

Agrobiodiversity strategies

to combat food insecurity and HIV/AIDS impact

in rural Africa

Advancing grassroots responses for nutrition, health and sustainable livelihoods

Josep A. Garí



Population and Development Service

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This strategy paper has been developed in the framework of the FAO Population and Development Service (SDWP), under the support and lead of Marcela Villarreal (SDWP Chief). The paper aims at stimulating grassroots action for household food, nutrition and livelihood security in rural Africa, placing special emphasis on the evolving needs owing to the HIV/AIDS crisis. For the elaboration of the proposed strategies, the author carried out a specific FAO field mission to Uganda and Tanzania, as well as supplementary fieldwork in Ethiopia and Mali, in September-December 2001.

The ideas expressed in this paper do not necessarily reflect any official view of FAO. They can, and should be freely used and diffused, provided the source is acknowledged and the collective rights of African rural communities over their genetic resources and indigenous knowledge are fully respected.

The photographs were taken by the author in 2001 with the full consent of local people.

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Cover photo: Farmers displaying diverse local crops and foods in Iringa-Mvumi village, central Tanzania

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NOTE: For rapid appraisal of these agrobiodiversity strategies, it is recommended to start reading the following sections: abstract, field leaflet, conclusions and epilogue. Chapters 1-2 address the conceptual aspects. Chapters 3-9 examine the proposed strategic components, including field information and recommended actions.

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Josep A. Garí

ABSTRACT

In Sub-Saharan Africa, food insecurity and the HIV/AIDS crisis represent priority issues for agricultural and rural development. They are mutually aggravating phenomena that pose heavy and increasing pressures on the livelihoods and lives of poor rural people. In the first place, food insecurity and malnutrition continue distressing millions of rural people, urgently demanding more tangible and better targeted actions. In addition, the HIV/AIDS epidemic is undermining the labour and economic foundations of poor rural households, therefore aggravating their food insecurity, deepening their poverty, and limiting their coping capacities. The AIDS epidemic is also dislocating social reproduction systems, such as the transmission of indigenous and local knowledge around agriculture. Moreover, the absence of an ecological rationale in agricultural and rural development further erodes the prospects of sustainable agriculture and food production. Consequently, the agricultural sector needs to explore and deploy suitable and timely responses that genuinely combat food insecurity and the manifold impacts of HIV/AIDS in poor rural households, whilst stimulating a transition towards sustainable rural livelihoods. However, most existing agricultural development policies and programmes are inadequate to address these critical challenges. At this impasse, agrobiodiversity and the associated indigenous knowledge represent grassroots resources with potential in strengthening the entire agriculture-food-nutrition-health structure in poor rural communities.

On the basis of participatory field research conducted in different rural areas of Sub-Saharan Africa, this paper reveals that agrobiodiversity and the associated indigenous knowledge are relevant forces to combat food insecurity and the HIV/AIDS crisis. In particular, this paper proposes and examines the following strategic components: (i) traditional, neglected and under-utilised crops; (ii) agricultural diversification; (iii) home gardens; (iv) wild food plants; (v) medicinal plants; (vi) community seed systems; and (vii) livestock and agropastoral systems. The mobilisation and development of these agrobiodiversity components would expand the options, opportunities and means available at the rural grassroots level to improve nutrition, cope with labour constraints, safeguard the household economic security, and enhance sustainable agriculture.

The maintenance of agrobiodiversity resources and the transmission of indigenous knowledge are, however, under continuing neglect and erosion. Modern development processes have not only disregarded such agricultural assets, but have also disrupted their roles and potential in rural communities. HIV/AIDS further accelerates this tendency because this epidemic disrupts intergenerational relations and social reproduction systems. In this sense, the loss of agrobiodiversity and indigenous knowledge impairs the agricultural prospects of rural youth and children, undermining rural reconstruction and development in Africa. Consequently, efforts devoted to the

maintenance, promotion, use and improvement of agrobiodiversity and indigenous knowledge will empower rural people to combat malnutrition, to address the evolving circumstances owing to HIV/AIDS, and to craft sustainable livelihoods. That requires to simultaneously supporting agroecological approaches, gender equality and community mobilisation in the whole agricultural development process.

In essence, agrobiodiversity represents locally available and affordable resources with untapped potential in grassroots strategies for advancing food security and mitigating HIV/AIDS impact. In the first place, agrobiodiversity has a direct role in nutrition, which is crucial in the control of HIV infection and the alleviation of AIDS-related health problems. Therefore, the optimal use of local plant, crop and food resources offers inexpensive and effective options for diversifying the diets, improving nutrition and enhancing healthcare. Furthermore, the conservation and comprehensive use of agrobiodiversity can provide every household with broader and practical options to plan their agricultural activities according to their specific labour, economic and environmental constraints. In this sense, appropriate access to, and use of agrobiodiversity represent a suitable means to cope with labour scarcity, to design agricultural systems that are economically responsive, to manage environmental risks, to deal with land shortages, to support the roles of women in agriculture and nutrition, to explore income alternatives, and to incorporate marginal lands into food production. Finally, agrobiodiversity and indigenous knowledge are indispensable ingredients in agroecological approaches to agriculture. In particular, the proposed strategic components will provide rural people with greater capacity to enhance the social and ecological sustainability of agriculture, carrying out actions that increase the resilience of agroecosystems, conserve natural resources, support agricultural experimentation, build community seed security, foster *in situ* transmission of agricultural knowledge, and maintain the basis for rural reconstruction, among others.

In conclusion, this paper calls for agricultural policy and programme responses towards the mobilisation and development of the greatest agricultural assets of rural communities in Africa: agrobiodiversity and indigenous knowledge. The proposed strategies challenge the entire agricultural development sector: from crop research programmes to agriculture and food policies, and from rural development projects to agricultural extension services. They also renovate the action horizon of rural grassroots initiatives, such as farmer field schools, nutrition projects, local HIV/AIDS committees, and women's associations. Although biodiversity and indigenous knowledge alone are insufficient to eradicate food insecurity and the HIV/AIDS impact, they constitute a privileged basis to empower rural communities to confront their most pressing needs in nutrition, healthcare, and for sustainable livelihoods. These agrobiodiversity strategies, even if apparently simple and unpretentious, are more crucial in view of the intensification of poverty, social exclusion, environmental disruption, and the HIV/AIDS crisis throughout rural Africa.

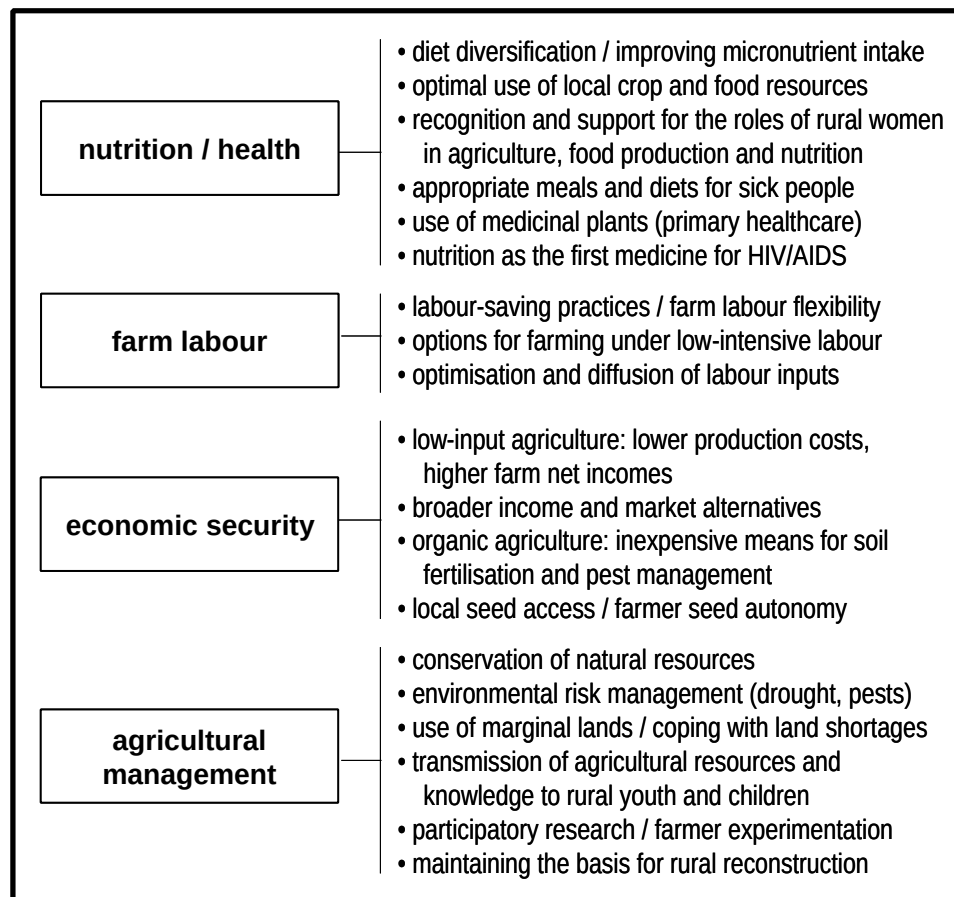
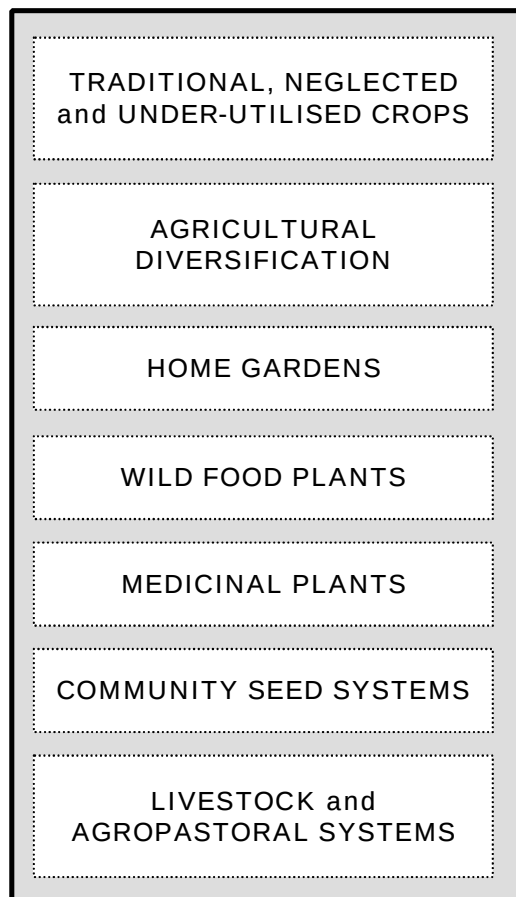


Agro-biodiversity strategies

to combat food insecurity and HIV/AIDS impact in rural Africa

English.1

strategic components



objectives

FIELD LEAFLET

-
- agroecological approaches
 - gender equality
 - community mobilisation

Source: Josep A. Garí / SDWP / FAO (2003)

Glossary

These are working definitions for the purpose of this paper. "AIDS" is often used as equivalent to "HIV/AIDS", rather denoting the whole health, human and development effects of this epidemic.

Food security. The state in which all people have an autonomous and regular access to food in sufficient amounts, under safe conditions, with the adequate nutritional quality, and in due regard for their legitimate cultural values and food preferences. In rural areas, local food security also entails sustainable agricultural and environmental means for food production as necessary factors for a genuine and enduring food security. -- *From box 2.*

HIV/AIDS. "Human Immunodeficiency Virus / Acquired Immune Deficiency Syndrome." It is a global epidemic disease that erupted and spread worldwide in the late 20th century, hitting hardest and most dramatically in Sub-Saharan Africa. HIV damages the human immune system and causes irreversible health deterioration. To present there is no effective vaccine to prevent the infection or health effects of this virus, but there are drug treatments that can slow down or stop the progression of the disease for some years. This epidemic has a devastating health, human and development impact, particularly among poor people and developing nations that cannot access the existing treatments due to poverty, economic inequality and legal barriers. In fact, HIV/AIDS can be considered the first disease of the globalisation process because the pattern of epidemic expansion and the scale of development impact reveal global inequalities. It is the only disease that has forced the creation of a specific United Nations agency. -- *Adapted from Barnett and Whiteside (2002) and Garí (2003).*

People living with HIV/AIDS. Persons that are infected with HIV.

AIDS impact. The health, socio-economic and development effects of the AIDS epidemic on people, households and communities.

AIDS affected households. Households that are affected by the AIDS impact in diverse ways: for instance, households that have members living with HIV/AIDS, households that have lost productive force due to AIDS, female-headed households due to HIV/AIDS, households that foster AIDS orphans, and orphan-headed households due to HIV/AIDS.

Agrobiodiversity. The different biological resources that sustain agriculture and food production, such as particularly crops, crop varieties, useful plants and farm animals.

Indigenous knowledge. The wealth of information, experiences, practices and wisdom that rural people and communities produce and reproduce locally, more typically in the domains of agriculture, the environment and the use of local resources.

Agroecology / agroecological approaches. The science and practice that provides ecological principles and socio-cultural perspectives to the design and management of sustainable agricultural systems. -- *Adapted from Altieri (1995).*

Labour stress. Failure of people or households to attend their essential tasks and responsibilities due to losses in labour force or increasing duties that require additional time and efforts. In rural societies, labour stress results from the inability of people and households to attend their basic farm, off-farm and domestic responsibilities, which impair their food security, livelihood and quality of life. AIDS is a major cause of labour stress due to the cumulative sickness and death of productive adults (which results in important labour losses) and the incessant need to divert time and efforts to care for the sick and AIDS orphans.

Economic security. The state in which people and households have financial capacity to attend their most basic needs, as well as ability to manage their productive and living activities in ways that safeguard their economic base.

Seed security. The state in which farmers have access to sufficient amounts of viable seed to conduct their farming practices, with due regard to the diversity of crop genetic resources that they need for food security and they prefer for cultural reasons. -- *From chapter 8.*

"Intercropping assists me very much."

- Robina Nabwire, widow farmer, household head, and chairwoman of "Enjala Siyita" Farmer Field School. Nabulamu village, Busia, Uganda, December 2001.

"Nutrition is the first medicine for HIV/AIDS."

- Florence Ayupo-Elimu, coordinator of Teso AIDS Project. Soroti, Uganda, November 2001.



A community nutrition leader displaying local foods:
"a balanced diet from our local environment"
(Agoriata village, eastern Uganda).

1. INTRODUCTION



Woman husking fonio
near to River Niger (Mali).

The scale of food insecurity and HIV/AIDS impact in Africa

In Sub-Saharan Africa, food insecurity and HIV/AIDS impact represent priority issues for agricultural and rural development. They are interrelated and mutually aggravating phenomena that heavily affect the rural poor. Poverty, social exclusion and wrong development policies and programmes are primary causes of both food insecurity and the scale of HIV/AIDS crisis.

In Sub-Saharan Africa, food insecurity has become chronic and widespread. It is the region with the world's greatest depth of hunger and malnutrition. Food insecurity and malnutrition affect about 200 million people, and over 40% of the population in Central, East and Southern Africa (FAO, 2002). In late 2001, 15 countries in this region were facing "exceptional food emergencies" (FAO/GIEWS, 2001). In more than half of African countries, hunger is even increasing (FAO, 2002). Rural people, which represents about 70% of the total population in most African countries, are typically the most severely affected because of the extent of poverty, vulnerability and exclusion they suffer. Leading causes of food insecurity and malnutrition in Africa comprise poverty, war, global socio-economic inequalities, environmental constraints, faulty national and international policies, persistent exclusion and, most recently, the HIV/AIDS epidemic.

Since the late 20th century, the HIV/AIDS epidemic has virulently expanded and impacted throughout Sub-Saharan Africa, further aggravating poverty and food insecurity. Data currently available illustrates the scale of the epidemic and suggests a severe development impact: Sub-Saharan Africa has over 28 million people living with HIV/AIDS (about 70% of world's HIV-infected population), 80% of affected children world-wide, about 2.5 million dead people annually, an average adult prevalence rate of 9% (exceeding 15% in about 8 countries), and over 12 million orphans left (UNAIDS, 2000; UNAIDS, 2001). Among the poor, the scale of the epidemic causes a severe development crisis because it depletes their labour capacities and economic resources in a cumulative pace. Therefore HIV/AIDS is not just a public health issue, but also a serious development concern.

In rural areas, this epidemic is rapidly disrupting agricultural dynamics, aggravating food insecurity, impoverishing people, and dislocating entire communities (Barnett and Whiteside, 2002; FAO, 1995; FAO, 1997b; FAO, 2001b; Mutangadura *et al.*, 1998). It poses a serious development impact on the rural poor, not only on infected people (those living with, and suffering the disease), but also on a wide range of affected people (such as households with infected people, female-headed households owing to AIDS, AIDS orphans, households fostering AIDS orphans, and to some extent entire communities with high prevalence rates). The expansion and impact of HIV/AIDS intermingle with poverty, food insecurity and uneven development, revealing that the HIV/AIDS crisis is significantly a result of the tremendous inequalities of the globalisation process (Barnett and Whiteside, 2002). In addition, HIV/AIDS is already merging with natural and social crises, such as drought and civil strife, and creating complex humanitarian emergencies (Garí, 2001b).

The HIV/AIDS epidemic arrests the development prospects of the African rural poor and washes away development efforts for the last decades. It thus represents a new wave of poverty, destitution and human despair. Overall, food insecurity and the HIV/AIDS crisis represent a formidable socio-economic, development and emotional burden. They are mutually related problems that are reshaping the borders between poverty and destitution, between life and death, and between hope and despair.

The agricultural sector's response

The depth of food insecurity and the scale of HIV/AIDS crisis demand an urgent redefinition of priorities and strategic actions in the agricultural and rural development agenda in Africa, placing special emphasis on the conditions of poor rural people. The agricultural sector has a major role to play, especially as food insecurity and HIV/AIDS concur and mutually aggravate. A number of studies and research projects conducted during the 1990s have illustrated the severe impact of HIV/AIDS on agriculture and food security in rural Africa (e.g. FAO, 1995; FAO, 1997b; Matanyaire, 1999; Mutangadura *et al.*, 1998; White and Robinson, 2000). Accordingly, development agencies and the international community have become increasingly sentient to these evolving scenarios in the rural world (FAO, 2001b; IFAD, 2001; IFPRI, 2002). In particular, FAO is increasingly addressing HIV/AIDS in relation to food security and rural development.

After more than a decade producing studies and diagnostic analysis on the impact of HIV/AIDS on food security and rural development, FAO is currently developing an agricultural sector strategy to HIV/AIDS (Villarreal, 2002). The three main agencies of the United Nations dealing with food and agriculture are joining efforts to explore and deploy adequate responses in the interface between food security and HIV/AIDS (e.g. FAO, IFAD and WFP hold a specific international technical meeting in Rome in December 2001 on this topic). Guidelines for nutrition among people living with HIV/AIDS and for integrating HIV/AIDS concerns in agricultural emergency interventions have been also produced (FAO/WHO, 2002; Garí, 2001b).

The present paper proposes to contribute to the agricultural sector strategy to HIV/AIDS, specifically exploring grassroots responses that address food insecurity and the HIV/AIDS crisis among the rural poor in an integrated manner (Garí, 2002; Garí and Villarreal, 2002). It focuses on agrobiodiversity and indigenous knowledge because these are grassroots assets with potential to empower the rural poor in their struggle for eradicating food insecurity, improving nutrition, mitigating the HIV/AIDS crisis, and launching sustainable rural livelihoods.

The formulation and deployment of adequate responses to address food insecurity and the HIV/AIDS crisis require the identification of priorities. Accordingly, this strategy paper starts with an analysis on food insecurity and the scale of HIV/AIDS impact that serves to define priority issues for the agricultural sector (chapter 2). This analysis places emphasis on the grassroots scenario, aiming at identifying responses that: (i) are meaningful, appropriate and effective at the community and household levels; and (ii) incorporate the rural poor are both subjects and beneficiaries of the development process. In harmony with this grassroots approach, the paper will accordingly focus on the optimal use of the resources, knowledge and capacities of rural people themselves. In this sense, agrobiodiversity and the associated indigenous knowledge emerge as strategic resources that rural people can draw on to cope with food insecurity and HIV/AIDS impact.

Agrobiodiversity comprises the whole biological resources that sustain agriculture and food production, such as particularly crops, crop varieties, useful plants, and farm animals. Among farmers, pastoral communities and forest dwellers in the developing world, agrobiodiversity is largely associated to extensive indigenous knowledge, which covers aspects related to these resources such as farming practices, agroecological features, uses, management, and genetic resource conservation.

Agrobiodiversity and indigenous knowledge represent unique grassroots resources with relevance in the food security, nutrition, healthcare, livelihood, and overall welfare of millions rural people in the developing world. They are, however, notably neglected in the theory and practice of development, whilst undergoing incessant erosion (which is further aggravated by HIV/AIDS impact itself). This neglect and erosion constrains the very capacity of rural people to cope with their evolving circumstances and pressing needs, washing away options and means for grassroots development. As local resources and knowledge decline, the rural poor become increasingly dependent on external assistance and relief for survival. In fact, the continuous neglect and erosion of traditional knowledge, practices and customary systems are at the roots of poverty and underdevelopment in Africa (Mammo, 1999).

This paper explores the following strategic components: traditional, neglected and under-utilised crops (chapter 3); agricultural diversification (chapter 4); home gardens (chapter 5); wild food plants (chapter 6); medicinal plants (chapter 7); community seed systems (chapter 8); and livestock and agropastoral systems (chapter 9). The analysis of these strategic components is based upon field research (box 1), which serves to ground case-studies, examples, and practical considerations. In particular, the analysis and field information provided in this paper serve the following purposes:

- (i) to reveal the wealth of agrobiodiversity resources and the extent of associated indigenous knowledge that rural people hold and could further develop, if adequate policy and programme support was available;
- (ii) to ground an overall analysis on the values, benefits and potential of agrobiodiversity resources and the associated indigenous knowledge, especially in combating the most urgent needs related to food insecurity and HIV/AIDS impact among the rural poor; and
- (iii) to assist agricultural policy and programme stakeholders, including field practitioners, in the mobilisation of agrobiodiversity and the implementation of the suggested strategic components.

Therefore, this strategy paper blends both analysis and practical information to guide rural grassroots responses to food insecurity and HIV/AIDS impact. It thus provides substance for tailored policy and project formulation. In general, this paper aims at illustrating, from a very rural grassroots perspective, *why* and *how* agrobiodiversity and indigenous knowledge can effectively serve to empowering rural people to combat the complex concurrence of food insecurity and HIV/AIDS impact.

Box 1. Overview of field research

The elaboration of this paper is based on field research that the author carried out under FAO framework during the second half of year 2001 in different rural areas of Africa. Participatory field research in rural areas throughout Uganda and Tanzania represents the primary information and research source. Supplementary field research in Ethiopia and Mali enrich the analysis and practical approaches.

Uganda and Tanzania represent two extremes of the degree of national and local responses to HIV/AIDS, since Uganda is renown for its wide-ranging public commitment to confront HIV/AIDS since the 1990s. In addition, the selected research areas in Uganda and Tanzania represent a wide range of agroecological, cultural, and rural development conditions. Accordingly, field research in these countries allowed the consideration of diverse scenarios, including as follows: (a) rural communities under prolonged exposure to the HIV/AIDS epidemic, such as those around Lake Victoria in both Uganda and Tanzania; (b) dryland traditional farmers suffering extreme poverty and vulnerability to food insecurity, such as those inhabiting Dodoma region in central Tanzania; and (c) communities facing a complex set of environmental and social constraints, such as those in Soroti area in Uganda.

Field research in Ethiopia provided perspectives on both highland ecosystems and emergency situations. A shorter visit to Mali supplied with an insight on the arid Sahelian area and on the West African context.

Field research comprised a wide range of activities, investigation methods and participatory approaches at the rural community level, including as follows:

- (a) fieldwork in about 30 villages that represent different agroecological zones, farming practices, livelihood systems, poverty conditions, vulnerability to food insecurity, and degree of HIV/AIDS impact;
- (b) participatory discussion and interviews in about a dozen farmer field schools in Uganda and Tanzania, in association with FAO/IFAD's Farmer Field Schools Programme;
- (c) interviews to numerous farmers, community representatives, women leaders, traditional healers, people suffering from HIV/AIDS, AIDS affected households, female-headed households, orphan-headed households, and orphan-fostering households, among other rural people;
- (d) participatory elaboration of local agrobiodiversity surveys under multicriteria approaches;
- (e) field visits to the activities and projects of different non-governmental and community-based organisations that address HIV/AIDS issues in rural areas, such as THETA and UWESO in Uganda, and Partage in Tanzania;
- (f) a specific farmer workshop organised in Iringa-Mvumi village (Dodoma, Tanzania), with about 40 farmer participants from different villages, in collaboration with TAWLAE-Dodoma and FAO's LINKs Project; and
- (g) visits to areas under humanitarian emergency situations and to refugee camps, in association with FAO emergency unit (TCOR), to explore the interface between food security, HIV/AIDS and agricultural emergency assistance.

In addition, field research comprised supplementary activities, such as meetings with officers from United Nations organisations, governmental agencies, and non-governmental organisations in the agricultural and health sectors of the countries visited. Open discussion seminars with a wide range of relevant rural development stakeholders were held in main cities visited, such as in Kampala and Busia in Uganda, and in Dar es Salaam, Dodoma, and Bukoba in Tanzania.

During year 2002, the following activities were conducted towards the drafting of the paper: analysis of results from fieldwork, complementary research, and diffusion of preliminary ideas in public presentations to receive feedback.

Justification

Sceptic readers, researchers and agricultural development practitioners may question the approach of this strategy paper in the following terms:

- (i) Why do food insecurity and the HIV/AIDS crisis require a reformulation of mainstream agricultural and rural development approaches?
 - (ii) Why should agrobiodiversity and indigenous knowledge be considered as strategic components for reducing food insecurity and mitigating the HIV/AIDS crisis?
- (i) *Reviewing agricultural and rural development in the light of chronic food insecurity and the evolving HIV/AIDS crisis*

Food insecurity is a severe, chronic and even expanding problem across vast rural areas in Sub-Saharan Africa, affecting about 200 million people in the region. Malnutrition is rampant and food crises are expanding. In general, most agricultural and rural development recipes have failed in addressing the priority needs of the poor and destitute people in the rural world. There is no overall success to date in safeguarding the basic food production and nutrition needs of the poorest and most vulnerable rural people in Africa. Modern agricultural and rural development models, extracted from experiences in the developed world, are at odds with the environmental, socio-economic and cultural conditions of smallholder farmers and other rural dwellers in Africa. Agricultural development policies and programmes devote scarce attention to the subsistence agricultural systems that sustain the life and livelihood of millions of rural poor, rather concentrating on commercial and export agriculture. Macroeconomic approaches, though certainly needed, have however dominated over microeconomic approaches, discriminating efforts needed to bring small but tangible improvements to the subsistence agricultural systems of the rural poor. At the same time, the prospects of agricultural commercialisation among smallholder farmers in Africa are even deteriorating, partly due to uneven economic globalisation and to the persistent socio-economic exclusion of countless villages.

In addition, the HIV/AIDS crisis is further deteriorating the local capacities for agricultural production and development. HIV/AIDS aggravates food insecurity, expands poverty and erodes the coping capacities of affected households (Barnett and Whiteside, 2002; FAO, 1995; FAO, 1997b; Mutangadura *et al.*, 1998). Consequently, HIV/AIDS is a serious development crisis that deserves priority attention in the agricultural and rural development agenda. For instance, it demands a priority attention to nutrition, which is a key force to control the progression of HIV infection and combat AIDS-related diseases and health problems. However, the nutrition effect of modern agricultural interventions continues rather erratic. Furthermore, the impact of HIV/AIDS on the labour and economic foundations of poor rural households also requires alternative approaches in agricultural and rural development. Mainstream agricultural development models tend to rely on significant doses of labour and capital inputs, but the HIV/AIDS crisis is urgently demanding approaches that are particularly responsive to labour and economic stresses. Chapter 2 will further explore the problems, evolving circumstances, and priority needs that require a renovated agricultural development agenda to benefit the rural poor.

(ii) The role and potential of agrobiodiversity and indigenous knowledge

In the renewed approach required to combat food insecurity and the HIV/AIDS crisis, this paper advocates and illustrates that agrobiodiversity and indigenous knowledge are indispensable forces for empowering the rural poor in their struggles against those problems. This is part of the required set of integrated, cross-sectoral and multi-scale responses. Although some academic work and fewer development efforts are addressing agrobiodiversity and indigenous knowledge, this component of the agricultural dynamic in Africa is largely neglected, yet in continuous erosion. The following considerations are, however, illustrative:

- Agrobiodiversity and indigenous knowledge are insufficiently addressed, and largely overdue, in community development strategies for food security, nutrition and sustainable agriculture.
- Agrobiodiversity strategies have a significant potential in delivering timely and affordable responses to labour and economic constraints, which are dramatically expanding among the rural poor due to HIV/AIDS.
- The promotion and improvement of agrobiodiversity and local knowledge systems is a key way for empowering smallholder farmers towards agricultural modes that are more responsive to their specific needs and evolving situations. In particular, developing the local resource base, both material and cultural, will provide rural people with broader options to plan agricultural activities according to their conditions and priorities.
- Agrobiodiversity and indigenous knowledge are important grassroots assets relevant to: (i) attain sustainable rural livelihoods, (ii) manage the risks inherent to commercial agriculture, and (iii) safeguard the prospects of agricultural and rural reconstruction in view of complex crisis over rural Africa, such as HIV/AIDS, civil conflicts and the effects of economic globalisation.

In essence, the emphasis on agrobiodiversity and indigenous knowledge does not constitute a plain approach to the resolution of food insecurity, but a dedicated effort to raise recognition and support for a largely neglected dimension of African agriculture. Agrobiodiversity and indigenous knowledge continue sustaining the agricultural systems, food security and livelihood of millions of small-scale farmers and rural dwellers throughout Sub-Saharan Africa. They are insufficient for coping with the scale of development crisis and needs, but are certainly indispensable forces to launch grassroots responses for nutrition, health and sustainable livelihoods. This grassroots dynamic needs adequate recognition and support from agricultural policies and programmes.

Although agrobiodiversity may seem to have little to do with HIV/AIDS, there are relevant connections. The impact of HIV/AIDS on the household labour and demographic structure further erodes the maintenance of agrobiodiversity and the transmission of indigenous knowledge, which are fundamental assets for rural subsistence and development. The scale of sickness and mortality among adults undermines community efforts for conserving agrobiodiversity resources and disrupts customary ways for the transmission of agricultural knowledge and skills through generations. In this sense, children could also become

agricultural orphans, lacking the resources, knowledge and practices required to advance rural development, not to mention in case they need to launch rural reconstruction in the aftermath of AIDS and other ongoing crisis. Extraordinary efforts are thus required, just at a time when less capacity remains. In addition, agrobiodiversity represents an important asset to cope with labour and economic constraints, which are an historical problem among the rural poor (Iliffe, 1987), further aggravated in AIDS affected households.

Although insufficiently studied, the African rural poor have routinely relied upon agrobiodiversity and indigenous knowledge to meet their basic needs and to address their evolving problems, including natural, health and social emergencies. In this sense, HIV/AIDS represents a new development challenge for which the rural poor will attempt to utilize as optimally as they can their agricultural and knowledge resource base, which is often the only assets they have available. However, these resources are under growing erosion and significant discrimination, as well as further threatened by HIV/AIDS impact itself as farming systems and the transmission of indigenous knowledge result constrained. This paradox adds complexity to the rural scenario in Africa. Overall, supporting agrobiodiversity and indigenous knowledge represents a strategic effort to empower the rural poor to address more effectively their most pressing agricultural, nutrition, health and livelihood needs.

Additional considerations

The adequate assessment and implementation of the proposed agrobiodiversity strategies requires a few conceptual and practical considerations.

To begin with, the AIDS crisis requires a committed, yet judicious response. HIV/AIDS has become a major force of impoverishment, food insecurity and social exclusion. Therefore, priority attention and responses are required and justified. However, there are other parallel causes of rural poverty and food insecurity that equally require priority attention, such as civil conflict, gender inequalities, and other health problems. They often overlap with the HIV/AIDS crisis. They are at risk of being discriminated by the growing profile of "HIV/AIDS issues". Accordingly, this strategy study focuses on food insecurity as the overall concern among poor rural people. It places special emphasis on HIV/AIDS impact because that is a very recent, poorly addressed and highly troubling factor of poverty and destitution in rural Africa. In this sense, HIV/AIDS represents a renewed opportunity to devote priority attention to the conditions and needs of African rural poor people, hopefully capable of stimulating an overdue revision of agricultural and rural development.

Secondly, the emphasis on agrobiodiversity reveals a new paradigm of agricultural development. The implications of an "agrobiodiversity and indigenous knowledge" approach require deep consideration. Agrobiodiversity strategies do not just involve to look at more resources, or to identify a "miracle" crop or crop variety. It is rather a new vision of agriculture, where the goal is for farmers to maintain, develop and exchange a broad crop genetic diversity to better meet their fundamental agroecological, food, nutrition and livelihood needs. In this sense, the awareness on crop diversity is futile if it simply leads to changes in selected crops, whether it is reintroducing a traditional crop, or introducing a new crop. That would simply perpetuate the narrow approach to agriculture where a limited group of crops and pedigree

varieties dominates fields, farmer decision-making, agricultural policies, extension services, and rural development programmes. Thus, substituting a major crop with a traditional crop, or creating vicious tensions between traditional and modern agriculture would result useless for the suggested strategies. The challenge ahead is to introduce an agrobiodiversity paradigm, where both traditional and introduced crops, both farmer and modern varieties, both indigenous and new agroecological practices are equally engaged in a comprehensive and dialectical effort for new modes of agricultural and rural development.

Finally, the strategies proposed in this paper aim at fostering timely and affordable responses that can bring tangible benefits to the agriculture, food, nutrition and livelihood needs of the rural poor. The strategy paper adopts a moderately ambitious task: to optimise the use of agricultural resource diversity and indigenous knowledge at local level. That may seem at odds with the formidable challenges that the rural poor in Sub-Saharan Africa face. In fact, agricultural development actors are often more inclined to explore ambitious and colossal projects to counteract enormous challenges ahead. However, ultra-modern and highly sophisticated initiatives will probably create more confusion and uncertainty at the grassroots level. The proposed strategic line emerges from the conviction, deeply rooted in field experience, that rural people need, first and foremost, that their habitual agricultural systems and resources work better. In this sense, simple nutrition and agricultural initiatives that enhanced the well-being and prolonged the life of people living with HIV/AIDS could significantly ease the ongoing tragedy and could benefit the prospects of surviving family and community members, such as particularly children and young people. In view of the scale of food, health and livelihood crisis that affect the rural poor in Africa, every effort likely to empower rural people is urgently to be undertaken, never disregarded. The emphasis on agrobiodiversity and indigenous knowledge aims at crafting moderately ambitious, yet tangible and timely responses to the primary needs of poor rural households.

2. PRIORITY ISSUES AND STRATEGIC ACTION AT THE RURAL GRASSROOTS



Farmers examining local varieties of sorghum
in Obak village, central Uganda.

