resistant, where they would normally grow, etc. Volunteer members of the FFS can note down this information.

For more information:

FAO (2006). Community Diversity Seed Fairs in Tanzania. Guidelines for seed fairs. LinKS project (gender, biodiversity and local knowledge systems for food security) report no 51. Available at: http://www.fao.org/3/a-ag387e.pdf

7.1.9. Growing local food plants in home gardens

Objectives: the main objective of cultivating local food plants in home gardens is to provide a nearby source of diverse and nutritious food to households throughout the year. Furthermore, this activity offers an opportunity to experiment on many other issues (some of which are included in this guide), such as seed germination, vegetative propagation, crop management practices, intercropping, harvesting practices. This activity can also be combined with cooking and developing of recipes, and with food processing and preservation. It can also help to raise awareness on the importance of local food plants for a healthy diet, and to address the stigma around some of them, promoting the cultivation and consumption of nutritious plants that are not common in the community and/or diets. In addition, the surplus can be sold (fresh or processed), providing an (additional) income to the households. Working with home gardens may contribute to the FFS objectives of improving dietary diversity, improving the nutritional quality of diets, and strengthening farmers' coping strategies during the food scarcity period. It can be used to address bottlenecks related to: availability and access to local food plants, poor knowledge on plant propagation, cultivation and agronomic practices, low acceptance and stigma associated to some traditional plants.

Types of local food plants: Different types of local food plants can be grown in home gardens, depending on their ease of propagation and on their needs in terms of water, nutrients, and management.

Location for the activity: This location of this activity may vary according to the location of home gardens in the community. If individual gardens are established around/next to the houses of FFS participants, discussion sessions can take place in an area that is easily accessible for FFS participants, or in one or more of the gardens. If communal gardens are established in the community, sessions can take place in the communal garden, which may also function as a general meeting place for the FFS group.

Materials required: gardening tools, labels, pots and containers.

Stakeholders involved: FFS participants and other members of their household, other community members that are interested in contributing to the activity. Local authorities may be involved if the activity

takes place in communal gardens. Local agricultural experts could contribute with specific advice on garden design and plant management.

Description:

First FFS session (or first few sessions):

1. Opening questions to explore the situation before the FFS when the activity will take place in individual home gardens established around/next to the houses of FFS participants:
    a. How many of you have home gardens? (Count by show of hands).
    b. What kind of plants do you grow in your home gardens (e.g. vegetables, spices, medicinal plants)?
    c. What plants would you like to grow in your home gardens?
    d. Do you encounter any problems when managing your home garden? (Count by show of hands)
    e. What are the main problems you encounter?
    f. For those who do not have home gardens, what is the reason?

    Opening questions to explore the situation before the FFS when the activity will take place in communal gardens:
    a. What kind of plants are grown in the communal garden (e.g. vegetables, spices, medicinal plants)?
    b. What plants would you like to grow in the communal garden?
    c. Do you encounter any problems when managing the communal garden?
    d. What are the main problems you encounter?
2. Explain the importance of home gardens in providing affordable nutritious food to the households. Highlight the importance of including local food plants, as a way to ensure the production of a wide variety of micronutrient-rich species for the food and nutritional security of the households.
3. Set the objectives of the activity, for example: establishing individual home gardens, establishing communal gardens, improving existing gardens (by improving the design or the management, or by expanding the diversity of species and including local food plants). Side objectives such as exploring sowing or plant management techniques may be set at this stage or later on in the FFS cycle, depending on the farmers' needs emerging in the process.
4. Determine which steps are necessary in order to set up a garden or to reach the specific objective, and make a plan. If possible, plan for one or a few visits to existing local home gardens. Determine how the work will be carried out and how responsibilities will be divided among the FFS participants. For instance, if the activity focuses on individual gardens, the FFS group may meet once a week to discuss the participants' problems and solutions. If the focus is on communal gardens, it may be useful to establish how the work will be divided (e.g. groups of participants may be responsible for specific plots), how frequently the participants will take care of the garden, what would be the purpose of the harvest, among others.

Following FFS sessions:

5. One or more sessions may be dedicated to selecting the area (in the case of communal gardens) and designing the garden, e.g. whether it will be organized in plots or whether small pots and containers will be used, and which plants will be included. A discussion on the plants to include can be done in subgroup and plenary activities in the FFS: at this stage it may be useful to look back at the outcome of the diagnostic exercises, to determine which local food plants have been listed as important in terms of nutrition, and which constraints there are to their consumption and cultivation. Discuss the needs of the species and where they should be located in the garden, also considering whether different plants should be grown separately or together, and how they can be combined. Seeds and plant parts may be gathered locally from the village farmers or natural areas (see section 7.1.2 on sustainable harvesting in the wild). The FFS participants can also exchange planting materials among themselves.
6. In most villages households will already have home gardens, which may be well developed. If possible, a visit to one or multiple home garden(s) may be included as part of the FFS sessions, to observe and reflect on the following:
    a. Functions of the garden: e.g. food production, food storage, medicines, washing, food processing, social functions for meeting or as playground, among others.
    b. Cultivated plants: e.g. staple crops, vegetables, fruits, spices, medicinal plants, plants for fodder, fiber, fuel, dye, domestic use, ritual, among others. What foods that are purchased by the household could be grown in the garden?
    c. Representation of food groups (see Special Topic 8.1. for an explanation of food groups): which food groups are covered by the species present in the home garden? Which food groups are not covered? Identify micronutrient-rich plants. How could the production of the garden be diversified?
    d. Design of the garden: what are the different environments present in the home garden (e.g. pots, living fence, open yard, fenced plot, fenced plot margin) How management practices differ per environment? Which household members are responsible for the different management practices? How are the different species distributed in the environments (e.g. one or multiple species per environment)? How are they distributed over the whole area?
    e. Purpose of the harvest: what is used for home consumption? What is exchanged? What is processed and preserved? What is sold?
    f. Management: are the plants healthy (e.g. evaluate in relation to nutrients, water, pests and diseases, light exposure)? How can the agronomic management be improved?
    g. How do you evaluate the gardens (e.g. economic feasibility, labour and resource requirements, impact on diets, acceptability of the plants included, etc.)? What could be improved?
7. Select and prepare the area where the FFS activity will take place, plant the species in the gardens, take care of their management and harvesting. Consider how to ensure the sustainability of the garden over time by keeping seeds or cuttings for propagation (see the information below).

8. Regularly evaluate the activity throughout the cycle. Examples of points for reflection include: what problems are you encountering? Are the new species contributing to the household diets? Which household members are involved in taking care of the gardens?

Final FFS session (it may take place after some of the plants have fully grown and harvested):

9. Closing questions to evaluate the impact of the activities:
    a. How many of you found the sessions useful? (Count by show of hands)
    b. How many did not find them useful? (Count by show of hands)
    c. Why not?
    d. For those who already had a garden before the FFS activity, did you apply the new knowledge or are you going to apply it in your own garden? (Count by show of hands)
    e. For those who did not have a home garden before participating in the FFS, how many of you will establish a home garden? (Count by show of hands).
10. Reflections, lessons learned and steps to follow (see chapter 7.2).

Background content:

Home gardens are important for the food and nutrition security of rural households, as they represent a easily accessible source of a variety of food plants for home consumption, allowing for the production of nutritious food at a low cost year round. They may include starchy plants, protein-rich plants (such as legumes and nuts), fruits and vegetables, and particularly micronutrient-rich species, herbs, spices, medicinal plants. They can supply snack foods, such as sweet fruits or nuts, that can be eaten fresh or raw providing readily available energy between the main meals. Home gardens often have social functions: they can be a place where children play and people meet. Home gardens may include areas dedicated to food processing and storage, or for poultry. Depending on the availability of surplus harvest, sales of part of the produce can provide an (additional) income to the household. However, producing diverse and nutritious food for household consumption may be encouraged as the primary objective, and surplus harvest may be stored (after processing if needed) for the food scarcity period or in case of emergencies. Home gardens are often considered as a woman's responsibility, hence it is particularly important that both women and men are actively involved in this activity.

Home gardens are usually established in small areas, which makes labor requirements relatively low. They can be maintained at a low cost by using available resources such as pots, boxes, ceramics or plastic containers, old tires. The proximity to the homestead ensures that no travel and transportation are required, and that working in the garden can be combined with other activities such as looking after children or taking care of the household activities. It also allows the use of household food residues as compost, the application of manure produced by poultry, or the re-use of household water for irrigation (if not polluted with chemical detergents).

A few steps may be followed when setting up home gardens:

- Selecting the species: include local food plants that have good nutritional value. Some of these plants might be rare in the community and uncommon in the diet, but they may contribute to the nutritional security of the households. When choosing the plants to include in the home garden,

look back at the results of the FFS diagnostic phase (particularly sections 5.5 to 5.8). Reflect on their management, reproduction, resistance to pests, water requirements and nutrient needs, nutritional value, cooking and processing, taste and cultural acceptance. Include species for which there is poor knowledge but good potential in terms of nutritional value, as well as plants that are consumed during the food scarcity season. If a specific malnutrition problem is present in the region, make sure to include plants that can contribute to address it (e.g. if anemia is a problem in the community, include species with high iron content). Overall, ensure that the garden includes a wide diversity of species (i.e. more than 20), and that the plants have different seasonality in a way that the produce can be harvested throughout the year.

- Preparing the area: clearly define in which area the garden will be set up, and how it will be organized spatially in environments (e.g. pots, living fence, open yard, fenced plot, fenced plot margin) and plots. Clean this area from weeds and thrash residues. Depending on the local climatic conditions, a field on a slight slope can be preferable to avoid waterlogging. Plough the soil and prepare it in raised beds if possible, as this makes it easier to work on the plots later on. Ensure sufficient space for walking between the plots. Use nets to protect the area from roaming animals.
- Planting: depending on the species and on their germination rate, sow seeds/seedlings (see section 7.1.1) or plant cuttings (see section 7.1.5). Think of the plant distribution: each environment and each plot may include one or multiple species, and the plants may be distributed in the garden depending on their use and their management needs. For instance, species located near the kitchen may indirectly receive water more frequently (e.g. when washing food ingredients), and they will be more easily accessible for consumption. On the contrary, species requiring less management may grow in the marginal areas of the garden.
- Management: the following aspects should be taken into account:
    - Nutrient availability: protecting the soil is key. This includes for example ensuring a high soil cover (e.g. only clear the areas that will be cultivated) and applying mulch. Including legumes among the cultivated plants is also beneficial for the soil quality. Application of organic fertilizers such as compost or animal manure may be done in the early vegetative stage of the plants, to enhance nutrient availability.
    - Water management: it largely depends on the local climate and on the species, hence plants with similar water needs could be grown in the same space. In the case of water scarcity, mulching, ensuring shade, and removing weeds can reduce water loss. If there is an excess of water, working with raised beds and drainage channels can reduce water logging. It is important that young plants are protected from direct rain.
    - Competition for resources: appropriate distancing between plants should be ensured during sowing, and different species may be combined to optimize resource use. This involves for example combining species with different heights and light needs (including climbing plants), with complementary rooting systems, or with different development and maturity times. When maintaining the garden, consider whether thinning is required: if the competition among plants is impairing their growth, remove the ones that are suffering more to ensure proper development of the stronger plants.

    - Weeds: undesired weeds should be removed regularly. Creating shade or using mulch may reduce weed growth.
    - Pests and diseases: regularly check for signs of disease and pest presence. A few precautions may reduce their presence and impact: planting in a suitable place and season, avoiding replanting of a species in the same place, including insect-repellent plants, and removing plant parts that are damaged by diseases. Natural pesticides produced in the FFS or in the households may be applied.
- Harvesting: may have the dual purpose of harvesting edible parts for home consumption and sales, and collecting seeds or plant parts for propagation for the next season. This is important to ensure the sustainability of the garden over time.
    - For household consumption (and sales): harvest the desired part of the plant at maturity, minimizing as much as possible the damage to the plant as a whole (see Table 6 in section 7.1.2). The surplus can be processed for preservation (see section 7.1.6).
    - Collecting seeds: for each species, select a few healthy plants showing favorable traits and cultivate them until blossoming and seed setting. After seed extraction, proceed to dry and store the seeds (see section 7.1.3).
    - Harvesting plant parts: depending on the species, collect cuttings that can be used for vegetative propagation (see section 7.1.5).

For more information:

ASOCUCH. (2020). Los huertos de hortalizas nativas / plantas sub utilizadas como estrategia para la conservación de la agrobiodiversidad y sostenibilidad de grupos de mujeres indigenas de la Sierra de los Suchumatanes, Huehuetenago.

Cruz-Garcia, G. S., and Struik, P. C. (2015). Spatial and seasonal diversity of wild food plants in home gardens of Northeast Thailand. *Economic Botany*, 69(2), 99-113. DOI 10.1007/s12231-015-9309-8

FAO. (1995). Improving nutrition through home gardening - A training package for preparing field workers in Southeast Asia. Rome, FAO. Available at: http://www.fao.org/3/v5290e00.htm#TopOfPage

Yasmin, T., Khattak, R., & Ngah, I. (2014). Ecofriendly kitchen gardening by Pakistani rural women developed through a farmer field school participatory approach, Biological Agriculture & Horticulture, 30:1, 32-41, DOI: 10.1080/01448765.2013.845112

7.1.10. Creating school gardens

Objectives: To encourage children to care for their own plants (individual or small groups), to cultivate and consume local food plants, and to complement school meals with nutritious food produced in the schools. This activity contributes to the general FFS objectives of improving dietary diversity and improving the nutritional quality of diets. Children can transfer their knowledge to their homes, hence the benefits are potentially for many people in the community. School garden activities can address bottlenecks

related to the consumption of local food plants: low social acceptance and stigma, poor knowledge on cultivation, poor knowledge on nutrition, dislike of taste and texture by children.

Types of local food plants: All local food plants that are relatively easy to cultivate can be used in school gardens.

Location for the activities: School grounds or fields belonging to the school. The garden should be located in proximity to the classes and be visible for parents and school visitors. School gardens may also comprise perennials and tree species.

Materials required: Access to water, garden tools, labels, paper and pencils for drawing.

Stakeholders involved: Children and their parents, other members of the community that are interested in helping; collaboration with teachers is essential, and it is important to involve school cooks; local experts can be consulted for horticultural advice on how to set the garden and grow specific plants, while nutritionists could help with educational activities on nutrition. School gardens can be established by primary as well as secondary schools.

Description:

Before the first FFS session:

1. Make sure to comply with any legal requirement for working with schools and children.
2. Prepare a general plan for the activities to carry out with the children. Since many activities can potentially be included, making a preliminary plan can help to ensure that the necessary infrastructure and support are available (e.g. are nutritionists needed? Is it necessary to obtain agricultural support from extension services, or will the community members provide sufficient knowledge?). Do keep flexibility in the plan, as it is important to work according to the children's interest and learning capacity.
3. Collect information on the most common agricultural practices in the area.
4. Collect information on the children's diets and, if possible, on their nutritional status.

First FFS session (FFS participants in the classroom):

5. A few questions should be asked at the beginning of the first session, to explore the initial knowledge and experience of the children:
    a. How many of you have vegetable gardens at home? (Count by show of hands).
    b. How many of you help your families in taking care of the gardens? (Count by show of hands).
    c. Do you like doing that? Why? (Count by show of hands)
    d. For those who do not like doing that, why not?
    e. Which plants would you like to grow if you would have your own garden?

    Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session.

6. Explain to the children that they will prepare and take care of a school garden, and give a general overview of the activities that this will entail. Ask them which steps they think are necessary; reorganize the steps and add new ones if needed.
7. Depending on how the work will be organized, the pupils could be divided in groups that will work together throughout the year. In this first session they could do some team building activities, such as finding a name and motto for their group, drawing a group stemma, etc.

Second FFS session onwards (FFS participants supporting the school children):

8. The first few sessions can be dedicated to bringing the children closer to their natural environment, increasing their knowledge on ecosystem functioning, and raising their environmental awareness.
9. FFS sessions can be dedicated to: identifying a location for the school garden, making improvements in the area and setting up the garden, planting the crops, maintaining them, harvesting them.
10. The time spent in the field should be complemented with some in-class activities, on topics such as nutrition, plant functioning, soil quality, insect role, etc.
11. Questions can be asked at the beginning and the end of the sessions (on the model of those asked in the first and last sessions), to understand the initial knowledge of the children and to check if the lessons have been effective.
12. The activities can be organized in different ways: for example, each class or group can have a designated plot/garden or task, or they can rotate regularly. The first option facilitates a sense of attachment to the plot, it makes the children more specialized, and it stimulates competition, whereas having rotating groups can ensure that all pupils learn about different crops and functions. Contests and prices can be introduced to stimulate and reward children.
13. Once the garden is ready, it is possible to organize a school fair, where children are going to show the plants in their garden to other children, explaining why are these plants important for the diet. The school fair could also include cultural activities, like singing and dancing songs related to food, seeds and nature.

Final FFS session (end of the school year/term):

14. Closing questions to evaluate the impact of the activities:
    a. How many of you enjoyed working in the school garden? (Count by show of hands).
    b. How many did not? Why not? (Count by show of hands)
    c. For those who were usually helping your parents in your home gardens, did you learn something that you will use at home? (Count by show of hands)
    d. For those who did not, how many of you will start helping your parents in your home garden or help them establish a home garden? (Count by show of hands).

    Write down the answers to each question, for monitoring and evaluation purposes. Register the number of persons present in the FFS session.
15. Reflections, lessons learned and steps to follow (see 7.2).

Background content: The activities described in the following section are intended for school children (ideally between 9 and 14, but the activities can be adapted to the pupils' age), however the parents and other adults from the community should also be involved. The involvement of parents and community members is important in order to increase the acceptance of the sessions, since gardening could be associated with low social status or be seen as an inappropriate activity for a school. Moreover, it ensures that adult volunteers will help when needed, e.g. in tasks that are physically demanding or in which children could easily get hurt. The activities should be adapted according to the age of the children. Even though this section focuses on school gardens, most of the other activities described in this guide can be implemented in schools and combined with gardening (e.g. food processing, germination tests, etc.), as long as they are made interesting and feasible for children.

The first few sessions should be dedicated to improving the children's awareness of the school garden's ecology. This can be done through several exercises, for instance:

- The children can draw maps of the school grounds: this can make them more familiar with the environment in which they will work, and it can help to decide where the garden should be located (e.g. it should be on a flat area, visible from classrooms and for visitors, etc.). They could also draw a hypothetical garden site, before it is set up.
- Before the garden is created, let the children observe the area closely, looking at which plants and insects are already there. Explain the role of the different components of the ecosystem, and how they will be altered by the cultivation activities. Explain which insects are beneficial for gardening and why.
- Making compost is an instructive and entertaining activity, and the compost can be used in the school garden. It teaches children about recycling and minimizing waste, as well as about plant nutrient needs and soil quality.

At this point, the garden establishment should take place (see section 7.1.9):

- Prepare a plan for the garden set-up and layout.
- Look at the site and decide what is needed, taking into account water availability, protection from animals, protection from the sun, slope (it should be a flat area), equipment. Analyze the soil with the available resources (from visual estimation of the soil composition to laboratory analyses). Children can be involved in doing some of the improvements, although adult volunteers are needed in this phase. Depending on the necessary interventions, technical support may be needed. It could be useful to ask for help from community members who are more experienced with gardening.
- If possible, set the garden in permanent raised beds, as they are easy to work on (although making them requires more initial work). They should have the right size for children to be able to work on them without stepping on the soil, as this will cause compaction. Other elements to consider when building the raised beds are pathways, water availability, compost heaps (they should be close to the beds). A shaded table could be used as a plant nursery.
- Children should make labels to put next to each plant. Make sure the labels are water resistant.

After the garden set up has been concluded, decide what to grow, together with the children. This is a good moment for educating children about healthy diets. A few points should be considered:

- When deciding what to grow, take into account the current eating habits of children: ask their parents and look at the composition of their school meals. Look at the variety of food and at the balance between food groups in each meal. The produce grown in the school gardens should complement and expand the diet diversity of the children.
- If the children are currently not having a sufficient number of meals per day (children should eat frequently, ideally three balanced meals per day with two snacks in between), make sure the garden plants can serve as snacks for the morning and the afternoon. Also take into account existing micronutrient deficiencies and malnutrition problems, if present, as these should be specifically addressed – e.g. if anemia is prevalent in the area, prefer iron-rich plants (legumes, dark-green leafy vegetables, whole-grain cereals), provide them in meals in association with vitamin C-rich foods, and explain children why iron is important, where they can find it, and how it is better absorbed by the body.
- Gardens can have special designs for educational or nutritional purposes. For example a plot could be dedicated to growing vitamin A-rich plants, or it could include different food groups that need to be consumed in a day (e.g. a starchy plant, a legume, vitamin-rich vegetables and fruits).
- Choose plants that grow easily and with productive cycles that align well with the school term, so that harvesting (and processing if needed) can be done during the school year. Collect agricultural information on the plants before making a final choice on what to include, to check for feasibility. In the final selection, make sure to include a wide variety of species.
- Check if the parents or the community members have seeds (non-hybrids) or cuttings of local food plants that they are willing to donate to the school garden, as this can reduce the costs.

What agricultural practices to implement strongly depends on the chosen plants and on the local conditions. In general:

- Apart from collecting information and obtaining technical advice, it can be useful to consider what practices are common in the area, as they are already accepted in the community. Children can learn how to improve those practices, and they can bring their knowledge back to their homes thus enhancing the production in their households.
- Possible topics to address with the children include: soil quality, the use of mulching and manure; crop rotation schemes; intercropping and multi-layering (growing plants of different heights, including perennials shrubs and trees); weeding; integrated pest management; seasonality and plant life cycles; cooking and processing (see dedicated sections in this FFS guide).
- In all cases, the educational objectives of the activities should come before the actual success of the agricultural practices.

Additional observations to take into account: The level of production reached in school gardens will not be sufficient to provide for school feeding: this would require an excessive amount of time and work from children and teachers, which would be detrimental for the educational purpose of the activity. The cultivated food plants should, however, complement the school meals, since this will further motivate the

children's work and encourage them to consume local food plants in their daily diets. For this reason, time should be dedicated to teaching pupils about nutrition and healthy diets.

For more information:

FAO, Food and Nutrition Council of Zimbabwe, UNICEF (2013). Healthy harvest: a training manual for community workers in good nutrition and the growing, preparing, and processing of healthy food. Available at:
http://www.fao.org/fileadmin/templates/tc/tce/pdf/Healthy_Harvest_training_manual_.pdf

FAO (2015). Setting up and running a school garden. A manual for teachers, parents and communities. ISBN 92-5-105408-8. Available at: http://www.fao.org/3/a0218e/A0218E00.htm#TOC

7.2. Reflections, lessons learned and planning for the next cycle

This activity corresponds to the last FFS meeting of the cycle, and involves the participation of both FFS facilitators and project staff in addition to the farmer participants. During this meeting, FFS participants will reflect on what has (and has not) been accomplished during the FFS cycle and why. The lessons learned will include a list of all aspects related to FFS content (e.g. FFS curricula and guide), process (e.g. group organization, facilitation, development of skills and competences, gender and social inclusion issues) and procedure (e.g. planning, reporting and documentation) that 'went well' and that 'need improvement', to take them into consideration for the next FFS cycle. In this context, it is important to evaluate the partnerships with local institutions, and the participation of external experts. The review will also provide a basis for the identification of 'model farmers' (including women) in different FFS sites for the purpose of training them as future FFS facilitators. The special topic "Curriculum evaluation" (Chapter 8.8), presents some methods that can be used for evaluation and reflection. In addition, the guidelines for the implementation of FFS activities provided in this chapter, include some reflection questions specific to each activity to be conducted at the end of the cycle.

The second part of this meeting should be devoted to plan for the next FFS cycle with guidance from the FFS facilitators. FFS participants could suggest and discuss, based on the lessons learned, which activities they would like to conduct in the next cycle to complement or continue the work they did so far. They could return to the results of the diagnosis exercises and review if there any other bottlenecks that constrain local food plant consumption that they would like to address (and how they would do it), or if there are any additional special topics they would like to add to the curriculum. If it would be necessary to keep the seeds for the next FFS cycle, this is the moment to agree who will be responsible to store them. Finally, participants could also discuss when would be the best time to conduct a next pre-cycle planning meeting, who is going to participate in the next cycle's activities, and which additional partnerships or collaboration they would need in order to conduct the future activities successfully.

The FFS constitutes a continuous cycle of learning and feedback, so it is necessary to ensure reflection and learning during the different phases of a cycle, and throughout cycles (Figure 8).

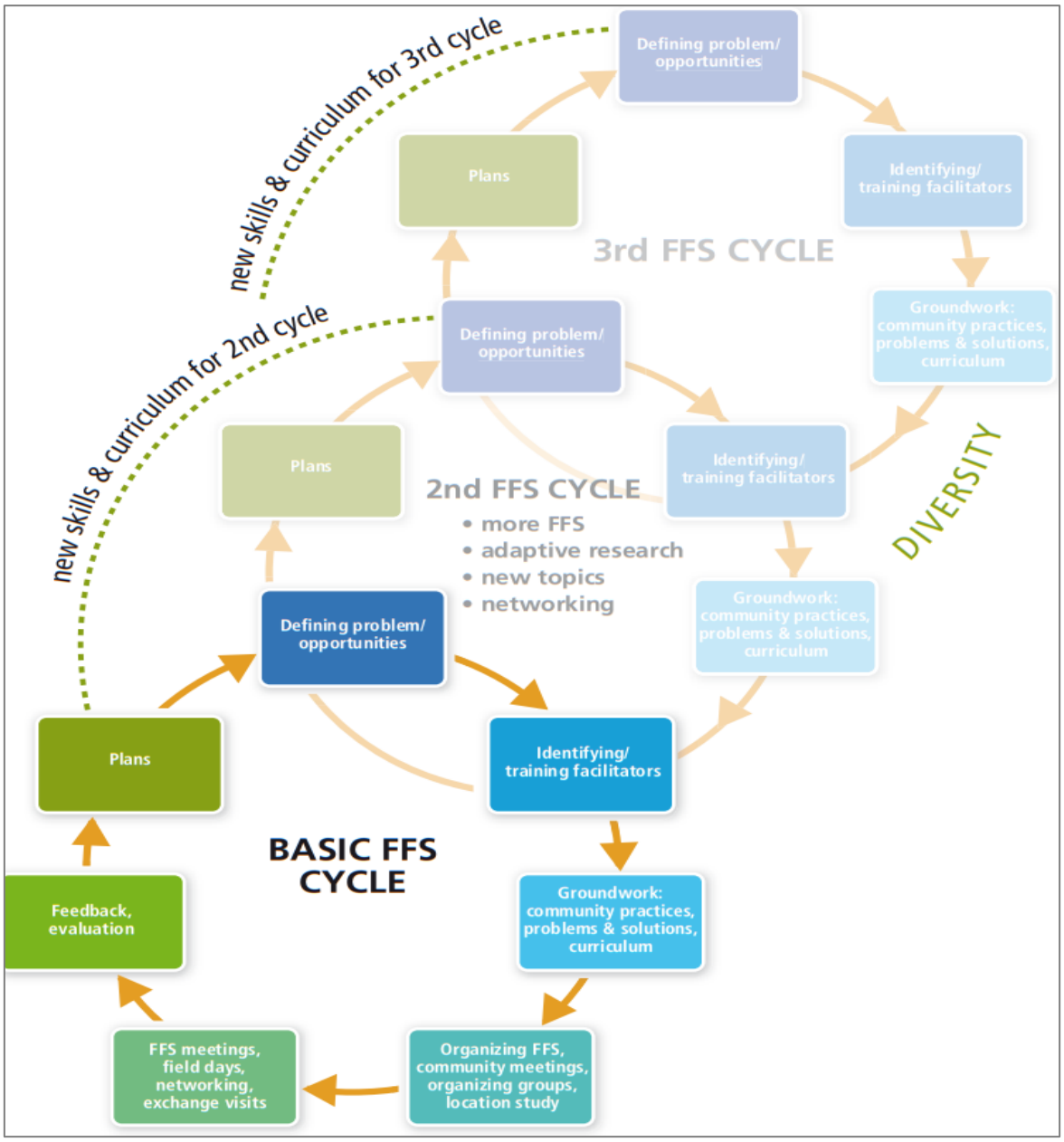


Figure 8: The FFS cycle of continuous learning and feedback. Source FAO Farmer Field School guidance document 2016.

8. Special topics

8.1. Nutrition and food diagram exercise

This exercise can be conducted in a single session with the special topic on Maternal and child nutrition (8.1 and 8.2).

This exercise will start with the introduction to the main concepts related to nutrition. Then participants will prepare their own food diagram showing local availability of food diversity and what they consume. The diagram divides the food in three types: proteins (body building), carbohydrates (energy) and vitamins and minerals (protection). Finally, the role of local food plants to improve the quality of the diet will be explored. It is important to take into account that food consumption may include sensitive topics in many cultures, since it may be associated to wealth, social status and beliefs. For every step of this exercise, cultural appropriateness should be considered.