Reviewing food insecurity

Food insecurity is a serious, chronic problem affecting countless rural communities and millions rural households throughout Sub-Saharan Africa. It entails a wide range of situations and conditions, such as starvation, malnutrition, food shortages, forced reduction in number of daily meals, seasonal famine periods, unequal household food access, and food relief dependency. Food security is a primary goal in human development. It is often defined as the access to sufficient foodstuff to escape hunger, but it also involves other components, including particularly nutritional quality and cultural considerations (box 2).

Box 2. Towards an integral approach to food security

Food security is the state in which all people have an autonomous and regular access to food in sufficient amounts, under safe conditions, with the adequate nutritional quality, and in due regard for their legitimate cultural values and food preferences. In rural areas, local food security also entails sustainable agricultural and environmental means for food production as necessary factors for a genuine and enduring food security.

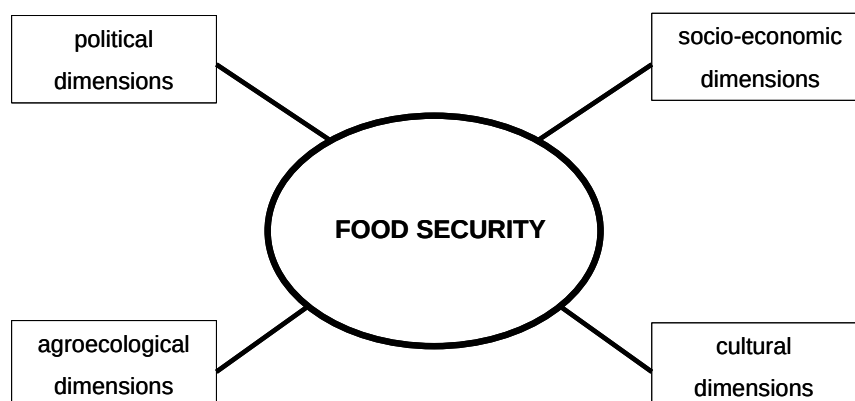
Source: Personal elaboration, drawing on FAO (1996) and Maxwell (1996).

Food insecurity is deeply connected to poverty (FAO, 1996). Overall, the poor and destitute in Africa are historically those struggling for food security (Iliffe, 1987). In particular, the poor are those living under a constant struggle to meet food security and other basic needs for themselves and their families, whilst the destitute are those that temporarily or permanently fail in that struggle. Food insecurity owes to a number of factors and forces, such as environmental conditions, socio-economic exclusion, chronic sickness, labour force shortages, gender inequalities, orphaning, civil unrest, and war. Since the late 20th century, HIV/AIDS impact has become a major factor of food insecurity throughout Sub-Saharan Africa (FAO, 2001b).

Agricultural development policies and programmes have mostly addressed food security through up-down approaches and macroeconomic analysis, attempting to solve a simple equation between inputs and outputs. In particular, high inputs of capital, technology, improved seeds, animal breeds, and chemicals were argued to result in higher agricultural productivity, increased agricultural commodity exchange, and poverty alleviation. Although mainstream agricultural policies and programmes have improved food access for growing urban populations (in terms of higher supplies and lower prices), they have been much less beneficial for rural people. Such policies and programmes were imported from the developed world, where economic dynamics are under sufficient institutional control and the temperate geography offers agroecological advantages. However, in tropical Africa, many rural communities have become more vulnerable to market fluctuations, have lost food autonomy, have become more exposed to environmental conditions, and confront a crisis around their agricultural systems. Population growth and insufficient doses of *modernity* have been often blamed for food insecurity in rural areas, yet they have rather served as pretext to hide the impact of misleading and missing policies and programmes. Inappropriate agricultural and rural strategies have not only resulted ineffective to the primary needs of the rural poor, but have also impaired their development prospects. In addition, economic globalisation trends and inadequate international cooperation further impair the prospects of rural people to attain food security and escape poverty.

Food security action requires duly attention to the food production, nutrition, and livelihood dynamics at the grassroots level. A shift towards microanalysis, participatory efforts and a rural grassroots focus is highly needed. Food security is not a simple equation where agricultural productivity and market exchange are outcomes, but demands multicriteria approaches with increased attention to the micro-dynamics. In particular, it relies on a more complex equation between agroecological, socio-economic, political and cultural factors (box 3). Consequently, grassroots considerations become more meaningful, including aspects related to local crop diversity, traditional knowledge, culture, nutrition education, community mobilisation, gender equality, and local food habits (Altieri, 1995; FAO, 1997; Villarreal, 2000). Accordingly, food security is not a matter of managing farmers and fields as pieces of a chess game, but demands that policies and programmes recognise that farmers are the primary actors in agriculture and rural development, not just objects. This grassroots-oriented and participatory approach to food security is likely to result more responsive to the poorest and most food insecure households, such as AIDS-affected households, female-headed households, and households fostering orphans.

Box 3. Integral approach to food security among smallholder farmers



- **agroecological dimensions:** drought, soil quality, agroecological zones, crop genetic resources, indigenous agroecological practices, pest risks, water management, *et al.*
- **socio-economic dimensions:** market opportunities and risks, food prices, labour availability, land tenure, gender inequalities, HIV/AIDS impact, nutrition, household food utilisation, access to appropriate technologies, micro-credit, *et al.*
- **political dimensions:** social stability, land reform programmes, agricultural policies, market and trade policies, rural development plans, agricultural research and extension programmes, rural micro-credit schemes, international agreements, community and civil society participation, *et al.*
- **cultural dimensions:** traditional crops, local food habits, indigenous knowledge systems, gender, grassroots organisations and initiatives, farmer seed systems, nutrition education, recognition of the dignity of rural lifestyles, *et al.*

Source: Personal elaboration, 2002.

HIV/AIDS impact in rural communities

In the late 20th century, the HIV/AIDS epidemic expands in rural Africa, in a lethal connection with poverty. The epidemic is rapidly spreading and severely impacting in rural areas, particularly over the poor and women (Villarreal, 2002). In fact, HIV/AIDS has become a *disease of poverty*: most infected people are poor, the socio-economic impact of HIV/AIDS is greater on poor households, and coping mechanisms are more limited and less effective in poor households (World Bank, 1999). In rural societies, HIV/AIDS impacts agricultural activities and, hence, undermines the very foundations of food security, nutrition and subsistence.

Unlike other major diseases, HIV/AIDS escalates morbidity and mortality particularly on the most active and productive segment of the rural society. That leads to a severe disruption of the rural socio-economic dynamic, especially in the labour and economic fabric of affected households (FAO, 1995; FAO, 1997b). In addition, AIDS dislocates the local mechanisms for the transmission of agricultural knowledge and skills, hence impairing the development prospects of surviving people, particularly rural youth and children.

The major development impacts of the HIV/AIDS epidemic on agriculture and rural livelihoods are as follows:

1. **Labour stress.** The cumulative scale of morbidity and mortality causes increasing labour losses in AIDS affected households, whilst there is an increasing need to divert time and labour to care for sick people and orphans resulting from AIDS. Rural households affected by AIDS suffer labour stresses that affect farm, off-farm, and domestic work alike. Poverty impedes hiring of labour as coping strategy. This labour loss undermines agricultural practices, hence aggravating livelihood vulnerability and food insecurity. In essence, HIV/AIDS exacerbates a classical factor of poverty and destitution in Africa: labour scarcity (Iliffe, 1987). The labour impact of HIV/AIDS affects more heavily rural women, due to gender inequalities, the traditional condition of women as caregivers, and the overwhelming workloads and responsibilities that women bear in the rural society.
2. **Economic impoverishment.** In poor households, AIDS drives an escalating economic crisis because of the growing related expenses (e.g. costly medical care) and the reduced income sources (due to labour losses). The cumulating healthcare needs of AIDS patients forces individuals and households to draw economic resources from other needs, such as food, education and agriculture. The labour shortages due to AIDS reduce food production and income generation, hence impoverishing households.
3. **Loss of indigenous and local knowledge.** AIDS undermines the transmission of agricultural knowledge within the household and across the community because of the related demographic asymmetries (disproportionate sickness and death of adults) and the weakening of the social fabric (lack of time, discrimination, and self-exclusion of HIV/AIDS affected families). In addition, the epidemic impact on rural professionals, like teachers and agricultural extension officers, and the withdrawal of children from school (as a distress response to the epidemic) further erode local mechanisms for the transmission of agricultural knowledge and skills. Consequently, indigenous and local knowledge is lost, hence impairing the development prospects of rural youth and children. In fact, the continuous neglect and erosion of indigenous knowledge and practices are at the roots of poverty and underdevelopment in Africa (Mammo, 1999). Accordingly, HIV/AIDS is likely to exacerbate this detrimental trend, unless targeted initiatives are deployed.

HIV/AIDS raises an additional issue that directly challenges the agricultural sector: the nutrition-health interface. It is manifest that HIV-infection and malnutrition are mutually aggravating processes. In fact, the fast and devastating health impact of HIV/AIDS in Sub-Saharan Africa owes significantly to the chronic malnutrition in the entire region, aside from lack of access to medical care and available drugs due to poverty and severe world inequalities. In essence, adequate nutrition represents a fundamental healthcare component in the struggle against HIV/AIDS, when not the only healthcare tool available for millions of rural poor that have no access to healthcare services and medicines. In particular, a balanced nutrition builds up the immune system, which helps people living with HIV/AIDS to control the progression of the virus and to combat AIDS opportunistic diseases with greater force. Nutrition action is also important in view that many AIDS patients tend to suffer from certain propensity to malnutrition.

In essence, the agricultural sector has a significant role to play in the HIV/AIDS crisis among the rural poor. It is relevant in the three main response areas to HIV/AIDS: prevention, care and mitigation (table 1). The most relevant roles are in care (nutrition/health) and mitigation (agricultural and rural livelihood issues). Concerning care, nutrition is a key healthcare component, especially among the poor that lack access to other healthcare support elements. The agricultural sector is critical in the mitigation of the AIDS development impact since agriculture represents the primary foundation of food security and livelihood across rural Africa. In particular, there is an urgent need to deploy agricultural development modes that are responsive to the labour and economic conditions of AIDS affected people. It is equally needed that such efforts address simultaneously other related issues that are relevant to fight poverty, alleviate the HIV/AIDS impact, and foster rural development: particularly gender equality, community mobilisation, and the transmission of local knowledge.

Table 1. HIV/AIDS response framework: Principal concerns and the agricultural sector

Response area	Principal concerns	Major issues for the agricultural sector
PREVENTION	Awareness, education, and gender equality	• Enhance food and livelihood security, with a focus on vulnerable groups and gender equality, to eradicate socio-economic conditions that lead to HIV risk behaviour (in other words, food and livelihood insecurity force people to engage in commercial sex as survival strategy or to migrate to escape destitution). • Incorporate awareness creation in agricultural programmes and community development initiatives. • Advance gender equality in access to productive resources (e.g. land, credit, seeds) and in agricultural decision-making.
CARE	Healthcare and psychosocial support	• Support nutrition as primary healthcare component: nutritional quality helps to improve the control of HIV infection and mitigate the health impact of AIDS (e.g. opportunistic infections, propensity to malnutrition). • Promote, integrate and improve the use of medicinal plants to enhance primary healthcare systems. • Integrate people living with HIV/AIDS and AIDS affected families in agricultural and community development efforts, arresting discrimination and self-exclusion of AIDS-affected households.
MITIGATION	Food and livelihood security	• Deploy labour-saving and labour-diffusing strategies. • Promote low-input agriculture to reduce production costs and increase farm net incomes. • Conduct priority action on household food security and nutrition. • Tackle the increasing frequency of highly vulnerable, food insecure, and impoverished households owing to HIV/AIDS impact, such as female-headed, orphan-headed, and orphan-foster households. • Promote gender equality to alleviate AIDS impacts and enhance coping responses at local level. • Maintain agrobiodiversity and indigenous knowledge as grassroots components to improve food security, nutrition, livelihood resilience and the capacity for rural reconstruction. • Create spaces and opportunities at the community level to facilitate coping strategies among AIDS-affected households. • Strengthen and develop community-based or other mechanisms for the transmission of agricultural knowledge and skills. • Adapt agricultural and rural institutions to the evolving scenarios owing to HIV/AIDS.

Source: Personal elaboration based on field research in Sub-Saharan Africa (2001) and personal communications with Marcela Villarreal (2002).

Household nutrition

Household nutrition represents a fundamental component in food security action in rural communities, especially in view of the scale of malnutrition. Malnutrition is of particular concern among the poorest families and the most vulnerable groups (such as orphans, pregnant women, lactating women, and sick people). Malnutrition results from poor energy intake, insufficient protein supplies, or micronutrient deficiencies. It entails not only human suffering, but also many other negative consequences: for instance, malnutrition impoverishes health quality, erodes labour potential, impairs children's learning capacities, undermines socio-economic development, and may incite social tensions (FAO, 1997).

Nutrition has become more critical in the HIV/AIDS context because nutritional balance is a primary force in the fight against HIV/AIDS. In essence, nutrition seems to both improve the control of HIV infection and mitigate the health impact of AIDS. A growing literature shows the critical interface between nutrition and HIV/AIDS care (Egal and Valstar, 1999; Piwoz and Preble, 2000). Nutrition action is being publicly recognised as a major issue in HIV/AIDS action (box 4). For instance, some AIDS organisations, local health authorities, and farmer field schools' activities advocate nutrition for people living with HIV/AIDS. In addition, HIV/AIDS care experts indicate that modern treatments against HIV/AIDS, when available for the rural poor, will require adequate nutritional intake to be effective. Therefore, improving nutrition is a critical need in action around HIV/AIDS care, both to reinforce the capacity of HIV/AIDS infected people to better combat the associated health problems, and to effectively use modern treatments, when available for the poor.

Box 4. "Nutrition is the first medicine for HIV/AIDS"

- The co-ordinator of the Teso AIDS Project stresses that "nutrition is the first medicine for HIV/AIDS" and that "good nutrition is the first priority in the care and mitigation of HIV/AIDS". Accordingly, this organisation from central Uganda is seeking alliances with local agricultural organisations to target nutrition as a key response to HIV/AIDS.
- In a village in Kagera (Tanzania), a woman suffering from HIV/AIDS who is also a community AIDS counsellor indicates that a crucial constrain in fighting HIV/AIDS is that local people lack nutritious foods (to strengthen their health status) and foods that can be easily eaten (to help in cases of mouth and digestive problems, as it often happens to AIDS patients). She advises fellow farmers living with HIV/AIDS to increase consumption of leafy, fruit and wild plants.
- Experts from international healthcare assistance organisations working in Africa state that adequate nutrition is indispensable in modern treatments for HIV/AIDS, and that malnutrition in rural Africa may become a major obstacle for HIV/AIDS drug campaigns, when available.

Source: Personal communications in Uganda and Tanzania, 2001.

Although nutrition-oriented interventions are critical in the fight against HIV/AIDS, they are often missing in agricultural and rural development programmes. Household nutrition action, in particular, represents a central strategy to effectively respond to the wide range of constraints and priority needs around nutrition in rural areas (box 5). It is also required to establish closer

connections between agricultural projects and household nutrition, to enhance food-based approaches to combat malnutrition and improve health status among the rural poor. The nutrition impact of agricultural interventions needs to be reviewed and enhanced. Accordingly, suggested initiatives comprise: optimising the use of locally available crop and food resources, community nutrition awareness and education, nutrition-tailored design of agricultural systems, and ease the connection between *agri*-culture and *food*-culture. It is also recommended to empower rural women because of their crucial, yet neglected roles in household nutrition, particularly in relation to women's responsibilities in farming, food processing and meal preparation.



Children eating *maengere*, a nutritious local meal based on maize and beans (eastern Uganda).

Box 5. Reflections around household nutrition action

- Sub-Saharan Africa suffers chronic malnutrition, with many areas experiencing no significant improvements after decades of development efforts and macroeconomic approaches.
- Extended experience among rural development practitioners suggests that increased income does not often turn into improved household nutrition, at least for all household members. That reveals the importance of nutrition action, food-based agricultural programmes, and introducing gender approaches in food and agricultural initiatives.
- Some major crops, including cash crops, do not represent balanced nutritional sources. They may provide good energy supplies but they are often deficient in other key components, such as proteins and micronutrients. In this sense, agricultural development programmes focusing on starchy crops, such as cassava and banana, may perpetuate malnutrition problems.
- Income- and market-based food security approaches have prevailed over, and discriminated food-based nutrition strategies. However, food markets increasingly fluctuate and even collapse, thus impairing a stable access to sufficient and nutritious food among the rural poor. Subsistence agriculture, however, provides a more resilient means for household and community nutrition. It is not at odds with agricultural commercialisation, but there are potential synergies to be explored and supported.
- Many rural households are suffering a rapid impoverishment, owing to new socio-economic conditions and the devastating impact of AIDS epidemic, which undermines their capacity to access nutritious foods. This reveals the importance of food production modes that are economically responsive.
- Inequalities in food access and utilisation within the household remain, including gender inequalities and the persistence of misplaced cultural barriers on food uses for children and women in some rural areas. In particular, gender inequalities impair the pursuit of household nutrition. For instance, gender inequalities in the control of household income result in imbalanced means for nutrition. In addition, the critical role of rural women in household nutrition is often ignored and constrained, such as particularly in the neglect towards the crops cultivated by women, women's knowledge on food processing and preservation, and women's role in planning household nutrition through meal preparation.
- HIV/AIDS and malnutrition seem mutually aggravating phenomena. First, malnutrition aggravates the health conditions and prospects of people living with HIV/AIDS, generating a downward cycle of weakness, sickness and increased malnutrition. Secondly, HIV/AIDS causes malnutrition because of metabolic changes, lost of appetite, weakness, and other health impacts.
- The neglect and despise for many traditional crops and local food habits washes away many options for enhancing nutrition in rural areas. For instance, rural people in drylands focus more on maize porridge than on millet porridge because of the prestige of maize and the despise of millet as an "indigenous" crop, yet in those areas millet porridge is more nutritious and affordable than maize porridge. Nutrition education, including awareness on the value and potential of local resources, is a helpful tool for improving food security and nutrition.
- There is an urgent need to improve and strengthen the nutritional impact of agricultural interventions.

Sources: FAO (1997), Piwoz and Preble (2000), personal communications with Florence Egal (2001), and personal field experience in Africa.

Labour stress

Labour is a fundamental productive asset in rural societies. In pre-colonial Africa, lack of access to labour, rather than land scarcity, defined the structural poor (Iliffe, 1987). Nowadays, the HIV/AIDS epidemic causes important labour loss and stress in affected households (box 6). The cumulating scale of morbidity and mortality among productive adults reduces the labour capacity of affected families. In addition, the growing number of sick people and orphans owing to AIDS requires additional care giving efforts, drawing labour from productive activities. Overall, HIV/AIDS represents a new wave of labour stress and, thus, a factor of poverty and destitution. Accordingly, alleviating labour stress is a major goal in agricultural and rural development in Africa, partly in response to labour scarcity as an historic factor of poverty, and partly as a recent development constrain due to the HIV/AIDS epidemic.

Considering labour issues in rural Africa requires gender approaches. In most areas, women undertake the largest part of rural labour, including farm, off-farm and household work alike. In many areas, women assume over 70% of rural labour loads, including strenuous activities such as crop harvesting, fetching water and fuelwood, husking grains, and taking care of babies and the sick. In addition, HIV/AIDS affects markedly rural women because they tend to assume most of the labour loads owing to HIV/AIDS, such as caring for the sick and the AIDS orphans. Men, however, tend to have a more limited labour fraction and more concentrated in income-generating activities. In some cases, cultural barriers are used as a pretext for the persistence of such gender-based labour inequalities, such as that certain crops are only women crops, or that certain activities are not "proper" for men. In other cases, agricultural and rural development programmes perpetuate women's labour stress by addressing agricultural and rural issues that are more relevant to men's tasks and responsibilities. Therefore, addressing gender inequalities is a key issue to alleviate labour constraints. This is also relevant in view that the number of female-headed households is increasing, partly due to HIV/AIDS and partly to a significant migration of men from rural areas.

Finally, the depth of labour stress also depends on the agroecological conditions. Households inhabiting lands with adequate rainfall, soil fertility and certain crop systems will be less sensitive to labour loss than households in arid lands, with poor soils and with a small range of available crops (FAO, 1995).

Box 6. Major factors of labour stress due to AIDS

- Cumulative sickness and death affecting productive adults on a significant scale.
- Need to divert time to care for sick people, for the many orphans resulting from AIDS, and for attending relatives that return to their home villages from urban areas because they are suffering from HIV/AIDS infection.
- Reduced capacity to access additional labour force because AIDS causes a parallel economic impoverishment (due to labour loss itself and to costly healthcare, among other factors).
- Limited access to community labour support mechanisms (such as participation in women's labour groups) because of discrimination, self-exclusion, or difficulties to keep the pace of community life.

The alleviation of labour stress depends upon a wide range of concerted interventions. Suggested interventions comprise, among others: use of affordable labour-saving technologies, agricultural diversification as a labour-diffusing strategy, cultural changes towards more labour cooperation across gender, priority support for the crops and tasks of rural women, strengthening community labour support and exchange systems, exploring alternative labour-support schemes, organising cooperative initiatives to optimise labour efforts, and arranging labour dynamics to address the most important food security and nutrition needs.

Labour stresses may, in some cases, require the mobilisation of labour capacities of children, aged people and sick people. Accordingly, there is need to explore interventions that are sensitive to the labour capacities of these groups with due regard to their vulnerability and vital needs, such as children's schooling needs and health stability in people living with HIV/AIDS.



Group of farmers collectively weeding a field of teff in Haik village (central Ethiopia).

Agroecological approaches and sustainable rural livelihoods

The persistent nutrition, livelihood and environmental problems that poor rural people confront demand agricultural development alternatives. In fact, the hegemonic focus on raising unilaterally crop productivity, treating agriculture as a food production industry, and addressing food as a commodity has lead into an ecological and social crisis at the rural community grassroots (Garí, 2000). These trends have eroded the environmental, social and cultural basis for agriculture, food security and livelihood, progressively reducing the local capacities for improving nutrition, income and sustainable development. Consequently, the social and ecological failures of mainstream agricultural development recipes for the last decades are encouraging a shift towards agroecological approaches.

Agroecology represents an integrated understanding of the ecological and socio-cultural dimensions of agricultural systems (Altieri, 1995). Agroecological approaches aim at ecologically and socio-culturally sustainable ways of agriculture and food production. They represent a strategic force for more integrated and co-evolutionary relationships between people and ecosystems. Their distinctive feature is an integrated effort aiming at safeguarding the natural resource base, connecting agricultural production with nutrition, improving the

efficient use of local resources (both material and cultural), reducing the use and dependency on external inputs, incorporating appropriate and affordable technologies, strengthening the social and cultural dimensions of agriculture, improving the net economic return of agricultural practices, and empowering farmers as primary subjects in agricultural development. Agroecological approaches comprise a wide range of practices (box 7). Agroecology is a young agricultural development paradigm with untapped potential in rural development.

Box 7. Examples of agroecological practices

- crop diversification
- intercropping systems
- mobilisation and improvement of indigenous agricultural systems
- cover cropping
- organic farming
- integrated pest management
- selective weeding
- farmer-based and farmer-led agricultural experimentation
- water harvesting and conservation systems
- home gardens
- creation of living and non-living barriers in agroecosystems
- community seedbanks
- agropastoral systems
- participatory crop breeding
- agroforestry systems

The deployment of agroecological approaches is relevant to enhance the nutrition, labour capacity, economic security and sustainability of rural communities, as follows:

1. *Nutrition.* The nutrition dimensions is critical in view of the scale of malnutrition in the Region, as well as the nutrition needs of the many people affected, directly or indirectly, but the HIV/AIDS epidemic (e.g. AIDS patients, AIDS orphans).
2. *Labour flexibility.* Agroecological approaches broaden the options to manage labour at household level, especially through practices that: (i) save labour, (ii) optimise the use of available labour, or (iii) increase labour flexibility. For instance, agricultural diversification and the use of low-labour crops and varieties ease labour stresses.
3. *Economic security.* Agroecological approaches contribute to the economic responsiveness of agriculture, helping poor farmers to safeguard their scarce economic resources. In particular, agroecological approaches ease low-input agriculture, foster the efficient use of local resources, and facilitate the introduction of appropriate practices and technologies. That reduces production costs and increases the net economic return of agriculture, which is particularly useful to alleviate the economic crisis due to AIDS.
4. *Ecological and cultural resilience.* Agroecological approaches place special emphasis on maintaining the ecological and cultural foundations of agriculture. In the first place, they safeguard the natural resource base, ensuring nutrient recycling, conserving crop genetic diversity, and protecting soil and water resources, among others. Secondly, they aim at recognising, rescuing, mobilising and improving the indigenous agricultural systems, providing mechanisms for appropriate technical improvements.

The deployment of agroecological approaches relies significantly on agrobiodiversity and indigenous knowledge. In fact, *biodiversification* is a pillar in the science and practice of agroecology (Altieri, 1995).



Members of Bulobi farmer field school experimenting a traditional natural pesticide based on 5 local plants (eastern Uganda).

Gender equality

Gender equality is a central question in the theory and practice of development, more so as it matters food security and the mitigation of HIV/AIDS impact in rural communities. The persistence of gender inequalities aggravates food insecurity and the impact of HIV/AIDS, whilst simultaneously constraining the local capacities to effectively combat them. The pursuit of gender equality defies the whole development process, transcending mere support to women towards the generation of co-operative relationships between the roles that rural men and women play in the development process. Gender equality is thus part of the comprehensive effort to empower rural people, both men and women (Villarreal and du Guerny, 2000).

Gender is a major factor in the allocation of roles, responsibilities and resources at both the household and community levels (Koda, 2000). In this sense, women and men hold different perspectives, priorities, knowledge and skills related to agriculture, food security and livelihood. For instance, rural women have traditionally played a central role in household nutrition in a variety of ways, such as farming nutritious crops, planning household nutrition through meal preparation, and feeding the children. At the same time, women and men absorb differently the impact of HIV/AIDS. In particular, rural women tend to bear overwhelming responsibilities and workloads owing to caring for the sick and orphans. In general, gender inequalities place heavy, even growing labour loads on rural women, in all farm, off-farm, and domestic sectors alike. At the same time, gender inequalities exclude women from the resources, support and decision-making needed for the adequate fulfilment of such roles.

Gender inequalities do not only prevail in rural households and communities, but equally pervade agricultural policies, programmes, institutions and actors. Policy formulation and agricultural development projects often reconstruct and reinforce gender inequalities, for instance when emphasising technical support for crops typically farmed by men, when neglecting women's priority concerns around household nutrition, or when overlooking gender aspects in farmer participation. Therefore, gender sensitive approaches are thus required cross-scale, across the whole range of actors involved in agricultural and rural development.



Meeting of the Asuret women association
(central Uganda).

Gender equality is also crucial for supporting the poorest and most vulnerable rural households. Gender inequalities place female-headed households, AIDS-affected households, orphan-headed households, and orphan-fostering households, among others, at the edge of marginalisation and destitution, because of limited options and support to cope with their situation. In particular, female-headed households represent a highly vulnerable group in rural Africa, being often the poorest among the poor, notably due to pervasive gender inequalities. Their number and proportion in rural communities of Africa is rapidly increasing, partly because of the growing number of widows owing to AIDS and war, partly because of massive male migration to urban areas, and partly because of the prevalence of "many careless men" (quoted from a rural woman leader). Accordingly, community-based gender equality is highly required in order to ensure that such households are not discriminated for their gender condition, but adequately empowered to access productive resources (such as land, seeds and credit), to engage in community life, and to receive agricultural development support.



A farmer woman, head of household,
with her child in the drylands
of central Tanzania.

A critical question to consider is to what extent chronic food insecurity and HIV/AIDS impact are inducing, even forcing changes in gender relations, and how they affect gender equality. The formidable and growing pressures that rural people suffer in Sub-Saharan Africa are likely to produce social changes as a way to cope with the situation. At the same time, rural development practitioners may find new spaces to tackle gender inequality as rural people may be more willing to explore development alternatives to overcome their impasses.

Gender equality action is essential for people-centred sustainable agricultural and rural development, including the achievement of effective responses to food security, nutrition, and sustainable livelihoods (FAO, 2001c). The challenge ahead is to mobilise and concert all knowledge, skills and labour capacities available at the grassroots level, including those specific among women and men. In fact, rural people are increasingly aware that lack of cooperation and equality is a wasted opportunity to cope with food insecurity and malnutrition risks (box 8). In particular, gender equality and co-operation are required in terms of labour, income management, access to productive resources, access to marketing networks, commitment to support AIDS orphans, exchange of gender-specific indigenous knowledge, and decision-making, among other aspects. In this sense, gender equality action is not just to empower women, but also to involve both men and women together in every aspect of rural development. Taking the case of household nutrition, the challenge ahead is not to empower women alone to improve household nutrition, but to involve both men and women in designing adequate farming systems and achieving appropriate awareness to raise together the nutritional status in their households. In this sense, gender equality requires community mobilisation.

Box 8. Gender equality and food security

"Kuwepo na ushirikiano wa karibu kati ya wanawake na wanaume ili kuinua lishe, upatikani wa chakula na kupambana na madhara ya ukimwi."

[There should be more co-operation between women and men for raising nutrition, food security and mitigate AIDS impact]

- **Gertruda Tibanywa**, woman farmer, head of a household composed by 5 children (including 2 orphans) and her aged father, and active member of a local women's group. Gera-Kashekya village, Kagera, Tanzania, 19 December 2001.

Community mobilisation

Community mobilisation is also a transversal issue for rural development in Sub-Saharan Africa. The exclusion and formidable challenges that rural people suffer require grassroots mobilisation. Food insecurity is not just a concern for individuals, but community action is valuable and indispensable. The HIV/AIDS epidemic, which is disrupting the social fabric in the rural world, requires high doses of community mobilisation to counteract the ongoing community disruption and to explore ways ahead to overcome the crisis, from the social inclusion of households affected by HIV/AIDS, to care for the millions of orphans caused by AIDS and war. Community mobilisation is also necessary among powerless and small-scale farmers to achieve certain socio-economic progress, as isolated farmers are weaker to confront the complex rural livelihood challenges under the globalisation storm. Community mobilisation is finally indispensable for rural reconstruction, which is increasingly needed due to the scale of humanitarian emergencies, civil strife, natural disasters, famine, displacement, and HIV/AIDS crisis, among other calamities, that strike rural areas in Africa.



Refugee children in northern Ethiopia.

Community mobilisation comprises a variety of initiatives, efforts and processes, from informal women labour-supporting groups, to community organisations, and to farmer-led agricultural experimentation initiatives, among many others. There are incipient grassroots mobilisation efforts that connect agriculture and HIV/AIDS, revealing important prospects in enhancing local coping strategies to food insecurity and HIV/AIDS (boxes 9 and 10).

Box 9. Community mobilisation around agriculture as a force to fight HIV/AIDS

Farmer field schools

Farmer field schools, supported by an international FAO/IFAD programme, provide an exceptional space for farmer learning, discussion, and experimentation on agriculture to improve their food and livelihood security. Although farmer field schools were sponsored under a specific programme for integrated pest management, their flexibility and grassroots-oriented structure allows for broad community mobilisation initiatives. Farmer field schools provide ample room for farmer-led agricultural experimentation and, in fact, farmers incorporate their own experimental settings within the established protocols. In addition, farmer field schools have readily become community platforms for awareness on a number of crucial issues in rural communities, including nutrition, HIV/AIDS and, to some degree, gender equality. Farmer field schools offer inexhaustible options for community mobilisation and grassroots agricultural development. For instance, different farmers in Uganda and Tanzania (including some that are very poor and lack time due to labour stresses) report to have done every effort to join a local farmer field school to improve their agricultural practices and learn how to better cope with their most pressing nutrition and livelihood constraints. Farmer field schools are also addressing HIV/AIDS issues, so far mostly on prevention aspects, but they are a privileged basis for community-based HIV/AIDS mitigation strategies. Experiences from Zimbabwe indicate that farmer field schools provide farmers with many benefits, such as an opportunity for AIDS widows and other marginalised rural people to gain knowledge and support from their fellow community peers (Page and Davies, 1998). Some farmer field schools have also explored, although in embryonic status, a variety of community-based strategies for food security, such as creation of multiplication plots, conservation of crop genetic resources and transmission of indigenous knowledge. In farmer field schools, the active participation of women and the close co-operation between men and women farmers are likely to induce awareness and processes towards gender equality, as the knowledge, skills and concerns of each gender are brought together and conferred an equal status.

UWESO (Uganda)

In Uganda, UWESO (Ugandan Women's Efforts to Save Orphans) is a non-governmental initiative that supports community organisations to foster and attend orphans, as well as enhancing the social inclusion of widows and poor women. It was founded in the mid-1980s to attend orphans and destitute women as result of the two-decade war in Uganda, and has progressively incorporated support for AIDS orphans and families affected by HIV/AIDS. The organisation originally focused on relief and social support, but is recently engaging in agricultural development issues, such as provision of micro-credit, training and seed distribution. They currently network with the Agriculture Department to explore adequate agricultural development initiatives to support orphans and destitute women. They also incorporate men in every local group so to raise gender awareness in agricultural and rural community development. Overall, UWESO shapes community mobilisation and hence becomes a privileged space for grassroots action towards food security and HIV/AIDS mitigation.

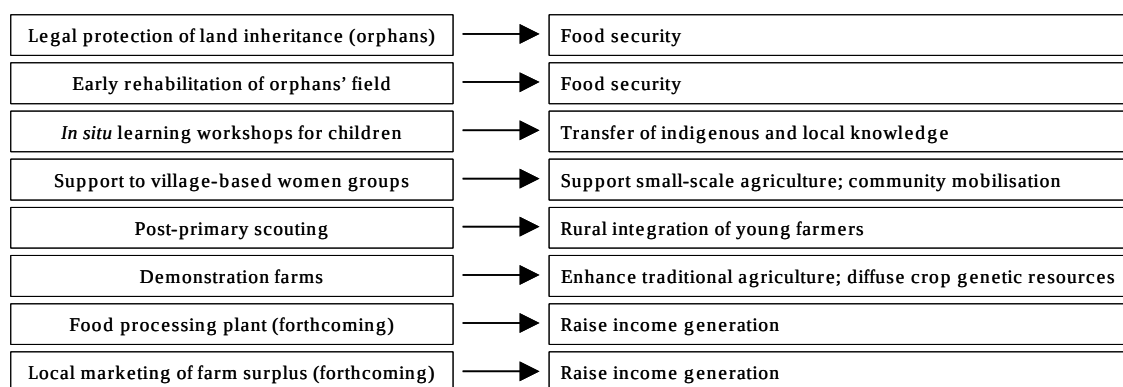


Meeting of the UWESO group in Aloet village (Soroti, Uganda).

Source: Field research in Tanzania and Uganda, 2001.

**Box 10. Supporting AIDS and war orphans through agricultural support:
The case of Partage-Tanzania**

In Kagera, northwest Tanzania, the non-governmental organisation Partage supports about 4,000 orphans in the aftermath of AIDS and regional conflicts. Its main goal is to secure the rural future of orphans. Partage-Tanzania started in 1990 with a focus on social support activities, but has increasingly incorporated agricultural dimensions in orphan support. Therefore, their renovated efforts connect orphan support, agricultural development, community mobilisation and overall HIV/AIDS mitigation. This illustrates the potential and relevance of agricultural interventions for the socio-economic inclusion of orphans, as well as for the overall mitigation of HIV/AIDS. For instance, Partage-Tanzania has a team of 5 agronomists that support the rehabilitation of about 600 *shamba* [family fields] annually in direct support to orphans and foster families. It also has 15 workshops for training young people, 60 village-based teaching volunteers, 40 community groups, 250 scouts, and 14 experimental farms. The emphasis on agricultural development in the context of food insecurity, poverty and HIV/AIDS reveals new prospects for the livelihood of the poorest and most marginalised people in rural Africa.



Source: Field research in Kagera region, including personal communications with Philippe Krynen (field manager of Partage). Tanzania, 2001.

In essence, community mobilisation is valuable and indispensable to combat HIV/AIDS impacts. So far, existing community responses have focused on prevention and care, whilst mitigation responses are significantly missing. HIV/AIDS awareness initiatives and prevention committees have expanded in rural communities; for instance, local music and dance activities serve for building HIV/AIDS awareness. Concerning care, most efforts at the community level come from non-governmental organisations that support HIV/AIDS affected households under a client-based framework. The issue of HIV/AIDS mitigation has received little and weak community responses, yet this dimension of the response spectrum to HIV/AIDS is crucial and in most urgent need of expansion.

Strategic action: Agrobiodiversity and indigenous knowledge

In the grassroots struggle against food insecurity and HIV/AIDS, agrobiodiversity and indigenous knowledge represent resources with notable value and potential. However, they suffer formidable neglect and disregard, despite they are agricultural resources considerably close to, affordable, and habitual for rural people.

Agrobiodiversity comprises the whole biological resource diversity that human societies use and manage for agriculture, food, healthcare, and livelihood. Cultivated plants constitute the most prominent dimension of agrobiodiversity, including the enormous diversity of crops and crop varieties that small-scale farmers cultivate in the developing world. At some extent, agrobiodiversity also embraces wild useful plants, such as particularly wild food and medicinal plants, which rural populations know and use for nutrition, healthcare and livelihood purposes. Other agrobiodiversity components include forest resources and livestock.

Agrobiodiversity and indigenous knowledge are inextricable. They represent the biological and cultural dimensions, respectively, of the agricultural systems of rural communities. The conservation and use of agrobiodiversity relies upon indigenous knowledge, which covers aspects such as farming practices, plant uses, soil types, seed selection, crop improvement, natural habitats of wild plants, taxonomy and food preservation techniques.

The fundamental roles of agrobiodiversity and the associated indigenous knowledge in rural communities throughout Sub-Saharan Africa have been much ignored in policies and programmes related to agriculture, food security, natural resource management and rural development. However, agrobiodiversity and indigenous knowledge ground the food security, livelihood, and agricultural development prospects of poor rural communities in the developing world (Cooper *et al.*, 1992; Mascarenhas, 2000; Thrupp, 1998). They represent locally available resources with enormous value and potential to empower rural people to improve food security and address evolving needs such as especially AIDS impact. In particular, they represent available and affordable resources to widen the range of options for agriculture, food security, nutrition, healthcare and livelihood among poor AIDS-affected households. They assume increasing importance as other resources dwindle, become unaffordable, or disappear. All too often, local biodiversity and indigenous knowledge are the only assets left in poor rural communities. They are equally the basis for sustainable rural livelihoods. Their adequate recognition, promotion and integration are thus essential for food security and HIV/AIDS mitigation. However, HIV/AIDS generates a paradox around the conservation and use of agrobiodiversity and indigenous knowledge (box 11).

Box 11. Agrobiodiversity and indigenous knowledge: The HIV/AIDS paradox

The AIDS epidemic generates a paradox around agrobiodiversity and indigenous knowledge. As AIDS disrupts customary agricultural systems, socio-demographic structures, and community dynamics, it further impairs the maintenance of agrobiodiversity and the transmission of indigenous knowledge. At the same time, as poor households and communities become severely impacted and impoverished, agrobiodiversity and the associated indigenous knowledge become increasingly important for achieving food security, improving nutrition, and coping with evolving needs and changes owing to HIV/AIDS (e.g. labour loss, impoverishment).

Modern agricultural and development forces have persistently neglected and eroded agrobiodiversity and indigenous knowledge. They have accelerated, even if inadvertently, their depletion and depreciation at the very grassroots level. The narrow focus on market-oriented agriculture and cash-crop farming has impaired the conservation, valuation and use of agrobiodiversity, washing away many options for food security, nutrition and sustainable livelihoods. Globalisation forces and short-sighted analysis continue neglecting and eroding agrobiodiversity, sometimes despising it as a backward component of agriculture, and some other times through venerating new techno-capitalist endeavours such as transgenic crops that will hardly benefit the poorest people. For instance, in a seminar that the author presented in Dodoma (Tanzania) in December 2001, a regional agricultural officer criticised that a focus on agrobiodiversity and indigenous knowledge would bring Tanzanian farmers to the "past" and prevent them to access new resources such as particularly genetically modified crops. He even stated that Tanzania should follow European agricultural systems, which he wrongly argued to depend on transgenic crops. Misleading views, deficient knowledge base and poor development analysis perpetuate the neglect and erosion of agrobiodiversity as a force for sustainable agricultural and rural development. Glamorous agricultural development proposals such as the massive introduction of transgenic crops with promising yield increases will not bring tangible benefits to the poor, if they ever reached them, aside from posing threats to sustainable rural development (Garí, 2002b). After some decades of failing agricultural development strategies under the Green Revolution fever, new dreams following a similar rhetoric are not much convincing any more.

Promoting the conservation and use of agrobiodiversity is a suitable approach for food security, household nutrition, and sustainable livelihoods. Wider use of agrobiodiversity will be required to meet the food security and nutrition needs of poor rural and urban populations, to produce varieties adapted to adverse environments, to advance the protection and sustainable use of natural resources, and to foster agricultural and livelihood diversification. The international community has already recognised the importance of the conservation and use of biodiversity in agricultural and rural development (box 12). Awareness and initiatives are growing, but there still remains a strong reluctance to consider agrobiodiversity and indigenous knowledge as valuable forces for agricultural and rural development.

Box 12. Conservation and use of biodiversity in the international arena

- " (The) conservation and sustainable use of biological diversity is of critical importance for meeting the food, health and other needs of the growing world population."
- *Convention on Biological Diversity* (1992): preamble.
- " The conservation of plant genetic resources is one side of the development equation; the use of these resources is the other."
- *Diversity for Development: The new strategy of the International Plant Genetic Resources Institute*. IPGRI, Rome, Italy (1999): p. 4.
- " (Countries shall) promote or support, as appropriate, farmers and local communities' efforts to manage and conserve on-farm their plant genetic resources for food and agriculture."
- *International Treaty on Plant Genetic Resources for Food and Agriculture* (2001): art. 5.1(c).

A set of strategic components have been identified and will be analysed in the next chapters:

- Traditional, neglected and under-utilised crops (chapter 3)
- Agricultural diversification (chapter 4)
- Home gardens (chapter 5)
- Wild food plants (chapter 6)
- Medicinal plants (chapter 7)
- Community seed systems (chapter 8)
- Livestock and agropastoral systems (chapter 9)

These strategic components can empower the rural poor to combat food insecurity and AIDS impact, if adequate changes in policies, agricultural programmes, and practices at the farmer level are accomplished. These strategic components are already embedded in farmer dynamics and hence allow for grassroots responses. They appeal to the entire development sector, from international co-operation, to national policy-making, to agricultural research and extension programmes, and to community mobilisation. In fact, policy and programme responses around these strategic components are required to assist farmers in their implementation, whilst that would making farmers subjects, not objects in the development process.

The consideration of these strategic agrobiodiversity components is connected to gender equality and community mobilisation. In fact, gender inequalities result in the discrimination of the agrobiodiversity and indigenous knowledge that rural women hold and need for their specific roles, washing away options for agricultural development. Accordingly, gender approaches are indispensable for the viability and effectiveness of agrobiodiversity-based strategies and for the full transmission of indigenous agricultural knowledge (box 13). In addition, community mobilisation is required to launch community-based awareness and efforts around agrobiodiversity and indigenous knowledge.

Box 13. Agrobiodiversity and gender

- Through their daily work, rural women have accumulated intimate knowledge of their ecosystems, including the management of plant and animal genetic resources. It is estimated that up to 90% of the planting material that poor farmers use is derived from seeds and germplasm that rural women produce, select and save.
- Through their different activities and agricultural practices, rural men and women have often developed different expertise and knowledge about the local environment, the plant and animal species, and their products and uses. These gender-differentiated knowledge systems play a decisive role in the conservation *in situ*, management and improvement of genetic resources for food and agriculture.
- Women's key roles, responsibilities and specific knowledge about agrobiodiversity often remain "invisible" to experts in the agricultural, environment and rural development sectors, as well as to policy-makers and agricultural planners.

Source: Adapted from FAO (2001d).

In conclusion, the consideration of agrobiodiversity and indigenous knowledge results in new modes of agricultural and rural development. That equally forces a grassroots focus, empowers both men and women farmers, enhances local responses and increases farmer autonomy.

3. TRADITIONAL, NEGLECTED AND UNDER-UTILISED CROPS



Children from May-Chena refugee camp in a rehabilitated field of finger millet with the local and drought-resistant variety *walye* (Tigray, north Ethiopia).

Description

In Sub-Saharan Africa, many poor and small-scale farmers cultivate and rely on a rich diversity of crops and crop varieties. However, these resources are at odds with mainstream agricultural development discourses and processes. The notion of "traditional, neglected and under-utilised crops" accounts for a unique and heterogeneous assemblage of crop genetic diversity (comprising both crop species and varieties) that is notably unrecognised, displaced and often threatened (box 14). However, these genetic resources represent grassroots resources with potential to improve the agriculture and livelihood systems of the rural poor.

Traditional, neglected and under-utilised crops constitute a rich portfolio of crop genetic resources that farmers conserve, cultivate, use, exchange and improve (table 2). They represent locally available resources that broaden farmers' options to cope with the most pressing needs and evolving circumstances, such as AIDS impact. In fact, the mobilisation and improvement of traditional, neglected and under-utilised crops would expand the local capacities to cope with farm labour stresses, household economic insecurity, nutrition needs, agroecological management, and income generation.

Box 14. Description of traditional, neglected and under-utilised crops

- **Traditional crops.** Crops and their local varieties that ground customary agricultural and food systems. These resources are *traditional* in the sense that they are integrated and coevolving with the indigenous knowledge, agricultural practices, food habits, and cultural dynamics of the rural communities and peoples that hold them. Many traditional crops are also considered as minor crops due to their little relevance in global agricultural production and trade, as well as to their scant attention in science, rural development programmes, and agricultural policies. They also include neglected and under-utilised crops (Eyzaguirre *et al.*, 1999).
- **Neglected crops.** Crops, including their associated genetic variability, that peasants cultivate in centres of crop origin or diversity, and that are allegedly *neglected* by science and development. They play relevant roles in the agriculture, nutrition, livelihood and cultural dynamics of countless rural communities, but they are not accordingly supported.
- **Under-utilised crops.** Crops that used to be widely cultivated but are rapidly diminishing, often as a result of socio-economic, cultural, policy, agronomic or other forces. They often encompass advantageous traits and potential for food security, such as specific nutritional properties and ecological adaptation, but their cultivation and use are rapidly declining.

Traditional, neglected and under-utilised crops comprise crops that were domesticated in Africa, as well as crops that, coming from other regions, have become indigenised and generated a myriad of landraces and varieties in rural communities. They include cereal crops like fonio (*Digitaria* spp.) and pearl millet (*Pennisetum glaucum*), tuber crops like yams (*Dioscorea* spp.) and American-originated cassava (*Manihot esculenta*), legume crops like bambara nut (*Vigna subterranea*), and leafy vegetables like African amaranth (*Amaranthus* spp.) - see table 2 for a broader list.



Woman displaying bambara nuts
(Cercle Kati, Mali).



Women examining local varieties of
eboga [amaranth] (Soroti, Uganda).

Table 2. Selected traditional, neglected and under-utilised crops in Sub-Saharan Africa

Common name	Scientific name	Distinctive properties and values
African <i>Cucurbitaceae</i> crops: e.g. cucumber, gourd, melon, pumpkin, squash.	<i>Cucurbita</i> spp., <i>Cucumis</i> spp., <i>et al.</i>	Very diverse family of crops with significant, yet overlooked agricultural, economic and nutritional values. Cultivated in a wide range of agroecological conditions, from drylands to humid areas. Relevant in household nutrition, including excellent supplies of micronutrients. Some species and varieties represent a fast source of food, and are critical in household food security and nutrition during seasonal food shortage periods. Some <i>cucurbits</i> are easily stored for long time. Some seeds are used as a source of oil. Some species have multiple uses, including use of dried fruits as seed containers, which have proven to be an easy, cheap and safe indigenous practice for seed storage.
African rice	<i>Oryza glaberrima</i>	Farmer varieties are adapted to a wide range of habitats in humid and sub-humid areas. Compared to Asian rice (<i>Oryza sativa</i>), African rice is better adapted to West African environments, requires lower labour and management efforts, has flexible planting timing, and constitutes a faster food supply in emergency situations, among other values.
Amaranth	<i>Amaranthus</i> spp.	Highly diversified and widely cultivated plant, also gathered from the wild in some areas. Species and cultivars are adapted to a very wide range of agroecological conditions. Low labour requirements. Grains and leaves provide superior protein and micronutrient supplies.
Bambara nut	<i>Vigna subterranea</i>	Legume crop for semi-arid lands, tolerant to drought and poor soils. Excellent protein content. Soil fertilisation properties.
Cassava	<i>Manihot esculenta</i>	Adapted to poor soils. Optimal production/area ratio. Flexible labour timing. Root crop adapted to intercropping systems. Efficient and reliable source of energy and carbohydrates in most environments of Sub-Saharan Africa. When consumed, leaves provide valuable micronutrient supplies.
Cowpea	<i>Vigna unguiculata</i>	Versatile legume crop. Grains and leaves provide excellent supplies of protein and micronutrients, including especially iron and vitamins A and B. Suitable in different African environments, drought-tolerant, able to fix nitrogen even in extremely poor soils, and very adapted to intercropping systems.
Finger millet	<i>Eleusine coracana</i>	Adapted to uplands and subhumid lands. Superior source of protein and micronutrients, particularly iron and calcium. Represents a critical nutritional complement to diets based on starchy foods (e.g. cassava, plantain), which is the case of millions of poor people in Sub-Saharan Africa.
Fonio	<i>Digitaria exilis</i> and <i>Digitaria iburua</i>	Highly adapted to drought, poor soils and extreme agroecological conditions, growing where other crops fail. Minimal material and labour input requirements. Staple and critical food security crop in the Sahel region. Early-maturing cultivars are a fundamental food source in famine periods. Highly nutritious, very palatable, and easily digestible. Therapeutic and medicinal properties. Low labour requirements during farming, but higher labour requirements in post-harvesting.

(.../...)

Table 2 (continuation)

Common name	Scientific name	Distinctive properties and values
Groundnut	<i>Arachis hypogaea</i>	American crop that has become indigenised, widely spread, and highly diversified throughout Sub-Saharan Africa. Cultivar diversity provides different options concerning agroecological adaptation, labour requirements, and maturation time, among others. High nutritional values, including protein and fat contents.
Jute	<i>Corchorus</i> spp.	Leafy vegetable adapted to a wide range of habitats and agroecological conditions. Good source of proteins and micronutrients.
Pearl millet	<i>Pennisetum glaucum</i>	A leading cereal crop in Sub-Saharan Africa, particularly in drylands such as the Sahel and savannas, though not accordingly supported from science, agricultural programmes, and policies. Tolerant to drought and poor soils. Low vulnerability to diseases and pests. Good nutritional values compared to other cereal crops, including an excellent energy/protein ratio.
Roselle	<i>Hibiscus sabdariffa</i>	Minor crop with recognised nutritional and medicinal properties.
Sorghum	<i>Sorghum bicolor</i>	A global crop (the 5 th most important world crop), yet its condition among small-scale farmers is poorly supported. Vast genetic diversity at the farmer level, yet highly neglected. Tolerant to a wide range of habitats and agroecological constraints, including drought. Staple crop in many African drylands. Very versatile: e.g. broad culinary uses, fodder source, used for beer-making, source of manure, stems may provide sugar. Some farmer varieties can be ratooned (successive croppings without need of replanting), thus saving labour.
Sweet potato	<i>Ipomoea batatas</i>	American crop that has become indigenised and highly diversified throughout Sub-Saharan Africa. Leaves and yellow tubers represent a good source of micronutrients, particularly vitamin A. Income source for some rural people. Some cultivars are adapted to marginal environments. Labour requirements vary according to cultivar, soil features, agroecological conditions, and farming practices.
Tef	<i>Eragrostis tef</i>	Endemic crop in the Ethiopian lands, where it is a staple and the most valued crop, indispensable in local diets. Cultivars are adapted to a broad scope of agroecological conditions and constraints, including a wide altitude and rainfall variation range. Although it is high labour demanding, it represents an income source for some poor rural people, and it is highly nutritious, including superior protein and iron contents compared to other cereal and grain crops.
Velvet bean / Mucuna	<i>Mucuna</i> spp.	Multipurpose legume crop, with some species growing wild and occasionally harvested. High potential in soil conservation and improvement strategies because of its superior capacity in both soil fertilisation and weed suppression. Increasingly recognised and used as cover crop in fallow periods and in practices for recovering soil fertility. Fair potential as food and animal feed source.
Yams	<i>Dioscorea</i> spp.	Staple crop in West Africa, well integrated in local diets. Subsidiary crop in a diverse range of habitats, becoming critical in emergency situations. Flexible labour timing and requirements. Low input requirements. Tubers have a large sink capacity and continue growing through time, representing a good on-farm food reserve. Long storage life compared to other root crops.

Source: Personal compilation from diverse sources, including field experience in rural communities in Ethiopia, Kenya, Mali, Tanzania, and Uganda.

Traditional, neglected and under-utilised crops suffer notable disregard and erosion (box 15). Mainstream agricultural development models, which are largely tied to urban economies and lifestyles, have for decades focused on a selected bunch of global crops and pedigree varieties; basically those that foresee intense market exchange and preferably if connected to international food trade networks. Agricultural research and extension services concentrate on these crops and on the release of a limited group of high-yielding varieties. Consequently, the crop genetic diversity of poor farmers results excluded in the entire process of agricultural and rural development. Most recently, a growing fascination with genetically-modified crops is again reinforcing this discrimination. The disregard and erosion of traditional crops and farmer varieties has even lead to a decline of their value and use among rural people themselves.

Box 15. Constrains and causes of erosion in traditional, neglected and under-utilised crops

- a) **Cultural discrimination.** Dominant modern and urban cultures despise, even if unconsciously, many crops that the rural poor cultivate as "indigenous" or "peasant" crops. This cultural discrimination results in the exclusion of these crops in policies, agricultural research, extension programmes, markets, and rural development plans. Such cultural discrimination is so pervasive that often results in a decline of the dignity and use of these crops among rural people themselves, as they are persuaded or feel compelled to abandon their crops and varieties in order to become *modern* and achieve *development*.
- b) **Socio-economic exclusion.** Many traditional crops suffer socio-economic exclusion because they have a weak policy and programme support, and very restricted access to market niches.
- c) **Insufficient knowledge and awareness.** Many traditional crops have received little research support to the point that their value and potential are poorly known, including their distinctive agroecological properties, nutritional quality, and roles in local food habits. Consequently, such crops seem *worthless* for agriculture compared to other major crops whose features are well established and whose limitations are being addressed. This poor knowledge base leads into unawareness and impairs their further improvement and use. The lack of formal research efforts on many traditional crops washes away technical, developmental and investment options to improve their cultivation and use.
- d) **Technical constrains.** Some traditional, neglected and under-utilised crops suffer technical constrains that impair their wide cultivation, consumption and marketing. For instance, some crops require high labour efforts in specific phases that farmers could overcome with selected technical assistance. Other crops have a reduced market value due to consumer prejudices or to the lack of simple added-value actions that could boost their marketing. The deployment of appropriate technologies, commercialisation skills and policies may support rural people to overcome such technical constrains, hence optimising the use of their crops for the goals of food security and income generation. Often it is just needed an initial support that could boost the development of such crops.
- e) **Exclusion in agricultural research and extension programmes.** Agricultural research and extension programmes are often disconnected from the customary agricultural dynamics of small-scale farmers, partly because they are designed up-down and far away from the farmers, partly because they respond to policy considerations that are alien to the priority needs and interests of peasants, partly because they focus on certain crops and agricultural market trends, and partly because they are tied with ambitions to follow Western agricultural development trends. That is detrimental to many local crops and crop varieties, which result displaced and are left unsupported. In addition, the obsession with high-yielding varieties excludes the diversity of farmer varieties and the potential of farmer-based crop improvement, which would better address the agroecological conditions, food needs, and agricultural constrains of farmers themselves.

Strategic values and potential

Traditional, neglected and under-utilised crops represent locally available resources with value and potential to contribute to the food security, household nutrition, agricultural diversification, and rural livelihoods of poor farmers. Their value is already recognised at the international level (box 16), yet there is an enormous need for agricultural policies and programmes to effectively recognise and promote their dignity, values and potential.

Box 16. Under-utilised crops and species

"While a small number of species provides a large proportion of global food needs, hundreds of other species are utilised at a local level, either through cultivation or harvesting. These under-utilised species contribute substantially to household food and livelihood security; they are often managed or harvested by women. Knowledge concerning the uses and management of these species is likewise often localised and specialised. Many under-utilised plants have potential for more widespread use, and their promotion could contribute to food security, agricultural diversification, and income generation, particularly in areas where the cultivation of major crops is economically marginal. However, current programmes for conservation, research and development tend to neglect these species." (12/189)

Global Plan of Action for the Conservation and Sustainable Utilisation of Plant Genetic Resources for Food and Agriculture, FAO, 1996.

[Endorsed by 155 countries that met in Leipzig (Germany) in June 1996, by the FAO Commission on Plant Genetic Resources for Food and Agriculture, by the Conference of the Parties to the *Convention on Biological Diversity*, and by the 1996 World Food Summit.]

Crop diversity is relevant as strategy to combat food security and to cope with HIV/AIDS impact, partly because it fulfils critical functions in subsistence agriculture, partly because it provides farmers with specific services, and partly because it broadens the options and means for agricultural development, food security and livelihood. Traditional, neglected and under-utilised crops as a whole comprise strategic values and potential as follows:

1. **Agroecological management.** Increasing crop diversity helps coping with local agroecological constraints and risks, such as drought and poor soils. For instance, some crops or specific farmer varieties tolerate poor fertility soils, grow in marginal lands, or serve farmer-based environmental risk management strategies. In addition, the use of legume crops improves soil fertility. In addition, many traditional, neglected and under-utilised crops are highly useful for agricultural diversification strategies, which result very beneficial for poor rural households to cope with labour, economic, agroecological and nutrition difficulties, as it will be discussed later in chapter 4.
2. **Nutrition and health properties.** Traditional, neglected and under-utilised crops are indispensable in agriculture-based nutrition action. For instance, legume crops provide high protein supplies and traditional leafy vegetables are often excellent sources of micronutrients. Furthermore, some local crops are particularly useful to nourish people suffering from AIDS, helping them to cope with eating difficulties (such as digestive problems and sore mouth that makes eating painful) and to arrest loss of appetite (which

has negative health effects). Traditional crops can also enhance food supply, helping HIV/AIDS affected households to cope with food shortages and the need for faster food supply. For example, some crops and varieties are particularly advantageous in maturing in a shorter time period. Some crops can remain un-harvested in the field for a long period, hence representing a prolonged food source. In addition, the use of traditional crops improves in relation to food processing and preservation practices, for which rural women hold specific knowledge and skills. That increases the values of these crops in household food security, nutrition, and marketing. Finally, traditional crops are well integrated in local cultural dynamics and food habits. They thus represent a superior force for agriculture-based nutrition strategies, for advancing sustainable rural livelihoods, and for recognising the dignity of rural lifestyles.

3. **Labour.** Crop diversity provides means for coping with AIDS-related labour stress in different ways, such as follows: (a) reducing labour inputs, (b) optimising labour inputs, or (c) diffusing labour loads. For instance, traditional, neglected and under-utilised crops comprise crops and varieties that are low-intensive in labour terms, crops that provide an optimal nutrition supply per labour unit, and crops that allow flexible agricultural timing (helping labour-stressed households to diffuse labour through time).
4. **Low-input agriculture.** Many local crops are adapted to their environments and require low external inputs. They are thus responsive to the economic security of poor and impoverished households. Crop diversity is at the roots of agroecological strategies that increase net rural economic gains. For instance, some crops grow well without the need of fertilisers and pesticides, whilst some legume and cover crops improve soil fertility.
5. **Income alternatives.** Some neglected and under-utilised crops have untapped economic potential, as they could fit in agroindustrial and market niches. The deployment of small-scale pilot initiatives and support programmes could be enough to expand such potential.
6. **Seed access.** The use of farmer varieties and the maintenance of farmer seed systems are relevant to ensure affordable seed access among the rural poor (see further discussion in chapter 8 on community seed systems). The promotion of modern and high-yielding varieties often impoverishes farmers because such varieties deteriorate shortly due to the breeding practices involved, forcing farmers to regularly buy new seed or engage in seed-related credit. However, farmer seed systems are more affordable and economically sound for the rural poor and for households needing to divert scarce economic resources to non-farm needs, such as healthcare or education. Accordingly, local crop genetic diversity is indispensable to build up community seed systems and maintain viable seed access for the rural poor, in connection with farmer seed knowledge and practices.

Traditional, neglected and under-utilised crops are relevant in coping with HIV/AIDS impact, particularly as follows: (a) strengthening food security; (b) improving the nutritional quality of the diet; (c) helping designing agricultural practices that suit labour shortages; (d) advancing agricultural systems with low external inputs that are responsive to household economic security; and (e) exploring income-generating options. They also provide AIDS affected households with a wider range of options for agriculture, allowing coping responses tailored to the conditions and needs of every household, community and agroecological area.

Crop diversity in arid and semi-arid ecosystems

Sub-Saharan Africa has vast arid and semi-arid lands, such as the Sahel and dry savannas. In these areas, average annual precipitation does not exceed 1,000 mm., but often falls below 400 mm. That poses severe constraints for agriculture. In addition to adverse agroecological conditions, rural people in these areas often suffer socio-economic marginalisation.

Arid and semi-arid lands house livestock and adapted agricultural practices, depending on the land uses, agroecological conditions and cultural dynamics. There is an extensive, dynamic and evolving use of natural and agricultural resources. Arid and semi-arid lands have been often stigmatised as non-favourable and useless for agriculture, hence receiving little hope and support. However, the African drylands are home to a unique diversity of crops, livestock, and wild food plants that have coevolved with the agroecological conditions and indigenous practices. Accordingly, the recognition, support and improvement of these crop genetic resources represents the basis for agricultural development. The farming systems in African drylands is unique in world's agriculture, and it reveals the wisdom of their peoples. Next there follows a concise allusion to traditional crops and farming systems in the Sahel (West Africa) and in the central drylands of Tanzania (East Africa). These dynamics have been notably ignored in agricultural development efforts, when these have existed.

In the Sahel [desert bank], which is the arid strip south of Sahara desert, rural people hold a unique crop genetic diversity. Their crops and the farmer varieties are well adapted to the local agroecological conditions, playing a critical role in the food security and livelihoods of millions of poor and excluded farmers. In particular, the Sahel is home to both cereal and legume crops, such as pearl millet, fonio, cowpea and bambara nut (box 17). Most of these crops were domesticated in this region some millennia ago, and some later expanded across Sub-Saharan Africa. Many of these crops are neglected or under-utilised, such as fonio, bambara nut, and the farmer varieties of pearl millet.

Among the traditional and neglected crops of the Sahel, fonio has unique properties and potential (Garí, 2001). This crop is extremely well adapted to semi-arid lands, requires minimal inputs, grows where other crops fail and is highly nutritious. Many rural women cultivate this crop in the Sahel, using it for farming any marginal land left. In addition, fonio helps women to improve the diets of their children and family, as well as to feed sick people because fonio is particularly digestible and even therapeutic. Although fonio requires significant post-harvesting efforts (e.g. threshing), small-scale technological innovation could substantially alleviate this labour constrain. Fonio has also good prospects for commercialisation, yet it requires policy and programme support, such as support for producer's associations, creation of production-commercialisation chains, and education and promotion activities among urban consumers in the countries where fonio grows.



Informal sale of fonio in the streets of Bamako (Mali).

In the drylands of Dodoma, in central Tanzania, the agriculture of the Gogo people is based on a unique intercropping system that basically combines 2 cereal crops, 2 legume crops and about 6 vegetable crops (table 3). This system proves well adapted to the dryland conditions and the subsistence needs of local farmers, therefore constituting the best basis for agricultural development programmes. The cereals millet and sorghum, named collectively as *uhemba*, are the dominant crops. They are supplemented by 2 legume crops (cowpea and lablab bean) and a rich diversity of *Cucurbitaceae* species and varieties (pumpkins, gourds, cucumbers *et al.*). For seeding, farmers mix the seeds of all those crops in a gourd recipient called *chihali*. Seeds of millet and sorghum dominate, including a rich diversity of farmer varieties for such crops, whilst seeds for the rest of crops are present in a lower proportion. Farmers pick up randomly some seeds and bury them in small holes in their fields. That creates a diverse intercropping system. In agreement with local farmers, I have named this indigenous farming practice as the *chihali* agricultural system after the name of the recipient where seed diversity is combined.

The *chihali* system in the Tanzanian drylands provides many benefits and options for food security. The *chihali* crop diversity includes crops that produce food after just 2 months of seeding (e.g. some of the *Cucurbitaceae*), which arrest the risk of malnutrition and famine since seeding time is generally a food shortage period in drylands. In addition, this crop diversity entails balanced nutritional supplies, since the cereals are good sources of energy, the legumes provide both energy and protein supplies, and the *Cucurbitaceae* crops are rich in micronutrients. Many of these crops can contribute to food security in terms of long-term food access strategy: grains of *uwele* [indigenous varieties of pearl millet] have excellent storage properties, leaves of *matanga* [cucumber] are stored for long time if treated under women's food preservation practices, and fruits of *mahikwi* [bitter melon] and *majenje* [pumpkin] are stored for months during the dry season. Finally, the *chihali* system already represents an excellent basis for agricultural diversification. In addition, Gogo farmers cultivate separate fields with crops like *nharanga* [groundnut], *nzugu* [bambara nut], and *matama* [maize], among others, which enhance food production.

There are many traditional farming practices like the *chihali* system that are based on crop diversity and indigenous knowledge, and that play a critical role in the agriculture, food security and rural livelihood in arid lands. However, these systems are poorly known, receive little agricultural research and technical assistance (if any), and lack policy support for their improvement and further development. Accordingly, the challenge ahead is to deploy policy and programme support aiming at: (i) recognising the dignity, values and potential of such crop diversity; (ii) improving, through participatory approaches, these resources and their uses at the local level.

Box 17. Main crops of the Sahel region in West Africa

CEREALS

- **Pearl millet** (*Pennisetum glaucum*). Staple crop in the Sahel. Adapted to drought and poor soils. Long storage capacity.
- **Sorghum** (*Sorghum bicolor*). Staple crop in the Sahel, yet research efforts are comparatively poor. Adapted to a wide range of adverse conditions. Highly versatile. Its agricultural, food and commercial potential at the farmer level remains untapped.
- **Fonio** (*Digitaria exilis*, *Digitaria iburua*). Superior adaptation to drought and poor soils, growing where other crops fail. Easy cultivation, requiring very minimal labour inputs, and only consuming labour in post-harvesting (threshing). Fast and reliable food source, critical in the dry-wet seasonal interface before main crops can be harvested (i.e. critical in so-called *famine* periods). Nutritional and digestive properties.



Farmer couple with their fonio harvest in Kolle village (Mali).

LEGUMES

- **Bambara nut** (*Vigna subterranea*). Native legume crop of West Africa, named after the Bambara people. Highly adapted to drought. Soil fertilisation capacity. It is often neglected as a women's crop.
- **Cowpea** (*Vigna unguiculata*). Legume crop native to, and widely cultivated in the drylands of West Africa, feeding millions of poor people across the African drylands. Adapted to drought and tolerant to poor fertility soils. Different plant parts are used for food and are highly nutritious, particularly in protein and micronutrients. Soil fertilisation capacities. Excellent adaptation in intercropping with cereal crops, therefore facilitating agricultural systems that are nutritionally responsive (i.e. cereals provide energy and cowpea provides protein and some micronutrients).
- **Groundnut** (*Arachis hypogaea*). Indigenised crop, often excluded as "women's crop". Good source of protein and oil. Favourable commercial value and prospects in local markets.

Note: Average annual precipitation in the Sahelian agroecological area is about 200-500 mm.

Sources: FAO (1997), Garí (2001), IITA (2002), NRC (1996), and field research in Mali (2001).

Table 3. Crop diversity in the *chihali* system of the Gogo people, Tanzania

crop type	local name	common name	edible part	initial harvest	storage / preservation	other qualities
cereal	uwele	pearl millet	grains	3 months	grains (stored)	Drought resistant. Excellent grain storage for a long time and with little losses (in traditional granaries). Local varieties provide many values.
cereal	hemba-hemba, lugugu	sorghum	grains	4 months	grains (stored)	Drought resistant. Local varieties provide a wide range of values.
legume	fwili	lablab bean	beans	6 months	beans (stored)	Highly drought resistant. Soil fertilisation properties. Women's cash source.
legume	nhandala	cowpea	beans, leaves	2 months	beans (stored) and leaves (preserved)	Highly drought resistant. Soil fertilisation properties. Cash value at village level.
<i>Cucurbitaceae</i>	mahikwi	bitter melon	fruits	2 months	fruits (stored)	Fruits are stored for months throughout the dry season.
<i>Cucurbitaceae</i>	matanga, magogo	cucumber	fruits, leaves	2 months	leaves (preserved)	High drought resistance. Cash value at village level
<i>Cucurbitaceae</i>	mayungu	gourd	fruits	2 months		Important food security crop, as it starts providing nutritious food just after 2 months of seeding (that is a critical food shortage period). Women's cash source in villages.
<i>Cucurbitaceae</i>	nhungu	gourd	(non-edible)			Multipurpose fruit: house utensil, water recipient, seed storage, handicraft, cash source.
<i>Cucurbitaceae</i>	majenje	pumpkin	fruits, leaves, flowers	2 months	fruits (stored) and leaves (preserved)	Flowers are edible and a rich vitamin A source (as revealed by their yellowish to orange colours). Fruits are stored for months throughout the dry season.
<i>Cucurbitaceae</i>	matikiti	sweet watermelon	fruits	4 months		Cash value at village level

Source: Field research in Dodoma, Tanzania, 2001 (fieldwork was conducted in the villages of Ihumwa, Iringa-Mvumi, Iyumbu, Makangwa, and Mvumi-Makulu)

A neglected cereal: The African rice

The African rice (*Oryza glaberrima*) is native to, and mainly cultivated in West Africa since millennia ago. It is often disregarded and increasingly displaced by the hegemony of Asian rice (*Oryza sativa*). However, there are about 20 million farmers in West and Central Africa, most of them extremely poor, who rely on the African rice for their food security and livelihood (WARDA, 2000). The hegemony of the Asian rice in scientific, agricultural and development circles internationally has eroded the potential and opportunities for the African rice.