Objectives:

a. To understand the main concepts related to nutrition
b. To gain insight in the importance of including different types of food in the diet to obtain a better nutrition
c. To assess which foods are more commonly consumed in the community and to which food type these belong
d. To reflect on the food types less and well represented in the diet, to evaluate whether their inclusion might add to nutritional status, and to discuss possible ways to address this challenge

Recommended duration: 2 hours

Materials: large sheets, paper, markers, pencils, food groups image in poster format (see step 1 below), nutritional value of local food plants image in poster format (see step 2 below)

Description:

<u>Step 1: Preparing the food diagram</u> (before the start of the FFS sessions)
The food diagram includes the most common food items consumed as carbohydrates (energy type of foods), proteins (formation type of foods), and protection type of foods. The food diagram can be derived from a national food guide (Figure 1A). Most countries have a 'food guide diagram' displaying dietary recommendations. The most common examples of food guides are in the shape of a food pyramid or food plate. Make sure to use adapted versions for different population groups if available. Before showing the diagram to the participants, remove most of the food items displayed in the diagram and keep only a few to set an example (Figure 1B), so participants will only include the foods that are locally available and consumed. Ensure to have one example per food group within each type of food (e.g. fruits and vegetables as part of the protection type of foods).

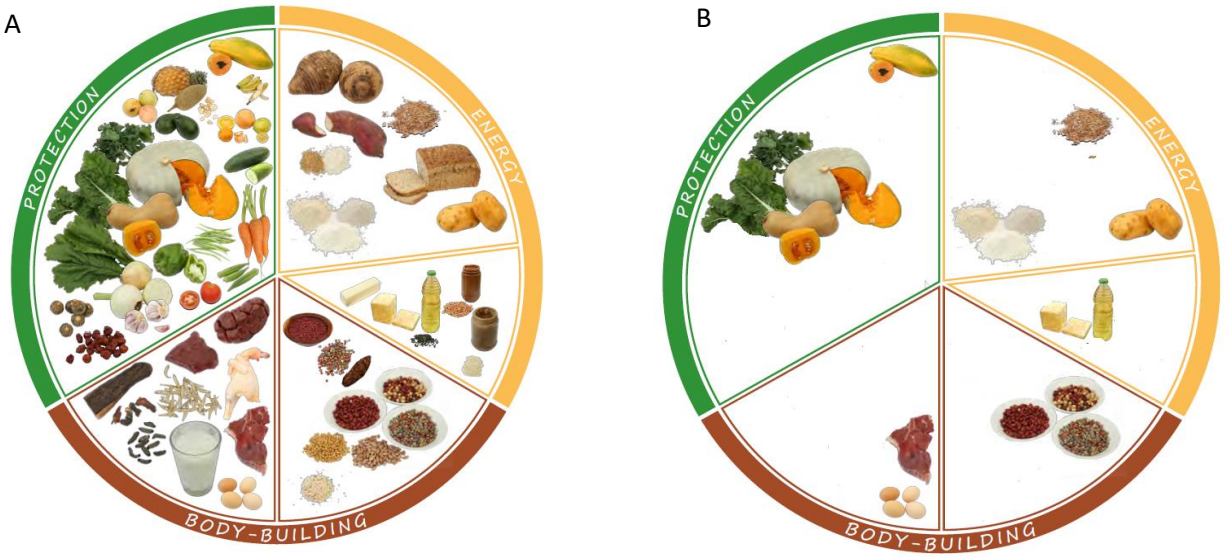


Figure 93: A: Food guide from Zimbabwe indicating the foods belonging to each food type. B: Adapted version (foods were removed and only a few were left as example) for use in the exercise.

Step 2: Preparing charts on the nutritional value of local food plants (before the start of the meeting)
Based on the baseline information, prepare charts on the nutritional value of local food plants in relation to the major macro- and micro-nutrient deficiencies in the region. The charts should highlight how local food plants could contribute to address these problems. Specify which local food plants could be recommended for child stunting, wasting, and underweight; and for addressing the main nutritional problems in the communities (e.g. anemia, various vitamin deficiencies, etc.).

Step 3: Introducing the concepts related to nutrition
The local expert is requested to introduce farmers to the main concepts related to nutrition, including types of food and food groups (Boxes 9, 10 and 11). In order to make the exercise dynamic, participants could be asked about how they understand each concept before presenting the expert description. They could also be asked to reflect on how this knowledge is applied (or can be applied) to their daily diet. The facilitator can use flip charts and posters with illustrations of the concepts, which is particularly important for illiterate people.

Step 4: Discussing the types of food consumed in the community
Show the poster with the food types diagram (see Step 1) to the participants and discuss with them the importance of including food items belonging to all types in the daily diet in order to ensure a good nutrition. Reflect with the participants on each type of food and ask:

- What are the foods that you consume that belong to the 'formation' ('body-building') type of foods?
- What are the foods that you consume that belong to the 'energy' type of foods?
- What are the foods that you consume that belong to the 'protection' type of foods?

The foods can be listed using either words or drawings, depending on the literacy level of the participants.

Step 5: Reflecting on the food items consumed in the last meal

After the community-specific food type diagram has been compiled, reflect with the participants on the number of food types that were consumed during the last main meal of the participants:

- What did you consume during your last meal?
- What were the ingredients of your dish?
- To which food types do these foods belong?
- How many food types did you include in your last meal?
- What could be added to ensure that the meal contains more foods from all food types?
- Could some local food plants be included in the diet to ensure and broaden the presence of all food types?
- What have been the limitations to the wider use of local food plants?

Then explain participants that – in addition to the three types of food – it is necessary to include all main food groups (see Box 11 below) in the diet. The facilitator can have a list of food groups in a big paper sheet and add a dot in a food group each time a participant said that consumed foods belonging to this food group during the last meal. This will give an idea of which food groups are more commonly consumed within the community and which ones less or not.

Step 6: Reflecting on the foods consumed during the food scarcity period

Reflect with the participants on the dietary diversity during the food scarcity period. Using the food diagram ask:

- Which food items are no longer available during the food scarcity period? Why is this? Can that situation be remedied?
- Which other food items are available in that time that could replace or complement the food items that are not or only scarcely available, in order to ensure the presence of all food types and food groups?
- Which local food plants can play a role in diversifying the diet during the food scarcity period?

Step 7: Reflecting on the role of local food plants

Present the charts on the nutritional value of local food plants to counter major local nutritional problems in the region (prepared based on baseline information, see Step 2), and ask the participants:

- What can we do to improve nutrition within our community?
- Can we use local food plants to obtain a more balanced and diverse diet, including all food types and groups, and improve nutrition of our community members or cope with food insecure periods?

Step 8. Summarizing the key points

Together with participants, summarize the local food diagram, the presence or absence of food types and food groups, the (potential) role of local food plants and other strategies to improve dietary diversity.

Box 9. Nutrition, food and diet

Nutrition (or nutritional status) is made up of three underlying components: food, health and care.
- Food: related to the adequate access to sufficient food sources
- Health: affected by the state of the local environment, water quality, access to public health facilities, and sanitation practices
- Care: includes home practices, i.e. monitoring if children are consuming enough nutrients

Food can be any product suitable for human consumption; it provides the energy and nutrients necessary for the growth and development of the body.
Food can be classified into three groups according to origin:

1. Food of vegetable origin: vegetables, roots, fruits, cereals and legumes.
2. Food of animal origin: meat, milk and derivatives, eggs, fish and seafood.
3. Food of mineral origin: salt and water.

Diet is the composition of the consumed food. Eating and drinking is part of our everyday life and it is so normal that we do not think about why we eat and drink. Most people feed themselves first to satisfy hunger and to have the strength to work or play. Children also eat to grow and develop. We also eat and drink because we enjoy it and because it is a time to share with our family and friends. A balanced diet is the adequate combination of sufficient quantity and quality of food items from each food group (see the definition of food groups below).

Nutrition refers to the use of food by our body in order to provide for the functions of living, working, growing, protection from diseases, and a healthy development. It is determined by digestion, absorption in the body, assimilation and use of the nutrients present in food items.

Box 10. Nutrients

Nutrients are the components in our food that have a specific function and that can be used by the body once they have been ingested and absorbed. No single food item contains all the nutrients in the amount that the body requires, so it is necessary to have a varied diet. Two kinds of nutrients are distinguished: macronutrients and micronutrients.

Macronutrients are those that the body needs in greater amounts: carbohydrates, fats and proteins.

- Carbohydrates provide the main source of energy in the diet. It is recommended that we consume carbohydrates in the form as present in potatoes, wheat, corn, rice, as well as their derivatives: flour, noodles and bread. Simple carbohydrates, like sugar and honey, should be consumed in smaller quantities only.

- Proteins provide for the formation, repair and maintenance of body tissues such as: hair, nails, skin, muscles, blood and bones. Proteins also contribute energy and are important for growth. Proteins can be of animal or vegetable origin.

- Fats have three main functions: to store energy, to help the body to absorb fat-soluble vitamins (A, D, E, K) and to provide essential fatty acids for the functioning of the body.

Micronutrients are those that the body needs in smaller amounts: vitamins and minerals.

- Vitamins are various substances necessary to regulate the different functions of the body. If we do not consume enough of them, health is seriously affected, since our body cannot produce vitamins itself. The main sources of vitamins are vegetables, fruits, green leaves, and animal food.

- Minerals have specific functions in the body. Minerals are found in many foods, especially those of animal origin such as: milk, eggs, cheese, seafood, viscera (liver, kidney) and iodized salt.

Box 11. Types of food and food groups

Food items can be grouped by the function these items have in the organism (food types) and the nutrients they contain (food groups). The fact that a group contains several food items allows to switch between food items of the same group without altering the nutritious contribution to the diet. There are three types of food – energy, formation and protection – that encompass the following main food groups:

Energy Foods provide us with the energy necessary for the functioning of the body. They include:

- Legumes (beans, lentils), cereals (rice, corn, wheat, barley) and tubers (potato, cassava).

- Fats and oils (butter, margarine, mayonnaise, etc.), to be consumed in moderation.

Formation ('body building') Foods help in the formation, growth and maintenance of tissues such as nails, hair, skin, bones, organs, muscles. They include:

- Dairy (milk) and derivatives (e.g. yoghurt and cheese), an important source of protein and calcium.

- Meat, eggs and fish, rich in proteins, almost always of high biological value.

Protection Foods contain the nutrients which are necessary for the prevention of diseases and proper absorption of the other nutrients present in food. They include:

- Vegetables provide regulatory functions. They are made up of 80-90% water and are rich in mineral salts, vitamins, and dietary fibre. They should preferably be consumed every day in large quantities.

- Fruits, with a similar function as vegetables, providing the diet with minerals and vitamins (mainly vitamin A and C) and fibre. Fruits also contain 80-90% water, and are rich in sugars. They should be consumed daily.

Each one of the food groups has its own importance, since each group provides different substances that are equally indispensable for the maintenance of the body. Within each group, no food is more important or better than another, so it is recommended to vary the foods consumed at each meal time and on different days of the week, to make the daily meal more varying and attractive.

8.2. Maternal and child nutrition

This activity can be combined with activities on the special topic Nutrition and Food Diagram (8.11).

Objectives:

a. To understand the special needs of mothers and children regarding nutrition
b. To assess current shortcomings in the diet
c. To discuss ways to improve the diets of pregnant and young mothers and children
d. To answer main doubts on COVID-19 in relation to pregnancy, childbirth and breastfeeding

Materials: large sheets, paper, markers, pencils

Description:

A local expert (e.g. nutritionist, health care staff member) should help participants to understand the importance of good nutrition for children and mothers during pregnancy and breast-feeding.

Step 1: Discussing the traditional practices related to maternal and child nutrition

As a start, participants may be asked about their traditional practices in relation to child and maternal nutrition and care, including their beliefs, customs, and food preferences (what they eat and do not eat). In discussions about child nutrition three categories of children could be distinguished, i.e. new-borns until six months old, children from six months to two years old, and children older than two years. Posters and flip charts may be used to illustrate the explanations and discussions.

Step 2: Comparing traditional practices and good nurturing practices

The discussion about traditional practices in relation to child and maternal nutrition, should be compared by meeting participants with good nurturing practices (Boxes 12, 13 and 14), i.e. asking the following questions:

- Where are differences in daily practices and recommendations apparent?
- Which are the reasons for these differences?
- Should these differences be addressed?
- And if so, how?

The main concepts related to maternal and child nutrition that can be presented and discussed in this meeting are presented in Boxes 12, 13 and 14, which include a summary of good nurturing practices for pregnant women, new-borns and children from 6 months to two years old. The local expert may provide additional examples of good nurturing practices for children older than two years old, elderly and sick people, based on guidelines of the local nutrition or health office. It is recommended that the local expert complements this information with examples of nutritious local foods.

Step 3. Summarizing the key points

Together with participants, summarize the main conclusions and key messages of the exercise.

Box 12. Nutritional requirements during pregnancy

It has been well established that the proper growth and development of a baby and child depends on the nutrition it receives in its first 1000 days from conception (during pregnancy) until its second year of life. Therefore, the health of the mother before conception, during pregnancy and when she is breast-feeding is very important for the development of her child. However, women of child-bearing age are often nutritionally vulnerable because they are exposed to high demands during pregnancy and lactation. If the intake of nutrients by the mother is not enough before and during pregnancy and lactation, the health of both the mother and baby can be put at risk. Very young pregnant women (under the age of 18) need even richer and more balanced diets because they are still growing, meaning that they are even at a higher risk of malnutrition.

Nutritional requirements are higher for pregnant and nursing women than for adult men. For instance, women during pregnancy need food items richer in protein, vitamin A and iron than men.

Pregnant women should eat food items high in iron, such as liver, meat, fish, and legumes (beans, lentils, soybean). Vitamin C, which is needed for the body to absorb iron, is present in fruits, and dark green and leafy vegetables. Pregnant women also have a higher risk of lacking vitamin A. To avoid this risk, they should consume dark green leafy vegetables, orange and yellow fruits and vegetables that contain vitamin A on a daily basis (e.g. pumpkin, squash, papaya, mango, and peach). These vitamins must be eaten together with small amount of (vegetable or animal) fats, so that the vitamins can be properly absorbed by the body. Normally, health institutes provide iron supplements to pregnant women and vitamin A supplements to women after childbirth.

Box 13. New born nutrition

Breast milk is the best, most nutritious natural food for babies: it provides the baby with all the calories and nutrients he/she needs during his/her first six months of life. Breast milk continues to meet half of the baby's nutritional needs during the next 6 months of life (i.e. until one year old), and a third of his/her needs up in the second year of life. Breast milk helps the cognitive development of the baby and also provides major protection from infectious and chronic diseases. Breast-feeding also contributes to the health of the mother since it may reduce the risk of cancer. Equally important is that breast feeding is good for the household economy (there is no need to buy baby milk). The recommendations of international health organizations for optimal child nutrition are as follows:

- Begin breast-feeding as soon as possible (first hour of infant's life)
- Maintain exclusive breast-feeding during the first 6 months of life
- Continue with breast-feeding up to the age of two years or more
- Introduce – from the age of six months – complementary, healthy, solid or semi-solid food adapted to the child's age.