Compared to the Asian rice, the African rice is considered inferior in terms of yielding capacity and commercial value. However, the Asian rice has received intense scientific and development support for some decades, to the extreme that many farmers in West Africa have become persuaded to abandon the African rice for the Asian rice. However, adequate analysis reveals the critical advantages and roles of the African rice in the agriculture, food security, and sustainable livelihoods of poor farmers in West Africa (NRC, 1996; WARDA, 2000). Compared to Asian rice, the African rice displays the following features and advantages:

- The African rice is much better adapted to the West African environments. In particular, farmers hold local varieties that are well suited to rainfed farming systems and to a wide range of agroecological conditions of West Africa, such as coastal wetlands, riverine ecosystems, and dry uplands.
- The African rice is more tolerant to the drought patterns, soil types, pests and weeds of West Africa. For instance, the strong plant structure of African rice varieties resists and suppresses local weeds, hence reducing weeding efforts. That is crucial for low-labour-intensive agriculture, particularly as rural women are often rice farmers. In addition, the soil, pest and weed tolerance of African rice varieties reduces the need for pesticides and fertilisers, hence reducing economic inputs, contributing to the economic security of poor rural households, and enhancing the sustainability of agriculture.
- The African rice requires much lower labour and management efforts than the Asian rice. It is, therefore, a valuable crop in labour sensitive strategies, which are particularly needed in coping with HIV/AIDS: (a) its capacity to resist and even compete with local weeds reduces weeding efforts; (b) its adaptation to drought avoids irrigation and water management efforts; and (c) its flexible planting timing is also likely to alleviate labour stresses.
- The African rice is as rich in most nutrients as the Asian rice, and far superior in some micronutrients, notably some essential amino-acids (e.g. methionine, tyrosine), vitamins (e.g. vitamin B components), and minerals (e.g. iron, phosphorous) (NRC, 1996).
- The African rice represents a faster food supply in emergency situations, compared to the Asian rice, therefore being more relevant for food security in cases of civil unrest or under heavy HIV/AIDS impact.
- The African rice provides better opportunities for grassroots-based agricultural reconstruction and development. As millions farmers in West Africa hold countless local varieties of African rice, poor farmers that cultivate African rice have more affordable and accessible means to restore their seed systems in case of emergency, and can easily engage in farm-based crop improvement (Richards and Ruivenkamp, 1997).

The African rice is increasingly supported and integrated in agricultural development in West and Central Africa. In particular, scientists have developed NERICA (New Rice for Africa), which is a new rice plant developed through breeding African and Asian rice varieties to optimise their respective advantages and minimise its limitations in Africa (WARDA, 2000; WARDA, 2001). The effective and sustainable progress of initiatives such as this relies on the conservation and use of farmer varieties of African rice.

In general, participatory conservation, selection and breeding of crop genetic resources will support poor farmers to cope with their specific agroecological, labour and economic conditions. Targeted interventions through agricultural policies and programmes are also required to effectively connect smallholder farmer production of African rice with markets and, particularly, with the increasing food demands from growing urban populations. Rural livelihoods can improve if traditional and neglected crops like the African rice receive the policy, research, and agricultural development support that they deserve.

A neglected, but reviving root crop: Yams

Yams (*Dioscorea* spp.) constitute a very diverse group of tuberous plants that belong to the genus *Dioscorea*, and that typically have climbing stems and produce edible tubers. Cultivated yams represent a neglected but valuable root crop that is common in diverse rural areas of Sub-Saharan Africa, from tropical rainforests to savannas. In fact, most of the world's yams are cultivated in Central and West Africa. There is also a rich diversity of wild yams that are gathered for human consumption, and that in some cases undergo a process of domestication (Hamon *et al.*, 1995). Yams are also used in some traditional pharmacopoeia throughout Africa, as part of traditional medicine.

Yams produce tubers with a large sink capacity, growing and storing food on-farm for a long period. This feature maximises labour flexibility, as harvesting has no timing at all. After harvesting, yams usually have a long storage life: about 4-6 months at ambient temperature, much longer than other root crops such as cassava and sweet potato. Therefore, yams have superior on-farm and off-farm storage capacity that benefits food security and livelihood options, particularly in households suffering labour shortages and famine risks.

Yams are often disregarded before cassava and sweet potato, which are considered as important root crops. However, the value and potential of yams in the agriculture and food security of peasants in Africa deserves further attention. Smallholder farmers in East Africa are increasingly considering yams after the cassava mosaic virus devastated cassava production in vast areas in this region in the late 1990s. Consequently, diversification of root crops has become a critical food security strategy. For instance, a farmer group in Nabulamu village (Busia Province), in Uganda, has set up yam multiplication plots, aiming at a wide distribution of yams among farmers in the area (field research, 2001). In a different context, farmers of Kagera region, in Tanzania, are focusing more on yams as strategic agricultural and food resource after their banana production is increasingly more vulnerable to pests and diseases.

Crop genetic diversity and farmer varieties

Emphasis on crops as the basic farming unit overlooks the enormous genetic diversity within crop species level that farmers conserve and use throughout Sub-Saharan Africa. Crop genetic diversity, which comprises countless farmer varieties, represents a vast and unique dimension of agrobiodiversity that is relevant in small-scale agriculture. In particular, it provides farmers with further options and strategies for agriculture and food security, as varieties differ in aspects such as drought resistance, pest susceptibility, maturing time, yield potential, labour demand, market value, culinary uses, and even nutritional properties. The wider the range of crop varieties that farmers can access, the better they can address their agricultural, food and livelihood needs. In fact, crop genetic diversity is not redundant or superfluous resources, but the resource base for planning and conducting agriculture, particularly among the rural poor.

In the context of HIV/AIDS, crop genetic diversity can further support affected households to better cope with their specific needs. In particular, crop genetic diversity is relevant to cope with three major constraints that AIDS affected farmers often report: labour shortages, need for faster food production, and need to increase flexibility in agricultural practices (field research in Uganda and Tanzania, 2001). For instance, there are varieties of finger millet that require less threshing efforts, there are varieties of fonio and sorghum that mature faster, and there are varieties of groundnut that can be cultivated in minor agricultural seasons under lower rainfall. The specific cases of groundnut and sweet potato varieties in Uganda, described in boxes 18-19, illustrate the value and potential of crop genetic diversity in the context of smallholder farmers. Since AIDS-affected households are often less capable of maintaining crop genetic diversity (due to labour constraints), community systems for the management of crop resources represent a viable strategy (see further analysis on community seed systems in chapter 8).



Farmer and his children in their sorghum field, planted with *lefo* variety, which is early maturing and resistant to bird attacks (South Wello, Ethiopia).

Box 18. Farmer genetic diversity of groundnut in Asuret area, Uganda

Poor rural communities maintain a rich diversity of varieties of groundnut (*Arachis hypogaea*), including both traditional varieties and introduced modern bred-lines. As field research in eastern Uganda illustrates, groundnut varieties differ, *inter alia*, in maturity time, labour demand, and cultivating period.

Early maturing varieties like Erudurudu optimise the rainfall period and provide food in short time, even in less than 3 months. Varieties like Emoit require lower labour inputs because one weeding suffices, whilst harvesting is easier because of the root structure. In groundnut, the root structure is a key feature in harvesting: varieties with vertical roots are easy to harvest, whilst varieties with a horizontal rooting network are labour-intensive in harvesting because they require digging. The variety Egoromoit have significant resistance to drought and a good market value. Finally, there are varieties that can be successfully cultivated in the second rainfall period (a minor cultivating season, from July to October), hence enhancing the agricultural, food production and nutrition system.

The maintenance and development of this crop genetic diversity at household and community level eases agricultural planning and benefits food security, particularly in constrained households such as those affected by HIV/AIDS. For instance, AIDS affected households may find that the maintenance and access to the local genetic diversity facilitates agricultural planning tailored to their specific conditions of labour availability, food security, or livelihood needs at a given time.

Variety	Origin	Maturity time (days)	Required weedings	Labour demand in harvesting ⁽¹⁾	Cultivating season ⁽²⁾
Egoromoit	traditional	110	2	high	1 st
Emoit	traditional	90	1	low	1 st / 2 nd
Erudurudu	traditional	75	1	low	1 st / 2 nd
Etesot	traditional	120	2	high	1 st
Egola I	introduced ⁽³⁾	110	2	high	1 st

1. The root structure of every groundnut variety determines the degree of labour effort for harvesting (i.e. uprooting).
2. There are two agricultural seasons in the study area: the 1st rain season (March-June), which is the main agricultural season, and the 2nd rain season (August-October), which is a shorter rain season less favourable for agriculture. Varieties adapted to the 2nd rain season maximise food production and reduce risks of food shortages year round.
3. Variety Egola I was introduced from Uganda's National Agricultural Research Organisation (NARO) in the mid-1990s. Despite the promises of this improved variety, farmers state that it has a poor taste and is late-maturing.

Source: Fieldwork in Okunguro village (Asuret subcounty, Soroti), Uganda, 2001.

Box 19. Traditional sweet potato varieties in eastern Uganda.

The diversity of sweet potato (*Ipomoea batatas*) is also an important resource for food security, as well as valuable in the coping needs of households affected by AIDS and other pressures.

In Busia, eastern Uganda, rural people maintain a high diversity of sweet potato varieties. On average, communities maintain over 5 traditional varieties and households cultivate a range of 2-4 varieties. Each variety provides different values and options in terms of drought resistance, maturation time, market value, and yielding features, among others. Drought-resistant varieties are important for a resilient food security system. Maturation time is a critical feature, especially for AIDS-affected households because it helps coping with sudden food shortages. Varieties with market value represent income options. Varieties that continue producing tubers after harvesting optimise food production per labour and time unit, and improve food security in cases of labour shortages, such as particularly in the case of households affected by HIV/AIDS.



Farmer with *bungoma* variety of sweet potato (eastern Uganda).

Name	Drought resistance	Maturation time	Market value	Continuous yield	Observations
Bundugusa	+	2 months	-	+	Very early maturing variety.
Bungoma	++	5 months	+	+	Very yellow tuber, likely to provide high amounts of vitamin A.
Kikuyu	-	3 months	+	-	
Maraoko	++	4-5 months	-	+	
Mukokola	+	6 months	+	+	
Siliki	-	3-4 months	-	-	Low yielding variety, but the most appreciated for its superior taste and culinary properties.
Soroti	-	2-3 months	+	-	Poor taste, but represents a fast food and income source.

Source: Field research in Mawero parish (Busia Province), Uganda, 2001, including information from farmers of the villages Agoriata, Akipeneti, Alupe, and Amagoro.

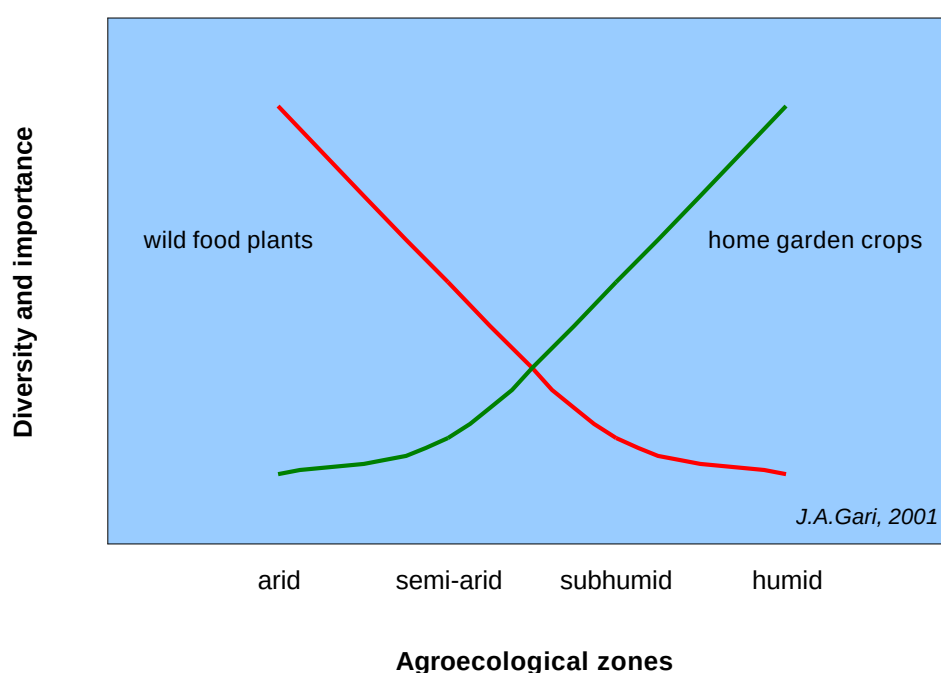
Crop genetic diversity at the farmer level is thus a strategic resource for agricultural development among the rural poor, particularly for food security, managing labour, and mitigating AIDS impacts. Accordingly, efforts around the conservation, use, management and improvement of crop varieties at the farmer level are required. However, the way formal crop actors design and introduce new and "improved" varieties dislocates and even depletes farmer varieties and local crop diversity. The full appreciation of the values and roles of farmer crop diversity can become visible only under a different agricultural development paradigm.

Home garden crops and wild food plants

Home garden crops and wild food plants are a very heterogeneous group of plants that are cultivated or harvested as supplementary food source. Their roles and potential in household food security and nutrition deserve adequate attention. Home gardens are small plots of land, often close to homesteads, where a diversity of leafy vegetables, fruit plants, legumes and root crops, among others, are cultivated as a food complement or to provide additional income. Wild food plants typically grow in wild areas or around farmland, being harvested as food source. Both home garden crops and wild food plants have analogous functions and value, generally as source of leafy and fruit vegetables. They represent an excellent supply of micronutrients (vitamins and minerals). In addition, wild food plants are critical for household food security and nutrition during seasonal food shortage periods and in emergency situations. Home gardens and, to a lesser extent, wild food plants are a potential source of income.

The respective importance of home garden crops and wild food plants depends largely on the agroecological conditions. In humid areas, rainfall allows farmer women to satisfactorily cultivate home gardens, and consequently wild food plants play a minor role. In contrast, rural people inhabiting arid and semi-arid lands rely heavily upon wild food plants, since home gardening is severely constrained. Consequently, home garden crops and wild food plants play equivalent roles, respectively, in humid and arid zones across Africa (box 20). Rural women are the principal actor in both the cultivation of home garden crops and the harvest of wild food plants. They hold extensive knowledge on these plants and on their cultivation, location, and uses. However, all this food plant diversity is notably neglected in agricultural development programmes. Given their significance, home garden crops and wild food plants will be specifically treated later in chapters 5 and 6, respectively.

Box 20. Wild food plants and home garden crops throughout African environments



Crop dynamics and coping with HIV/AIDS impact

The labour and economic impacts due to AIDS are likely to change crop dynamics. Diagnostic studies have already shown that AIDS affected households reduce their farming area due to labour shortages. That may result in crop diversity loss, or a focus on specific crops. However, field research in Uganda and Tanzania suggests that crop diversity tends to significantly remain among AIDS affected households, which try to maintain crop diversity despite suffering labour shortages and having to reduce the farm area. This strategy probably responds to the food security, nutrition, agricultural and cultural values of crop diversity.

The most manifest change around crop diversity is the abandonment of certain cash crops, specifically those with high labour demand and risky market prospects. There is also some decline in the number of crop varieties maintained at the household level. However, lack of seed, rather than labour shortages, is often reported as the cause of crop diversity decline. This trend is consistent with the fact that the rural poor have been those that maintained most of agrobiodiversity as part of their subsistence and livelihood systems. In particular, rural women habitually manage enormous crop diversity despite overwhelming labour constraints. Accordingly, agrobiodiversity-based strategies to cope with HIV/AIDS and labour shortages are coherent with the agricultural dynamics of the rural poor and their current circumstances.

Crop diversity provides households different options to address constraints related to HIV/AIDS. For instance, many AIDS affected households indicate that short-season crops and early maturing varieties are often valuable to cope with sudden food shortages. In highly constrained households, some cash crops are often abandoned because of unequal balance between labour inputs and income prospects, but women struggle to maintain traditional crops with relevance in household nutrition and diets, no matter if labour inputs are high. In the context of HIV/AIDS, some crops receive added value because of a variety of criteria: for instance, some require low labour, some allow flexible labour timing, some are suitable for mobilising labour support from children and aged people, some are adapted to poor soils (in case households can only access such land), some require no economic expenses in terms of chemical inputs, some have good and lasting storage properties, some are highly nutritious, and some are more suitable to feed sick people. Accordingly, the strategic action is to provide poor households and communities with mechanisms to access crop diversity, so they can plan farming according to their needs and constraints in every moment and case.

Food storage, processing and preservation

The use of crop diversity improves through food storage, processing and preservation practices. These post-harvest aspects are key for food security and agricultural marketing. Adequate storage and processing-preservation techniques ensure the full contribution of some crops to food security and nutrition. Appropriate granaries enable households to store grain and beans for long time periods. For some crops, processing and preservation practices optimise their food security roles, aggregate market value, and ease meal preparation.

Indigenous knowledge on food storage, food processing, and food preservation represents an important basis to mobilise agrobiodiversity and improve food security, nutrition and

livelihood in the post-harvest stage. Rural people, notably women, hold enormous, yet neglected knowledge on food processing and preservation techniques. In particular, home garden crops and wild food plants are often linked to extensive indigenous knowledge around food processing and preservation (see chapters 5-6). This knowledge deserves recognition, support and improvement. There are simple and affordable technologies for food processing and preservation that could improve local practices through well targeted technical support.

Storage is a critical issue in household food security. In drylands, where there are distinct rain and dry seasons, the preservation of grains and legumes is essential. Many crops can be stored, such as millets, sorghum, groundnut, bambara nut, and beans. Storage has two main benefits:

- (a) **Household food security.** Storage makes available the production of grains and legumes throughout the year. Since some crops are only cultivated and harvested in specific seasons, storage is basic to access them during the whole year.
- (b) **Income.** Storage allows farmers to sell agricultural products when market prices are fairer and labour is available. After harvesting, markets are generally flooded with harvested produce and prices tend to be low. Furthermore, AIDS-affected and labour-constrained households cannot conduct harvesting, food processing and commercial activities at the same time, so storage allows them to manage labour. Therefore, storage allows farmers to do marketing according to price dynamics and labour availability.



Children next to traditional granaries in the Sahel (Mali).

Many rural communities have traditional storage systems, such as granaries. Storing food is a very advantageous strategy for AIDS-affected households, in view of their labour, economic, nutritional and food insecurity concerns. Adequate storage and crop diversification practices require a storage system, with more than one granary. For instance, in Soroti area, in Uganda, granaries [deero] are required for every crop or crop type; that is, adequate storage requires a separate granary for millet/sorghum, groundnut, bambara nut, and maize.

Having storage facilities is often a constrain for poor households, including particularly AIDS-affected households. The building of storage facilities often requires high labour and

even some investments that AIDS-affected and other troubles households cannot meet. The case of Joyce Igoru, in central Uganda, is a typical example. She is a poor woman, widow, with 2 children, and living with HIV/AIDS. She has only one granary and she has to keep a large part of her products within the house, lacking sufficient space and risking the production that is stored out of the traditional granary. She cannot afford more granaries, as she is weak to build them and she has no money to hire labour. She would ideally need 4 granaries, which would allow her to safely store her production of millet, sorghum, groundnut, and preserved root crops, among others. She states that traditional granaries are good and safe to store harvest. They are essential to maintain food and seed throughout the year. They also keep food products so that she can sell them in local markets when prices are favourable and she has the time and strength to go to the marketplace. In conclusion, support for adequate storage facilities, including traditional granaries and other affordable systems, is a key need for food security and mitigating AIDS impact, especially in relation to mobilising and optimising the use of local crop and food resources.



Farmer looking inside her traditional granary in central Uganda..

Gender aspects around crop diversity

The effective promotion and use of traditional, neglected and under-utilised crops is connected to gender approaches. Gender inequalities are often at the roots of the poor visibility and recognition that traditional, neglected and under-utilised crops suffer. In addition, gender co-operation is required to fully use crop diversity to meet the most urgent food security, nutrition and livelihood needs of poor rural people.

In rural Africa, a gender-based asymmetric division on crops prevails. Rural women usually manage the largest part of the local crop diversity, including especially crops used directly for household nutrition, whilst men focus on specific crops with the highest income-generating value. Gender inequalities tend to result in imbalanced recognition and support of the specific crops, needs and aims of women and men farmers.

Rural women are the dominant actor in most traditional, neglected and under-utilised crops. Their roles include cultivation processes (e.g. knowledge on soil requirements and intercropping potential), uses (e.g. food preservation techniques, culinary uses), and management of genetic resources (e.g. seed selection, customary genetic resource conservation, variety improvement). In many cases, crops and local varieties are neglected and under-utilised because of their *female* condition. This discrimination occurs simultaneously within and outside the communities. Rural people themselves have biases on crop importance according to who farms them or which crops yield income. Furthermore, agricultural research and extension programmes reinforce gender inequalities when they focus on crops with higher economic value and that are more prestigious in the communities. They generally focus on men's crops, whilst neglecting the wide range of women's crops.

Gender inequalities often force crop asymmetries that are detrimental to effective food security. In particular, cultural barriers on men's and women's crops undermine the fair allocation of labour within households and communities. Thus, the large amount of crops under women's responsibilities are partly cause of women's workload excesses, along with the little recognition and support that women receive for playing such crucial roles. For instance, in Kagera (Tanzania), men focus on two permanent crops, banana and coffee, which are those that provide income, whilst women manage a wide range of annual crops with key food and nutritional roles in the household, such as sweet potato, beans, and groundnuts, aside from farming marginal areas such as the *rweya* (table 4). In rural areas of Soroti (Uganda), men concentrate on farming and commercialising cassava and, secondarily, sweet potato. Women, besides supporting men in the farming of cassava and sweet potato, are rather alone with the farming of finger millet, sorghum, groundnuts, sesame, cowpeas, green grams, and *oyototo* [vegetable crops], among other crops. In addition, women often suffer discrimination in the control over the income resulting from men's marketing of cassava. As agricultural economic research conducted precisely in Kagera illustrates, the asymmetric and unequal division of crop diversity leads to a deficient allocation of available labour at the household level (Tibajuka, 1994). The optimal use of labour is essential not just because labour scarcity is a critical and classical factor of poverty in Africa (Iliffe, 1987), but also because labour stress is among the most pressing needs in AIDS-affected households. Therefore, gender equality around crop diversity represents a fundamental objective for the optimal use of available labour.

Table 4. Gender roles and socio-economic aspects of crops in Kagera (Tanzania)

Crops	Cultivation roles	Income source	Importance in household diets
Bambara nut	women		+
Banana	men / women	+	++
Beans	women		++
Cassava	women		+
Cocoyam	women		+
Coffee	men / women	+	-
Groundnut	women		++
Maize	women		+
Sweet potato	women		++
Yams	women		+

Source: Field research in diverse villages of Kagera region, Tanzania, 2001.

Some traditional, neglected and under-utilised crops are important in household nutrition, yet they have low income generating prospects. Women are often key actors in these crops, which allow them to connect agricultural practices with household nutrition. However, gender inequalities depreciate these resources and their specific roles. Agrobiodiversity strategies with appropriate gender approaches can bear significant improvements in household nutrition.

The AIDS epidemic and renovated awareness on farming at the community level are leading changes in gender roles on crops. In particular, field research in Kagera region, Tanzania, suggests that the close border between male and female crops is becoming permeate, in particular as men are withdrawing cultural prejudices and starting to support women in female crops (box 21). The scale of food insecurity and HIV/AIDS impact are encouraging changes in gender relations towards gender equality, as men and women are increasingly aware and involved in joint farming.



Woman (household head) farming with her elderly father and 3 children in Kagera region (Tanzania). She teaches all her children (5 in total, including 2 adopted orphans) about the farming of every crop, irrespectively of the gender of the child and local gender prejudices in crop farming. She states that the pressing food and income needs in the household require everybody to cooperate, making "gender biases" irrelevant and even a threat to the household food security. She adds that her male children will become more complete farmers by knowing about all crops.

**Box 21. HIV/AIDS and gender changes around crop diversity:
Experiences from Kagera region (Tanzania)**

In Kagera region there are incipient, but promising changes in gender relations as it matters farming crop diversity. Two main processes are forcing these changes: on the one hand, the scale of HIV/AIDS impact, especially as Kagera was one of the earliest affected regions and bears a long-lasting impact, and, on the other hand, exogenous development initiatives.

Farmer field schools, a participatory farmer-based learning and experimentation programme in rural communities supported by FAO and IFAD, has served to weaken gender barriers on farming. For instance, in one of the farmer field schools in Kagera, the group was considering to set up a commercial plot for cassava and bambara nuts, particularly aiming at selling bambara nuts and get income for the entire group. Men from this farmer field school were reluctant to do that because such crops were regarded as female crops in their culture and custom, notably bambara nuts. But they finally accepted, assuming the risk that other men may "laugh" at them. Nowadays, the men from that farmer field school are comfortable farming the mentioned female crops, and are even willing to consider contributing to farm labour for other female crops, either in their homes or in the farmer field school. Therefore, initiatives like farmer field schools represent farmer forums to comprehend gender inequalities, and to experiment potential responses and changes.

In some villages in Kagera region, farmers report that men with many orphans and children in their homes are starting to farm female crops to enhance agriculture and food security in the household. The rest of men farmers are looking at them, remaining attentive to which are the social perceptions in the community before potentially following their path.

In the village of Gera-Kashekya, a rural woman is teaching her male children to farm female crops. She is head of a household with many children and orphans, so she suffers overwhelming labour shortages to meet the basic food needs of the household. Consequently, the eldest children, male and female, help her in farming. She teaches them about all the crops, and she transmits her agricultural knowledge regardless of gender. Her male children are growing up accustomed to farm female crops, and they simultaneously are receiving the knowledge required to do that. These new tendencies, fuelled notably by the impact of HIV/AIDS, suggest changes towards gender equality, and reveal the soundness of gender-based approaches to crop diversity management.

Finally, the decline of the two crops traditionally farmed by men is likely to further changes in gender aspects on crop diversity. Men usually farm banana and coffee. However, banana is increasingly prone to diseases, and coffee prices are dramatically dropping, hence generating serious food and economic insecurity. In this context, other local crops, such as cassava or sweet potato, which are female crops, are likely to play more relevant roles in food and livelihood security. Hence, in one way or another, men will have to become involved.

Source: Field research in Kagera region, Tanzania, 2001. Personal communications with Julianus Thomas.

Conclusions and recommendations

Multi-criteria perspectives on traditional, neglected and under-utilised crops lead to the following policy and programme recommendations:

1. Promote the conservation and use of traditional, neglected and under-utilised crops.
2. Support farmer varieties, as well as the associated farmer knowledge and innovation systems, as essential resource for agricultural development.
3. Encouraging integrative and non-invasive means for the introduction of modern breed lines.
4. Deploy participatory crop genetic resource conservation, management and improvement strategies, such as community seedbanks, farmer-based crop breeding, and participatory research and documentation initiatives.
5. Implement programmes and initiatives that connect the use of traditional, neglected and under-utilised crops with food autonomy and nutrition well-being.
6. Explore and foster changes in gender relationships around crop diversity that bring more gender equality, mobilises and allocates more efficiently available labour within the households, and balances the agricultural, food security and livelihood roles of men and women farmers.
7. Support the consolidation and expansion of market niches for traditional, neglected and under-utilised crops, especially those typically managed by women and those adapted to marginal environments.

The case of traditional, neglected and under-utilised crops reveals that agrobiodiversity as a whole represents the foundations of strategies for food security, HIV/AIDS mitigation and rural development. In other words, the suggested strategy is not shift crops, either using some marginalised crops or introducing a new crop, but to operate with an agrobiodiversity mind. Thus expanding, consolidating and institutionalising the agrobiodiversity base available for poor rural households and communities allows new modes of agricultural and rural development that can better serve poor rural people to address their most pressing needs.

4. AGRICULTURAL DIVERSIFICATION



Woman in her intercropped field with maize, beans and cassava
(cereal-legume-rootcrop system) in Agoriata village, eastern Uganda.

Overview

Agricultural diversification is the agricultural practice that seeks the dynamic integration of the broad natural resource diversity, from the genetic to the ecosystem level. It therefore represents an agrobiodiversity component that genuinely embraces the ecosystemic dimensions of agriculture, integrating elements such as crops, livestock, farming practices, ecological processes, and land uses. It consists in the diversification of agricultural systems and practices to better balance social and ecological factors, such as nutrition provision, agroecological management, marketing options, gender equality in farming, conservation of the natural resource base, optimisation of land uses, and low-input agricultural modes.

Agricultural diversification represents an optimal strategy to combat food insecurity and AIDS impact among the rural poor. In particular, it broadens household options for food production and nutrition, expands income-generation sources, provides practical and affordable means for agroecological management, and helps alleviating agricultural labour pressures.

Agricultural diversification is strongly connected to agrobiodiversity and relies upon indigenous agroecological knowledge and practices. In particular, many traditional, neglected and under-utilised crops (as discussed earlier in chapter 3) represent critical resources for

effective agricultural diversification processes. The introduction of new crops and varieties can strengthen agricultural diversification, provided due regard is devoted to ecological, cultural and socio-economic impacts. Local genetic resource management systems, including their gender dimensions, are relevant instruments to advance agricultural diversification.

In Sub-Saharan Africa, farmers have traditionally hold diversified agricultural systems, which are however declining, if not vanishing. Agricultural diversification constitutes a new agricultural development strategy that diversifies agricultural systems to better address agroecological, food security, nutrition, livelihood, and gender conditions. It is thus not a simple activity that merely consisted in increasing the number of crops grown by rural households or in "rescuing" some traditional polyculture systems. It is rather an interdisciplinary and cross-scale process of agricultural development that interconnects traditional agricultural systems, crop diversity, indigenous knowledge, agroecology science, and new research frontiers. Farmer-based and farmer-led approaches are indispensable.

Agricultural diversification comprises a wide range of potential systems and practices (box 22). Its goal is not the indiscriminate distribution of seeds or encouraging farmers to plant many crops. Agricultural diversification requires creating spaces where indigenous knowledge, innovative agroecological research and farmer-based experimentation concur and reinforce each other. It equally requires the deployment of adequate policy and programme support schemes; for instance, legitimating and promoting the indigenous genetic resource and knowledge base, increasing training to fully divulge the value and benefits of agricultural diversification, supporting research tailored to agricultural diversification, and implementing participatory experimentation. Farmer-to-farmer cooperation schemes are also useful to facilitate an horizontal flow of experiences, knowledge, and agrobiodiversity resources. It is finally important to empower actors that are generally excluded in the process of development, but hold enormous resources and knowledge relevant for sustainable agricultural diversification processes, such as particularly rural women.

**Box 22. Agricultural diversification systems and practices:
Selected examples**

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- | | |
|--|--|
| <ul style="list-style-type: none"> • Crop diversity farming • Intercropping systems • Polycultures • Shifting cultivation • Crop rotation • Inclusion of leguminous crops • Home gardens • Introduction of new crops • Cover cropping • Agroforestry systems • Multipurpose crops and species • Seedbanks • Fodder production | <ul style="list-style-type: none"> • Crop-livestock association • Crop genetic diversity management • Elaborated fallow systems • Selective weeding • Contour planting • Integrated agriculture-aquaculture • Cultivation of hillsides • Crop mosaics • Cultivation of trees and orchards • Separation of crops with similar pest and disease susceptibility • Sustainable grassland management • Sustainable use of wild ecosystems |
|--|--|

Launching agricultural diversification needs preliminary consideration of the existing farming systems, agroecological conditions, and priority needs of farmers. In general terms, agricultural diversification may develop from three different grounds:

- a) *Rural communities that maintain comprehensive indigenous polyculture and diversified systems.* In this case, the existing farming dynamics, in terms of the agrobiodiversity and indigenous knowledge they embrace, provides an optimal basis for enhancing agricultural diversification dynamics. Selected innovations and improvements can be integrated. It must be noted that such indigenous polyculture systems are rarely fixed on time, but are continuously evolving according to the constraints and needs of farmers. Accordingly, the challenge for the agricultural sector is to support them to continue evolving in ways that better serve the needs of the rural poor. Selected and well-targeted scientific and technical support is critical.
- b) *Rural communities that rely on specific monocultures, generally encompassing a very limited crop resource base (in many cases due to historic agricultural changes attempting to maximise market opportunities).* In these cases, agricultural diversification will entail a transition towards a new farming culture. The interventions required and the intensity of the process will depend upon the status of such market spaces, the state of food security and nutrition, and the agroecological conditions, among other factors.
- c) *Rural communities where the cultivation of key commodity crops receives the dominant attention and value, yet substantial agrobiodiversity and diversified farming practices remain, basically under the lead of actors with lower socio-economic recognition (such as women and the smallest landholding households).* Integrative and cross-border efforts will be required with the aim of both legitimating and incorporating the existing agrobiodiversity and indigenous knowledge into the agricultural diversification processes.

Aside from the agroecological benefits, agricultural diversification is especially relevant for poor and small-scale farmers that confront food insecurity, malnutrition, socio-economic marginalisation, or labour shortages.



Members of Nabulamu farmer field school examining an ecological barrier created to conserve soil and water (eastern Uganda).

Values, benefits and potential roles

Substantial research proves the many values and benefits of agricultural diversification, particularly in relation to enhancing sustainable agriculture and strengthening food security in poor rural communities (Altieri, 1995; Cooper *et al.*, 1992; Garí, 2000; Thrupp, 1998). Participatory field research in Uganda and Tanzania further explored agricultural diversification with a focus on food security and AIDS impact (field research, 2001). The values, benefits and services identified through participatory discussions comprise as follows:

1. **Nutrition.** Agricultural diversification is an affordable and immediate way to enhance household nutrition, particularly in the contexts of poverty and socio-economic exclusion. Diversifying food production can directly benefit household nutrition and health quality, hence reducing vulnerability to external food availability and food access. In fact, established experience among rural development practitioners indicates that increasing incomes does not often turn into better nutrition, but food produced in the community is more likely to improve nutrition. Agricultural diversification thus represents a food-based agricultural development strategy with high nutritional impact.
2. **Agroecological management.** Agricultural diversification enables small-scale farmers to manage agroecological conditions, such as drought risks, pest control, and need to cultivate marginal lands. Crops and crop varieties differ in vulnerability to agroecological risks, so that the diversification of farming systems represents an agroecological risk management strategy. Practices like intercropping and field diversification are recognised as efficient and affordable to reduce the incidence and impact of pests. Crop diversification is also relevant in soil conservation strategies; for instance, through the introduction of legume crops which enhance soil fertility, the use of cover crops such as velvet bean (*Mucuna* spp.) to facilitate soil fertility recovery, and the use of crop residues as green manure. Agricultural diversification represents an optimal strategy to address food security among household with limited land resources or forced to use agriculturally marginal lands. Agricultural diversity systems also improve soil and water management, hence optimising the use of resources that are often scarce. Agropastoral systems, fodder production and sustainable grassland management contribute to food production, nutrition and rural livelihoods through broadening and optimising land uses.
3. **Labour.** Agricultural diversification provides a mechanism to alleviate labour stress, as it assists households to optimise labour inputs and to diffuse labour loads through time. For instance, intercropping is a labour-saving strategy, as land preparation and weeding efforts serve simultaneously for different crops and food sources. Crop-livestock systems reduce labour destined to soil fertilisation. In addition, crop diversity diffuses labour, as crops differ in labour needs, labour intensity and timing throughout the agricultural period. Hence, AIDS affected households suffering labour shortages and occasional lack of labour can better conduct agriculture and reduce crop loss risks.
4. **Low-input agriculture.** Agricultural diversification provides affordable, yet more sustainable, means to address important agricultural needs, such as soil fertility and pest management. For instance, the use of legume crops (e.g. bambara nut) and cover crops (e.g. *Mucuna* sp.) enhances soil fertility without jeopardising the household economy

with the purchase of chemical fertilisers. In addition, integrated pest management systems serve crop protection needs without expensive chemical inputs. In that way, agricultural activities do not undermine the household economy.

5. **Land shortage management.** Agricultural diversification provides an optimal strategy to cope with land shortage in terms of food and nutrition security. Land shortage is key constrain for food security and rural development, affecting certain areas, such as particularly in southern Africa, as well as discriminated and vulnerable groups, such as the case of widows, female-headed households and orphans. Agricultural diversification provides an agroecological strategy to optimise the use of scarce land through a combination of subsistence, nutrition and income purposes.
6. **Rural income.** Agricultural diversification is useful to expand income sources, particularly in marginal rural areas. It first serves to maintain a wide range of marketing and income options, thus allowing farmers to cope with market fluctuations and collapses. It provides opportunities to gain access to new or emerging market niches. Overall, agricultural diversification alleviates the insidious dichotomy between food crops and cash crops, leading to a better balance between nutrition and income needs within rural households.
7. **Gender equality.** The institutionalisation and improvement of agricultural diversification can contribute to gender equality in agriculture and food security. That would first help recognising agricultural practices and crops that rural women hold. It would also expand the agricultural space available for women, enhancing their customary tasks. Overall, agricultural diversification would require the joint collaboration of both men and women in agricultural development, integrating their respective knowledge systems and fostering gender equality in the agricultural development process. In essence, agricultural diversification represents an advanced strategy to accommodate the needs, resources, skills and knowledge systems of both men and women farmers.
8. **Healthcare.** Agricultural diversification can contribute to healthcare among poor rural people. In the first place, it broadens the food production base, providing balanced supplies of energy, protein and micronutrient resources that combat malnutrition in a direct and inexpensive way. In addition, agricultural diversification can incorporate the cultivation of medicinal plants.
9. **Farmer autonomy.** Agricultural diversification enhances farmer control over food production and consumption. The promotion of agricultural diversification reverses narrow crop and farming approaches that increase food and livelihood vulnerability among the rural poor, whilst enhancing local autonomy on food production and nutrition. Thus agricultural diversification provides poor households with a broader production base to attend their critical food, nutrition, and livelihood needs alike.

Overall, agricultural diversification provides a resilient and reliable strategy for food security and balanced nutrition, with specific advantages and benefits in the context of HIV/AIDS. Agrobiodiversity and indigenous knowledge are critically relevant for agricultural diversification efforts; in fact they have traditionally supported diversified agricultural systems.

Crop diversity

One of the central strategies for agricultural diversification is crop diversity, at both species and genetic levels. Traditional, neglected and under-utilised crops, as discussed earlier (chapter 3), represent a privileged set of resources for maintaining and developing crop diversity. The introduction of new crops and crop varieties, with all due regard to ecological and cultural impacts, can also contribute to crop diversity and, hence, to agricultural diversification strategies. Above all, the conservation and cultivation of crop diversity entails an agricultural dynamic where crops and crop varieties evolve, but overall system diversity remains.

Crop diversity is the primary basis for agriculture-based nutrition strategies in poor rural areas. Cultivating a diversity of crops ensures the range of nutrients that are required for maintaining healthy lives, especially among children, sick people, aged people, pregnant women, and lactating women. Every crop group is known for specific nutritional values: in general, grain crops are a good source of energy, legume crops supply abundant proteins, and fruit and leafy vegetable crops are excellent sources of micronutrients. Overall, maintaining crop diversity ensures adequate supplies for nutritionally balanced and healthy diets.

Crop diversity improves the local coping capacity with agroecological conditions (tables 5-7). For instance, crop diversity is relevant in land use management, allowing rural households to optimally use available land. In this sense, some crops are well adapted to marginal areas and poor fertility soils, hence integrating these areas into food production. Accordingly, access to sufficient crop diversity is crucial for poor households that only have land in marginal areas, so to farm them adequately. Crop diversity is also relevant for addressing rainfall conditions. For instance, there are crops and crop varieties that suit less-favourable agricultural seasons, thus being able to provide food resources in periods under agroecological limitations, when rainfall is reduced, irregular or unreliable. Crop diversity also broadens the options around food storage and preservation, hence contributing to long-term food security.

Crop diversity provides different options around farm labour (tables 6-7). For instance, some crops have low labour requirements, some crops allow a flexible timing in agricultural activities, and some crops contribute to labour-saving practices. Thus, crop diversity provides AIDS-affected households with practical options to cope with labour constraints.

Crop diversity also allows for a balanced coexistence of both food and cash crops, hence allowing households to better meet both household nutrition and income needs. Overall, crop diversity alleviates tensions between food and cash, as allows for the co-existence of both agricultural resources (table 6). Accordingly, the institutionalisation of crop diversity systems gives equal legitimating and opportunities for the crops and farming needs of both men and women, thus generating spaces for gender equality in crop management. Crop diversity thus alleviates tensions between male-female crops, nutrition-income crops, and staple-minor crops.

Table 5. Crop diversity and land use management in Kagera region (Tanzania)

	Kibanja ⁽¹⁾	Kikamba ⁽²⁾	Rweya ⁽³⁾
Bambara nut			X
Banana	X		
Beans	X		
Cassava	X	X	X
Cocoyam	X	X	
Coffee	X		
Groundnut		X	
Maize	X	X	
Sweet potato		X	X
Yams	X	X	X

1. Kibanja [fertile land near the house] is the main field, which is located close to the homestead, where farmers typically conduct banana-coffee based intercropping systems.
2. Kikamba [bush] represents subsidiary land for agriculture.
3. Rweya [grassland] accounts for poor fertility lands.

Source: Field research in diverse villages of Bukoba Rural (Kagera), Tanzania, 2001.

Table 6. Crop diversity in eastern Uganda

Local name ⁽¹⁾	English name	Use value	Labour demand ⁽²⁾	Food security relevance
Amabere	Sorghum	food	+++	*
Amadimua	Maize	food	+++	*
Amaido	Groundnut	food / cash	++	
Amajanjalo	Beans	food	+	
Amatema	Banana	food / cash	+	
Emabuoni	Sweet potato	food	+	*
Engooli	Cowpea	food	+	
Epamba	Cotton	cash	+++	
Mongo	Cassava	food / cash	++	*
Obule	Finger millet	food / cash ⁽³⁾	+++	*
Olai	Green gram	food	+	

1. Saamia language.
2. Labour demand is ranked as high (+++), fair (++) and low (+), according to participatory surveys with men and women farmers.
3. Obule [finger millet] has also a cultural value, as it is used in ceremonies.

Source: Field research in Bulobi and Nabulamu villages, in association with "Enjala Siyita" Farmer Field School. Busia, Uganda, 2001.

**Table 7. Crop diversity in Soroti district (central Uganda):
Agroecological and labour aspects**

Crops	Agroecological, labour and other features
Beans	Cultivated in both 1 st and 2 nd rain seasons. Low labour inputs. Soil fertilisation properties.
Cassava	High but flexible labour. Cultivated year-round. Market value. Men's crop.
Cowpea	Cultivated in either 1 st or 2 nd rain seasons. Fair labour requirements. Leaves are edible just a few weeks after seeding (good source of micronutrients).
Finger millet	Cultivated only in 1 st rain season. High labour requirements, but very versatile crop. Easy storage and for a long time in traditional granaries. Good, tasty and nutritious food. Habitual women's income source (e.g. marketing, brewing).
Green grams	Adapted to both rain seasons, but generally cultivated in the 2 nd rain season. Low labour requirements.
Groundnut	Cultivated in 1 st rain season, though some farmer varieties are also adapted to 2 nd rain season. Variable labour requirements depending on varieties. Well stored in traditional granaries. Soil fertilisation properties.
Sesame	Adapted to both 1 st and 2 nd rains, and generally cultivated in 2 nd rain as there is more labour and land available. Good source of food and oil. Local rural people have knowledge about efficient drying and storing practices.
Sorghum	Can be cultivated in either 1 st or 2 nd rain seasons. Low labour requirements. Drought resistant. Well stored in traditional granaries.
Sweet potato	High labour, but farming has flexible timing. Cultivation almost any time year round. Harvesting has more strict timing, but this root crop can be easily dried and stored.

Comments: Soroti has two rain seasons: a major rain season in March-June (1st rain season) and a minor rain season in August-October (2nd rain season). Conducting agriculture in the minor rain season is important to cope with food insecurity risks.

Source: Field research in different rural communities of Soroti district, covering the subcounties of Arapai, Asuret and Kiere.



Farmers with sesame drying in Okunguro village (Soroti, Uganda)

Intercropping systems

Intercropping systems are a widespread practice with notable benefits (Altieri, 1995). However, they are often disregarded as inefficient agricultural systems, and food and agricultural policies and programmes give a disproportionate support for monocropping.

The improvement of intercropping systems is essential in agricultural development and food security strategies among smallholder farmers. Participatory discussion with farmers from Agoriata village (Busia) and Obwakol village (Soroti), both in Uganda, revealed that there already exists substantive awareness on the benefits of intercropping systems, including as follows:

- *Profit maximisation*: intercropping provides a variety of food sources from the same plot, and facilitates an even combination between food and cash crops.
- *Labour optimisation*: field preparation and weeding serve various crops at the same time.
- *Soil fertilisation*: some crops add fertility to the soil and save expenses on fertilisers, such as particularly beans and other leguminous crops, which usually incorporate Nitrogen in the soil through their root nodules.
- *Insurance*: as a farmer rightly stated, "not all crops fail to yield".
- *Integrated pest management*: some crops function as traps for some pests and thus protect other crops, therefore reducing the environmental and economic costs of pesticide use.
- *Water management*: some crops retain water in the soil thanks to their root structure.
- *Land use*: intercropping helps optimising land use, especially when land shortage exists.

Farmers are thus aware of the value and potential of intercropping, yet they lack technical support to improve their intercropping systems, so to adapt them to their evolving needs and constraints. In fact, some farmer field schools informally include intercropping fields in their experimental designs, using their indigenous knowledge and their hypothetical considerations to evaluate intercropping systems and options. For instance, farmers from Akwangalet-Okunguro farmer field school (Asuret, Soroti), in central Uganda, are experimenting with cotton-beans intercropping because cotton market is very fluctuant, so they ensure some food and income from bean production.

Intercropping seems particularly a useful practice for constrained households, as it provides direct benefits in food security. Robina Nabwire, widow and chairwoman of Enjala Siyita Farmer Field School, in Nabulamu village (Busia Province, Uganda), states that she has abandoned cotton and she is abandoning coffee because these crops demand high amounts of labour. She focuses on food crops, which she often inter-plants to optimise the use of labour and space. She asserts as follows: "intercropping assists me very much". However, farmer women often report that their main constraint for intercropping is lack of seed at the right time (personal communication, 2001).

Intercropping is also a relevant strategy for low-input agriculture or, in other words, for designing agricultural systems that are economically responsive. Intercropping often constitutes an agroecological practice for soil, water and pest management. It therefore reduces

the need of chemical inputs, which are often unaffordable for poor farmers and certainly reduce the net economic returns of farming. The science of agroecology provides evidence and "best practices" for intercropping systems, yet they need further institutional and technical support.



Farmers in a field intercropped with beans, root crops and bananas, among other crops, in Kagera region (north Tanzania).

Indigenous farming: The *chihali* system of the Gogo people (Tanzania)

The practice of agricultural diversification requires due regard to indigenous agricultural systems, including their associated crop genetic diversity and traditional agroecological knowledge. In fact, indigenous agriculture is result of a coevolutionary interaction between agroecological conditions, traditional knowledge, and local needs. It often provides useful basis for agricultural diversification and represents an excellent basis for sustainable agricultural development. Indigenous agriculture is more likely to meet the food and livelihood needs of the poorest rural people if adequate technical assistance, capacity-building and improvements are deployed.

Indigenous agricultural systems are however under threat due to modern agricultural development projects and socio-economic pressures. This erosion results in more livelihood vulnerability and food insecurity, whilst washing away options for local responses to them. Next there follows an overview of the *chihali* system of the Gogo people, in the drylands of central Tanzania, as example of the complexity, uniqueness and significance of indigenous farming practices, particularly as it matters the pursuit of food security and the agricultural sector response to mitigate HIV/AIDS impacts. Accordingly, agricultural interventions are encouraged to develop and improve these indigenous agricultural systems, rather than disrupting or replacing them with alien approaches that cannot suit the local agroecological conditions and that are deaf to the priority needs of the rural poor, particularly those constrained and impacted by HIV/AIDS epidemic.

As described earlier in chapter 3, the Gogo people of Dodoma drylands, in central Tanzania, conduct a complex intercropping system that is based on 2 cereal crops, 2 legume crops and a diversity of *Cucurbitaceae* crops (table 3 above). The cereal crops, named collectively as *uhemba* in Gogo language, are pearl millet and sorghum; the legume crops are cowpea and lablab bean; and, finally, the *Cucurbitaceae* crops include gourds, pumpkins, melons, and cucumbers. During fieldwork, the author, with permission from farmers, called this intercropping as the *chihali* system, after the name of the traditional gourd recipient that farmers use to mix the seeds of all those crops before seeding. All those crops are cultivated together in the field and thus form a comprehensive intercropping system.

The state of the *chihali* system is variable throughout Dodoma. Some villages and households maintain it as their fundamental agricultural practice. Some communities have abandoned it progressively in response to agricultural programmes and market prospects, hence focusing on specific monocroppings such as particularly maize, improved sorghum varieties, and grapes. However, the *chihali* system entails some values that are relevant for food security, and that are responsive to the needs of the poorest farmers and HIV/AIDS affected households. In particular, it entails agroecological, food security, labour and economic advantages (box 23).



Woman from a Gogo community, in the central drylands of Tanzania, sowing a field with the *chihali* [gourd recipient], which contains a seed mix of pearl millet varieties, sorghum varieties, two legume crops, and a rich diversity of *Cucurbitaceae*.

Box 23. Analysis of the indigenous *chihali* agricultural system (Dodoma, Tanzania)

1. **Agroecological adaptation.** Many farmers stress that their traditional crop system is adapted to the local agroecological conditions, particularly drought and poor soils. Most of the crops are typically drought resistant. In the intercropping system, crops protect one to another. The root network created by the different crops is likely to retain water. Intercropping pearl millet and sorghum is an advanced strategy for the optimal use of scarce water resources and for minimising drought risks, since both crops have different water requirements during the growing season (Holtland, 1994). In addition, the *chihali* system as a whole allows for agriculture in some of the different soil types of the region. The inclusion of two legume crops represents an inexpensive and labour-free mechanism for improving soil fertility. Intercropping also represents an agroecological mechanism for integrated pest management, which is ecologically sensitive, economically viable, and labour-saving. Finally, intercropping represents a risk management strategy: the diversity of crops cultivated is resilient to agroecological and socio-economic risks. For instance, drought or pests cannot harm all crops, and market fluctuations cannot affect all crops with economic value. In the *chihali* system, farmers maintain crop genetic diversity, which renders them further agroecological values. The diversity of millet and sorghum varieties provide farmers with a broad range of options and values. For instance, cultivated varieties of millet differ in maturing time, susceptibility to birds, and productivity potential, among other aspects. In sorghum, some varieties are more drought resistant, some have stems that provide sugar, some are easy to thresh and thus are labour-saving, and some are very resistant to local pests.
2. **Food security (I): Famine periods.** The diversity of *chihali* crops provides poor farmers with a broad strategy for food security, specifically to confront the seasonal food shortage periods that often occur in semi-arid lands like Dodoma. Some of the minor crops start yielding some food shortly after seeding, about 2 months, just in a time that is often critical for food security among the poorest households as food reserves are depleted after the long dry period. The grains of millet, particularly local varieties, have excellent storage properties and the grain stock remains viable for a long time. The fruits of mahikwi [bitter melon] and majenje [pumpkin] are stored for several months, often preserved over the roofs of houses, just under direct sunlight. In addition, rural women possess knowledge and techniques for the preservation of the leaves of some of the legumes and vegetables cultivated, such as nhandala [cowpea] and matanga [cucumber].
3. **Food security (II): Nutrition.** The crop diversity characteristic of the *chihali* system provides a balanced nutritional supply. In particular, millet and sorghum provide good energy sources and some amino acid and micronutrient elements; the legumes are good in both energy and protein supplies; and the vegetables are typically excellent micronutrient sources.
4. **Optimal use of labour.** The *chihali* system allows for an optimal allocation of labour, specifically in the agroecological conditions of the Dodoma drylands. In particular, the *chihali* system optimises available land for agriculture, thus helping to reduce land preparation efforts and cope with labour shortages. In particular, land preparation is a demanding task because of soil features and drought. In addition, it has typically to be conducted in a short time period just with the arrival of rains. Hence, land available for agriculture is generally limited due to labour constraints or shortage, so the *chihali* intercropping system maximises crop, food and nutrition production for units of labour and available agricultural land. Moreover, the crop genetic diversity that generally characterises the *chihali* system includes varieties that are more labour sensitive, as they require less threshing efforts. The labour sensitiveness of the *chihali* system results more relevant in the context of HIV/AIDS, where affected households suffer labour shortages and are likely to confront labour stresses in the short rain period, when land preparation, seeding and weeding are required. The labour unit devoted to the *chihali* system balances the needs for agroecological risk management, diversified food production, adequate nutritional supplies, and livelihood options.
5. **Low-input agriculture.** The *chihali* system represents an advanced basis for low-input agriculture, thus preventing impoverishment and allowing affordable practices among the rural poor. The agroecological values of the *chihali* system provide an economically viable means for soil, water and pest management, aside from being ecologically soundness and labour sensitive.

Source: Field research in diverse villages of the Gogo people. Dodoma, Tanzania, 2001.

Agricultural programmes do not only disregard indigenous practices, such as the *chihali* system of the Gogo people, but also undermine them, even if inadvertently. For instance, the introduction of modern varieties of sorghum and millet has accelerated sorghum and millet monocultures and dismantled customary intercropping systems. Farmers systematically exclude modern varieties in their *chihali* system because their experience indicates that such varieties cause genetic deterioration of their local varieties. That is due to the breeding methodologies used in modern plant breeding, which are at odds with farmer crop genetic dynamics. Consequently, farmers receiving modern varieties are recommended to set up separate fields. That increases their labour loads and forces the abandonment of the *chihali* system. Implications include major vulnerability to food insecurity, a limited capacity to achieve balanced nutrition, and agroecological mismanagement, among others.

Abandoning the *chihali* system and shifting towards monocultures seems to increase agroecological problems. For instance, farmers in Makangwa village, where the *chihali* system was significantly displaced and disrupted, collectively report a higher incidence of pests (field research, 2001). In addition, the abandonment of legume crops reduces local means for soil fertilisation. These facts concur with established agroecological knowledge that show that intercropping systems, such as the *chihali* system, represent an effective strategy for integrated pest management and an ecological mechanism for soil fertilisation (Altieri, 1995).

Moreover, improved varieties are often introduced through agricultural packages that trap farmers in credit. For instance, agricultural extension services introduced the sorghum variety *tegemeo* in the early 1990s as part of the Global 2000 Programme, which gave improved seeds, fertiliser and sometimes pesticides to farmers as a loan (Holtland, 1994). That engaged farmers in a vicious circle of external dependence. Improved seeds need to be regularly purchased because they rapidly undergo genetic deterioration due to the breeding techniques used. Farmers accessing such varieties fall into seed dependency. In essence, these models of agricultural development are not responsive to the conditions and prospects of poor farmers, much less to AIDS affected households. Instead, low-input agricultural practices and specific assistance connected to the *chihali* system would result more useful for the communities.

Finally, past agricultural development programmes promoted single crops for large-scale market exchange. In particular, Dodoma was encouraged to shift towards grapes and maize. However, those programmes did not succeed due to agroecological, farming, cultural and market factors, generating confusion in rural people about how to pursue development. As a consequence, the *chihali* system has resulted misvalued and partly abandoned, whilst the associated indigenous knowledge has not been duly supported, transmitted, and improved.

In the context of AIDS, farmers seem to rely on the *chihali* system (box 24). Interviews to AIDS affected households in rural Dodoma shows that their main coping mechanism is to reduce the farm area, but not to simplify or abandon the *chihali* system. AIDS affected households with labour constraints reduce the cultivated area, but maintain the same crops and agricultural practices due to food security and cultural reasons. Such households state that the *chihali* crops are their food basis, and that no household should miss any of them. Culture and food habits also play a role, yet agricultural programmes tend to neglect them. For instance, a woman heading a 10-member household, including 5 children and a very ill AIDS young woman, states that she maintains the whole *chihali* system because she knows its functioning,

adding that her children should not lack any of the gourds and melons in their diets because that would be shameful for them and the whole family.

In summary, the case of the *chihali* agricultural system in the drylands of Dodoma reveals how important is to advance agricultural development on the basis of existing farming systems. In particular, the *chihali* system proves adapted to the local agroecological constraints, is trusted by local people, provides a balanced household nutrition, and is more labour responsive than other alternatives already experimented or suggested in the area. It is also connected to the farming practices, indigenous knowledge, food habits, and culture of the Gogo people.

Box 24. HIV/AIDS and Gogo farmers in the drylands to Tanzania

Dodoma is the poorest region of Tanzania, located in its central drylands. It is inhabited by Gogo agropastoralists, among other agricultural and pastoral tribes. Food insecurity and malnutrition are important problems. The HIV/AIDS epidemic status is probably high and escalating. A member of a village AIDS committee indicates that 25% of people tested were HIV positive. This AIDS committee, which is a pioneering community organisation combating HIV/AIDS in the region, has about 100 orphans registered and allocated in fostering families.

AIDS affected households are more devoted to their indigenous farming practices because they trust them, they know that they can provide them with balanced food and nutritional supplies, and they are tied to their culture. Most agricultural development programmes introduced or planned for the region are less responsive to the conditions and priority needs of the poorest households and, particularly, AIDS affected households. They are less labour sensitive than customary agricultural systems. Interviews suggest that AIDS affected households rather focus on the agricultural systems they are familiar with, and they trust. Accordingly, a shift in agricultural development programmes is required, placing emphasis on improving the existing indigenous agricultural practices if they want to be responsive to the needs, concerns and capacities of AIDS affected households. In essence, times of crisis are less appropriate to "experiment" with alien or odd strategies. Highly troubled households have no margin left for trials, but rather need that their habitual agricultural systems work better.

Source: Field research in rural areas of Dodoma, Tanzania, 2001.

Concluding comments

Agricultural diversification is a broad agricultural strategy highly relevant for smallholder farmers. It comprises different components, systems and practices. Developing agricultural diversification requires concerted dialogue between traditional agricultural systems and modern agroecological research. Agrobiodiversity and indigenous knowledge are indispensable ingredients for agricultural diversification initiatives.

A comprehensive approach to agricultural diversification is required to accommodate the different opportunities and potential. In particular, agricultural diversification represents a viable and affordable strategy among poor smallholder farmers to improve nutrition, advance agroecological management, cope with labour constraints, enhance low-input and economically responsive agricultural systems, and progress towards sustainable livelihoods.

5. HOME GARDENS



Ethiopian peasant
in her small home garden.

Value and potential of home gardens

Home gardens have an established tradition in many rural communities throughout Africa, especially in humid and sub-humid areas (FAO, 2001a). They constitute a relevant agricultural space that typically contains notable plant diversity, including particularly crops with high micronutrient properties. Home garden crops represent a supplementary source of food and a privileged basis for nutritional quality in rural households. They can also become a source of income. They are helpful to cope with food shortage periods and failures of staple crops.

Home gardens embrace a genuine portion of agrobiodiversity with distinctive agricultural, food and nutrition roles, relevant in both food security action and AIDS mitigation (box 25). The crop diversity that home gardens typically or potentially hold can provide a wide range of resources, such as nutritious foods, marketable products, firewood, herbs, spices, and medicinal plants. Home gardens are usually managed by rural women, who use them as diversified agricultural spaces to fulfil a variety of household needs, from feeding their children and the sick, to cultivating vegetables and spices that are important ingredients in local diets, and to generating some income.

Among the rural poor, home gardens are strategic to improve food production and household nutrition. Traditional home gardens continue representing a key micronutrient source for rural communities and, thus, offer exceptional opportunities for food-based approaches to prevent micronutrient malnutrition (FAO, 1997; FAO/ILSI, 1997). In addition, home gardening may expand household income-generating opportunities, especially if connected to increasing food demands from growing urban populations.

Despite their food security and nutritional values, home gardens are largely neglected, receiving insufficient recognition and lacking technical support in agricultural development. Gender inequalities further discriminate this agricultural system: rural women are the leading managers of home gardens, but their limited access to land and water resources, and their lack of technical and financial support impede them to further develop this agricultural space and its associated agrobiodiversity. In addition, local unawareness further limits the development of home gardens, horticultural practices and food-based approaches to nutrition and healthcare.

Management of home gardens tends to be labour sensitive, particularly suiting the labour conditions of rural women. Home gardens often constitute a small farm area where intense food production occurs. If available, water resources are more easily and optimally managed in home gardens. Some home garden crops grow continuously, and others perpetuate themselves without needing frequent seeding. Practices like weeding and harvesting do not require strict timing, but can be diffused through time and adapted to the labour conditions of the household. The crop diversity acts as a natural weed suppressing. Finally, the usual location of home gardens close to the homestead facilitates the harmonisation between farm and household duties, particularly among rural women, who bear both farming responsibilities and household duties like caring for the children and the sick family members.

Home gardens can represent an income source for poor households. In this sense, policy and programme support to the processing, preservation, storage, packaging, transport and marketing of horticulture crops would ensure that home gardens serve to raising household income, whilst improving nutritional quality in urban and peri-urban populations. However, the monetary value of horticulture raises concerns on equitable food utilisation: income options should not be detrimental, but complementary, to the nutrition roles of home gardening.

The promotion and improvement of home gardens represents an agricultural strategy with potential benefits to the food security, nutrition, health status, and livelihood of poor rural households. It requires integrated, well-targeted and gender-sensitive interventions. Understanding the dynamics and potential of home gardens demands consideration of crop diversity, local culinary habits, traditional food preservation techniques, and gender aspects. For instance, the experience of rural women, the use of local vegetable and fruit crop diversity, and household nutrition are indispensable elements to enhance home gardens. In addition, support in terms of training, technical improvements, and participatory experimentation is equally required, so to improve home gardening and to effectively connect it with the food security, nutrition, labour and livelihood needs of rural people, and women in particular. FAO recently elaborated a comprehensive manual on home gardening in Africa with a practical field orientation and a priority focus on improving household nutrition (FAO, 2001a).

Box 25. Home gardens: Distinctive agricultural, food and nutrition roles

- The genuine crop diversity of home gardens supplements staple crops, provides critical nutritional supplies (especially vitamins and minerals), and enriches local diets.
- Home gardens may represent a nearly continuous supply of food and nutrition, performing an important function as *food safety net*.
- The practice of home gardening allows intense food production systems with optimal use of resources that may be scarce, such as land and water.
- Use of organic farming practices is highly feasible, such as particularly the use of green manure, compost and natural pesticides, which result in lower food production costs.
- Home gardens can provide income if adequate marketing channels are supported.
- Home gardens may produce medicinal plants and contribute to primary healthcare.
- Home gardens can produce non-food resources, such as flowers and firewood, thus improving rural livelihoods and income sources.
- Home gardens can represent a labour responsive strategy for food security, with tangible benefits for AIDS affected households; in particular: (i) home gardens have a favourable labour/production ratio; (ii) home gardens provide a good labour/nutrition ratio; and (iii) home gardens are often located close to the homestead and hence help women to better harmonise their farming and household tasks.
- The improvement of home gardens may contribute to gender equality in agricultural production, as home gardens are agricultural systems typically managed by women and particularly suited to some of their roles, such as household nutrition and meal preparation.
- Home gardens can serve as a space for the production of crop planting materials (such as particularly vines, fruit seedlings, and vegetable seeds) and, therefore, contribute to local seed security.
- Home gardens are excellent spaces for the conservation of plant genetic resources, for agricultural experimentation, and for the transmission of indigenous agricultural knowledge (e.g. children can acquire basic farming skills in their home gardens and in school gardens).

Sources: FAO (2001a), personal communication with Florence Egal, and personal field experience.

Crop diversity in home gardens

Home gardens are typically spaces with rich agrobiodiversity, basically vegetable crops and fruit trees. In particular, rural Africa has a wide diversity of traditional vegetables that are often cultivated in home gardens. They constitute an heterogeneous group of food plants whose leaves, fruits, tubers, roots, tender stems, flowers, beans or bulbs are consumed as vegetables. For instance, there is a rich diversity of traditional leafy vegetables that are well adapted to a wide range of environments, represent a rich source of micronutrients, and in some cases have economic value (Chweya and Eyzaguirre, 1999). The "African spinach" accounts for various vegetables whose leaves are widely consumed and highly appreciated, including cultivated, semi-cultivated and wild species. Amaranth (*Amaranthus* spp.) is a widespread vegetable that is both cultivated in gardens and harvested in the wild. In addition, most dark green leafy vegetables and yellowish roots are notorious for their superior provision of vitamin A. They thus represent affordable and locally available resources to arrest vitamin A deficiency, which is one of the most extended and critical malnutrition issues. Rural Africa has also native fruit vegetables that excel in adaptation, versatility of uses, nutritional properties, and marketing

potential, such as the African eggplant (*Solanum* spp.) and countless species and varieties of *Cucurbitaceae* (pumpkins, gourds, cucumbers *et al.*). There are also fruit trees that represent tasty, nutritious and somewhat therapeutic food sources, such as the distinguished baobab tree (*Adansonia digitata*), the mango tree (*Mangifera indica*) and papaya (*Carica papaya*).



Farmer with a local variety of *dodo* [amaranth], central Uganda.



Farmer showing an eggplant in her home garden, eastern Uganda.

Every rural community holds a specific array of horticulture crops, depending on the agroecological conditions, agricultural dynamics, and food habits. Humid and sub-humid areas are more suitable for home gardening due to water availability. They usually have richer horticultural diversity and more advanced practices than arid and semi-arid lands.

Field research in Soroti district, in sub-humid Uganda, illustrates the extent and condition of home gardens. Home gardens are ubiquitous in many households, but receive little social recognition at the village level and scarce support from agricultural programmes. Farmers themselves get surprised when a researcher investigates about this farming system and the crops associated. In Soroti district, Teso and Kumam farmers cultivate about 20 home garden crops, including local *Cucurbitacea*, leafy vegetables, fruit vegetables, and fruit trees (table 8). Vegetables, which are locally referred to as *oyototo*, represent an important supplement for local diets and a key source for household nutrition, especially micronutrients. They also include certain leafy vegetables that act as food catalysts ("etigo") during meal preparation. Some of these crops are also found in urban markets (table 9). Thus, they also have a potential in raising rural incomes, if adequate programmes were deployed. In the villages visited in Soroti, home gardens are poorly structured, partly due to recent social turbulences in the region and partly to the decreasing recognition of this agricultural space. Improving the structure, practices and crop diversity of home gardens would certainly improve food production, nutrition, income and labour management. Farmers already hold the genetic resource and knowledge base required, but lack awareness and technical assistance to further develop their home gardens.

Table 8. Selected home garden crops among farmers of Soroti district, Uganda

Local names ⁽¹⁾	English name	Scientific name	Crop category	Edible part	Distinctive micronutrient values
Akolel, okueker	Cucumber	<i>Cucumis</i> sp.	Fruit vegetable	Fruits	
Atungulu	Onion	<i>Allium</i> sp.	Vegetable	Bulbs	Vitamin C
Avokado	Avocado	<i>Persea americana</i>	Fruit tree	Fruits	Vitamin A
Cabbage	Cabbage	<i>Brassica</i> sp.	Leafy vegetable	Leaves	Vitamin C
Eboga, dodo	Amaranth ⁽²⁾	<i>Amaranthus</i> spp.	Leafy vegetable	Leaves	Calcium, Vitamin A
Eboo, boyo	Cowpea ⁽³⁾	<i>Vigna unguiculata</i>	Leafy and grain vegetable	Leaves / Grains	Calcium, Folic acid, Iron, Vitamin A
Ebrinyanya, berejanya	Eggplant	<i>Solanum</i> spp.	Fruit vegetable	Fruits	
Ecadoi, akeu ⁽⁴⁾	Cat's whiskers	<i>Cleome gynandra</i>	Leafy vegetable	Leaves	Vitamin A
Eimulalu, amulalu	Pepper	<i>Capsicum</i> spp.	Fruit vegetable	Fruits	Vitamin A, Vitamin C
Emalakany, malakuany	Roselle	<i>Hibiscus</i> spp.	Leafy vegetable	Leaves	Vitamin A
Emiebe, emiyembe	Mango ⁽⁵⁾	<i>Mangifera indica</i>	Fruit tree	Fruits	Vitamin A, Vitamin C
Enyanya	Tomato	<i>Lycopersicon esculentum</i>	Fruit vegetable	Fruits	Vitamin A, Vitamin C
Esuyo, suyu	Pumpkin	<i>Cucurbita</i> spp.	Leafy and fruit vegetable	Fruits / Leaves	Calcium, Vitamin A
Etigo ⁽⁶⁾	Corchorus, jute	<i>Corchorus</i> spp.	Leafy vegetable	Leaves	Vitamin A
Lavaro	Banana	<i>Musa</i> sp.	Fruit shrub	Fruits	Vitamin A
Mapera	Guava	<i>Psidium guajava</i>	Fruit tree	Fruits	Vitamin A, Vitamin C
Matonda	Passion fruit	<i>Passiflora edulis</i>	Fruit vine	Fruits	Vitamin C
Muchonga	Orange	<i>Citrus</i> sp.	Fruit tree	Fruits	Vitamin A, Vitamin C
Nanasi	Pineapple	<i>Ananas comosus</i>	Fruit vegetable	Fruits	Vitamin C
Pawpaw, apapalu	Papaya	<i>Carica papaya</i>	Fruit vegetable	Fruits	Vitamin A, Vitamin C

1. Local names in Ateso and Kumam languages, based on phonetic transcription from local dialects in villages visited. Taxonomic identification revised after Goode (1989).