Box 14. Principles of complementary feeding (> 6 months)

The transition from exclusive lactation to the introduction of other, additional food is very important for the child and his/her family. Some principles must be respected and followed so this transition period is carried out smoothly:

- Introduce food supplements from the age of 6 months (180 days), and continue breast-feeding on demand until the age of two (or older).
- Start at 6 months with small amounts of alternative food and increase the amount depending on age, while continuing to breast-feed. Most health centers have a scheme on what types of food should be introduced to the diet of the baby every month (with examples of foods adapted to the local context).
- Gradually increase the consistency and variety of foods according to the child's growth, adapting it to the child's needs and abilities (e.g. presence of teeth).
- Increase the number of meals containing complementary food depending on the child's age.
- Ensure that the child is provided with various food items with high nutritional content.
- Provide care for the child during meals, especially hygiene.
- If necessary and recommended by the health center, use food supplements like iron, vitamins and minerals.
- During illness, increase the consumption of fluids, try to breast-feed more frequently and prepare his/her favourite dishes.
- After the illness give food more frequently and encourage him/her to eat more.
- Ask any questions or doubts related to child nutrition to the health experts in the community.

8.3. Promoting knowledge on hygiene, sanitation, and water (WASH)

Introduction: To promote knowledge on hygiene, sanitation, and water use in the community, as well as to improve the existing conditions to the extent possible. Indirectly, the objective is to improve the health status of the people in the community, particularly reducing the incidence of diarrhea and infectious diseases, in order to improve the people's nutritional status.

Objectives:

a. To gain insight in the importance of hygiene, sanitation and access to clean water
b. To assess current shortcomings in the household and in the community
c. To discuss ways to improve hygiene, sanitation and access to safe water within the community

Materials required: large sheets, paper, markers, pencils

Stakeholders involved: Health workers can be involved in this training, as they can provide precise information and instructions for improvement of current local practices.

Description:

A local expert (e.g. health care staff member, nutritionist) should be involved in this training, as he/she can provide precise information and considerations for improvement of current local hygiene and sanitation practices. The meeting may be set up and managed as follows.

Step 1: Opening questions

A series of opening questions can be asked to the participants, to understand the local starting situation in terms of hygiene, sanitation, and water. Examples of questions include:

- How often during the day do you wash your hands? In which moments?
- Where do you keep the garbage?
- Do you have access to clean water?
- How do you treat and store water at home?

More opening questions can be asked, but they may vary depending on what is relevant under the local conditions and what is socially acceptable to ask. Questions can also be asked at several later moments throughout the session (e.g. some before discussing hygiene, some before discussing sanitation, etc.).

Step 2: Understanding the importance of hygiene

Upon questions from the participants, the local expert may explain in more detail why hygiene, sanitation, and safe water are important and why they are relevant for improved nutrition. On hygiene in particular (Box 15):

- Explain the importance of handwashing and give a demonstration on how to do it properly; if in the village handwashing facilities are scarce and/or not in proximity to toilets and cooking areas, show how to make a tippy tap (the participants can make some in groups) and explain where tippy taps should be located.
- Discuss food and environmental hygiene. When possible, provide practical examples (e.g. show proper food containers), to make the training more interactive.

Step 3: Understanding the importance of sanitation

Explain the effects of poor sanitation on health; discuss common sanitation facilities in the village and the associated risks in transmitting disease; discuss how to properly dispose of children feces (Box 16).

Step 4: Understanding the importance of clean water

Explain the importance of having access to sufficient safe and clean water; discuss and demonstrate proper household water treatment and safe storage of water in the homestead (Box 17).

Step 5. Summarizing the key points

Together with the participants, summarize the key conclusions and take home messages of the exercise. Emphasize that improving hygiene and access to clean water and to appropriate sanitation facilities can have a strong positive impact on nutrition. In contrast, poor health conditions, and particularly diarrheal diseases, reduce or impede nutrient absorption, and they can cause loss of appetite and influence the body metabolism. Hence, poor health conditions can undermine efforts to improve nutrition through better diets. Interventions to improve hygiene, sanitation, and water can prevent the transmission of

pathogens and reduce vector-, food-, and water-borne diseases, thus having a positive effect on nutrition. Children are particularly vulnerable to diseases, and their development and growth is especially affected by a poor nutritional status. For this reason, reducing the incidence of diarrhea in children should be particularly targeted in the interventions.

Box 15. Hygiene

Interventions on hygiene that can influence nutrition are handwashing, improved food hygiene, and improved environmental hygiene.

Handwashing:
It needs to be done before cooking and manipulating food, before eating and feeding a child, after defecation and after cleaning children's bottom, after handling garbage, and after touching animals.
To be effective, handwashing needs to be done properly: hands should be washed with water and soap for 30 seconds or rubbed with an alcohol-based solution for 20 to 30 seconds.

To ensure that hands are washed when necessary, facilities for handwashing should be placed next to toilets and latrines, as well as in kitchens. One simple handwashing facility is a tippy tap, which can be constructed using a big clean plastic bottle and a knife. After the blade of the knife has been disinfected with a candle, make a small hole at the base of the bottle. While keeping the hole closed, fill the bottle with water and close the cap tightly. Hang the bottle to a pole with strings and provide soap in proximity. Slightly open the cap to allow for water flow, close the cap to stop the water.

Food hygiene is essential to prevent food-borne diseases. It implies both a clean environment for cooking (clean utensils) and the use of safe water and ingredients. A few basic rules should be followed to guarantee food safety:
- Cook food completely, especially meat, fish, and eggs; cooked food should be reheated thoroughly immediately before consumption.
- Keep raw and cooked food separately and wash kitchen utensils that have been used for raw products, to avoid cross-contamination.
- Cooked food should not be at room temperature for more than 2 hours; cooked and perishable food should be refrigerated at preferably below 5˚C, and in any case not for long (it depends on the food, but normally 3 days maximum); leftover food should not be reheated more than once; cooked food should be kept at more than 60˚C prior to serving.
- Store food at an appropriate temperature in clean containers with a lid (the containers should be specifically made for food storage, thus not releasing plastic and chemical compounds).
- Cover food to protect it from insects, as they can contaminate the food and be vectors of diseases.
- Do not consume food from damaged or swollen containers, or after the expiration date.

Environmental hygiene can also help to prevent diseases, particularly in children.

- Avoid feces in child play areas, as children put objects and soil in their mouth thus ingesting feces residues.
- Keep animals as much as possible out of the places where children usually play, and regularly clean these areas. Keep animals also away from places where food is prepared and from around sources of water.
- Kitchen floors and surfaces should be regularly cleaned and washed with soap and bleach, and latrines need to be cleaned and disinfected daily.
- Improve drainage systems if possible and safely dispose of garbage (garbage bins should be covered and emptied frequently), to prevent accumulation of disease vectors.

Box 16. Sanitation

A safe disposal of feces is essential for preventing fecal pathogens from infecting humans. Significant structural improvements in sanitation facilities require bigger investments and support than an FFS can achieve. However, the meeting participants can observe and analyze the current sanitation facilities used in the village, discuss the effects on the community's health, and jointly seek for improvements. A number of simple suggestions for improved sanitation are provided below.
- If open defecation practices are common, discuss how this facilitates vector-borne diseases and exposes children to feces ingestion.
- Depending on the types of latrines or toilets that are in use, simple improvements may be possible (e.g. improving ventilation).
- In all cases, highlight that latrines and toilets need to be cleaned on a regular basis, and hand-washing facilities need to be present in proximity.
- Sanitation facilities should be easily accessible to vulnerable members of the population, such as older people, people with disabilities, and pregnant women. The paths to the latrines and toilets should be clear of obstacles, and there should be poles or ropes inside the facilities to provide support for vulnerable community members.

Discuss appropriate disposal of children feces, as it is an easy measure to implement and it is essential for disease prevention. Children often have diarrhea, hence their feces can contain a high amount of pathogens, and they are often exposed to other children's feces if defecation happens in play areas.

Nappies or cloths should be used to prevent feces dispersal. Nappies should be safely disposed of, and reusable cloths need to be washed and disinfected regularly. When children are old enough to use potties, these can facilitate the disposal of feces in the latrines.

Box 17. Clean water

The consumption of contaminated water is one of the main causes of diarrhea. In the same way as for sanitation, significant improvements in water systems go beyond the scope and possibilities of FFSs. However, if appropriate practices for household water treatment and storage are learned by the participants, the access to clean water in the community can significantly improve. Household water

treatment should ensure that pathogens causing diarrhea are removed, which can be done in several ways:

Boiling: water is boiled for a few minutes to kill the pathogens. It is the most common and the easiest treatment for water to be used in households. However, the water is at risk of re-contamination after the treatment if not kept in clean and properly sealed containers.

Solar disinfection: this is only for transparent water (turbid water needs to undergo filtration or flocculation first). Transparent PET plastic bottles of up to two-liter capacity are filled with water and placed in the sun for 6 hours to 2 days (the time increases with the cloud covering). The combined exposition to UV rays and high temperatures is effective against most viruses, bacteria, and protozoans. It is necessary to do this with PET plastic, other types of plastic might release toxic substances when exposed to the sun for long periods of time. This option is effective and cheap, and it also prevents recontamination since the water is stored and served from the same bottles used for disinfection. However, it is time-consuming and it can only be applied to a limited amount of water at a time. Moreover, many clean plastic bottles are necessary, and turbid water needs to undergo pre-treatments (filtration, flocculation) before solar disinfection can be practiced.

Filtration: it can remove bacteria and protozoans, although it is not as effective against viruses. It is a necessary pretreatment for turbid water, before disinfection can be done. Common systems for filtering water are ceramic filters and sand filters. Ceramic filters are widely available for purchase, they are easy to use, and they can be used for a long time, thus they are low-cost in the long term. However, they must be of good quality in order to be effective, and the filter needs to be cleaned regularly and can easily break. The water flow is slow, thus the system is time-consuming and only applicable to small volumes at a time, and there is risk of recontamination. Sand filters are containers (usually about 0.9 m high) in which layers of clean sand and gravel alternate. The water is kept at a slightly higher level than the sand, and as the water slowly passes through the filter most of the bacteria and protozoans are eliminated. Compared to ceramic filters, the flow speed is higher and more clean water is produced. However, it also needs routine cleaning and offers no protection from recontamination, and it is heavy to transport in the beginning.

Flocculant and disinfectant powders: they are mixed with the water, causing a separation of the solid parts; then the water is filtered with a cotton cloth. This method is very effective against pathogens and it also removes heavy metals from water, while preventing recontamination since chlorine residues stay in the water. However, it requires multiple steps and materials, and the powders need to be purchased.

Chlorination: for water with low turbidity; a hypochlorite solution or chlorine tablets are mixed with water to disinfect it. It is effective against viruses and bacteria, but it has a limited effect on protozoans. It is very easy to use and low-cost, but the hypochlorite solution needs to be of sufficient quality. Chlorination also affects the taste and smell of the water, hence potentially causing acceptability problems.

Household water storage should be done in clean containers provided with lids. The containers should have small necks to limit contamination. Water can be served through a spigot in the container; alternatively, a ladle can be used for serving, as long as it is reserved for this function only and stored in a clean place, or water can be kept in a smaller bucket with a tight lid, from which it can be directly poured.

For more information:

On water, sanitation, and hygiene:
WHO (2015). Improving nutrition outcomes with better water, sanitation and hygiene: practical solutions for policies and programmes. ISBN 978 92 4 156510 3. Available at: https://apps.who.int/iris/bitstream/handle/10665/193991/9789241565103_eng.pdf;jsessionid=BFA9BB950427E97034AE8B2A22F547AA?sequence=1

On building a tippy tap:
SPRING/Balngladesh (2015). How to build your own tippy tap (brochure). Available at: https://www.spring-nutrition.org/sites/default/files/publications/tools/spring_tippy_tap_brochure_english.pdf

On food safety:
WHO (2006). Five keys to safer food manual. ISBN 978 92 4 159463 9. Available at: https://www.who.int/foodsafety/publications/consumer/manual_keys.pdf

On household water treatment:
CDC (Centers for Disease Control and Prevention) webpage: Household Water Treatment | The Safe Water System. Retrieved on 18/09/2019 from: https://www.cdc.gov/safewater/household-water.html

8.4. Keeping local food plants in Community Seed Bank facilities

Objectives:

This activity can make farmers more aware of their role as keepers of local biodiversity, and it can empower them to handle local food plant genetic resources. The objectives of this activity are:

1. To clarify the importance of including local food plants in Community Seed Banks (CSBs) for sustained food and nutrition security in the community and for biodiversity preservation;
2. To provide guidelines for the preservation of local food plant seeds in CSBs.

Stakeholders involved:

Local botanists may be involved to ensure a correct taxonomic identification of the local food plants that are going to be included in the CSBs, so that these can be compared and exchanged with other CSBs. They may also be able to provide information on the seed characteristics of the species, as not all seeds are suitable for conservation and different species may require different conditions in the CSB environment.

Collaboration with national and regional gene banks can be useful to obtain support in terms of knowledge and resources.

Materials: flipcharts, large sheets, paper, markers, pencils

Description:

1. A few questions can be asked to the participants, to understand the starting situation in terms of familiarity with CSBs, and of local seed conservation and exchange systems. Questions should be adjusted depending on the local context, e.g. depending on whether well-established CSBs already exist in the community or not. Examples of questions include:
    a. What is a community seed bank?
    b. Why to establish a community seed bank?
    c. What species are/can be included in community seed banks?
    d. How are people in the community currently saving and exchanging seeds?
2. Discuss the importance of plant genetic diversity and the function and potential importance of CSBs.
3. Ask the participants to brainstorm on whether and how a CSB would be meaningful to the community, on the steps that are needed to set up a CSB and the requirements to keep it functioning. This can best be done within subgroups, which can discuss and write on flipcharts, and then present their views to the other FFS participants in plenary. At the end, discuss the answers and integrate additional steps if necessary.
4. Ask the participants to brainstorm on other functions that the CSB could have and other activities that can take place there (e.g. knowledge exchange sessions), to make the best use of the CSB facilities and ensure its long-term sustainability.

Background content:

- CSBs store and preserve seeds that have been contributed by local farmers in the community. This ensures that seeds are stored under optimal conditions and that a stock of seeds is available in the case of shortage caused by adverse environmental factors and crop failure. It also allows community members to access seeds at lower prices than through formal seed suppliers. Moreover, CSBs can ensure that a high variety of food plants is available to be cultivated by farmers.
- The inclusion of local food plants in the CSB can contribute to the preservation of local plant genetic diversity and ensure the conservation of species that are adapted to the local environmental conditions. It also allows to preserve plants that are important for nutrition, especially those that guarantee food security during the scarcity period. Keeping the seeds of local food plants in seed banks enables farmers to maintain high quality seeds, and to easily access them and cultivate them in their home gardens, therefore it can also enhance the consumption of plants that are usually only collected from the wild. Including local food plants in CSB facilities can also reduce the stigma around some of these species, bringing them closer to the appreciation of staple crops. Women can have an important role on this, since they are often traditionally

responsible for saving seeds and for cultivating local food plants. Hence, it is important that women are involved in all steps of the establishment and management of the CSB.

- Preserving genetic diversity is essential for agricultural production and for food security. On the one hand, CSBs can protect against shocks (e.g. extreme weather events), by providing seeds in case of need; on the other hand, they can help to cope with longer-term trends (such as temperature increase), by ensuring that plant diversity is preserved, and that species adapted to specific conditions are available. Having a high genetic diversity in CSBs and including local food plants can ensure the maintenance of dietary diversity in times of food scarcity. Moreover, a wide diversity between and within species can facilitate adaptation to changing environmental conditions. Local food plants are particularly important in this perspective, since they often have a high genetic diversity and are adapted to the local conditions, which are likely to become more extreme under the effects of climate change.
- A few steps are important for setting up a CSB:
    a. Deciding its purpose and scope: for instance, it should be clear that one of the functions of the CSB may be to preserve seeds of local food plants, in addition to providing a well-maintained seed stock for staple crops.
    b. Organizing the CSB management: a management committee should be established, consisting of community members that are responsible for different functions in the CSB, such as seed collection, selection, and cleaning. Assigned members of the committee should have the specific role of ensuring that local food plants are included, and more generally of enriching the diversity of seeds and keeping record of it. The community should set a budget for the bank, discuss how income could be obtained, and look for expertise and material resources within the community, including knowledge on seed selection and storing techniques. For a detailed description of role division in CSBs, please see the guide on "Operating regulations for Community Seed Banks" (the full reference is listed below, under the subheading *For more information*).
    c. Collecting and selecting seeds: see subchapter 7.1.3. Seeds should be collected at maturity, or slightly before to prevent animals from eating them. Documentation of the collection site should be done timely. Only healthy seeds that are not damaged nor infected with pests or diseases should be collected; the seeds should have a good germination rate (85-90%) and be able to tolerate storage at 13% humidity. The seeds should be handled with care on the field to avoid exposure to high temperatures or humidity.
    d. Cleaning and drying the seeds: see subchapter 7.1.3. Seeds that already become dry on the plant should undergo threshing: they can be put in a cloth bag which is then beaten on the floor, or they can be rolled between hands to separate the seeds from the containers. Seeds extracted from fleshy fruits should be cleaned by soaking, to remove residues of fruit pulp. They are then put in warm water for two to four days, after which the viable seeds will sink to the bottom while non-viable seeds, pulp, and mold will float. Germination tests can be done on a sample of the selected seeds to check on their quality and germination rate (see subchapter 7.1.4).

e. Recording information: it is important to record from whom and where the seeds come from. This is especially the case for local food plants, since they can have very different origins (e.g. they can be collected from forests, fields, roadsides, etc.). Other important information to be recorded includes: species name (both local and scientific name), date on which it was collected and stored, possibly date of germination test, plant characteristics (e.g. yield, growth, fruit and seed characteristics), disease susceptibility, management practices, expected storage time (seed longevity) in the bank. The information should be partially summarized on the containers, and recorded more in detail in separate files (hard copy or in the computer). Additionally, information should be recorded on the seeds that leave the bank, and on the expenses and profits of the bank.

f. Storage: see subchapter 7.1.3. Ensure that the conditions of the seeds are checked regularly, and that information is properly collected on how long each species can be stored for.

g. Restock of supply and ensuring seed diversity: a system of seed loans and barter should be established with farmers and community members, to ensure that the seed stock is regularly maintained and increased and that seed diversity is guaranteed. Organizing seed fairs can be a way to improve the seed stock quality and diversity (see subchapter 7.1.8).

- CSBs can be used to host other activities in which traditional knowledge and consumption of local food plants are promoted, such as cooking demonstrations or seed fairs and food fairs. CSBs can also become a place in which other FFS sessions are held, for instance on breaking seed dormancy and on sowing practices. The site of the CSB can also be used to hold regular seed and produce markets. This could improve the role of CSB facilities as places for community gatherings, thus strengthening their role and value for the community.

For more information:

ASOCUCH and Reserva Comunitaria de Semillas Joya Hermosa. Operating regulations for Community Seed Banks - Normativa de Funcionamiento para Reservas Comunitarias de Semillas. Retrieved from https://www.sdhsprogram.org/tool/operating-regulations-for-community-seed-banks-a-manual/

FAO. (2014). Community seed banks. Junior Farmer Field and Life School – Facilitator's guide. Rome, FAO. Retrieved from http://www.fao.org/3/a-i3987e.pdf

8.5. Local food celebration day

Introduction:

When most local food plants are available (either in the field or harvested and/or processed), and once processing and food preparation experiments have shown major progress, it is time to conclude the season's FFS activities. The Local Food Celebration Day (LFCD) is the culminating activity of the FFS Nutrition and Local Food Plants cycle-long sessions, organized in order to report back to the whole community on the lessons learned and the progress made. The best time to have a LFCD is when the plants in the 'learning field' are still standing and nearing maturity.

The LFCD is an activity that brings the FFS participants and other members of the community together. It is an occasion for the FFS members and the facilitators to show the community and other stakeholders (e.g. elders, local authorities and officials) what they have learned and what have been the results of their research activities. It also highlights what a group of FFS participants can do when working together as a team to solve issues related to nutrition. It can also show the major role, knowledge, and inventiveness of women in particular, touching on traditional knowledge and gender roles. Thus, the LFCD also serves as a platform for FFS participants to generate support for their follow-up activities among dignitaries, authorities and officials, and other prospective stakeholders.

The LFCD may include such activities as a field tour, an exhibition, and/or a formal programme in which local officials deliver speeches. The participants and the community may also jointly prepare food dishes as part of the event. The FFD is a genuinely festive occasion, with a festival-like atmosphere. Folk media activities (songs, dances and other common cultural activities in which the knowledge that has been gained can be expressed) prepared by the FFS participants may complete the celebrations.

It is important to prepare well for the LFCD. The preceding days are usually full of activities: field evaluations are finalized, graphs and tables prepared, performances rehearsed and exhibition rooms arranged and food items prepared. The LFCD is the FFS participants' affair, meaning that they must plan and implement it themselves. The participants may choose to invite members from the same or neighbouring villages. The facilitators may opt to invite their local chief executives or direct supervisors with the aim of informing them about the results of the FFS programme.

Apart from the preparations for the LFCD, ample time will be needed to evaluate the lessons learned in the FFS group and to plan for the next season. This can be done either before or after the LFCD.

Objectives:

- To help farmers decide on activities for the LFCD
- To organize the LFCD
- To show the results of the cycle-long FFS studies

Materials required:

- A 'learning field' in maturity stage (if the FFS included field experiments)
- Cooking materials and tasting area/facilities
- Exhibition area and materials
- Tape, paper and markers

Time guide:

Participants should devote considerable time to the preparation and organization of the LFCD. Planning activities should start about three weeks ahead of the day. The last few days before the LFCD, when FFS

participants send out invitations, prepare exhibition materials and conduct rehearsals, are usually very busy.

Description:

- Discuss with the farmer participants what makes a LFCD successful. What are the reasons for holding a LFCD? What might happen during the LFCD?
- Write down the answers and use them as a basis for planning the group's LFCD.
- Plan the LFCD activities.
- Conduct the LFCD.
- Evaluate and document the LFCD activities.

Guiding Questions:

- Who should be invited for the LFCD? Why?
- How should participants approach local leaders to ensure the latter's involvement in and commitment to the LFCD?
- How should the knowledge and skills learned in the FFS be shared with other farmers and local officials?

Notes:

- The LFCD may be combined with the Farmers' Field Day organised in parallel by the participants in a FFS on PPB (participatory plant breeding), if such FFS took place in the same period and the same community. The invited farmers and guests can also engage in the activities organised by the members in the FFS PPB.
- Testing and ranking of the food items prepared with the different local food plants according to the preferences of the visitors can thus take on a cheerful character.
- The LFCD is also an excellent time to hold a graduation ceremony for the community members who have participated in the FFS activities throughout the cycle.

8.6. Gender equity

Introduction:

This session examines the respective roles and contributions of women and men in food production, nutrition, knowledge on and management of local food plants, and gender roles. It analyses some prevailing practices and their underlying assumptions bearing on equity and household food production as much as environmental management. It offers a perspective through which values and attitudes may be affirmed or modified, and practices changed. The session could best be performed during the second part of the FFS cycle, when local food plants have been cultivated and cooking exercises are undertaken. Whereas gender forms a major basis for unequal positions and different roles in the community, other variables might result in similar inequalities, including age, marital status and income. A gender analysis might also extend to such parameters.

Why focus on women?

- Men's roles, responsibilities and contributions are often recognized by the community and the authorities as a standard, whereas this is not the case for roles of women.
- Policies, institutions and societal structures are mostly supportive towards the roles of men.
- At the same time, women often remain systematically excluded.
- For women's empowerment, existing power relations caused by gender differences need to be transformed.
- For inclusion, existing multiple exclusions need to be identified, addressed and corrected.

Objectives:

At the end of the session, participants should be able to:

- Raise awareness of perceived and prescribed roles of women and men and analyze the values underlying those roles;
- Discuss why gender equity is an imperative to sustainable seed management;
- Examine one's personal perspective on gender equity;
- Discuss lessons and action plans to support women's agendas and their participation in the FFS.

Materials required:

Papers, marking pens, cards, visual aids for presentation (PowerPoint or flip charts or other appropriate materials)

Duration: 4 hours

8.6.1. Activity 1: Sharing personal experience as a man/woman (30 minutes)

- Divide the participants into 2 groups split between men and women.
- Ask the individual participants to reflect on their own individual experiences, in particular on any incident that made each participant realize that she/he is a man or a woman.
- Facilitate the sharing of experiences within the group. Be respectful of the fact that not everyone may be open to sharing personal reflections.
- Ask volunteers to share one experience per subgroup in the plenary, ensuring that both men and women are represented.
- In the plenary, let the selected participants share their experiences and lead a discussion by asking the following questions: What made him/her feel that she/he is a woman/man? Why did she/he feel that way?
- Moderate discussions to highlight the economic, social and cultural attributes and opportunities associated with being a woman or a man.
- Lead the discussion on basic gender concepts (see Box 18 below).

Note**:** The experiences will reveal some of the socially constructed ways of being women and men.

Box 18. Basic concepts on gender

Gender - refers to the economic, social and cultural attributes and opportunities associated with being women or men. It describes the **socially constructed ways** of being women and men, rather than the biological differences. It changes according to culture, class, time and place.

Gender Relations - refers to **relations of power** between women and men which are revealed in ideas and behavior, differences in roles, the division of labor, access to and control over resources, and in ascribing different expectations, abilities, desires and aspirations to women and men.

Gender and Social Inclusion Analysis - Identifies the differences between women and men of different ethnicities regarding their:
- Specific roles and activities;
- Access to and control over resources;
- Access to benefits and roles in decision making;
- Social practices which cause discrimination and violence against women.

Gender and Ethnic Equality - to strive for gender and ethnic equality does not mean to ignore the biological differences between the two sexes, nor to ignore the differences between what it means to be a man and what it means to be a woman, or what it means to belong to an ethnic minority.
The process of achieving gender and ethnic equality - while respecting these differences - refers to changing norms, values, attitudes and perceptions in order to attain equal status between men and women, as well as between advantaged and excluded social groups.

Gender and Ethnic Equity - this refers to fairness in women's and men's roles and positions, or in those of advantaged and disadvantaged social/ethnic groups. In particular, it refers to fairness in access to socio-economic resources. Discrimination results from inequitable access to socio-economic resources due to being a man or being a woman, or being a member of a disadvantaged group or ethnic minority.

Empowerment - empowerment is the enhancement of assets and capabilities of diverse individuals and groups to function and to engage, influence and hold accountable the institutions that affect them (World Bank definition). The definition applies directly to the options for women and disadvantaged groups. Two Dimensions of Empowerment can be distinguished.

Livelihood Empowerment (access to assets and services) includes **a**n increase in access by women, or the poor and excluded, to assets and services that are needed to sustain at least a minimum level of livelihood security; the creation of systems and mechanisms for upward mobility of women, the poor and excluded. Note: Assets may be natural, physical, financial, social and human. Livelihood empowerment can be initiated by outsiders (government, donors, NGOs, etc.).

Mobilization empowerment (voice, influence and advocacy) includes an enhanced ability of women, the poor and excluded to engage in a debate with, influence and hold accountable the institutions that affect them; understanding of the systemic causes of poverty and social exclusion concerning women, the poor and excluded; capacity of women, the poor and excluded to aspire and act on their aspirations, and overcome the sense of powerlessness.

Social exclusion - Social exclusion occurs when formal laws and government policies and/or informal social practices, values, norms and beliefs:
- Result in the conscious or unconscious ignorance and disregard of the interests of specific groups of people, in particular women or ethnic minorities, or groups belonging to a certain class or age;
- Prevent members of certain social groups from getting equal access to economic assets and opportunities; public goods, services and rights; political voice and influence.

8.6.2. Activity 2: Old and new stereotypes (30 minutes)

- Distribute cards with gender-related proverbs (see gender-related proverbs below) to the participants.
- Ask the participants to read their cards; then ask if they know of other similar proverbs.
- Discuss with the participants the implications of such proverbs on men and women, their roles and behavior.
- Ask the participants to relate the proverbs to the experiences shared earlier among them.

Note: Lead the discussion on common stereotypes of men and women farmers, and on what the experiences and proverbs say about how norms, rules, practices and social expectations are different for men and women. Explain how these form an unconscious part of our perceptions, which in turn influence our behavior (see 0 for some important points to highlight in the discussion).

Gender-related proverbs and stereotypes

"Sons are sticks for old age"

"Bringing up a daughter is like manuring and watering a plant for someone else's courtyard"

"An unmarried girl must obey her father, a married woman her husband, and a widow her children"

Old and new stereotypes of men and women farmers

- Men cultivate cash crops, while women cultivate food crops in small plots only for family subsistence.
- Women can best be reached by agricultural services and resources (e.g. extension, training, credit) indirectly through their husbands.
- Women are overburdened with work and therefore cannot participate effectively in development activities.
- Women farmers are generally poor and can only manage subsistence farming.

What do the proverbs and our experiences say?

- Rules, practices, the division of labor, social expectations, and vulnerability and mobility conditions are different for women and men as a result of religious and cultural traditions, societal values and beliefs.
- These ideas have been in existence for many years in communities and societies. As a result, they form an unconscious part of our perceptions, which in turn influence our behavior.
- These ideas become part of our lives so much that even if we are doing gender work, we unconsciously remain influenced by these perceptions and beliefs.

Table 9: Basic gender analysis questions.