2. People consume cultivated, semi-cultivated and wild species of Amaranth.

3. Cowpea is a major grain crop in Soroti, but leaves are equally an important and lasting nutritional source. In fact, cowpea plant, which is often planted close to the homestead and provides leaves for a long time from shortly after seeding till much after harvesting the grains. Accordingly cowpea qualifies as vegetable or home garden crop because of the local uses and considerations.

4. In Soroti area, *ecadoi* is a semi-cultivated plant as it often grows wild in the home gardens. It is also classified as *Gynandropsis gynandra*.

5. In many rural areas of Soroti, mango is often a wild tree, yet it has enormous potential for increased cultivation.

6. *Etigo* is also a generic name for a number of cultivated and wild leafy vegetables that are relevant in local culinary practices (e.g. food preparation).

Sources: Participatory research with Teso and Kumam farmers from different sub-counties of Soroti district, including particularly the villages of Aloet, Amoru, Obak, Obwakol, and Okunguro. Soroti, Uganda, 2001. Nutritional properties according to FAO (1997) and FAO (2001a).

Table 9. Leafy vegetables on sale in Soroti market (central Uganda)

Local name ⁽¹⁾	English name	Scientific name
Ecadoi	Ecadoi / cat's whiskers	<i>Cleome gynandra</i>
Emoros	-	<i>Cyphostemma</i> sp.
Eboga	Amaranth spinach	<i>Amaranthus</i> sp.
Atigo	Jute	<i>Corchorus olitorius</i>
Emalakany	Roselle	<i>Hibiscus sabdariffa</i>
Eboo	Cowpea	<i>Vigna unguiculata</i>
Sukuma-wiki ⁽²⁾	-	[unidentified]

1. Ateso language.
2. *Sukuma-wiki* is a generic name for a group of leafy vegetables with specific culinary uses in East Africa. In this case it represents an unidentified local leafy vegetable.



Women selling leafy vegetables in Soroti market (Uganda).

Source: Survey conducted in Soroti market, Uganda, on 29th November 2001.

Since home gardens are typically spaces of crop diversity, improving home gardening requires the optimal use of local agrobiodiversity, as well as the dynamic integration of additional crops and crop varieties with specific values and uses. Many neglected crops, such as the enormous diversity of African leafy vegetables, constitute important plant genetic resources for developing home gardening in Africa. The introduction of new crops is generally a feasible and desirable strategy, as home gardens boast notable degree of flexibility with low agroecological impact. There are many crops suitable to expand the agrobiodiversity base of home gardens, including leafy vegetables, fruit vegetables, root crops, and legume crops (table 10). The consideration of seed access and seed multiplication aspects is also relevant for the effective and continued development of home gardens.

Table 10. Selected crops for home gardening

Leafy vegetables

Amaranth	<i>Amaranthus</i> spp.
Bitter leaf	<i>Vernonia amygdalina</i>
Blackjack	<i>Bidens pilosa</i>
Cabbage	<i>Brassica oleracea</i>
Cassava	<i>Manihot esculenta</i>
Cat's whiskers	<i>Cleome gynandra</i>
Cowpea	<i>Vigna unguiculata</i>
Drumstick tree	<i>Moringa</i> spp.
Jute	<i>Chorchorus</i> spp.
Kale	<i>Brassica carinata</i>
Leek	<i>Allium porrum</i>
Mustard	<i>Brassica campestris</i>
Nettle	<i>Urtica</i> sp.
Pumpkin	<i>Cucurbita</i> spp.
Rape	<i>Brassica napus</i>
Rosella	<i>Hibiscus sabdariffa</i>
Runner bean	<i>Phaseolus coccineus</i>
Sweet potato	<i>Ipomoea batatas</i>
Taro	<i>Colocasia esculenta</i>
Water spinach	<i>Ipomoea aquatica</i>

Fruit vegetables

African eggplant	<i>Solanum</i> spp.
Bitter cucumber	<i>Momordica charantia</i>
Cucumber, melon	<i>Cucumis</i> spp.
Okra	<i>Hibiscus esculentus</i>
Pineapple	<i>Ananas comosus</i>
Pumpkin	<i>Cucurbita</i> spp.
Sweet pepper	<i>Capsicum</i> sp.
Tomato	<i>Lycopersicon esculentum</i>

Root & tuber crops

Carrot	<i>Daucus carota</i>
Cassava	<i>Manihot esculenta</i>
Hausa potato	<i>Plectranthus esculenta</i>
Oromo dinich	<i>Amorphocallus abessynicas</i>
Potato	<i>Solanum tuberosum</i>
Sweet potato	<i>Ipomoea batatas</i>
Taro	<i>Colocasia esculenta</i>
Yam	<i>Dioscorea</i> spp.

Beans and legumes

Bambara nut	<i>Voandzeia subterranea</i>
Beans	<i>Phaseolus vulgaris</i>
Broad bean	<i>Vicia faba</i>
Chickpea	<i>Cicer arietinum</i>
Cowpea	<i>Vigna unguiculata</i>
Lima bean	<i>Phaseolus lunatus</i>
Locust bean	<i>Parkia clappertonii</i>
Long bean	<i>Vigna sesquipedalis</i>
Mung bean	<i>Vigna radiata</i>
Pea	<i>Pisum sativum</i>
Peanut	<i>Arachis hypogaea</i>
Soybean	<i>Glycine max</i>
Winged bean	<i>Psophocarpus tetragonolobus</i>

Fruit and nut trees

Avocado	<i>Persea americana</i>
Banana/plantain	<i>Musa acuminata</i>
Baobab	<i>Adansonia digitata</i>
Breadfruit	<i>Artocarpus altalis</i>
Cashew nut	<i>Anacardium occidentale</i>
Citrus	<i>Citrus</i> spp.
Cocoa	<i>Theobroma cacao</i>
Coconut	<i>Cocos nucifera</i>
Coffee	<i>Coffea</i> spp.
Guava	<i>Psidium guajava</i>
Jackfruit	<i>Artocarpus heterophyllus</i>
Mango	<i>Mangifera indica</i>
Oil-palm	<i>Elaeis guineensis</i>
Papaya	<i>Carica papaya</i>
Passion fruit	<i>Passiflora edulis</i>
Soursop apple	<i>Annona muricata</i>
Tamarind	<i>Tamarindus indicus</i>

Grains

Maize	<i>Zea mays</i>
Sorghum	<i>Sorghum bicolor</i>

Oil-seed crops

Nug or niger seed	<i>Guizotia abyssinica</i>
Oyster nut	<i>Telfairia pedata</i>
Safflower	<i>Carthamus tinctorius</i>
Sesame	<i>Sesamum indicum</i>
Shea butter	<i>Butyrospermum paradoxum</i>
Sunflower	<i>Helianthus annuus</i>

Herbs, spices et al.

Chilli pepper	<i>Capsicum annum</i>
Coriander	<i>Coriandrum sativum</i>
False cardamom	<i>Afromomum melegueta</i>
Fenugreek	<i>Trigonella foenum-graecum</i>
Garlic	<i>Allium sativum</i>
Marigold	<i>Calendula officinalis</i>
Mustard	<i>Brassica nigra</i>
Neem	<i>Azadirachta indica</i>
Onion	<i>Allium fistulosum</i>
Sugar cane	<i>Saccharum officinarum</i>
Tea	<i>Camellia sinensis</i>
Turmeric	<i>Curcuma longa</i>

Multipurpose crops

Calliandra	<i>Calliandra calothyrsus</i>
Drumstick	<i>Moringa oleifera</i>
Gliricidia	<i>Gliricidia sepium</i>
Guinea grass	<i>Panicum maximum</i>
Leucaena	<i>Leucaena</i> spp.
Pigeon pea	<i>Cajanus cajan</i>
Scarlet wisteria	<i>Sesbania grandiflora</i>
Setaria grass	<i>Setaria anceps</i>
Velvet bean	<i>Mucuna pruriens</i>
Vetiver grass	<i>Vetiveria</i> spp.

Source: FAO (2001a).

Targeting household nutrition

Household nutrition is a central factor in the development of home gardens in rural Africa, due to the extent of malnutrition, the insidious micronutrient deficiencies, and the critical nutrition care needs of people living with HIV/AIDS. In particular, home garden crops are privileged resources for food-based strategies to improve rural nutrition, as they inexpensively provide key nutrients, including particularly micronutrients such as vitamins, calcium and iron (table 11). They are thus a valuable nutritional complement to staple crops.

Table 11. Common home garden crops that are rich in key nutrients

Nutrient	Selected crops
Carbohydrates	Avocado, bambara nut, banana, breadfruit, cashew nut, cassava, coconut, enset, groundnut, maize, millet, oilseed plants (oil) ⁽¹⁾ , sorghum, sweet potato, taro, yams.
Protein	Bambara nut, baobab seeds, beans, cowpea, groundnut, kapok (seeds), melon (seeds), peas, pigeon pea, pumpkin (seeds), soybean.
Fat	Avocado, bambara nut, coconut (cream), groundnut, oilseed plants (oil) ⁽¹⁾ , soybean.
Vitamin A	African spinach ⁽²⁾ , amaranth, bean (leaves), carrot, cassava (leaves), cat's whiskers, chillies, jute, kale, maize (yellow), mango (ripe), okra, papaya (ripe), pumpkin, rape, red palm (unrefined oil), rosella, sweet potato (leaves), sweet potato (yellow/orange coloured roots), many green leafy vegetables.
Vitamin C	Baobab (fruit), cabbage, cashew nut, citrus fruits, custard apple, guava, mango, papaya (ripe), passion fruit, pineapple, sweet pepper (orange), sweet potato (yellow/orange coloured roots), tomato.
Iron	Beans ⁽³⁾ , peas ⁽³⁾ , some green leafy vegetables ⁽³⁾ .

1. Oilseed plants include groundnut, maize, safflower, soybean, and sunflower.

2. African spinach is often a generic name for diverse local leafy vegetables.

3. Combining these foods with vitamin-C-rich foods in the same meal increases Iron absorption.

Source: FAO (2001a).

The goal of household nutrition requires duly consideration to gender aspects in home gardens. Rural women are in general the major actor in home gardening, from crop diversity management to labour, and to food preservation. They also play a critical role in household nutrition through meal preparation. Accordingly, gender considerations are essential to effectively connect home gardens and household nutrition. That demands not only to empower women's roles in home gardening and household nutrition, but also to involve both men and women (and children) in developing home gardening as a nutrition strategy. That is more urgent in view of the scale of malnutrition in rural Africa and the nutritional care needs

of people living with HIV/AIDS, women and children. Gender equality is thus essential to fully incorporate home gardens in community nutrition action.

In some cases, the role of home gardens in household nutrition conflicts with the potential of vegetables in income generation. Home gardening oriented to market exchange raises concerns about equitable food utilisation because food production serving the marketplace may be detrimental to household nutrition. Although income is a key need among the rural poor, established experience among rural development practitioners indicates that income does not often turn into improved nutrition. Accordingly, the promotion and improvement of home gardening requires adequate consideration of equitable food utilisation, so to harmonise income opportunities with household nutrition. In addition, when home gardens generate income, gender equality is also a issue, as women often devote significant efforts in home gardens but are later excluded in the control of resulting income (whilst women tend to be more inclined to spend income in nutrition). Gender equality around home gardens is thus required to optimally use home gardens for household nutrition, either directly through food-based approaches as indirectly through the better allocation of income for nutrition.



Community water well that also serves to irrigate surrounding vegetable gardens in a village in northern Ethiopia.

Food preservation and processing

Food preservation and processing is a relevant aspect for the optimal use of home gardens, as many home garden foods are perishable. Food preservation, processing and storage practices ensure the full use and prolonged availability of those foods.

Traditional techniques for food preservation include drying (sun drying, solar drying, shade drying), blanching, curing, and strategic mixing of certain foods. Rural women hold significant indigenous knowledge, practices and techniques for food processing and preservation. However, these are being abandoned, poorly transmitted, and nearly lost. The erosion of agrobiodiversity also results in the abandonment of associated food processing and

preservation techniques. Traditional food processing and preservation knowledge is tied to techniques that are inexpensive, adapted to local resources, and culturally rooted. For instance, solar drying of beta-carotene-rich fruits and vegetables is an effective and inexpensive technology for the preservation of these vitamin A sources (FAO/ILSIS, 1997).

Consequently, the maintenance and transmission of local knowledge and techniques on food preservation and processing expands the long-term availability and consumption of nutritious foods. It is equally required to explore and deploy technical improvements in order to enhance the quality and durability of foods, to expand food processing and preservation means, and to better meet market and commercial opportunities.

Recommendations

Home gardens are distinctive agricultural spaces, notably neglected, but with significant potential in raising the food security, nutrition, and livelihood of the rural poor. Rural women are prominent actors in home gardens. The promotion and improvement of home gardens requires special emphasis on the following actions:

1. Institutionalise and raise awareness on the value and potential of home gardens among the rural poor, particularly as it affects household nutrition.
2. Expand the agrobiodiversity content of home gardens to improve their food, nutrition and livelihood roles.
3. Deploy agricultural projects that focus on improving home gardens through an integrated approach to the following pillars: (a) the agrobiodiversity content, (b) technical support and best practices, (c) food processing and preservation practices, (d) household nutrition and food habits, and (e) commercialisation options.
4. Support and improve indigenous knowledge relevant to home gardens, such as knowledge on local vegetable crops, traditional food preservation techniques, local food habits, and meal preparation skills.
5. Explore and deploy new home gardening technologies and practices, as well as farmer-based home garden experimentation and improvement.
6. Consider gender as a transversal issue for the effective promotion and development of home gardens, including equal consideration of men's and women's priorities around home gardens, and gender equality on the control of income generated from horticulture.
7. Consider food utilisation issues, including the prioritisation of nutrition (over income) and the securing of gender and generational equality in food access.

6. WILD FOOD PLANTS



Woman displaying wild and preserved food plants in central Tanzania.

Knowledge and consumption of wild food plants

Wild food plants grow in natural conditions and are harvested for their human food and nutrition values. They are relevant in household food security and nutrition in some rural areas, particularly in drylands. They represent relevant food sources during seasonal food shortage periods, and provide good nutritional supplies, notably micronutrients. In some cases, wild food plants may have some economic value in local markets. Wild food plants constitute a component of agrobiodiversity because of the scale of indigenous knowledge, management and uses involved.

Wild food plants are relevant in the food security and nutrition of rural people dwelling arid and semi-arid ecosystems. Dryland peoples know and consume a rich diversity of wild food plants. Field research in the drylands of central Tanzania showed that Gogo communities harvest and consume over 40 different wild food plants (table 12). Rural women are the principal actors around wild food plants because they hold substantial knowledge on their localisation, seasonal availability, properties, preservation practices, and culinary uses.

Wild food plants grow in a wide range of spaces. Some are only located in bushes or in specific natural habitats. Some typically grow close to the fields or in anthropogenic ecosystems, having somehow coevolved with human agricultural systems. In some cases they

are semi-domesticated plants because local people manage them in ways that ensure their conservation and regular availability, even occasionally cultivating them.

Wild food plants suffer large neglect, disregard, and erosion. Agricultural programmes envision their use as a "backward" food security practice, devoting very little attention, if any, to them. Biodiversity initiatives around wild food plants and rural nutrition are also scarce. There is poor scientific knowledge and awareness on the values of wild food plants, such as their nutritional qualities, ecological features, and local uses. This scarce attention and support washes away practical and inexpensive efforts to improve nutrition and income among the rural poor, especially those inhabiting arid and marginal areas.

In addition, the expansion of farming land and the intensification of unsustainable practices of natural resource management are further constraining the space available for some wild food plants, hence undermining their availability and use. Gender inequalities further exclude wild food plants, as rural women are the major actor in their harvesting and use, yet they have little decision-making and receive the least technical and training support. Rural people themselves are increasingly abandoning the use of wild food plants as result of the overall neglect, disregard, and erosion. However, wild food plants have significant values and potential for household food security and nutrition among the rural poor, especially those inhabiting harsh agroecological areas such as the vast dry savannas of Africa.

Table 12. Selected wild food plants among the Gogo people in Dodoma drylands (Tanzania)

Local name ⁽¹⁾	Seasonal availability ⁽²⁾	Part consumed	Preservation ⁽³⁾
Chidingulilu	Dry	Flowers	+
Chimhela	Rain	Roots	-
Chipali	Rain	Leaves	+
Chiwandagulu	Rain / Dry	Leaves	+
Dinhi	Rain	Leaves	-
Fulu	Rain	Fruits	-
Fwene	Rain	Leaves	+
Ikuwi / Upela ⁽⁴⁾	Rain / Dry	Leaves / Fruits	-
Ilende	Rain / Dry	Leaves	+
Kayeba ⁽⁵⁾	Rain / Dry	Leaves	+
Lwamuya	Rain	Leaves	-
Mahulihuli	Rain / Dry	Leaves	+
Manhala	Rain	Leaves / Fruits	-
Matanga	Rain	Leaves / Fruits	-
Mbuli	Rain	Leaves	-
Mhelemehe	Dry	Fruits	-
Mhilile	Rain	Leaves	+
Mkuyu	Rain / Dry	Fruits	-
Mnamha	Rain	Leaves	+
Mnghonjela	Rain	Leaves	+
Msisi	Dry	Fruits	-
Mujinanhandala	Rain	Roots	-
Mzimwe	Rain	Leaves	+
Ndalangwe	Rain	Fruits	-
Ndejeha	Dry	Leaves / Fruits	-
Ngazi	Rain	Leaves	+
Ng'hole	Rain / Dry	Fruits	-
Ng'homwa	Rain	Roots	-
Nghwata	Dry	Fruits	-
Ngologolo	Rain / Dry	Roots	-
Ngwelu	Rain / Dry	Fruits	-
Nhafuta	Rain	Fruits	-
Nhingha	Dry	Roots	-
Nhumba	Dry	Fruits	-
Nhundwe	Rain / Dry	Fruits	-
Nyakifwega	Rain	Leaves	+
Saka	Dry	Fruits	-
Sang'hala	Dry	Leaves / Flowers	-
Sunga	Rain	Leaves	-
Susunha	Rain / Dry	Fruits	-
Udawi	Rain / Dry	Fruits	-
Uwoga	Rain	Mushroom	-
Yagayaga	Rain	Leaves	-
Yambu	Rain	Leaves	-

1. Gogo language.

2. Availability in rain season is important as that is often a food shortage period among the poor.

3. Indicator of indigenous knowledge and techniques for food preservation of such plants.

4. "Ikuwi" and "upela" refer to baobab tree leaves and fruits, respectively. Leaves are mostly available in the rain season, whilst fruits in the dry season.

5. "Kayebe" is a semi-domesticated plant, as it is harvested wild and often cultivated.

Source: Field research in Dodoma region (Tanzania), in 2001, in collaboration with the organisation TAWLAE. Methodology included participatory surveys with Gogo farmers from the villages of Ihumwa, Iringa-Mvumi, Iyumbu, Makangwa, and Mvumi-Makulu, and a farmer workshop held in Iringa-Mvumi, with the participation of farmer men and women from different villages.

Value and potential of wild food plants

Wild food plants represent a versatile agrobiodiversity resource, providing different benefits and opportunities depending on the agroecological conditions, food security dynamics, nutritional needs, cultural dimensions, and other circumstances. The most relevant and distinctive values of wild food plants are as follows:

- Supplementary food source, adding nutritional quality and food variety to local diets.
- Excellent supply of micronutrients (vitamins and minerals).
- Critical food source during seasonal food shortage periods, which are recurrent among the rural poor dwelling in arid lands.
- Inexpensive and easy food source, often requiring low labour inputs.
- Vital ingredient in food habits and culinary practices in some areas of Sub-Saharan Africa, especially for the so-called relishes that accompany main meals.
- Emergency food source, for instance in cases of food shortage, enduring drought, crop failure, and civil conflict.
- Source of income, as some wild food plants may access specific market niches.

Wild plants play a critical food security role in arid and semi-arid environments. Since in these areas dry and rainy seasons are sharply separated, agriculture is restricted to specific periods in the year, thus leaving wide time lapses with limited options for food production. In such periods, food reserves reduce or may become exhausted, whilst the main crops cannot be harvested yet. Wild food plants then become a critical food security resource. Wild food plants represent untapped resources with potential to improve nutrition in arid and semi-arid lands. They play an analogous role to that of vegetable crops in humid and sub-humid areas.

Wild food plants have also a potential in the mitigation of AIDS impact, especially among the rural poor. In particular, they are relevant in three main concerns of AIDS affected households: (i) improving food access, (ii) improving nutrition and health quality, and (iii) alleviating labour constraints related to food production. Wild food plants represent inexpensive, locally available and versatile food sources capable of improving nutrition and health quality. Furthermore, they often represent food sources with low labour requirements, to the extreme that children, aged people and some sick people can participate in their harvesting, provided adequate indigenous knowledge on their localisation and identification has been adequately transmitted. Therefore wild food plants represent a relevant food security and nutrition option for households suffering labour shortages, such as typically those affected by HIV/AIDS. In fact, the recognised role of wild food plants in emergency situations is well extensible to the context of AIDS, which in fact constitutes an emergency scenario.

The wide indigenous knowledge on the preservation and processing of wild food plants further enhances their roles in household food security and nutrition. In this sense, preserved wild food plants can help AIDS affected households and other troubled families to cope with labour shortages, confront sudden food scarcity, or build food reserves for times of acute production constraints. Rural women hold specific indigenous knowledge on preservation and processing for many of their local wild food plants (table 12). These practices optimise the use of those plants for nutrition, long-term food security and marketing activities.

Wild food plants can represent an easy income source, especially if specific policies and programmes were deployed to expand market niches and support the integration of poor rural households in their sustainable harvesting, processing, and commercialisation.

Recognition, promotion and sustainable use of wild food plants

The increased use of wild food plants represents a useful strategy for household food security and nutrition, especially as rural communities confront hunger, malnutrition, and labour shortages in arid and semi-arid lands. This strategy requires the agricultural development sector to recognise their value and potential, hence redefining agricultural extension support, agriculture research programmes, biodiversity conservation initiatives, and even food policies. Raising recognition and awareness at the rural grassroots level is equally required, as wild food plants have been losing value and use among rural people themselves. Thus promoting awareness and use around wild food plants at the community level is a critical task. Suggested initiatives may comprise conducting participatory surveys of wild food plant diversity (as illustrated in table 12), incorporating wild food plants in farmer field schools programmes, and integrating wild food plants in nutrition education.

A workshop organised in a village in Dodoma region (central Tanzania) in December 2001 illustrated the potential of training and participatory efforts to improve awareness and use of wild food and medicinal plants. Participant farmers, both women and men coming from different villages in the area, welcomed very much the initiative because it allowed them to increase awareness around local resources, discuss nutrition and healthcare issues, and exchange knowledge around wild food and medicinal plants (such as knowledge on edible plants, locations, preservation techniques, herbal treatments, and culinary uses).



Gogo people displaying wild food plants in a farmer workshop held in Iringa-Mvumi village (Dodoma, Tanzania).

The optimal use of wild food plants relies upon preservation and processing practices. Traditional preservation techniques of wild food plants are inexpensive, labour-sensitive, and effective means to enhance their roles in household food security and nutrition. Their improvement would further enhance the contribution of wild food plants to household nutrition and improve their marketing prospects.

The promotion of wild food plants needs due regard to gender issues, particularly since rural women are the main actor in the harvesting and use of wild food plants. Gender inequalities are often at the roots of the disregard and poor valuation of wild food plants. At the same time, recognising and promoting wild food plants would enhance women's role in household food security and nutrition, whilst advancing awareness on gender dimensions in natural resource management.

Although wild food plants are often destined for household consumption, some have commercial value or potential. They may thus represent an income source if market niches existed. Adequate policy and programme support strategies would be needed, including improved preservation, processing, and marketing skills.

The promotion of wild food plants also demands support for community natural resource management, so to ensure sustainable use and facilitate equitable access. A number of initiatives may be useful, such as arresting practices that reduce natural habitats where wild food plants grow, deploy sustainable harvesting schemes, and implement conservation strategies. In fact, the issue of wild food plants falls on the interface between the conservation and the use of biodiversity. In addition, some highly valuable wild food plants may be considered for cultivation, such as in home gardens (in fact, crops historically evolved from the domestication of certain wild plants that had specific values and uses).



Farmer with *emoros*, a wild food plant whose leaves are consumed in central Uganda.

Recommendations

Wild food plants are neglected and declining agricultural resources with potential relevance in the food security, nutrition and livelihood of communities inhabiting arid and semi-arid lands. For instance, they could help AIDS affected households to cope with labour constraints, malnutrition, and even income needs. Suggested action comprises as follows:

1. Promote wild food plants as valuable resources to improve household food security, nutrition and income, especially among the rural poor and AIDS-affected households dwelling drylands and other marginal areas.
2. Incorporate wild food plants in agricultural development programmes, placing special emphasis on their nutritional values.
3. Conduct initiatives to transmit and improve indigenous knowledge and practices for processing and preserving wild food plants.
4. Incorporate wild food plants in community nutrition and healthcare advising, including aspects like nutrition information, meal preparation skills and local knowledge exchange.
5. Conduct participatory surveys on wild food plants to raise local awareness on the extent and potential of these resources (see table 12 above as example of a survey).
6. Support or establish community management systems for the conservation and sustainable use of wild food plants.
7. Prioritise wild food plants in biodiversity conservation initiatives in arid ecosystems, integrating conservation biology issues with local nutrition and development concerns.
8. Explore strategies for the commercialisation of wild food plants among poor rural families: for example, creating market niches, promoting co-operatives, and improving preservation-processing techniques.
9. Conduct research on wild food plants, including nutrition analysis, ecological aspects, preservation and processing techniques, and domestication potential.

7. MEDICINAL PLANTS



Traditional healer next to a mango tree, whose bark is used for treating diarrhea (central Uganda).

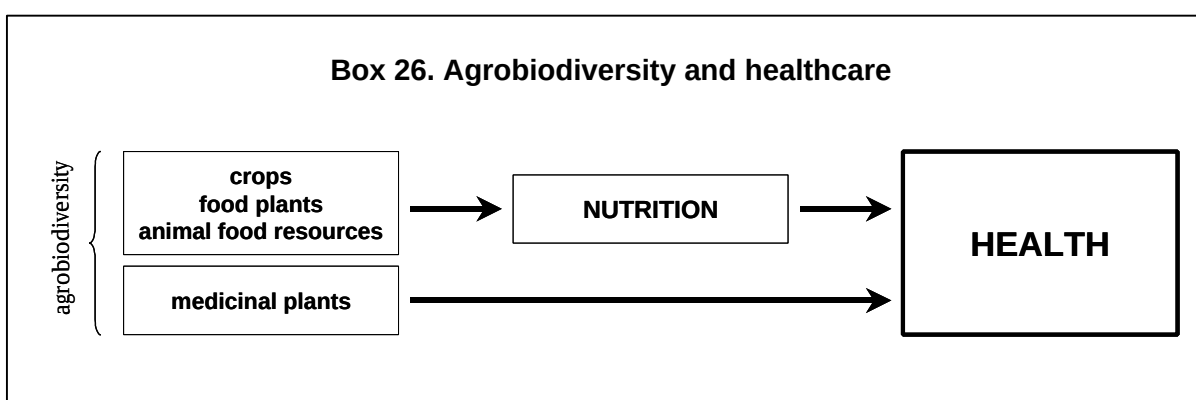
HIV/AIDS and healthcare

Healthcare is one of the critical development issues in Africa, more than ever in the context of the HIV/AIDS epidemic, which represents an unprecedented health crisis. HIV/AIDS is not only a recent pandemic, but it is one with multifaceted health impacts. In the first place, HIV/AIDS causes immune debilitation, which facilitates and aggravates many other diseases and health problems, such as tuberculosis and chronic diarrhoea. In addition, HIV/AIDS seems to lead to malnutrition, owing to an associated loss of appetite and other changes in metabolic functioning, which further aggravates health quality and limits health recovery among people living with HIV/AIDS. Finally, the concurrence of HIV/AIDS and malnutrition creates a downward cycle of health deterioration, which is alarming in Sub-Saharan Africa because this region accounts for the world's highest HIV/AIDS epidemic levels and malnutrition depth.

Although new medical treatments for a wide range of health problems related to HIV/AIDS are rapidly developing, the African poor cannot access them because of global economic and trade inequalities. Therefore, in the struggle against HIV/AIDS is urgently required to dissolve the economic, trade and legal barriers that impede the poor to access modern HIV/AIDS treatments and other healthcare therapies. That is, in fact, an international moral responsibility because such barriers define the borderline between prompt death and prolonged survival among poor people living with HIV/AIDS (Garí, 2003). At the same time,

it is necessary to incorporate every instrument available to address the healthcare needs of the rural poor, including the broad range of health concerns related to the HIV/AIDS epidemic.

In healthcare action, the major role for the agricultural sector is to improve nutrition. In this sense, agrobiodiversity-based actions to improve household nutrition has been already proposed. In addition, medicinal plants represent an agrobiodiversity component that is equally relevant to mitigate HIV/AIDS impact, particularly among the rural poor. In fact, medicinal plants represent valuable healthcare resources in rural Africa, especially in view of the vitality of indigenous healthcare systems, the shortage of modern healthcare services, and the disgraceful discrimination of the African poor in accessing modern medicines. The consideration of medicinal plants in the struggle against HIV/AIDS demands closer collaboration between the agricultural and health sectors.



Medicinal plants and traditional healthcare systems

Medicinal plants constitute a fundamental component of traditional healthcare systems in rural communities throughout Africa. It is commonly accepted that about 80% of people in the developing world rely on traditional medicine for most of their healthcare issues (Bodeker, 1999; Joyce, 1992; King, 2000; WHO, 2002). In Africa, rural people depend heavily, if not exclusively, on medicinal plants, indigenous healthcare knowledge and traditional medicine to meet their healthcare needs.

The roles of both herbal treatments and traditional healers in healthcare in the developing world have been much neglected. Traditional and modern healthcare systems are often regarded as incompatible. Health policies and programmes focus exclusively on modern healthcare systems, practices and resources. Policy-making spheres, which are heavily influenced by a urban and Western mentality, regard traditional medicine and herbal treatments as ineffective or inappropriate for formal healthcare. However, the promotion of medicinal plants and the integration between traditional and modern healthcare systems are very promising.

In fact, the World Health Organisation has been for some time promoting medicinal plants in healthcare action, as well as encouraging the integration between modern and traditional healthcare systems, in a number of ways: World Health Assembly's policy resolutions (WHO, 1988; WHO, 1991), instruments for research and evaluation of traditional medicine (WHO,

2000), and most recently a strategy on traditional medicine (WHO, 2002). In synchrony with a growing number of local initiatives in different countries of Sub-Saharan Africa, the joint United Nations programme to combat HIV/AIDS (UNAIDS) is also exploring and endorsing the need to improve the whole HIV/AIDS care response though fostering the use of medicinal plants and enhancing traditional healthcare systems (King, 2000). In addition, regional initiatives and South-South co-operation in the non-governmental sector are equally emerging (Bodeker *et al.*, 2000). However, there is still much to progress to achieve for the effective integration of medicinal plants and the associated indigenous healthcare knowledge in healthcare responses in rural Africa, especially through policy-making, healthcare services, research programmes, and rural healthcare development plans. The collaboration between the agricultural and health sectors is indispensable for this progress.

Medicinal plants represent unique biodiversity resources with notorious relevance in healthcare among the rural poor in Africa. Traditional healers constitute the principal actor in the use of medicinal plants for healthcare, as they hold knowledge on medicinal plant use and they are legitimised healthcare practitioners in their communities. Overall, medicinal plant diversity and the associated indigenous healthcare knowledge represent affordable and locally available means to address many diseases and health problems, such as those related to HIV/AIDS. They are notably important for the rural poor, who often lack other healthcare support options. Overall, medicinal plants provide a number of therapeutic, cultural, and economic values in rural Africa, especially as follows:

- Medicinal plants are often useful and effective resources for healthcare.
- Medicinal plants are at the core of primary healthcare systems at the rural community level, and rural people commonly use and trust them.
- Medicinal plants are affordable and available compared to other healthcare resources, when not the only healthcare resources available for the rural poor.

In Sub-Saharan Africa, the use of medicinal plants is connected to traditional healers. In fact, the number of traditional healers far outnumbers that of modern, Western-educated doctors (table 13). The importance of traditional healers and the reliance on medicinal plants is more manifest in rural areas, as modern healthcare systems are more limited and even declining, whilst the environment facilitates the access and use of medicinal plants.

Table 13. Healthcare in Africa: Modern doctors and traditional healers

Country	Population	HIV infection rate (%)	Estimated number of modern doctors	Estimated number of traditional healers	Ratio
Ghana	20,000,000	5	1,200	50,000	1 / 42
Zambia	10,000,000	> 20	900	40,000	1 / 44

Comments: "Modern doctors" refers to Western-educated doctors. In Zambia, about 70% of the 900 modern doctors are foreign. The *ratio* in the last column indicates "modern doctors versus traditional healers".

Source: Naur (2001).

Medicinal plants and HIV/AIDS

Traditional healers hold knowledge and experience on a wide range of medicinal plants that are useful to address a variety of AIDS-related health issues and problems (box 27). In particular, they highlight herbal treatments relevant for skin diseases, respiratory infections, diarrhoeal disorders, mouth problems, fever, loss of appetite, and weakness, among others. For instance, a healer from Bukumankola village, in Kamuli district (Uganda), emphasises that the leaves of *katoko* plant are useful for treating skin problems (Monica Kasaja, per. com., 2001). Another healer from the same district, but in Budini village, indicates that *muzanganda* plant is effective to raise appetite and support health strength in AIDS patients and others, to the point that he has been cultivating it in his herbal garden since the mid 1990s due to increasing need and use (David Mwire, per. com., 2001). In addition, traditional medicines and local healthcare knowledge may prove particularly useful to address locally specific diseases, which are likely to become exacerbated by AIDS, yet ignored in national healthcare systems.

Box 27. Roles of medicinal plants in combating HIV/AIDS

Medicinal plant diversity and the associated indigenous healthcare knowledge provide locally available and affordable means to address a wide range of health concerns related to HIV/AIDS, particularly as follows:

1. Herbal treatments to heal sexually transmitted diseases, thus reducing the risks of HIV infection and re-infection.
2. Herbal treatments to support immune strength and sustain an overall health well-being, thus serving to control the progression of HIV infection and to mitigate the potential impact of opportunistic diseases.
3. Herbal treatments to raise appetite, since loss of appetite is a frequent problem in AIDS patients that causes a downward cycle of malnutrition, weakness, and sickness.
4. Herbal treatments to address a number of HIV/AIDS associated and opportunistic diseases, such as respiratory infections, diarrhoeal diseases, and skin problems.

Source: Field research, including contributions from traditional healers, Uganda, 2001.



Embutamu plant, used to treat gastrointestinal problems (Uganda).