Who does what?	How?	Where?	When?	Why? (Labor)
Who uses what?	How?	Where?	When?	Why? (Access)
Who controls what?	How?	Where?	When?	Why? (Decision making and control = power)
Who knows what?	How?	Where?	When?	Why? (Information = power)
Who benefits from what?	How?	Where?	When?	Why? (Benefit-sharing)
Who is included in what?	How?	Where?	When?	Why? (Participation)

8.6.3. Activity 3: Gender-specific activity clock and calendar (1 hour)

- Divide the participants into two groups: one men-only group and one women-only group. If time is limited, each group can further divide into two so that they can do the activity clock and the activity calendar simultaneously.
- Ask the subgroups to prepare the activity clock (see 0) and activity calendar (see 0 on preparing the activity calendar below).
- Ask each group to present their individual outputs in the plenary.
- Lead the discussion by asking the following questions:
    - Which major differences do you notice in the way men and women farmers spend their day and year?
    - How are tasks and responsibilities (both in the household and in the farm) divided between male and female household members?
    - What are the implications of these differences for the farm and the family?
    - What are some of the consequences of these differences to men and women?
    - What are some of the consequences of these differences to society?

Guide on preparing the Activity Clock

Draw two large circles on two separate papers and slice both circles (one representing morning and the other representing afternoon) into portions to show the amount of time spent doing a particular activity in a typical 24-hour period by a typical woman/man farmer.

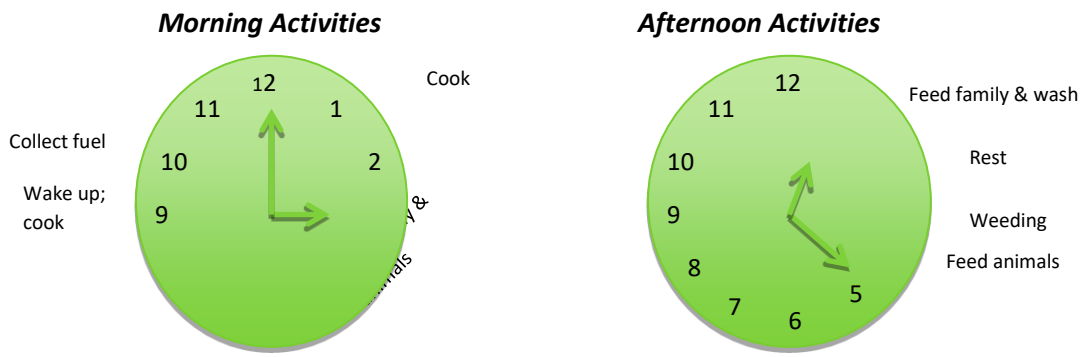


Figure 104: Sample activity clocks.

Guide on preparing the Activity Calendar

- Prepare a matrix (see sample in Table 10 below).
- Ask the participants to identify all the activities/tasks that they do on-farm, off-farm and within the household.
- Give some examples if needed.

Table 10: Sample Gender-Specific Activity Calendar.

	J	F	M	A	M	J	J	A	S	O	N	D
CROPS												
Ploughing												
Planting												
Seed Selection												
ANIMALS												
Herding												
Watering												
Milking												
HOUSEWORK												
Cooking												
Tending home garden												
Collecting NUS												
Collecting Firewood												

Feeding the Baby												
OFF-FARM												
Selling Crops												
Other Activities												

8.6.4. Activity 4: Access and control (1 hour)

- Divide the participants into two groups (one group of men and one group of women).
- Ask each group to fill in the Access and Control Profile (see
- Table ***11***).
- Ask each group to present their outputs in the plenary.
- Discuss the information generated from this activity in relation to access and control over resources:
    - Who owns the agricultural resources, i.e. land, farm equipment, etc.?
    - Who has better access to cash?
    - Who has better access to land, seeds and other inputs?
- Does the national or local culture equally support girls and boys going to school? If there are schools, are they situated close enough to settlements so as not to endanger girls on their way to and from school?
- Are extension services available? If they are, do they include women officers? Are extension workers approaching women too? How does the community respond to this? Are training programs designed with women farmers in mind? Are they offered in venues and at times accessible to women?

Note: Where women cannot own land, their chances of getting credit are nil. Without credit, whatever capital there is may not be augmented. Similarly, the hiring of labor and acquisition of tools and equipment are severely limited.

Training programs fail when the above concerns are overlooked. Note in particular that the capability to harness material resources, assuming they are available, is greatly enhanced through education and training.

Table 11: Access and Control Profile

Resources	**Access**		**Control**	
	Women	**Men**	**Women**	**Men**
Land Seeds Labour Cash Other				
Benefits				

Outside income Asset ownership (e.g. land) Basic needs (e.g. nutritional diet) Education Political power (community decision-making) Other				

Decision-making in the farmers' family

- How are decisions in the farmers' family made?
- Who has a say on what crops/varieties to plant, where to source the seeds and what to do with other assets (e.g. fertilizers)?
- Who decides on the use of proceeds from the sale of farm produce?
- Who has a say on the cultivation and use of local food plants in diets?

Note**:** Participation in all aspects and levels of activity (more importantly, decision making) in the household and in the community by all members ensures equity. It guarantees that labor is shared according to each one's capability, and that resources are allocated according to each one's needs. Likewise, it ensures that education and training are availed of equitably and that decision making is a co-responsibility.

- When the *who*, the *what*, and the *how* questions have been answered, lead the discussion on to the critique level by asking why for every major practice.
- Give particular attention to stereotypical comments, such as: "*The women do not know which varieties are good and where to source the seeds*," or "*It's insulting to men when women speak up in mixed company*."
- Summarize the comments and present to the group for validation.

8.6.5. Activity 5: Synthesis (30 minutes)

- Distribute three colors of cards. **Green** represents conditions that can be changed by the individual himself/herself. It can be implemented in the individual's own household. **Yellow** represents conditions that can be changed but would take time: consultation and consensus with community needed. **Red** represents conditions that cannot or should not change according to the farmers' views.
- Ask each participant to write down an item on a card of the appropriate color and post it on the designated board or wall. Place the green, yellow and red cards in separate columns.
- Determine whether there are common items under the green and yellow cards. Elicit opinions and insights on the *why* of each item. Reaffirm the green entries and give a strong signal that the yellow entries depend on the position of each individual.

- Document and present inputs on potential positive changes using a PowerPoint presentation or other visual medium (see 0 inclusion below for some important points to highlight).

Social inclusion (rules of the game)

Development of action plans contributes to:

- Removal of institutional barriers in order to increase the access of women, the poor and the excluded to development opportunities.
- Changes in informal practices and behaviour, as well as in formal law and policy, in favour of women and the poor and excluded.
- Structural changes in opportunities within which women and the poor and excluded effectively seek to develop and exercise their advocacy capacities.

What are the domains of change that we can support?

- Improving access to assets and services for women, the poor and excluded farmers
- Increasing their voice and influence
- Supporting changes in the "rules of the game" that have traditionally favoured the elite/advantaged

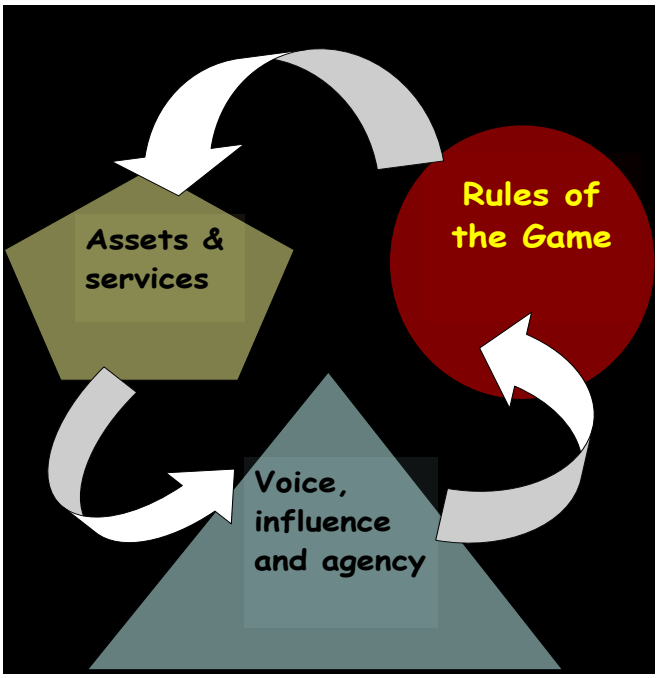


Figure 11: Rules of the game.

8.6.6. Activity 6: Lessons and actions to support women's participation in FFS (30 minutes)

- Divide the group into two men and women subgroups.
- Ask each group what they have learned about gender roles in the sessions:
  - Why is it important to be aware of gender and social inclusion?
  - What is the role of women in farming and seed management?

- What are the obstacles to women's participation in the FFS?
- What would women do differently in the FFS?

Plenary Discussions and Synthesis

- Ask each group to report and facilitate common reflections.
- Search for a consensus on how to support women's participation in the FFS.
- Ask the plenary do develop an action plan.
- Ask how and when they plan to monitor and assess action plans.

8.7. Group dynamics exercises

Introduction:

Group dynamics refer to the interactions between members of a group at any given time, which actively influence the functioning of each group individual, and the group as a whole. Group dynamics reflect interactions that influence the attitude and behaviour of people when they work in a group together. These interactions may be perceived as either accommodating, accepting or threatening. In all situations, tensions can grow within a group and between its individual members. The more rigid a person's position is towards what he or she perceives as threatening, the more tense he or she becomes. In more extreme situations, tensions can reach an explosive level and result in aggressive behaviour. A person who responds less rigidly to pressures from his or her environment is less tense and, therefore, more apt to manifest accepting behaviour.

The concepts of emotional value and tension play a significant role in the study of group dynamics. To a participant, for instance, group acceptance can be a positive emotional value and group disapproval a negative one. If a group shows characteristics attractive to a participant, the group will elicit an approaching behaviour from him or her. If the group behaves threateningly, avoidance behaviour may well result on the part of the participant.

Group dynamics exercises are meant to detect, discuss and help counter negative attitudes and perceptions resulting from group interactions between participants and facilitators during the learning process. Group dynamics activities are either games, trust exercises or initiatives that are more often used as group exercises by facilitators in the conduct of FFS sessions. According to the Philippine National IPM Program (1993) such group dynamics exercises are included in order to:

- Develop the participants into a closer knit FFS team;
- Establish a learning climate that is enjoyable as well as fruitful;
- Help participants experience and be able to identify such aspects of teamwork as mutual support, the importance of individual roles to a team's success, and behavior that can build or hinder teamwork; and
- Help participants to experience what can be accomplished by working together.

FFS Facilitators should be experienced in these group dynamics activities and make use of those activities that they feel are most appropriate in a given situation. Some examples of group dynamics exercises are provided below.

8.7.1. Group Dynamics Exercise No. 1: Drawing without Lifting of Pen

Objectives:

- To develop cohesion and cooperation among group members.

Materials required:

- Chalkboard and chalks, or newsprint and marker pens.

Description:

Divide the group of 25-30 participants into five smaller subgroups. Give each subgroup five minutes to make a group drawing of a farmer without lifting a pen. Give each participant in a subgroup one minute to contribute his/her share in the joint drawing activity. Then, give the next set of directions. This time, give each subgroup five minutes to plan together on how to come up with an illustration of a farmer in which each subgroup member would have a part in completing the drawing. Then, give each subgroup five minutes more to work on their drawings as planned. Evaluate each subgroup's drawings after five minutes. Ask the following questions:

- How did the first drawing look? How does your drawing look this second time? Why was this different?
- How did you come up with your second drawing? What attitudes or behaviours did each member exhibit? Are you happy with the result of your first drawing? Your second drawing?

The purpose of this exercise is to demonstrate that a higher quality of results can be achieved when a group thinks ahead and works together. While each group can work without a clear plan and direction, the result of their work may not be ideal. However, when each group plans cooperatively how the activity should be undertaken and each member is given a specific assignment to perform and guidelines to follow, the result is likely to be much better if not perfect.

When this exercise is most appropriate:

This game is appropriate for a group of 25-30 participants. Use this as a group dynamics exercise, an icebreaker, or a starter for sessions on planning, problem solving, leadership, community organizing or group work at any time in the FFS cycle.

8.7.2. Group Dynamics Exercise No. 2: Block of Ice

Objectives:

- To illustrate how people change when participating in a development process.

Materials required:

- Chalkboard and chalk, or newsprint and marking pens.

Description:

Draw on the board a block of ice measuring 8 cubic feet or 2' x 2' x 2' (approximately 50cm x 50cm x 50cm). Divide a group of 25-30 participants into five smaller subgroups and give each subgroup the following instructions:

- Imagine that you are given a block of ice with the above-mentioned dimensions.
- Alter the shape of the block of ice to one measuring 2' x 1' x 4'.
- Plan together how the group should go about it.
- List down the steps that the group should follow in altering the shape of the ice block**.**

When this exercise is most appropriate:

This activity is most appropriate when linked with discussions on how people react to various situations in a development process. People participating in any development activity or programme are like a block of ice: to change, they need to be opened up, 'liquefied,' moved to a new situation and made to stay in that situation of change.

8.7.3. Group Dynamics Exercise No. 3: Nine-Dot Game

Objectives:

- To be aware of the concepts, objectives and approaches of the FFS programme in reference to the problems and issues of farmers in the local community. Compare with past training experiences**.**

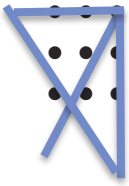
Materials required:

- Paper, tape and pens.

Description:

Draw nine dots on a flip chart, as shown below:

Ask the participants to join all of the nine dots with only four straight lines and without lifting the pen from the paper. Then ask them to share their results. The solution should look something like this:



In this game, farmers have to look outside the square (out of the box) to find the solution. Ask the farmers: Why was it difficult to find a way to do this at first? How did you overcome the problem? Discuss how this

experience relates to solving other problems (e.g. very often, before we are able solve a problem, we need to look beyond the things that we think are the problem in order to identify the real causes).

Tell the farmers that the nine dots can represent the nine most important problems of farmers in this community. Ask them to help you list them. Adapt the identified problems so that they fit into nine categories, which could for instance all begin with the same letter. Here is an example of nine categories beginning with 'P,' for inspiration:

- Plants that are neglected and forgotten (loss of diversity)
- Pests (including diseases)
- Poverty (profits are low)
- Pesticides (poisoning)
- Programmes (that are no good)
- Politicians (who do not help us)
- Public health
- Pollution
- Provision of water
- Protection of environment

Link each of the nine problems to an explanation of some of the central concepts and approaches of the FFS on nutrition and local food plants. Below are some of the ideas that could be discussed:

- In the FFS project, we explore ways to solve the problems of lack of nutrition security, disappearing knowledge and low appreciation of the value of local food plants, and traditional gender roles impacting negatively on the roles and positions of women in the community. The project is based on what community members need and want to learn; participants decide what they will do in the FFS.
- The FFS is based in the community and so looks at the real problems that are happening now. We learn by exploring these problems together as a group. By working together, we can discover how to solve problems that are too big for one person: a group can do much more than one. By becoming a strong group, we shall be able to get more support and attention from the local governments or other organizations that we may want to influence.
- The fields and the local environment are part of the community, so we also look at the effects our actions have on our fields and the environment.