Traditional medicinal plants and indigenous healthcare knowledge therefore represent a strategic force in healthcare action, capable of complementing modern healthcare systems. In addition, they are often the only healthcare option available or affordable in rural areas, as modern healthcare services are often missing, deficient or expensive. Accordingly, the healthcare response to HIV/AIDS in rural Africa has much to benefit from the conservation, use and improvement of medicinal plants and herbal treatments. This requires mobilising indigenous healthcare knowledge, empowering traditional healers, and fostering the co-operation between traditional and modern healthcare systems. The collaboration between the agriculture and health sectors around medicinal plants is equally valuable to enhance the healthcare response to HIV/AIDS in rural communities of Africa.



Female healer with a sample of *katoko*, which is a medicinal plant used against skin diseases (Uganda).

The organisation THETA in Uganda

In Sub-Saharan Africa, there is a growing number of grassroots efforts to promote medicinal plants, improve local herbal treatments, and support traditional healers as a community-based strategy to mitigate HIV/AIDS health impact (King, 2000). Non-governmental organisations and community-based initiatives are the leading forces in this innovative work that recognises the role of traditional medicine and aims at the joint collaboration between traditional and modern healthcare practitioners. Organisations and initiatives such as THETA in Uganda and Tanga AIDS Working Group in Tanzania are pioneering examples. A Regional Task Force on Traditional Medicine and HIV/AIDS in East and Southern Africa has been also established (Bodeker *et al.*, 2000). In addition, the World Health Organisation, UNAIDS, the World Bank and other international development agencies are increasingly supporting these neglected but emerging initiatives for enhancing healthcare among the poor through traditional medicine. The agricultural sector is due to become a crucial partner for this endeavour, particularly as it matters the conservation, use and expansion of medicinal plants.

Among these initiatives, the organisation THETA ("Traditional and Modern Health Practitioners Together against AIDS and other diseases"), in Uganda, has led a pioneering mobilisation around medicinal plant use, traditional healthcare, and community-based healthcare approaches. Their activities and approaches illustrate the potential of working around medicinal plants and indigenous healthcare systems. The organisation THETA emerged in response to the scale of HIV/AIDS health crisis and to the enormous deficiency in modern healthcare instruments in rural Uganda. It carries out an innovative effort to promote the use of medicinal plants and to strengthen community healthcare capacities to combat HIV/AIDS epidemic and other priority health concerns among the rural poor. It concentrates on three inter-related issues with a priority focus on the HIV/AIDS epidemic, as follows:

1. Medicinal plants: conservation, use and research.
2. Traditional healers: Training, organisational aspects and empowerment.
3. Increased collaboration between traditional and modern health practitioners.

Concerning medicinal plants, THETA is advancing two major initiatives: (i) the creation of a medicinal plants garden, and (ii) the conduction of clinical research on specific medicinal plants used by traditional healers to address AIDS-related health issues.

THETA and the Pharmacology Department of Makerere University in Kampala (Uganda) have jointly established a medicinal plants garden for the purposes of conservation, research and demonstration. This herbal garden is located in Bujuuko village, in the Central Region of Uganda, and comprises about 1 ha of land. It contains over 80 species of potentially useful plants in the treatment of diseases and health problems, including specifically, but not limited to those related to HIV/AIDS. The medicinal plants garden serves three main purposes: (i) to promote the conservation, recognition and institutionalisation of medicinal plant resources; (ii) to test the domestication viability of some medicinal plants, so to increase their use, reduce the time spent by traditional healers in harvesting them into the bush, and prevent their depletion in natural habitats owing to increased use; and (iii) to facilitate research on medicinal plants. In essence, medicinal plants gardens represent an advantageous strategy for the conservation, use, research, and promotion of medicinal plants.



Entrance to THETA's Medicinal Plants Garden in Bujuuko village (Central Region, Uganda).

THETA is also conducting a pioneering clinical research on the effectiveness of some traditional medicinal plants in specific AIDS-related diseases (table 14). This clinical research has been conducted jointly with the Pharmacology Department of Makerere University. It initially focused on a selected group of medicinal plants that healers use to treat skin problems (such as particularly herpes Zoster) and diarrhoeal diseases, which are two major AIDS-associated diseases for which available modern treatments seem to be poorly effective. The preliminary results of clinical research show not only that many of such medicinal plants are useful to treat either both herpes Zoster or AIDS-associated chronic diarrhoea, but that they are even more effective than existing modern treatments. Effectiveness might even increase when these medicinal plants are used by local healers themselves, who generally apply a combination of medicinal plants rather than a single medicinal plant alone.

Table 14. Medicinal plants and HIV/AIDS

Ugandan medicinal plants that prove useful to treat herpes Zoster and diarrhoea, which are two major diseases associated with HIV/AIDS ⁽¹⁾

Local name ⁽²⁾	Scientific name ⁽³⁾	Plant group	Medical use
Akasogaasoga	<i>Ricinus communis</i>	Euphorbiaceae	Herpes Zoster
Kibwankulata	<i>Iboza multiflora</i>	Labiatae	Herpes Zoster
Lukandwa	<i>Securinega virosa</i>	Euphorbiaceae	Herpes Zoster
Luwoko	<i>Phytolacca dodecandra</i>	Phytolaccaceae	Herpes Zoster
Mutulika	<i>Phyllanthus guineensis</i>	Euphorbiaceae	Herpes Zoster
Embutamu	<i>Hydrocotyle mannii</i>	Umbelliferae	Diarrhoeal diseases
Enkami	<i>Priva cordifolia</i> ⁽⁴⁾	Verbenaceae	Diarrhoeal diseases

1. After clinical studies, these medicinal plants used by traditional healers in Uganda have proven useful in treating two HIV-related diseases (herpes Zoster and chronic diarrhoea), even more effectively than available modern treatments.
2. Luganda language.
3. Provisional taxonomic identification, revised according to the *International Plant Name Index*.
4. Variety *flabelliformis*.

Sources: Clinical research carried out by the organisation THETA and the Pharmacology Department of Makerere University, Kampala, Uganda. Internal data sources from THETA. Personal communications with Claire Nsubuga (co-curator of THETA's herbal garden), Joseph Tenywa (manager of THETA's resource centre), and Dominic Mwebe (traditional healer). Uganda, 2001.



Three medicinal plants that are used and effective to treat skin problems and, particularly, herpes zoster: *kibwankulata*, *akasogaasoga*, and *luwoko* (Uganda).

THETA is also addressing supplementary issues around the optimal use of medicinal plants. In particular, it is exploring options for the production and commercialisation of medicinal plants, so to expand the use of medicinal plants into urban populations, which would simultaneously expand income opportunities in rural communities. In addition, THETA is exploring appropriate genetic resource management aspects on medicinal plants, including specific seed policy issues and the integration of medicinal plants in formal seed-banks.

Along with the support for the conservation and use of medicinal plants, THETA fosters grassroots mobilisations around healthcare, particularly through empowering traditional healers to enhance community healthcare responses to HIV/AIDS. The most relevant efforts are the training of traditional healers and the promotion of associations of traditional healers. Under the lead of THETA, the emerging associations of traditional healers in Uganda are institutionalising, improving and strengthening traditional healthcare and the use of medicinal plants. These associations are deeply oriented towards HIV/AIDS issues, but not limited to them. They conduct a wide range of activities, including training in improved traditional healthcare and in HIV/AIDS health issues, discussion on practices and treatments, exchange of medicinal plants and indigenous medical knowledge, community health awareness, local education on HIV/AIDS, collaboration with modern health practitioners, and deployment of initiatives for the conservation of medicinal plants (such as home herbal gardens). In addition, traditional healers and other grassroots health practitioners, such as midwives, can also raise awareness and provide advice on nutrition and health issues to the broad community. In general, traditional healers constitute an important actor to strengthen community-based healthcare systems, to optimise the use of medicinal plants, and to advance collaboration between traditional and modern healthcare systems (box 28).

Box 28. Potential roles of traditional healers in HIV/AIDS mitigation

- Use of affordable medicinal plants and herbal treatments to address the health issues and diseases related to HIV/AIDS, such as opportunistic diseases, lost of appetite, and malnutrition trends.
- Community awareness and education on HIV/AIDS.
- Generate public spaces for the open dialogue and consideration of HIV/AIDS issues in the community.
- Community HIV prevention action, such as education, provision of condoms, and advise on sexually-transmitted diseases.
- Counselling to HIV infected people, including psychosocial support and nutrition advice.
- Explore collaboration with modern health practitioners and services.
- Carry out initiatives for the exchange of medicinal plants, knowledge and experiences of relevance to HIV/AIDS through networking and associating with other healers.
- Conduct initiatives for the conservation of medicinal plant diversity and the effective transmission of indigenous healthcare knowledge.
- Improve traditional healthcare practices through joint research efforts with scientists and modern doctors.
- Combat stigmatisation and discrimination around HIV/AIDS, exposing misleading assumptions around this epidemic and helping recognising the dignity of people living with HIV/AIDS.

Sources: Fieldwork in Uganda and Tanzania conducted in 2001; experiences of THETA in Uganda; and King (2000).

Concluding remarks

Medicinal plants represent useful and affordable resources to address some of the health problems associated to HIV/AIDS, particularly for poor people in Africa. They often represent the main, if not the only means for healthcare among the rural poor, since modern medical treatments remain inaccessible, unaffordable or deficient in rural Africa. Accordingly, the agricultural sector should consider, design and deploy strategies to foster the use of medicinal plants as part of the response to HIV/AIDS. Such strategies include conservation and research on medicinal plants, support to indigenous healthcare knowledge, improvement of traditional herbal treatments, and collaboration between traditional and modern healthcare systems. Suggested activities include as follows:

- Promote the participatory elaboration of inventories of medicinal plants used to treat health problems related to HIV/AIDS. Compare the use of these resources across regions and cultures. Train healers to keep records of the use and effectiveness of selected medicinal plants.
- Establish partnerships with universities and research centres to conduct clinical studies on the effectiveness and properties of selected medicinal plants of relevance in key health problems, including especially those related to HIV/AIDS.
- Create herbal gardens as spaces for conservation, demonstration, research and diffusion of medicinal plant resources. Promote home herbal gardens at the community level, supporting traditional healers and interested households in setting up these fields.
- Promote spaces for the dialogue and cooperation between traditional and modern health practitioners.
- Support and improve the healthcare role of traditional healers at community level, through training (from HIV/AIDS issues to improved traditional healthcare), creating associations of traditional healers, conducting actions to enhance the collaboration with modern doctors in the fight against HIV/AIDS, and encouraging spaces for critical exchange of knowledge around medicinal plants.
- Promote community education on the value and limitations of medicinal plants and traditional herbal treatments, generating critical thinking at the community level to foster the use of medicinal plants but also to reduce misassumptions and abuses.
- Develop policies and programmes that recognise the value of medicinal plants, the potential role of traditional healers, and the need to establish cooperation channels between traditional and modern health systems.
- Promote meetings and regional initiatives around medicinal plants and healthcare, in order to: (i) share inventories on medicinal plants that are used to address health problems related to HIV/AIDS, evaluating critically their effectiveness and means to further experiment and promote them; (ii) share methodologies and results from clinical studies conducted on medicinal plants; and (iii) share experiences on the mobilisation of traditional healers and on the dialogue/cooperation between traditional and modern health practitioners in the fight against HIV/AIDS.

8. COMMUNITY SEED SYSTEMS



Members of the farmer field school in Agoriata village examining their yam multiplication plot (eastern Uganda).

Seed insecurity in rural Africa

Seeds represent an indispensable asset for farming. They include both generative and vegetative propagating parts of plants that safeguard the production and reproduction of agriculture. Seed security and food security are strongly connected (FAO, 1998).

Seed security can be defined as a state in which farmers have access to sufficient amounts of viable seed to conduct their farming practices, with due regard to the diversity of crop genetic resources that they need for food security and they prefer for cultural reasons. Seed security relies upon economic, agroecological, nutritional, cultural and technical factors, as follows:

- Economic factors: e.g. seed access, affordable seed supply.
- Agroecological factors: e.g. adequate seeds to manage local agroecological conditions.
- Nutritional factors: seed diversity needed to meet household nutritional needs.
- Cultural factors: seed diversity to suit local food habits and customary farming practices.
- Technical factors: e.g. ability to save seed on-farm, local seed selection and breeding.

Among poor farmers in rural Africa, seed insecurity is a recurrent problem, even worsening in recent times due to a wide range of causes (box 29). In addition, field research in different rural areas of East Africa revealed that the HIV/AIDS epidemic is further aggravating seed insecurity, mainly due to the associated economic and labour impacts (box 30).

Box 29. Selected causes of seed insecurity in Africa

- Crops left in the field overtime due to various reasons (such as lack of labour, sickness, or civil strife) impair the provision of viable seed for following crop seasons.
- Poor harvests due to factors such as climate, pests, or deficient farming practices result in a reduced provision of farm-saved seed.
- Famine shocks deplete farm-saved seed to meet household food and survival needs.
- Formal seed production and distribution mechanisms, both public and private, often focus on a narrow group of crops and varieties that do not suit the diversity of crops and farming systems of small-scale farmers.
- Certain seed improvement technologies and the arbitrary introduction of "improved" varieties disrupt local genetic resource dynamics and undermine farmer seed systems, due to crop gene flows between modern and farmer varieties and genetic displacement.
- Poverty and destitution impede the purchase of seeds.
- The reduction of public agricultural extension services weakens one of the few external seed sources that were available and affordable for the rural poor.
- Credit-based seed provision schemes are often inaccessible or unaffordable to poor, vulnerable and destitute farmers, who are precisely those in most need of seed.
- The expansion of the private seed industry benefits big farming systems to the detriment of smallholder farmers, creating the false illusion that seed systems are developing.
- The absence of community-based seed systems limits options towards farmer seed autonomy through the local conservation, improvement, production, and distribution of the seed diversity required by farmers.
- Inadequate facilities and methods for seed storage impair the maintenance of sufficient and safe seed resources, mostly due to poverty, lack of labour, and insufficient technical and financial support.
- Civil strife and war erode the basis of seed security owing to disrupted farming practices, devastated cropland, and forced displacement, among others.
- Food and seed aid introduces alien genetic resources that disrupt farmer seed systems.

Source: Personal elaboration based on miscellaneous sources and field research.

Box 30. AIDS impact on seed security

- In AIDS affected households, labour stress impairs farming practices and consequently affects the provision of sufficient amount, diversity and quality of farm-saved seed; partly due to reduced cultivation area, decline in the crop diversity farmed, poorer yields, and inadequate timing for seed selection.
- AIDS affected households are at a higher risk of suffering food shortages and thus be forced to consume their saved seed in order to meet immediate food needs.
- AIDS affected households suffer impoverishment that limits their ability to buy seeds.
- AIDS affected households suffer labour and economic constraints that impair their maintenance of adequate granaries and seed storage structures.
- AIDS affected households may suffer a reduced participation in community life due to sickness, time shortages or social discrimination, thus losing opportunities for seed access through community interaction and community support mechanisms.
- AIDS affected households require more comprehensive and versatile seed systems, particularly including access to a broader range of seed diversity, so to maintain sufficient flexibility and options to cope with their pressing conditions.

Source: Analysis based on field research conducted in Ethiopia, Tanzania and Uganda (2001).

In general, field research and reports from the field indicate that seed insecurity is expanding among the rural poor and is aggravating their food insecurity. Poor farmers often lack sufficient amount and diversity of seed to properly conduct agriculture. Seed insecurity is more acute among the poorest farmers, including female-headed households and AIDS affected households. In particular, AIDS-affected farmers indicate that their labour and economic constraints unable them to secure and access the variety and amount of seed they need (box 31). They also lack alternative mechanisms for seed security. In such households, seed insecurity further impairs their capacity to cope with food insecurity risks and the AIDS impact. In fact, seed insecurity narrows the options for planning and conducting agricultural systems in ways that better address the circumstances and needs owing to HIV/AIDS. Adequate seed resources are useful to cope with specific agroecological conditions, to optimise the use of available labour capacities, to meet nutritional needs, and to explore livelihood choices. In consequence, seed insecurity creates a downward cycle of food insecurity.

Furthermore, seed security is indispensable for the effective implementation of the agrobiodiversity components that have been examined throughout this strategy paper, in previous chapters. In this way, seed security is essential to effectively promote neglected crops, conduct agricultural diversification, and improve home gardens.

Box 31. Seed insecurity among farmers suffering from HIV/AIDS:

The case of Joyce Igoru

Joyce is a woman farmer suffering from HIV/AIDS who lives in central Uganda. She is a widow with two children and limited land available. She reports experiencing severe and aggravating seed insecurity, in similar patterns as many other AIDS-affected households report. At time of seeding, Joyce Igoru lacks enough seed due to different causes, including:

- she could not save enough seed in the previous agricultural season due to labour constraints;
- she lacks labour capacity and economic resources to improve granaries and seed storage facilities, which results in damages to her food and seed resources through time;
- she had to use some saved seed to feed her children and escape famine;
- she cannot afford to buy seeds in the formal sector because "they are expensive"; and
- there are no solid community mechanisms for local access to seed.

As a consequence, seed insecurity worsens her situation and creates a downward cycle of food insecurity and further seed insecurity.

In addition, Joyce indicates she was among the latest people in the village to get cassava seeds of the *nigera* variety. This variety is resistant to the cassava mosaic virus and arrived to the community after a massive incidence of this crop disease in East Africa in the mid-1990s. The fact that a highly vulnerable household as hers was the latest to get seed (some seasons later than the first households got it) represents a community failure in the distribution and exchange of seeds. Therefore, community seed systems could represent an important mechanism to bring more equity in seed access and to improve the agricultural prospects of the poorest and most vulnerable families.

Joyce Igoru indicates that she would like to improve her access to seeds and, particularly, to seeds of more crop varieties. For instance, when farming cassava, she currently uses three varieties, and she thus needs to access and manage seed diversity: *ongada* is an early maturing variety that provides her with a fast food supply; *aladu* is an indigenous variety with notable resistance to cassava mosaic virus (aside from being the best variety to feed her children, with good palatability and a good market value); and the introduced variety *nigera* is resistant to the cassava mosaic virus and easy to harvest. Accessing seed diversity, in terms of



both crops and varieties, allows her to better plan agricultural activities according to her land availability, agroecological conditions, labour capacity, food and nutrition needs, and economic circumstances. However, insufficient seed diversity reduces her options and coping capacities to achieve food security and overcome HIV/AIDS constraints. Joyce Igoru indicates that there are not community mechanisms for access to seed, that accessing seeds from outside the village is difficult for her alone, and that improved seeds are unaffordable for her. When discussing about building community seed systems, she indicates this would improve her access to affordable seeds and to sufficient seed diversity, as well as expanding her seed knowledge and even allow her to engage in some seed experimentation with fellow farmers.

Farmer Joyce Igoru looking at a local variety of cassava in her field (central Uganda).

Source: Field research in central Uganda, 2001. Joyce Igoru gave permission to diffusing her case in order to raise awareness on the situation of AIDS affected families.

Formal versus farmer seed systems

The major seed arenas are formal seed supply systems and farmer seed dynamics. The formal seed sector consists in the comprehensive system of modern plant breeding, certified seed production, and seed marketing (Louwaars, 1994). Farmer seed systems represent the wide range of farmer and indigenous practices in seed selection, improvement, conservation, production, and exchange.

Farmer seed systems are the most important source of seed in the world, more so in Sub-Saharan Africa. They are at the roots of plant domestication and agricultural development, and account for most of the vast crop genetic diversity in the South. Farmer seed systems remain an active source of crop diversification and evolution, but are increasingly constrained and impaired because of socio-economic discrimination, institutional neglect and the impact of formal seed breeding systems.

Formal seed systems carry out advanced seed breeding and qualitative seed production, yet they supply only a small portion of the total amount of seed planted by farmers and of a limited range of crops only. The institutional support for formal seed breeding and supply systems has not resulted in significant improvements in seed security among smallholder farmers, but in some cases has increased their seed vulnerability. In fact, the widespread promotion and overestimated importance of formal seed supply systems in the developing world has resulted in the virtual denial and rapid erosion of farmer seed systems (Louwaars, 1994). The uneven relationships between formal and farmer seed systems have impaired the accomplishment of seed security among poor and smallholder farmers in Africa, particularly through two simultaneous processes: (i) the scientific and institutional support for formal seed systems, with a bias towards supporting large-scale and commercial agriculture; and (ii) the persistent neglect, even despise for farmer seed dynamics.

Seed interventions need a profound reconsideration. The poor connection between formal and farmer seed systems is a key concern (Almekinders and Louwaars, 2002). There is a pressing need to generate and deploy grassroots seed strategies that truly attend the conditions and needs of smallholder farmers, especially those that are poor, those that rely on seed diversity for nutrition and livelihood, and those that suffer major difficulties such as AIDS impact. Accordingly, the issue of seed security requires the following considerations in agricultural development policies and programmes:

1. Examine critically formal seed systems in order to visualise their perverse impacts and adjust their potential to the specific needs of smallholder farmers.
2. Recognise the values of, and improve farmer seed dynamics.
3. Build community seed systems as a strategy for integrated, grassroots-oriented and participatory seed security.

A critical analysis of formal seed systems

The formal seed sector emerged with the aim of improving agricultural production through targeted seed research and technological efforts. It focuses on producing improved crop varieties with higher yield potential and on delivering high quality seed. However, the formal seed sector has often resulted irrelevant, if not detrimental, to the circumstances and needs of subsistence and smallholder farmers (box 32).

Box 32. Limitations and impacts of the current formal seed sector

- The formal seed sector usually focuses on uniform and predictable environmental conditions, yet most farmers inhabit and confront a wide range of agroecological conditions and risks.
- The formal seed sector serves predominantly farmers that conduct high-input agriculture (based on chemical use and capital investments), that can rely on crop specialisation, and that have good prospects of agricultural market exchange. However, most farmers in Africa are poor, need to manage a wide range of crops for food and livelihood security, and are permanently struggling with market integration.
- Formal seed systems attend a limited range of crop genetic diversity, yet many poor farmers rely on agrobiodiversity to sustain agriculture and coping with their most pressing agricultural development needs. Formal seed systems focus on selected crops with market value, therefore neglecting the agrobiodiversity dynamics of many rural people. In other words, the number of crops and varieties produced and distributed through the formal seed sector is very limited compared to the genetic resource portfolio that African farmers need and use.
- The current formal seed sector erodes the resilience and sustainability of local genetic resource systems. The technical means used for modern seed breeding and the impulsive diffusion of improved varieties often generate random genetic crossings at the farmer level. Smallholder farmers often report that improved seeds have "anomalous" behaviour that confuses them, disrupts their seed resources, and impairs their agricultural practices. Hybrid and composite varieties are indiscriminately distributed in rural areas without adequate information and awareness on their potential effects on local crop genetic resources and customary practices for saving seed on-farm. These "seed drifts" undermine the stability of farmer varieties and disrupt local seed management systems. Consequently, farmers suffer uncertainty and increasing distrust over both their own varieties and the introduced ones. Agricultural and seed experts aggravate the problem when unilaterally encourage the expansion and adoption of improved varieties, with no consideration for the conditions and concerns of farmers. The features, limitations and potential risks of adopting modern improved varieties are insufficiently communicated to farmers when such resources are released, distributed and promoted. This erratic, misinformed and even paternalistic dissemination of modern crop varieties among smallholder farmers causes seed and agricultural vulnerability, which in turn aggravates seed insecurity.
- The centralised seed production framework has been built to resemble the successful European and North American seed industries (Louwaars, 1997), with little consideration to the different agricultural, economic and productive conditions of most African countries.
- The formal seed sector is at odds with the economic conditions of poor farmers. The adoption of formal sector's seeds often engages farmers in a seed dependency cycle. For instance, the use of pure breed selection methods in the formal seed sector requires farmers to purchase new seed every seeding season because such seeds undergo rapidly genetic decline and breakdown. In addition, modern varieties are often unaffordable to poor farmers. The impoverishment of rural people and recent privatisation trends in the formal seed sector are further processes that reveal the disharmony between formal seed systems and the conditions of poor farmers.

Overall, seed programmes and policies have for decades ignored the agricultural, food security, nutrition and livelihood needs of most smallholder and poor farmers in the developing world. New trends of privatisation and genetic manipulation in seed production are likely to exacerbate this situation and, therefore, perpetuate, if not worsening, seed insecurity among poor African farmers (box 33).

Box 33. Trends of privatisation and genetic manipulation in seed production

The privatisation of formal seed systems along with a crisis of the public agricultural sector in the developing world are further limiting the options for seed security among smallholder farmers. Agricultural extension services, which often represent feasible and affordable sources of seed for poor farmers, are either shrinking or suffering funding shortages. The private seed sector is gaining increasing political and public space, yet not necessarily with the aim to, or capacity of better serving the needs of the poorest farmers. The private seed sector focuses on medium to large-scale farming, on specific crops with top market prospects, on agriculture in favourable environments, and on its own plans for crop development. The seed security needs of poor farmers are again left aside. At some extent, the private seed sector also influences the public agricultural development agenda, with limited options for participatory approaches to seed security. Despite the formal private seed sector is able to provide high quality seed, it does not help the seed diversity dynamics of poor farmer households.

In addition, several countries in Africa are suffering increasing corporate pressures to adopt genetically-modified crops through both political influences and aggressive marketing. The new transgenic seeds for selected crops are expensive for poor farmers and hence a threat to their economic security (Garí, 2002b). They also entail serious environmental risks. In addition, the whole debate on genetically-modified crops drives attention on local genetic resources and farmer seed systems away from the public and policy arenas.

These privatisation and genetic manipulation processes may simply left seed insecurity problems unresolved, providing no tangible means for coping with it at the grassroots level. The poorest and most vulnerable farmers, such as orphan-headed households and AIDS affected households, will simply be left behind because the ongoing policy objectives for seed production and privatisation have little significance to them.

Most of the analysis expressed above (boxes 32-33) suggests that the formal seed sector in its current trends is irrelevant to most of the circumstances and pressing needs of AIDS affected households. Although breeding crop varieties that are labour-saving and nutritionally valuable can be a promising line, the way formal seed systems work will not likely benefit poor AIDS affected households. For poor farmers, the formal seed sector is often irrelevant and detrimental. It is irrelevant because it releases and promotes varieties that do not serve their priority needs and circumstances. It is detrimental because it undermines their local crop genetic dynamics, and it also threatens their economic security (for instance, the adoption of modern seeds tends to force farmers to permanently purchase new seed). In addition, the engineering of "nutritionally-rich" modern varieties often represents a bizarre and expensive scientific endeavour that ignores nutrition alternatives that are more ecologically, culturally and economically sound, such as enhanced use of local vegetable resources and improved agricultural diversification practices. These latter practices are more effective, affordable and considerate for smallholder farmers and poor rural communities.

Consequently, alternative seed supply systems are required to confront the shrinking of agricultural extension services, to launch economically sound strategies for seed security that suit poor households and particularly those affected by AIDS, and to foster sustainable livelihood approaches. These considerations challenge the formal seed sector to undergo a review and reformulation to better respond to the needs and circumstances of smallholder farmers and, in particular, to attend and enhance farmer seed systems.

Reconsidering farmer seed dynamics

Farmer seed systems comprise a wide range of farmer and indigenous practices in seed selection, improvement, preservation, production and exchange. Farmer's knowledge, practices and values about local seeds are indispensable forces for seed security, yet they undergo neglect, continued erosion, and lack of technical and financial support. Farmer seed systems comprise profound knowledge about local cultivars, including agroecological features, such as drought resistance and labour requirements, and the use of genetic resources, such as food processing options and meal preparation.

Farmer seed systems are usually able to manage a rich portfolio of crop genetic resources, including both crop diversity and a vast cultivar diversity. This diversity responds to the agricultural, food and livelihood needs of most farmers, including farmers inhabiting harsh environments or heavily relying on subsistence agriculture. Farmers and communities, through the management of gene transfers in their agricultural systems, control in judicious ways the plant genetic resources that satisfy their food and livelihood needs (Senghor, 1999). Farmer seed selection, often conducted by women, represents a key practice for seed security. In addition, the conservation, access and use of farmer varieties provides agricultural, food and nutrition roles that are, however, absent or limited with the traits offered by modern varieties (box 34, and boxes 18-19 above in chapter 3).



Woman examining her traditional varieties of sorghum, which provide her more benefits than modern varieties deployed in the area (eastern Uganda) - see box 34.

Box 34. Examples of the roles of farmer seed dynamics in AIDS mitigation

Eastern Uganda

In Busia area, modern sorghum varieties have been distributed and encouraged. However, farmers stress certain advantages of local varieties of sorghum compared to modern varieties. Such advantages are precisely of the highest relevance for poor and constrained farmers, such as particularly AIDS-affected households, as follows:

- a) Local varieties of sorghum can be "ratooned", whilst the modern varieties that have been released in the villages cannot. "Ratooning" is a farming practice consisting in cutting the stems at ground level just after harvesting so that the plant grows again and produces another crop without the need for seeding. This practice represents an enormous labour saving strategy, as land preparation and seeding activities are not required. In addition, it reduces the time needed for the following harvest and it economises seed inputs. These advantages in terms of labour saving, faster food provision, and economic security are particularly critical for AIDS-affected households and poor farmers. However, modern varieties, such as those developed in formal research centres and released in Busia area, impede this practice because, according to farmers, they cannot grow again from the roots.
- b) Farmers report that local varieties can be stored for a longer time than modern varieties. Storage is a critical need for both food and seed security, particularly among poor farmers. Food storage is a critical mid-term risk management strategy, especially when households are uncertain about their capacity to do adequate farming and harvesting in the following season.
- c) Farmers report that modern sorghum varieties are more susceptible to bird attacks than local varieties. Consequently, the presumed higher yield potential of modern varieties could be spoiled by the time of harvest, therefore questioning costly research and breeding activities.

Central Tanzania

In Iyumbo village, in Dodoma region, drought is a major agroecological constrain. Staple crops are traditionally pearl millet and sorghum. Maize is a minor crop, for which farmers have developed and maintain a few local varieties (such as *chipejere*), that are fairly adapted to drought. The Tanzanian government has for some time encouraged nation-wide maize as a basic crop to enhance both national food security and rural income. However, the improved varieties that agricultural programmes have deployed and encouraged in the area do not resist the drought levels of Dodoma, such as is the case for varieties 4142 and *ilonga*. These introduced varieties produce big cobs and provide high yields under good rainfall, but they fail in years affected by harsh drought, which are precisely the years prone to severe food insecurity in Dodoma villages. In addition, farmer varieties of maize are rather early maturing, thus providing food in a short period (about 2 months), which is a valuable feature when food reserves are depleted, as it often happens in AIDS affected households and among the poorest farmers. Moreover, the adoption of modern varieties forces farmers to purchase new seed almost every year, since the improved varieties are hybrid and composite seeds that degenerate after one or two successive croppings. Consequently, farmer seed saving is void. Many farmers state nowadays that they prefer their local varieties, but they now lack enough seed because the persistent promotion of modern varieties over the previous years has displaced local varieties and has even altered the genetic stability of the remaining farmer varieties.

Source: Field research in Tanzania and Uganda, 2001.

In addition, in vast remote areas of Sub-Saharan Africa, where large rural populations dwell, farmer seed dynamics are the only consolidated and reliable means for seed security. That is likely to continue in the near future. Accordingly, seed policy and programme support should primarily build on existing systems, so to be more effective. However, the limitations of farmer seed systems often serve as pretext for neglecting them, rather than exploring suitable initiatives that would channel scientific and technical support to improve them. The challenge ahead is, thus, to recognise and improve farmer seed systems in order to enhance, not undermine, farmers' abilities and practices on seed diversity and seed security. Initiatives around participatory plant breeding, farmer training in seed management, and close co-operation between formal and farmer seed systems represent promising ways ahead.

Grassroots efforts towards seed security

The limitations and failures of formal seed systems, on the one hand, and the increased recognition of the value and potential of farmer seed dynamics, on the other, are inspiring renovated efforts for seed management and seed security with a grassroots approach, including both farmer-based and farmer-led initiatives.

The building of grassroots seed systems has been mostly activated through initiatives around participatory plant breeding (Eyzaguirre and Iwanaga, 1996; Friis-Hansen and Sthapit, 2000). These efforts foster the development of plant breeding through partnership between scientists and farmers, enhancing farmers' access to seed resources. Participatory plant breeding ranges from decentralised and grassroots-oriented breeding to various degrees of farmer involvement in crop conservation and breeding. It implies a transition from classical plant breeding, which focuses on high-yielding breeds of selected crops under favourable agroecological conditions, towards the context and needs of smallholder farmers.

In response to expanding seed insecurity, farmers themselves are also engaging in, or exploring a variety of community actions around seed resources, often in alliance with different organisations and projects. These grassroots efforts suggest good prospects for building more comprehensive community-based responses for seed security. In such initiatives, local seed systems and indigenous seed knowledge play a prominent role.

Seed fairs are a relevant grassroots activity for seed conservation, exchange and access. They evolve from informal seed exchange activities that farmers have been conducting since time immemorial, and can become an institutionalised mechanism for seed access at the grassroots level. Since 1997, rural seed fairs organised in different districts of southern Tanzania have proved successful in empowering farmers to address seed issues and to improve seed security (Synnevaag and Mkandawile, 2000). With the support of local agricultural services, national research centres and international organisations, rural seed fairs improve seed supplies to farmers through building up local seed systems. Rural seed fairs equally serve to generate awareness on seed issues, foster the exchange of seed resources, facilitate the transmission of indigenous seed knowledge, introduce gender approaches to seed security, and generate debate around strategies to improve farmer seed systems. Overall, rural seed fairs do not only improve seed security at the farmer level, but can also expand public awareness on the relevance of local seed systems and the need to explore alternative means to

improve seed security, including participatory strategies, gender approaches, and the effective integration of indigenous seed knowledge and practices.

In addition, farmer field schools represent a community-based agricultural forum that can provide farmers with renewed opportunities for seed security (field research, 2001). For instance, some farmer field schools in Busia district, in eastern Uganda, have set up on-farm multiplication plots to produce and distribute yam cuttings in their villages. They set up these seed production plots to facilitate local access to yam seedlings after the cassava mosaic virus devastated cassava production in the area. In addition, the farmer field school in Agoriata village has also established a commercial plot for sweet potato in order to raise income for the field school. This plot, which comprises over 5 local varieties and 3 improved varieties of sweet potato, also contributes to seed diversity conservation, experimentation, production and diffusion within the farmer group and the village.



Sweet potato field of a farmer field school, containing a diversity of varieties (Agoriata village, eastern Uganda)

Finally, seed security issues are becoming part of the agenda of the few AIDS-action organisations that are incipiently entering the agricultural domain. In this line, the

organisation Partage-Tanzania, which provides support for AIDS and war orphans in northwest Tanzania, has established about 15 demonstration farms with multiplication plots to improve seed access among the poorest farmers, especially households fostering AIDS orphans and rural women groups (field research, 2001). Consequently, AIDS-action organisations and projects are potential catalysers for seed access initiatives at the farmer level. In addition, the organisation THETA in Uganda, which supports traditional healthcare systems and medicinal plants as strategic action for HIV/AIDS healthcare responses, is exploring both seed policies and seedbanks initiatives on medicinal plants. Their demonstration herbal garden represents an innovative effort towards seed management on medicinal plants, which are important in combating major healthcare needs in Africa such as malaria and HIV/AIDS (see chapter 7, on medicinal plants, for further details).