The facilitator guides a participatory discussion on how the FFS project is changing the participants' current experiences and ideas of nutrition and diet, and the role of local food plants, as well as how gender roles influence nutrition security.

When the exercise is most appropriate:

Use the activity as a starter for a session on 'Concepts, Principles, Objectives and Approaches of the FFS Project.' It should assist farmers to compare their past experiences with the FFS concepts, objectives and approaches in addressing problems and issues in their own communities.

8.7.4. Group Dynamics Exercise No. 4: The Longest Line

Objectives:

- To develop an attitude of sharing and cooperation among participants.

Materials required:

- Items carried by the participants on their person (e.g. the contents of their pockets, etc.).

Description:

Divide a group of 25-30 participants into five subgroups. Give the following instructions:

- Within five minutes, make a single line out of the items found on the person of each of the group members.
- After completing the line, stand in a straight line and clap hands three times to announce that the subgroup has completed the task. The group with the longest line of items wins.

When the game ends, analyze the activity. Ask the following questions:

- What happened during the activity?
- How did each group come up with their line?
- What behaviours or attitudes did the group members show?

Explain to the team members that they can achieve successful programme or activity results when they work cooperatively, voluntarily share their efforts, resources, ideas and talents, and actively participate in all stages of the undertaking.

When the method is most appropriate:

Use it as a starter for a session on 'FFS Planning' in order to demonstrate to the farmers how to go about group activities and carry out objectives successfully.

8.7.5. Group Dynamics Exercise No. 5: Battle of Sports

Objectives:

- To demonstrate the value of planning and coordination as part of successful teamwork.

Materials required:

- Warm bodies of the participants.

Description:

Divide the group of 25-30 participants into five subgroups. Assign a different sport activity or action to each subgroup, for example:

- BASKETBALL, SHOOT
- BASEBALL, BAT

- VOLLEYBALL, TOSS
- FOOTBALL, KICK

Point to any subgroup to start the game. The subgroup should say its own assigned sport and its corresponding action thrice, before calling out the sport and the corresponding action of another subgroup it has chosen that should respond to their calling. In turn, the second, selected subgroup should say its own sport and its corresponding action thrice, before calling out the sport and the corresponding action of yet another, third group.

For example, the basketball group may say, 'BASKETBALL SHOOT, BASKETBALL SHOOT, BASKETBALL SHOOT TO FOOTBALL KICK.' The football group should answer, 'FOOTBALL KICK, FOOTBALL KICK, FOOTBALL KICK TO VOLLEYBALL TOSS,' and so on.

Eliminate any group that makes a mistake in calling out or doing the actions of the sport assigned to it. The group that is not eliminated automatically wins. Ask the winning group why they think they won over the rest (expect different answers). Ask the following questions:

- Why did your group not make any mistakes?
- How did you choose which group you were going to call out next?
- Did you have a leader?
- Did you make a plan?

Accepting all answers will encourage participants to share in the discussion as well as give them the feeling of respect. Emphasize the value of planning and coordination for successful teamwork.

When the exercise is most appropriate:

Use this as an initiating exercise in the morning or before the start of the afternoon sessions. However, use it at any time of the day when the group experiences a dip in its energy level and needs a perk-up exercise.

8.8. Curriculum evaluation

Introduction:

It is important to note that evaluation of the year's training is not a one-time activity, but rather an on-going process. However, the end of the FFS activities is an important moment to evaluate the cycle-long FFS Nutrition and Local Food Plants activities. The evaluation should consist of at least three components:

- Each FFS session should start with a review of farmers' expectations concerning the day's learning targets and finish with an evaluation using a checklist or the Ballot Box method (see below). This allows the participants to get the most out of the activities and the facilitators to learn and adapt their approaches.
- Slightly later, at the end of the FFS cycle, immediate effects of various kinds assumed to have been caused by the training activities should be evaluated. This includes the changes in know-

how, field skills and confidence of the participants that have developed between the beginning and the end of the training. Evaluation may be based on several methods, including T-Cross, Piling Up and Ballot Box methods (see below).

- Finally, it is important to evaluate the wider impact of the FFS. Farmers may have improved their knowledge, skills and attitudes (e.g. cooperation, confidence, and gender and social inclusion), but this may not resolve their major problems. Impact is perhaps the most difficult factor to measure, also since the FFS on nutrition and local food plants is not likely to produce tangible results in one or two training seasons. Thus, an evaluation on impact at the end of the first FFS cycle might only be preliminary. However, it is important to keep impact in mind as the overall goal of the training activities. To warrant a continued interest of the farmers' community in the FFS on nutrition and local food plants, the FFS activities should have an impact on one or more of the following three aspects: the farmers' awareness on nutrition and dietary quality, their food and nutrition security, their coping strategies during the food scarcity season.

Some Group Evaluation Methods:

- The ***Ballot Box*** is a method that uses multiple choice questions and field situations to test farmer's know-how and skills at the beginning and at the end of the FFS cycle. The Ballot Box can also be used to test farmers' know-how and skills at the beginning and the end of a single day. Questions should be developed before the start of the cycle, and therefore requires timely planning.
- The ***T-Chart*** is an evaluation method whereby a T-shape drawn on a large piece of paper forms two columns, one for activities deemed to be 'good' and one for activities that 'need to be improved.' All farmers write the names of activities on cards, which are then stuck to either one of the columns as appropriate. The activities that 'need to be improved' should be discussed with the aim of finding solutions to the identified weaknesses.
- In the ***Piling-Up*** evaluation method, the farmers are asked to make drawings on a large piece of paper to represent various aspects of the programme (e.g. activities from the diagnostic and review phase, implementations, discussions, etc.). Subsequently, each participant is given some seeds or coins and asked to score each activity by piling the seeds/coins on top of the drawing that represents it. Discuss the activities with the lowest scores with the aim of finding solutions for improvement of such activities, or alternatively, for their replacement by others.

9. Capacity building at the institutional level: more on the Training of Trainers

This chapter provides additional insights about capacity building at institutional level, including the role of master trainers and FFS facilitators, the preparation of the Training of Trainers (ToT) agenda, as well as the ToT and FFS facilitation (see Figure 3).

9.1. The role of master trainers

The establishment of a group of master trainers forms a prerequisite to the success of scaling-up the FFS approach. Master trainers may be selected from agriculture extension officers, farmers, and staff from NGOs and development organizations, with proven facilitation skills, knowledge on FFS on Nutrition and Local Food Plants, as well as motivation and commitment to support the work on this topic for several seasons. Master trainers are responsible for the support of the FFS facilitators assigned for the local organization and management of the FFS implementation. Trainings of trainers (ToTs) are coordinated by the master trainers and allow the generation of new master trainers.

9.2. Preparation of a FFS Field Guide

A ToT will need a draft FFS Field Guide and an agenda, to guide the learning objectives of facilitators during the ToT. The tools to guide the facilitated activities of the FFS are included in this FFS Field Guide. This Guide includes the framework and principles that guide the FFS on Nutrition and Local Food Plants. The Field Guide is not a prescription and should not be seen as a blueprint, it can be used by facilitators to use those parts of the information that are most relevant. The objective of the FFS Field Guide is to bring together information that has so far been scattered to facilitate the preparation of the FFS curriculum and to provide guidance on the process. Along these lines, this FFS Field Guide needs to be contextualized and possibly expanded during the ToT by the national partner organization and the team of master trainers under development. For instance, the FFS Field Guide may be enriched with information and activities based on the national or local baseline survey results, which will provide the general context on dietary conditions and local food plants of the community (e.g. new special topics may be added). In our expectations the FFS Field Guide may also be continuously improved after each FFS cycle based on the latest FFS experiences.

9.3. Collaborations and expert advice

In advance of the first ToT, it is necessary to reconfirm required partnerships with local institutions and individual experts in order to get all necessary scientific and/or technical knowledge that will help to prepare for FFS implementation. Experts may be invited to participate in some parts of the ToT. This preliminary action serves to establish contacts and to explore which support from experts and their institutions may be feasible. Once the research objectives have been set by the FFS communities, a more detailed exchange with experts and a more specific literature search on nutrition and local food plants

can be undertaken. This is very important, given that – at this point – traditional and scientific/technical knowledge should come together for the successful design and implementation of the FFS. To this end, the FFS facilitators – with the help of the implementing partner organization - have to build long-term relationships with the experts and local institutions that will collaborate, because their advice may also be needed later during the implementation phase.

Examples of local institutions and persons that could provide expert advice, depending on the FFS objective, are health centers, nutritionists, extension services, agronomists, chefs, gene banks and seed banks (for providing seed material), schools, universities, among others.

9.4. The Training of Trainers (ToT)

A one-week to two-weeks introductory ToT marks the start of the FFS implementation. Ideally, a ToT should consist of 25 participants/trainees. The number should not be less than 20 (to maximize the use of resources), and not more than 30 (to make the learning processes easier). Master trainers will assist in all initial ToTs, with experts acting as resource persons.

The ToT approach is to facilitate the learning of the participants based on their own knowledge and experiences, using new information from resource persons, and guided by the master trainers and the FFS Field Guide.

The ToT should inspire and build the motivation of the facilitators and should discuss aspects of monitoring, support, reporting and quality control (especially “rewards – recognition” is important).

During the ToT, the master trainers will follow the FFS Field Guide, that has been developed for that purpose. The Field Guide (in its original or adjusted version) will later be used by FFS facilitators and FFS participants (the ToT is a mirror of the FFS).

The introductory ToT is also the mechanism by which the methodological framework, principles and general approaches are adapted (improved, revised) to conform to the specific conditions in a country. For that purpose, the trainees during the ToT should provide feedback on the draft FFS Field Guide. The ToT shall end with a plan of work of six months approximately, containing an overview of the planned set of FFS, the facilitators allotted to these, and any further specific plans for individual FFS.

9.4.1. The ToT agenda

The ToT should have an agenda (see Table 12 by way of example), which explains how the content of the FFS Field Guide will be discussed during the ToT to ensure adequate learning. The ToT covers the following:

1. The basic concepts of Nutrition, Local Food Plants, and gender;
2. Qualities of good facilitation, principles of adult learning for FFS;
3. FFS organization and management;
4. Requirements for the diagnostic stage;

5. FFS curriculum design;
6. FFS activity implementation;
7. FFS reporting and documentation; and
8. FFS evaluation and planning for the next FFS.

A single ToT cannot cover all topics presented in this draft FFS Field Guide. Similarly, a particular FFS should not deal with all topics presented in the Guide; FFS participants (with the support of their facilitators) should make their own choices from the FFS Field Guide, that offers a basket of options.

The TOT agenda will only be finalised at the start of the ToT by the participants. Each day will end with a short evaluation of the working day and preparation for the next day by a small management group of 3 to 5 persons. The last day (or half day) might be kept as a reserve, to use it for any additional topics or for topics that need more elaboration, which topics may be decided in the course of the ToT.

Table 122: Example of draft ToT agenda, FFS Nutrition and Local Food Plants (the numbers indicate the chapter or sub-chapter where the information is found in this Field Guide).

	Monday ***Introduction***	**Tuesday** ***Diagnosis***	**Wednesday** ***Implementation***	**Thursday** ***Implementation***	**Friday** ***Planning***	**Saturday** ***Reserve***
Morning						
8.45 - 09.00		Recap	Recap	Recap	Recap	Recap
9.00 - 10.00	9.4.2. Opening Welcome Programme overview ToT agenda Local situation briefing	5.1 Malnutrition problem tree	5.4 Timeline analysis (local food plants)	5.4 Timeline analysis (nutrition)	6. Curriculum preparation	7.1.5. Vegetative propagation
10.00 - 11.00	Introduction of participants 4.1.6. Subgroup formation 4.1.7. Setting of rules	5.3 Local food plant list	5.7. Management and domestication	5.2 Intra-household food distribution	3./4. FFS planning	7.1.8. Seed fairs and food fairs
11.00 - 11.30	Coffee break					
11.30 - 12.30	1.1./9.4.3. FFS empowerment approach	5.5 Resource flow map	7.1.1. Sowing local food plants	7.1.6. Food preservation	9.5.1. Reporting and documentation	8.1. Nutrition and food diagram exercise
Afternoon						
13.30 - 14.30	1.2. Introductions on nutrition	5.6. Seasonal calendar	7.1.2. Harvesting wild food plants	7.1.7. Food preparation and cooking	Reflections on gender and youth	8.2. Maternal and child nutrition
14.30 - 15.30	1.3. Introductions on local food plants	5.8 Importance and bottlenecks	7.1.3. Seed storage	7.1.9. Home gardens	8.8. FFS evaluation	8.3. WASH
15.30 - 16.00	Coffee break					
16.00 - 17.00	Report on baseline surveys	5.9 FFS research objectives	7.1.4. Seed germination	7.1.10. Creating school gardens	Continued	To be filled in later

9.4.2. How to start the ToT

The start of the ToT is important as it should set a "happy atmosphere, with purpose and discipline". The ToT should start with a short welcome or opening speech followed by an overview of the SD=HS programme. Then, the programme would allow for a short introduction of the ToT agenda explaining

what will be addressed during the next days, followed by a briefing of the local situation in the project area (i.e. agro-ecological conditions, major crops, nutritional status, socio-economic conditions, other projects, previous exposure to FFS).

Before the introduction of participants, a group dynamic exercise can be used to "break the ice" to set a relaxed but serious atmosphere. The most simple and funny way is for each participant to introduce another participant. For example, such introduction may involve sharing of what makes a participant happy.

Most ToT sessions will be in the form of small working groups followed by back-to-plenary reports and discussions. Therefore, once all participants have been introduced, they could be organized in subgroups of five to six persons each (please see section 4.1.6. for more information on subgroup formation). The small groups are the organizational heart of the ToT as well as of the FFS, with the following objectives:

- to facilitate the active participation of all participants
- to practice collective discussion and decision making
- to allow the assignment of tasks and responsibilities to be shouldered by each subgroup
- to build team spirit (identity, belonging, positive competition among sub-groups, among others).

Subgroups may be formed at random, e.g. by participants counting from 1 to 5 and groups formed according to these numbers; or consciously composed to ensure a proper combination of capacities in each subgroup, e.g. both literate and non-literate farmers, or female-only and male-only groups. Given than gender and youth are main transversal topics within the SD=HS programme, it is also possible to organize sub-groups during the ToT in a way that each participant becomes aware of the effects of gender and youth in communication, views and decision-making. To that end, participants could be segregated in different types of subgroups, for instance, separating adults from youth, separating men from women, mixed groups including both men and women, separating adult and young women, separating adult and young men (each day a different segregation criteria). The last day of the ToT, the participants will reflect on which types of subgroups they felt more/less comfortable with for sharing their ideas and opinions, followed by a general reflection on the role of gender and youth.

The tasks and responsibilities of each person in a subgroup should be discussed. Then, the expectations of the ToT may be discussed and agreed upon in subgroups, and shared in plenary. These expectations should be written on a big sheet of paper that will hang on the wall of the ToT workshop venue for the entire duration of the ToT, or otherwise kept for later reference. Finally, the rules of the ToT group will be set, first discussing in subgroups and then agreeing in plenary (please see section 4.1.7. for more information on setting rules and regulations).

9.4.3. Introduction to principles of adult learning in FFS

This section is to be used in the ToT only. This section starts by explaining the experiential learning theory and how it is expressed in the FFS activities. It highlights the suitability of this approach for the FFS: as

with all adults, farmers' knowledge is by nature experiential, and therefore the experiential learning methodology is best suited to support farmers' experiments, observations, decisions and practices in issues of food and nutrition and in the management of local food plants.

The FFS is an experiential approach consistent with formal and non-formal adult education. It begins and builds on farmers' local and/or traditional knowledge, and further supports farmers' learning processes. The FFS is used as a participatory and interactive learning and community-based approach. Consistent with the experiential learning cycle, experience has the central role in the learning process: facts (concrete experience) are the basis for observation and reflection, and findings (abstract concepts) are transformed into experimentation and further actions. The FFS allows farmers to experiment, observe and analyze the outcomes, which are the basis of farmer's decisions and actions. New and/or additional knowledge is produced through transformation of experience.

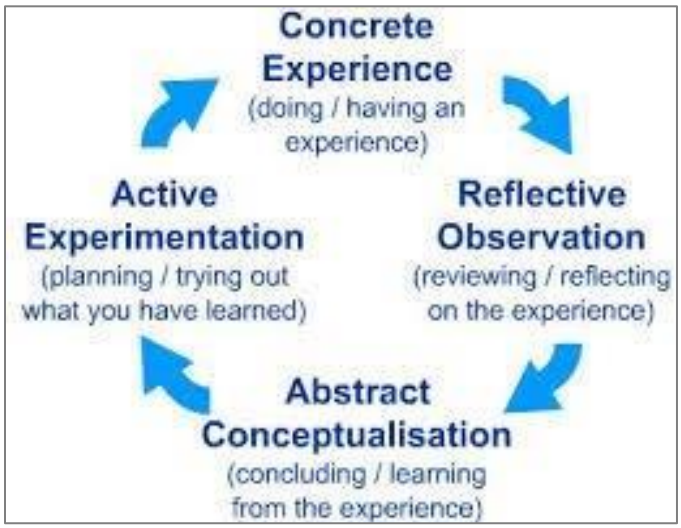


Figure 12: Kolb's learning styles.

Through experiments based on new ideas or existing farmer practices, experiential learning, and FFS group discussions, farmers are assisted to collectively identify solutions to their local challenges. In addition to enabling farmers to adapt their food patterns and use of local food plants to combat malnutrition, farmers' participation in the FFS also has the potential to increase their awareness of their rights, improve their negotiating power and, ideally, lead to the establishment of farmers' networks. Critical analysis (i.e. reflection, which is part of Kolb's learning cycle and of the FFS, and which turns experience into learning), the FFS activities (which include analytical actions through group presentations), and the role played by the facilitator, are all contributions to the enhancement of farmers' analytical skills.

The FFS enables activities that:

- link decisions with consequences;
- create knowledge;
- bring different stakeholders together;

- encourage improved communication and understanding (of problems and solutions) between participants;
- offer tools to handle local issues (such as climate change adaptation, empowerment of farmers and, in particular, women); and
- allow collaboration with scientists (through on-farm experimentation on cultivating local food plants, development of recipes and the use of local knowledge for seed harvesting and preparation for seeding).

Kolb's learning cycle can be seen as imbedded in the FFS: experimentation carried out allows sufficient time for farmer-to-farmer, peer-reviewed decisions and activities, and thus applies and reflects the experiential learning cycle. Participants identify an area of interest (identification and improved use of priority local food plants) and build a project around it (the program of the FFS curriculum). The content is delivered in a way that helps participants to transfer learning outcomes to other farmers. The diagnostic phase, including the preparatory surveys described in chapter 5 form the basis for the planning of experimentation (management of local food plants, preparation of dishes, addressing gender roles) in the cycle-long FFS. The FFS also enhances group building and increases farmers' knowledge, enabling them to improve nutrition and the use of local food plants under changing conditions. Communication is an integral component of the FFS: trained farmers are expected to become local agents and FFS facilitators who share knowledge and train other farmers. This proves to be beneficial to the farming community as a whole due to its capacity-building functions. For farmers, more interactive forms of curriculum activities result in better learning results and knowledge has to be explored in a so-named 'safe environment.'

Empowerment is seen as a process of social transformation and encompasses individual, institutional and structural levels. Participation in the FFS should thus be seen as a strategic, methodological goal of development. Through FFS, both men and women (with increased knowledge and development of critical thinking) acquire the 'power within' (increased self-esteem and confidence), the 'power to' (improved livelihoods) and the 'power with' (the set-up of farmers' networks and increased ability for collective action).

Empowerment through increased knowledge and engagement with diverse stakeholders can help farmers to be better equipped to cope with other societal and environmental changes.

The FFS is also an important instrument for scaling up. Scaling-up pathways describe how program outputs can be used within and outside program coverage in such a way that the impact on social, environmental and/or economic conditions is enhanced. In other words, such pathways describe how impact can be spread.

9.5. Facilitation of the first FFS series

The participants / trainees of the ToT should ideally group themselves into teams of two; and each team should organize and facilitate one or more FFS. In this way, the two facilitators (ToT graduates) can easily provide feedback and support to each other.

During the first FFS cycle the FFS curricula will be designed with the help of the FFS Field Guide, following the recommendations of the FFS Field Guide when relevant, to guide the FFS activities. It is in the actual management and facilitation of the FFS that true training occurs.

Farmers will be encouraged to choose FFS activities among these having guidelines in the FFS Guide, but if they would like to carry out other FFS activities, these should be added to the FFS Guide by the facilitator if they have a direct relation with improving the quality of the diet, or reducing the food scarcity season based on local food plants (general objective of the FFS). The team in Oxfam Novib will provide support in further developing the guidelines for such activities, given that the FFS Guide is a dynamic document in continuous preparation.

9.5.1. Reporting and documentation

An important aspect to take into account during the implementation phase is proper reporting and documentation. The FFS facilitators have to define the internal outlines and requirements for reporting and documentation of FFS activities, showing what were the weekly activities conducted by each FFS, which data they have been collecting, which were their results, which were the main challenges and difficulties the participants faced, and which appeared to be additional needs (for expert advice, materials).

The flow of information should be bi-directional: from FFS groups to FFS trainers, field staff and partner organizations (e.g. information on the activities, data and results of the activities), and *vice versa* (e.g. data analysis, feedback, advice on how to resolve main difficulties). It is also essential that the flow of information is timely and accurate. To that end, structured reporting templates and matrixes have been developed for the diagnostic phase, FFS implementation and evaluation according to the type of FFS intervention, and these could be edited to be easily understood and handled by facilitators (see Annexes 1 and 2).

9.6. The first FFS cycle concluding workshop

The FFS facilitators (ToT graduates) should reconvene when the first FFS cycle has been finished to share lessons and to improve the FFS Field Guide. It is at this stage that the facilitators of the previous ToT actually “graduate” or complete their training, and a selected group of these facilitators may become new master trainers. A core of human resources for FFS on Nutrition and Local Food Plants is thereby built, and the FFS Field Guide is continuously improved.

It is also at this stage that model farmers and FFS participants (and possibly other staff members of development institutions or extension services) from the FFSs are selected to qualify for participation in a next ToT, the clustered ToT (see 9.7.).

9.7. The clustered ToT

A clustered ToT (3-4 days) is a light-version of the ToT led jointly by two master trainers and with participation of model FFS participants (identified during FFS concluding workshop, see 9.6. above) coming from several (neighboring) districts. The master trainers together lead the full set of all clustered ToTs. The clustered ToT is shorter, given that most participants/trainees already experienced the FFS cycle. Hence their knowledge and experiences are well grounded in the actual FFS work. Topics of the clustered ToT are similar to the introductory ToT. Prior to the clustered ToT, a one-day preparatory meeting amongst the master trainers may be useful.

The concept of a clustered ToT has shown to be effective in consolidating the capacities of the master trainers, especially in strengthening their organization and planning skills. The process may increase the number of FFS facilitators, especially through the greater number of model farmers/FFS participants who may become FFS facilitators. The strength and number of advanced farmer facilitators will ensure the long-term sustainability of the FFS approach.

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11. Annexes

Annex 1. Reporting templates for Diagnostic Phase exercises

These reporting forms aim at documenting the results of the diagnostic exercises of the Farmer Field School (FFS) on Nutrition and Local Food Plants. The documentation of the diagnostic phase results is important because:

- Each FFS can always go back to the outcomes of their discussions, to revise their research objectives at the beginning of each FFS cycle.
- The documentation of the results is also the documentation of the community traditional knowledge on local food plants; as such, the documentation could serve as the basis for the preparation of an internal FFS / community report (or other kind of material) to be shared within the community, particularly with the youth and children, which would also be available for coming generations.
- This documentation could also be used for sharing traditional knowledge across FFS and communities from the same agro-ecological region.
- The information (compiled from different FFS groups) could be used by country partners for the preparation of technical or policy briefs, useful for broader stakeholder involvement and policy advocacy at national level.
- The information (when compared across countries) could be used by Oxfam Novib together with country organizations, for the preparation of policy briefs useful for policy advocacy at global level.

The results should be filled-in for each FFS separately. The matrixes aim at capturing the most important information product from the exercises, but country partners could always include additional items or topics that have not been included in the forms.

The information will be collected by FFS facilitators, and the forms will be filled in and managed by staff from country partner organizations. The results will be continuously monitored and analysed with the support of Oxfam Novib.

Malnutrition problem tree exercise

Question	Answer
What are the leading causes of malnutrition perceived by farmers?	
What are the consequences of malnutrition perceived by farmers ?	
What are the possible solutions to malnutrition as perceived by farmers?	

Decision making with respect to intra-household food distribution

Question	Options	Answer
Who decides what to eat in the household?	*(1= Father, 2= Mother, 3= Children, 99= Other, please specify)* [multiple options allowed]	
Who are the most powerful household members in terms of access to food?	*(1= Father, 2= Mother, 3= Children, 99= Other, please specify)* [multiple options allowed]	
Who are the least powerful household members in terms of access to food?	*(1= Father, 2= Mother, 3= Children, 99= Other, please specify)* [multiple options allowed]	

Preparation of the local food plant list

List the names of the 25-30 local food plants selected

Timeline analysis of local food plants and nutrition

Question	Options	Answer
Has the consumption of local food plants in the village changed in the last 30 years?	(*1=Decreased, 2=Increased, 3=Remained the same)*	
What were the major factors that affected the consumption of local food plants?	[enter text]	
Has the nutrition in the village changed in the last 30 years?	(*1=Decreased, 2=Increased, 3=Remained the same)*	
What were the major factors that affected the nutritional status of the households?	[enter text]	

Resource flow map for local food plants

Question:	Plant name	Where is it found?	Who harvests or gathers it?	Edible part(s)	Seasonal availability	Perceived nutritional and medicinal values	Are people reluctant to eat it? If yes, why?	Stress-tolerance qualities
Options:	[write local name]	*(1= Home garden, 2=Agricultural field, 3= Forest, 4= Water bodies (e.g. in lakes, water ponds), 5= Riverside or around water bodies, 6= Roadsides, 7= Swamps or wetlands, 8= Around livestock enclosures, 99=Other, please specify)* [multiple options allowed]	*(1= Men, 2= Women, 3= Children, 99=Other)* [multiple options allowed]	*(1= Roots/tubers, 2= Stem, 3= Leaves, 4= Flower, 5= Fruits, 6= Shoots, 7= Seed, 8= Stalk of flower, 9= Whole aerial parts, 99=Other, please specify)* [multiple options allowed]	*(1= All year, 2= Rainy season, 3= Dry season, 99=Other, please specify)*	*(1= Nutritional value, 2= Medicinal value, 3= None)* [multiple options allowed] [indicate the nutritional or medicinal properties]	*(1= Yes, 2= No)* [explain why]	*(1= Flood-tolerant, 2= Drought-tolerant, 3= Pest and/or disease resistant, 99= Other, please specify)* [multiple options allowed]

(to be filled in for all 25-30 local food plants selected by the FFS team)

Seasonal calendar and coping strategies

PART 1: Food scarcity season

Question	Answer
Which months correspond to the food scarcity season?	
What characterises the food scarcity season?	

PART 2:

Question:	What strategies do you adopt to cope with food scarcity?	What is the severity of each coping strategy?
Options:	[write strategies below]	*(1= Low, 2= Moderate, 3= High, 4= Don't Know.)*

PART 3: Local food plants during food scarcity

List of plants available during the food scarcity season

List of plants that are possible to preserve to make them available during the food scarcity period

Management and domestication of local food plants

PART 1: Definitions

Question	Answer
What are the definitions of "wild"?	
What are the definitions of "domesticated"?	

PART 2: Management practices

Question:	Plant name	Level of domestication	Management practices	In which environment does the management practice(s) take place?	Only for species that are transplanted, where do you acquire the seeds/planting material?	Management problems
Options:	[write the names below]	*(1= Truly wild, 2= Wild and managed (semi-domesticated), 3= Domesticated)*	*(1=Transplanting, 2=Protection, 3=Watering, 4=Fertilizing, 5=Weeding, 6=Pruning, 7=Mulching, 8=Absence of management, 99=Other, plesae specify)* [multiple options allowed]	*(1= Home garden, 2= Agricultural field, 3= Forest, 4= Water bodies (inside lake, water pond), 5=Riverside or around water bodies, 6= Roadsides, 7=Swamps or wetlands, 8=Around livestock enclosures, 99= Others)* [multiple options allowed]	*(1= Home garden, 2= Agricultural field, 3= Forest, 4= Water bodies (inside lake, water pond), 5=Riverside or around water bodies, 6= Roadsides, 7=Swamps or wetlands, 8=Around livestock enclosures, 9=Market, 10=Seed fairs, 11=Government aid, 99= Others, please specify)* [multiple options allowed]	[enter text]

(to be filled in for all 25-30 local food plants selected by the FFS team)

Identification of importance and bottlenecks for the use of local food plants

Question:	Plant name	Importance	Bottlenecks
Answer:			

(to be filled in for all 25-30 local food plants selected by the FFS team)

Setting FFS research objectives

Question:	Research objectives	FFS activities from the Field Guide that will be implemented	Plant name(s)
Options:	[write them below]	*(1=Sowing local food plants, 2=Harvesting wild food plants, 3=Seed storage, 4=Seed germination and breaking seed dormancy, 5=Food preservation, 6=Food preparation and cooking demonstrations, 7=Seed fairs and food fairs, 8=Creating school gardens, 99=Other activities not present in the Field Guide, please specify)* [multiple options allowed]	[if applicable]
Answer:			

Annex 2. Documentation template for FFS activity implementation and evaluation

[to be included]