These examples suggest the potential of grassroots efforts for seed security. The overall goal is to develop farmer seed systems and farmer seed autonomy through the mobilisation of all possible resources and knowledge, both indigenous and modern.

Community seed systems

The expanding seed insecurity in rural communities demands concerted responses, the cooperation between formal agricultural services and farmer organisations, and the integration between indigenous seed knowledge and modern seed science. In this sense, the development of community seed systems represents a key grassroots strategy for seed security, particularly for poor peasants and communities prone to seed insecurity. The goal of building community seed systems is to empower farmers in seed security through strengthening their local seed dynamics and enhancing the cooperation between farmer and formal seed systems.

Community seed systems represent farmer and community efforts dealing with conservation, experimentation, improvement, production and distribution of seed resources. Farmer seed dynamics (also called informal or local seed systems) are primary components for community seed systems, including their associated genetic diversity, indigenous seed knowledge, and farmer seed practices. They need support and strengthening through adequate knowledge, practices and technologies drawn from formal seed systems (Almekinders and Louwaars, 2000). These community seed strategies empower smallholder farmers in seed security, addressing aspects such as conservation, characterisation, selection, breeding, production, exchange and distribution of crop genetic resources. Building community seed systems entails the following processes:

- a) focus on community seed security, placing emphasis on the poorest and most vulnerable households;
- b) participation of farmers in seed security strategies;
- c) promotion and improvement of indigenous seed knowledge and practices; and
- d) equitable and participatory relationships between the formal seed sector and smallholder farmers.

Community seed systems comprise the wide range of initiatives, instruments and practices, conducted at the farmer grassroots level, that contribute to community seed security (box 35).

For instance, community seedbanks represent an initiative with growing prospects for strengthening farmer capacities in the conservation and management of a diversified portfolio of genetic resources. They have proved a successful and multipurpose strategy for seed security in the developing world, yet they have been the least experimented and implemented in Sub-Saharan Africa. Furthermore, rural seed fairs allow cross-community exchange of seeds and the associated seed knowledge. In general, the options for community seed systems are wide and varied, depending on local seed conditions and constraints, crop diversity, extent of indigenous seed knowledge, contribution of the formal seed sector, available support capacities, and imaginative programme support, among other factors.

Box 35. Suggested initiatives for community seed systems

- Community seedbanks
- Rural seed fairs
- On-farm seed multiplication plots
- Participatory plant breeding, including farmer-based and farmer-led initiatives for crop varietal selection, research and development
- Promotion and improvement of indigenous seed preservation practices
- Community seed exchange and supply mechanisms
- Farmer field days
- Community seed solidarity funds
- Community seed stocks
- Community seed diversity registers
- Small-scale seed storage infrastructure
- Farmer seed networks and associations
- Partnerships and co-operation between the formal seed sector and rural community organisations
- Community committees of seed experts
- Participatory seed policy-making
- Community-based seed emergency and rehabilitation networks
- Farmer seed training programmes
- On-farm seed production and commercialisation
- Appropriate seed technology transfer
- Seed modules in rural education programmes
- Community agrobiodiversity committees and organisations

Source: Personal compilation.

Building community seed systems requires concerted action from different seed sectors, including agricultural extension services, seed projects, seed policy-making, and the formal seed sector. In particular, support and co-operation from the formal seed sector is indispensable to improve farmer seed practices and crop genetic resources. In this sense, community seed systems represent an alternative force for seed security where farmers, scientists, national agricultural agencies, international organisations, and even the private sector are all called upon.

Community seed systems also represent grassroots spaces to overcome futile controversies between farmer and modern seed dynamics. They dilute dichotomies such as traditional

varieties *versus* modern bred lines, conservation of farmer landraces *versus* modern breeding, and farmer knowledge *versus* seed technologies.

If appropriately designed, community seed systems can serve a wide range of inter-related purposes, such as: (a) expanding seed access to poor and seed-insecure farmers in the community, (b) strengthening farmer capacity to conserve and use local agrobiodiversity, (c) empowering farmers to understand and confront seed issues, (d) fostering participatory analysis in the adoption of modern varieties, (e) creating social mechanisms for integrating the most marginalised farmers in community seed dynamics, and (f) generating grassroots spaces for discussion over seed and seed security issues. For instance, community seed systems empower farmers to address the erratic arrival of modern improved varieties with adequate consideration about agrobiodiversity and farmer-based seed security. They equally provide options to address the expansion of genetically-modified seeds, allowing farmers to access information, raise awareness, and deploy instruments of control. Finally, community seed systems represent a farmer space for learning and exchanging experiences about seed security.

Seed relief

Seed security action demands a review of seed relief, especially as agricultural and humanitarian emergencies expand in Africa and require seed relief efforts (Garí 2001b). In addition, the scale of HIV/AIDS impact is likely to demand targeted seed assistance due to the strong correlation between AIDS impact and seed insecurity. The interface between HIV/AIDS and seed relief raises specific concerns and demand appropriate practices (box 36). Furthermore, local seed resources and indigenous seed knowledge deserve full recognition and integration in seed relief interventions (box 37). In essence, seed relief should not consist in flooding villages with seeds, but restoring farmer seed systems and farmer seed autonomy with due regard to the environmental, socio-economic, and cultural conditions.

Box 36. Agricultural emergencies and seed relief in the context of HIV/AIDS

Seed relief is a central component in agricultural emergency interventions, since it represents the primary basis for agricultural rehabilitation. In the context of AIDS, emergency action requires the design and deployment of seed relief in accordance with the needs of AIDS-affected households. Relevant practices comprise as follows:

- Promoting non-labour intensive crops to help coping with AIDS-related labour shortages.
- Providing seed relief for a diversified set of crops in order to support household nutrition and restore the specific agricultural practices of women, among other benefits.
- Providing a diversity of seed resources that can assist every AIDS-affected household to plan an agricultural system that better suits their needs and possibilities, helping them to balance labour, agroecological management, income, and nutrition, among others.
- Promoting seed varieties that enable low-input agricultural systems, so to safeguard the household economy and help AIDS-affected households to better absorb the economic burden owing to HIV/AIDS.
- Conduct seed relief that is ecologically and culturally sensitive, conforming to the indigenous knowledge systems, farmer seed systems and local food habits. This practice will optimise agricultural rehabilitation, as AIDS-affected households need access to seeds that they know and trust.
- Deploying a seed relief combination that aims at rebuilding farmer seed systems, including components for creating community-based seed systems.

Another consideration around seed relief in the context of HIV/AIDS is related to the need of strengthening farmer seed dynamics. In development practice there is an extended belief that the more complex a problem is, the more sophisticated the solution should be. In the seed sector, this legitimates the systematic deployment of modern seed types, even most recently genetically-modified seeds. These modern seeds are supposedly superior to local ones and are encouraged as a means to overcome labour shortages, productivity limits, drought and other constraints. Indigenous and local seed types are disregarded as "useless" to meet the needs of poor rural people, and increasingly displaced as result of modern development discourses and emergency interventions. However, neither modern varieties constitute an agricultural miracle, nor traditional varieties are hopeless residues from the past. In fact, small-scale farmers have for decades managed their crop genetic resources to meet their circumstances and needs, with notable success as demonstrated by their rich crop genetic diversity and their success to develop agriculture in the most extreme conditions. Accordingly, there is an urgent need to design and deploy seed relief in ways that truly restore farmer seed systems and farmer seed autonomy.

In essence, households suffering emergencies, HIV/AIDS and other difficult conditions need first and foremost that their customary seeds and seed dynamics are restored and functioning again, rather than "experimenting" with new or exogenous genetic resources. This is an urgent need, yet often ignored or poorly attended.

Source: (Garí, 2001b)

Box 37. Ecologically and culturally appropriate seed relief

Analysis of seed relief in Aga-Terke village (Gulomahda), Ethiopia

In the village of Aga-Terke, and in surrounding areas of Martha P.A., in Eastern Tigray (Ethiopia), farmers cultivate two main local varieties of wheat: *teselemo* [black] and *shahan* [white]. *Teselemo* is an early-maturing variety (circa 3 months) that is resistant to drought, poor soils, and some local diseases. *Shahan* is less resistant to agroecological constraints but, under favourable climatic conditions, can provide a higher yield, aside from having excellent properties for making bread.

As result of war in the late 1990s, wheat seed relief in this village consisted basically in the supply of the variety HAR-1685, which is a high-yielding variety (HYV) developed by the formal crop breeding sector. Governmental regulations and, in some cases, unavailable local seeds in the markets encouraged the distribution of this high-yielding variety to the detriment of farmers seed types.

Farmers in Aga-Terke lack both knowledge and custom around the distributed HAR-1685 variety. In addition, this modern variety requires the use of chemicals to ensure growth. Although conventional agronomists may regard HAR-1685 as an advanced wheat variety for increasing wheat productivity, farmers have to deal with an alien variety that is at odds with their agricultural dynamic and may render them more vulnerability. In particular, this modern variety entails the following paradoxes:

- It is not connected to the farmers' agroecological systems and practices.
- As a high-yielding variety, it is highly dependent on chemical inputs (e.g. fertilisers, pesticides), which may generate a vicious debit and impoverishment circle among poor farmers.
- It is likely to be more vulnerable to adverse local agroecological conditions, so that farmers may suffer increased food insecurity.
- Its high-yielding potential is probably dependent on depleting soil nutrients, thus undermining the prospects of agricultural sustainability and long-term food security, particularly in arid lands and poor soils such as in the highlands of northern Ethiopia.
- As the case for many high-yielding varieties, its yield potential will start declining after a few cropping seasons owing to genetic segregation, thus forcing farmers to purchase seed again, incurring in further expenses and loosing their seed autonomy.

Farmers of Aga-Terke, when asked about which type of seed relief they would prefer, tended to say that they would like to receive seed of the three mentioned wheat varieties: their two native varieties (to reconstruct their seed system) and the improved variety ("to experiment it"). However, when requested which variety they would choose if seed relief was limited, farmers tended to say that they preferred the *teselemo* variety because they know it is resistant to the local agroecological constraints (mainly drought and poor soils) and, thus, it is more reliable in providing a minimum amount of wheat grain for the family.

This case illustrates that understanding, respecting, and supporting farmers' rationale, concerns and needs is highly relevant for a successful agricultural rehabilitation process. This is more critical in the context of HIV/AIDS, as households suffer heavy and manifold constrains in their labour, agricultural, economic, and food security systems. Enhancing farmers' autonomy in seed access is essential for the recovery process.

In other areas of Ethiopia, seed relief comprised an organised seed market, which allowed farmers to purchase seeds according to their criteria and needs, and therefore plan a tailored agricultural rehabilitation. Accordingly, farmer-based seed relief systems, such as distribution of seed vouchers and organisation of local seed fairs, would prove particularly valuable in the context of HIV/AIDS, yet they are not still the norm in seed relief. They would strengthen the autonomy of every household to plan a tailored agriculture and rehabilitation process according to their specific needs, constrains and priorities, with due regard to their specific agroecological conditions, labour availability, nutritional needs, and food security concerns.

Overall, seed relief systems that support, rather than undermine, customary seed systems and farmers' decision-making are fundamental in the context of HIV/AIDS. They are more likely to enhance the autonomy and capacity of poor households to develop coping strategies tailored to their specific conditions.

Source: Extracted from Garí (2001b: figure 8), based on field research in East Trigray, Ethiopia, September 2001.

Picture: Farmer with local wheat variety *teselemo* in East Tigray (Ethiopia).



Concluding remarks

At the seed insecurity impasse, community seed systems represent affordable, effective and sound responses for seed security at the farmer level. They bring tangible benefits and opportunities to the seed security needs of the poorest and most vulnerable rural households. In fact, the rural poor often lack resilient seed systems to ensure affordable and sustained access to the seed diversity required to meet their specific agroecological, nutritional and livelihood needs. Building community seed systems represents a valuable strategy to empower the rural grassroots in seed security through catalysing the conservation, use, improvement, exchange and diffusion of crop genetic resources in the communities.

In conclusion, community seed systems comprise a wide range of potential initiatives that empower farmers in seed management. They create new spaces and opportunities for the interaction between different seed stakeholders, including farmers, scientists, agricultural institutions, the formal seed sector, and rural development projects. The goal is to strengthen local seed systems through the integration of seed knowledge, appropriate technology transfer, and efforts oriented to community participation.

9. LIVESTOCK AND AGROPASTORAL SYSTEMS



Herd of livestock in the dry savanna of central Tanzania.

Introduction

Livestock represents an important asset for food and livelihood security throughout rural Africa. For many rural people, it is a source of food, nutrition, income, power, clothing, manure, identity and social cohesion. In particular, livestock is an indispensable productive resource for pastoral communities that dwell in the vast arid lands of Africa, where farming is limited or impracticable. Farm animals are also a supplementary agricultural resource for some poor farmers, either in the form of agropastoral systems or through farm animal management. In Africa, the management of livestock relies significantly on indigenous knowledge and traditional practices.

In Sub-Saharan Africa, livestock comprises a rich animal diversity that comprises the following categories: bovines (e.g. cattle, buffalo), camels, small ruminants (e.g. goats, sheep), poultry (e.g. chicken), pigs, and little livestock (e.g. honey bee). It provides many functions and benefits to rural livelihoods in different ways (box 38).

Box 38. Livestock and rural livelihoods in Africa

Livestock diversity is an essential component of agriculture in Sub-Saharan Africa. It is important in a wide range of environmental, socio-economic and cultural conditions. For instance, pastoral communities dwelling in arid ecosystems depend heavily, if not exclusively, on domestic animal diversity for their subsistence and livelihood, such as in the Sahel and some southern African drylands. In addition, many rural communities have developed agropastoral systems that integrate farming and the management of farm animals, such as in parts of East Africa. Furthermore, livestock is an important asset for power and labour management, such as among smallholder farmers in the Ethiopian highlands, who rely on oxen for traction and donkeys for transport. Finally, livestock can enhance the overall agricultural systems, food production and income of many farmers across Africa, yet it is an asset often difficult to attain and highly vulnerable to household economic pressures.

Multi-functionality and potential of livestock production

Livestock diversity provides many services and benefits to rural people in Africa. It represents a valuable source of food, nutrients, income, cash, soil fertility, clothing, and power. Livestock is equally an important asset in agroecological adaptation, cultural dynamics and social cohesion. However, the multiple functions of livestock at the rural grassroots level have not been duly recognised, especially in Sub-Saharan Africa, partly as a result of cultural prejudices (Lebbie, 1996). Promoting livestock production with emphasis in the wide range of values and potential of livestock in pastoral and farming communities offers good prospects for enhancing food security and sustainable rural development. Integrated livestock support can simultaneously contribute to the health and socio-economic needs of AIDS affected households, such as in diversifying their diets, providing them with alternative income sources, offering options to cope with labour constraints, and strengthening social support mechanisms.

The consideration of the multi-functionality of livestock is indispensable for effective livestock support among poor pastoralists and smallholder farmers. Key components of the multi-functionality of livestock resources are as follows:

1. **Food security and household nutrition.** Livestock is an important source of nutrition and food security. It provides high quality food in the form of meat, eggs, milk and dairy products, which can contribute significantly to diversify and improve the diets of both rural and urban populations. Livestock products are excellent sources of protein and some key micronutrients that are generally scarce in grain and root staples. In HIV/AIDS action, livestock food products are highly valuable for its nutrition and health values.
2. **Rural livelihoods and economies.** Livestock has a good potential to enhance rural livelihoods and activate rural economies. Livestock is a highly valuable income source thanks to products such as meat, eggs, milk, dairy products, wool, skins and oils. Appropriate livestock development may thus contribute to economic diversification, although poor pastoralists and farmers in Africa often lack access to markets and security for fair prices. Livestock also represents a defence against crop failure and income shocks. Raising and keeping livestock helps in asset building. In addition, livestock development can help easing gender-based economic inequalities; in fact, many poor women often gain some cash from the management of livestock, which helps them attending essential household needs (box 39). Finally, there are good prospects for livestock expansion in the developing world due to growing urban populations and their associated diet changes (Delgado *et al.*, 1999). These trends bring excellent options for food and livelihood security in rural Africa. However, it is required to formulate livestock policies and programmes that address the needs and capacities of poor pastoral and farmer communities, aiming at their integration in food processing and marketing chains.
3. **Agroecological management.** Livestock provides many environmental benefits and options for agroecological management. However, it has been unduly blamed for causing environmental degradation (Ehui *et al.*, 1998). Although livestock overpressure and the abandonment of adapted traditional livestock management practices pose environmental risks, livestock provides many environmental benefits and options for sustainable agriculture. In the first place, livestock represents a practical and inexpensive means for

enhancing soil fertility, improving crop productivity and saving expenses related to the use of inorganic fertilisers. That contributes to both the economic security of poor farmers and the environmental sustainability of farming. In this sense, using livestock for fertilising fields can help poor rural people to destine their scarce financial resources to medical attention for the sick and education for the children, instead of purchasing chemical fertilisers. In addition, livestock (particularly indigenous livestock) often provides the only practical means of using vast areas of natural grasslands, such as arid ecosystems, where crop production is impractical or arduous (Rege and Bester, 1998). Livestock also provides a means to use fallow lands during long dry seasons and, in general, it converts crop residues and fibre materials of no value into food and cash.

4. **Animal power and labour management.** Livestock represents an important source of power, principally draught power for farming and transport. In fact, livestock remains the most important, if not the sole form of non-human power available for poor farmers in much of the developing world (Delgado *et al.*, 1999). In this sense, the use of livestock saves enormous labour efforts and increases the production/labour ratio in farming. This potential of livestock is highly relevant for labour-constrained households, such as particularly those affected by HIV/AIDS and those holding a heavy proportion of children and aged people. In fact, the introduction or reintroduction of livestock in many rural areas of Africa would decisively change the power sources available for farming and transport, and thus improve the labour conditions. However, the introduction or reintroduction of large livestock requires due consideration of environmental impacts, financial capacity for purchase, and transfer of adequate knowledge on livestock management.
5. **Cultural values and social services.** The social and cultural functions of livestock in rural Africa is a relevant issue. For pastoral peoples, livestock is a key constituent of their cultural identity and lifestyle. In many African rural societies, keeping livestock is also connected to social status and represents an asset for social activities (for instance, exchange of livestock is often used for sanctioning marriages). In addition, livestock often plays a role of enhancing social cohesion and social support, which is relevant for food security and HIV/AIDS mitigation. In this sense, people having livestock, such as cattle or goats, belong to a "social group" of livestock keepers, a sort of "invisible" brotherhood where members support each other in livestock management and other concerns (box 40). Consequently, keeping livestock enhances social inclusion and provides access to social support mechanisms. For AIDS-affected households, raising livestock may not necessarily represent a labour burden, but may entail social dynamics that precisely relieve labour loads, whilst providing food and economic benefits. A final issue related to the socio-cultural dimensions of livestock is about the persistence of cultural barriers in the use of livestock resources. For instance, some rural societies ban women or children from the consumption of certain livestock species or animal parts, thus constraining the prospects of raising nutrition. That requires education and nutrition projects aiming at breaking these illegitimate cultural barriers and defending the best use of available animal food resources to improve nutrition of all rural people.



Farmers plowing a field with the help of livestock in central Ethiopia.

Box 39. The potential of goats in supporting rural women

Small ruminants, pigs and poultry are livestock resources easy to manage; for instance they can be raised in backyard areas. They can also improve the food and livelihood security of poor women, if adequate livestock support is provided through gender-sensitive projects. These livestock species can also be useful for farmers with land shortages. In fact, livestock enables poor and landless farmers to earn income using public, common-property or marginal areas, such as open grasslands or backyards.

Goats, in particular, represent an important, yet neglected livestock species in Africa, with good prospects to enhance food and livelihood security. Goats are easy to manage, are adapted to a wide range of agroecological conditions (including tropical areas and drylands), are short-cycle animals, provide high-value food such as meat and milk, and just require some environmental caution to avoid degradation of some grasslands. These traits are key in agricultural responses to HIV/AIDS because they are responsive to the labour, nutrition and economic security needs of AIDS-affected households: e.g. goats demand low and flexible labour efforts, provide good nutrition sources, and represent an economic asset. In general, developing countries are more efficient at producing meat and milk from small ruminants, particularly goats and sheep.

The donation of small ruminants to poor and troubled households represents an intervention that is economically feasible and that easily improves the food, nutrition and capital of beneficiaries through a labour-responsive effort. For instance, in central Uganda, the organisation Teso AIDS Project donated a few goats to female-headed households affected by HIV/AIDS. Three years later, most beneficiary households had a significant increase in their number of goats, reported no much difficulty or labour burden in managing the donated animals, and have certainly improved their diets and their economic security.

A final consideration for livestock programmes is the tendency, among poor households, of having more small ruminants, such as sheep and goats, and less cattle or camels. This trend probably results from their economic conditions, labour capacity, and livestock management aspects. Accordingly, livestock support programmes should attend those livestock resources that better suit the circumstances and needs of poor and constrained households, such as female-headed households and AIDS-affected households.

Source: Field research in Uganda and Tanzania, 2001. Delgado *et al.* (1999).

Box 40. Livestock and social inclusion: Implications for HIV/AIDS action

Field research in central Tanzania revealed that families possessing livestock often support each other in the management of livestock, as well as develop stronger social ties. For instance, a livestock keeper can entrust their herd to another livestock keeper, even for a considerable period of time. This practice optimises labour efforts (when having to bring the animals for grazing far away), or simply helps livestock herders to cope in case of having no labour capacity or time available to care for the animals. This support is arranged through non-monetary agreements, such as may be the right to use part of the milk production or receiving part of the offspring. These cooperation arrangements among livestock keepers assists the management of farm labour, since they help optimising labour destined for livestock and increase labour flexibility. They also turn livestock management into a labour-responsive activity. That is highly significant in the mitigation of labour stress, such as particularly in the context of HIV/AIDS. In this sense, AIDS-affected households can relieve labour burdens through the use of livestock-related social support mechanisms, whilst retaining the food and economic benefits of raising livestock. In some cases, the donation of livestock may help poor families to enter these "livestock groups" and therefore gain social support and inclusion.

Source: Field research among the Gogo people in Dodoma region, Tanzania, 2001.

Indigenous livestock resources and knowledge

African pastoralists and some agropastoralists typically manage a rich genetic diversity of livestock and hold a profound knowledge about animal husbandry and related aspects. In Africa, there are reported as many as 150 varieties of cattle, 60 varieties of sheep and 50 varieties of goat (McCorkle, 1999). Pastoralists and agropastoralists hold specialised knowledge around livestock management and agropastoral practices, such as genetic identification of breeds, grazing needs, animal reproduction, animal healthcare, location of water sources and grazing areas, breeding, crop-livestock integrated systems, and uses of animal resources. For instance, any 10-years-old child of the Bororo pastoralists of Niger can easily identify the pedigrees of all the animals in their herd (McCorkle, 1999).



Children leading cattle in the highlands of north Ethiopia.

The rich livestock diversity of rural Africa results from the coevolution between natural conditions and human action over hundreds of years. This has produced indigenous livestock breeds that are adapted to, and productive under the major environmental conditions of Sub-Saharan Africa. African herders actively conserve, manage and improve their livestock genetic resources in harmony with their specific environmental conditions, food needs, animal pathogenic conditions, socio-economic options, and cultural values. Recognising and strengthening this dynamic is a fundamental component of any strategy for livestock production in rural Africa. However, the livestock resources, knowledge and practices of pastoralists and other livestock keepers are often ignored in livestock policies and programmes. Many livestock programmes focus on specific exotic breeds and address the needs of medium to large-scale livestock keepers with good market prospects. Accordingly, a reconsideration of the values, roles and potential of indigenous livestock resources and knowledge is urgently required. A shift towards targeting poor pastoral communities and small-scale livestock keepers is urgently required for livestock development.

Indigenous breeds are generally well adapted to local environmental conditions, such as heat stresses, water restrictions, harsh environments, poor quality feeds, and local diseases. The environmental adaptation of indigenous breeds facilitates livestock production in a wide range of agroecological conditions and constrains, such as particularly the areas that most poor pastoralists and agropastoralists inhabit and use. This adaptation equally reduces and eases the labour and management efforts required. For instance, the capacity of indigenous breeds to use local fodders and feed from low quality grasslands assists significantly animal husbandry. Compared to exotic breeds, indigenous varieties entail lower workloads, especially for women (Köhler-Rollefson, 2000). The tolerance to climatic constraints also facilitates livestock management and ensures the resilience of livestock production. In this sense, the drought resistance capacity of many indigenous breeds reduces the labour required to bring animals to water sources, or to carry water for the animals. In addition, local knowledge about indigenous breeds ensures that pastoralists and farmers can manage their animals in an autonomous way.

In general, the use of indigenous breeds provides labour and economic advantages. Compared to many modern breeds, indigenous varieties require less labour and management efforts. They are thus more responsive to labour stress, and to the conditions of many poor rural households and those affected by HIV/AIDS. In addition, the adaptation of indigenous breeds to local fodders and poor quality grasslands is also an economically responsive trait because it prevents economic costs that would be required to purchase improved feed and nutritional supplements, as it is often needed with modern livestock varieties.

Indigenous breeds and the associated indigenous knowledge have also advantages in animal healthcare, with notable economic benefits. Indigenous breeds are often tolerant to local diseases, whilst herders can easily treat their animal health problems with traditional ethnoveterinary remedies. For instance, the renowned cattle variety *N'dama*, from West Africa, is resistant to trypanosomiasis, which is one of the major cattle diseases. The *Sanga* family of cattle, in East and Southern Africa, is resistant to the East Coast Fever, a major cattle disease in that region. In this sense, the use of tolerant indigenous breeds is the basis for healthier and economically responsive practices for livestock management, as it reduces chemoprophylaxis and chemotherapy (Smith *et al.*, 1997). In addition, the use of traditional veterinary therapies

contributes to safeguarding the household economy, reducing management efforts and ensuring a resilient production among poor pastoralists and livestock keepers (box 41).

Box 41. Veterinary plant resources

For pastoralists and livestock keepers, the health of their animals is essential for their subsistence and livelihood. They hold indigenous knowledge on animal health, and therapies that enable them to prevent and treat livestock health problems. Pastoralists know and use dozens of veterinary plants to treat livestock diseases. These phytoveterinary resources are a supplementary agrobiodiversity component of relevance in livestock management.

In essence, the use of indigenous breeds and the associated indigenous knowledge entails a number of labour, economic and environmental values that are critical for livestock production among poor rural communities. In most Africa, the use of indigenous breeds and their adaptive traits is indispensable for sustainable livestock production (Rege and Bester, 1998). Furthermore, some of these traits are particularly relevant for families affected by socio-economic marginalisation and the HIV/AIDS crisis. However, the emphasis of livestock programmes on exotic breeds neglects the role and potential of indigenous genetic resources in livestock production. Accordingly, the consideration of indigenous livestock genetic resources and indigenous livestock practices is particularly useful and recommended for livestock support programmes.



Masaai herders in the drylands of Morogoro (Tanzania).

Improving livestock resources and management

Improving livestock production requires action around both livestock genetic resources and livestock management practices. For this purpose, indigenous breeds, indigenous livestock knowledge and participatory approaches are essential ingredients.

Livestock breeding is fundamental for improving livestock production. However, the effectiveness of livestock breeding programmes relies on adequate consideration of the local livestock dynamics. The majority of intensive and modern livestock production systems focus exclusively on higher productivity and cash products. Livestock research and breeding programmes respond to this focus. However, livestock development in poor rural communities requires due consideration to other factors, such as particularly: (a) tolerance to environmental conditions; (b) labour and management efforts involved; (c) economic viability of livestock management; and (d) overall products, services and benefits provided by livestock. Consequently, livestock breeding programmes need first and foremost to understand and enhance the very livestock dynamics at the rural grassroots level, including the multi-functionality of livestock and the socio-ecological values of indigenous livestock resources.

There are various reported cases where the substitution or dilution of native breeds through the promotion of exotic breeds and arbitrary crossbreeding has increased the food and livelihood vulnerability of rural communities (Köhler-Rollefson, 2000). Several breeds of West African shorthorn cattle (*Bos taurus brachyceros*) are at high risk of extinction due to interbreeding (Jabbar *et al.*, 1997). These breeds, however, are important resources because of their superior abilities to resist diseases and be productive under high humidity, heat stress, water restriction and poor quality feed. Furthermore, most promoted exotic and "improved" breeds tend to require external inputs and specific management practices. Consequently, poor communities become dependent on supplies, incur in additional expenses, and become more vulnerable to environmental conditions. New breeds sometimes have different reproductive and behavioural characteristics that confuse local people and increase their labour and management loads. Overall, the indiscriminate deployment of exotic breeds needs careful revisioning, whilst there is a need to place more attention to the values, roles and potential of indigenous breeds, indigenous livestock knowledge, and indigenous animal management practices.

Indigenous breeding practices are also relevant for improving livestock genetic resources. They are often in harmony with the multifaceted dimension of livestock, yet they are poorly understood and scarcely supported from modern technologies and practices. For instance, Tuareg pastoralists in Niger breed two types of camel: one for milk and another for transport. Accordingly, community-based and participatory breeding efforts are valuable initiatives to foster the integration between modern technologies and the knowledge, practices and criteria of local people. In particular, livestock research and breeding programmes would better benefit poor pastoralists and farmers if reoriented towards: (i) participatory approaches; (ii) support for the multi-functionality of livestock; (iii) integration of the breeding rationale of pastoralists; and (iv) support and improvement of traditional breeding practices.

Crop-livestock systems

Crop-livestock systems represent a valuable practice for efficient resource management and sustainable agriculture (Smith *et al.*, 1997). These integrated practices provide a mutually beneficial interaction between crop and livestock resources, making optimal use of scarce resources, generating synergies, and increasing the labour, economic and ecological viability of agriculture. Selected food, nutrition, labour, economic and agroecological benefits are:

- Crop-livestock systems increase food security through diversifying food, nutrition and income sources.
- Crop-livestock interactions catalyse and optimise the transfer of nutrients and energy between animals, crops and humans through the manure, forage, and animal power.
- Ruminants contribute to enhancing soil fertility in a manner that is labour, economically and ecologically responsive.
- Cover crops, crop residues and fallow land provide feed to livestock in inexpensive and ecologically sound ways.
- Crop-livestock integrated systems alleviate conflicts and pressures derived from the ongoing expansion and intensification of both farming and livestock grazing.
- Livestock represents a high-value food and cash reserve, hence contributing to the food and livelihood security of poor farming families (especially in cases of famine risks, impoverishment, crop failure, and labour scarcity).
- Animal power provides an advanced means for increasing land and labour productivity (through traction and transport).

Some farming practices improve livestock production. For instance, rangeland and forage management enhance livestock production, especially if using legume forages and cover crops. Fodder banks, which are small and intensively managed pastures of forage legumes, enhance soil fertility and provide high-quality dry-season feed for cattle (Ehui *et al.*, 1998).

Box 42. Public health and environmental considerations in livestock production

Livestock development programmes require adequate consideration of the associated risks in terms of public health and environmental sustainability. In this sense, larger concentrations of animals and the expansion of livestock activities can lead to various environmental and public health problems, such as follows: degradation of pasturelands, deforestation, reduction of crop area, diversion of grain available for human consumption to animal feed, increase in zoonotic diseases, and increase of food safety risks if there is a high use of antibiotics and other chemicals in animal care. In fact, the sedentarisation trends of some transhumant livestock keepers and the implementation of crop-livestock systems often lead towards an increase of livestock diseases (Smith *et al.*, 1997). Livestock diseases affect farm animal production and have often health effects on people that dwell close to the animals. For instance, zoonotic diseases (animal-borne diseases) are particularly troubling in a context of HIV/AIDS because people suffering from HIV have a vulnerable immune system.

These public health and environmental concerns related to livestock development are important in rural Africa because poor families are already suffering health and environmental problems, such as the HIV/AIDS epidemic and expanding land degradation. Consequently, livestock development requires the deployment of training, regulatory and appropriate management practices to restrain and minimise these potential health and environmental impacts.

Policy and programme recommendations

A number of policy and programme recommendations follow, aiming at supporting livestock production for food security among pastoral communities and small-scale livestock keepers:

1. Promote community-based conservation and breeding of farm animal resources, including support for participatory animal breeding, animal diversity fairs, and maintaining local breed records.
2. Shift towards integrated and applied livestock research, with emphasis on the multi-functionality of livestock systems among pastoral communities and small-scale livestock keepers.
3. Inclusion of livestock resources in household nutrition programmes, including education components to break cultural barriers that prevent the consumption of certain livestock species or animal parts among specific groups, such as women or children.
4. Support for dialogue and integration between poor pastoral communities and commercial actors, with increased role for the public sector as mediator between the needs of pastoralists and the dynamics of markets.
5. Promote indigenous animal breeds, which are more responsive to both local environmental conditions (e.g. climate risks, fodder types, disease prevalence) and socio-cultural conditions (e.g. food habits, labour availability, indigenous knowledge, cultural practices).
6. Stimulate livestock market niches through initiatives such as participatory research, policy incentives, public-private partnerships, rural-urban market integration, promotion of specialty and ethnic products, and expansion of "fair trade" channels.
7. Create local capacity-building for the processing, preservation and marketing of livestock products, including attention to traditional practices, deployment of food safety and quality standards, added-value initiatives, and marketing of specialty and ethnic products.
8. Provide initial livestock capital to poor families, such as those affected by HIV/AIDS, in order to help building livestock capital and create options for social cohesion.
9. Identify policy and legal support for environmental aspects around livestock management among pastoralists and poor farmers, such as particularly: access to traditional grasslands, maintenance of common property grazing resources, access to water sources for livestock, and securing land rights and rights of access for pastoral communities.
10. Promote crop-livestock systems, including transmission of best practices in terms of agricultural sustainability, labour efficiency, animal husbandry, and animal and human healthcare.
11. Promote forage crops and cover crops, including introduction of legume forages (with appropriate prior environmental evaluation) as useful crop-livestock practice.
12. Promote, improve and diffuse ethnoveterinary knowledge and practices as an economically and culturally responsive mechanism for animal healthcare.

13. Broaden livestock diversity *inter* and *intra* species, with special emphasis on large livestock as source of nutrition and power, and on small ruminants and poultry as effective resources for food security, nutrition, and women's economic development.
14. Support the role and needs of women in raising livestock, reversing gender biases that livestock is a "male" business.
15. Promote economic and social cooperation between pastoralists and farmers, including support for traditional relationships that could have been eroded through modernisation, such as in-kind product exchange, access to grazing lands and water sources, exchange of breeds, and transmission of indigenous knowledge around farm animal management.
16. Recognise the dignity of pastoral peoples and lifestyles, deploying targeted policy and programme support to: (i) reverse the unjust and detrimental discrimination of these rural societies and their livelihoods; and (ii) promote their socio-economic development through technical assistance, participatory approaches and market integration.

CONCLUSIONS

In rural communities across Sub-Saharan Africa, food insecurity and the scale of HIV/AIDS impact represent critical development issues. Food security is the most pressing need in rural development, especially because its failure entails chronic malnutrition, aggravates poverty, and causes a tremendous human suffering. In addition, the HIV/AIDS epidemic is further impairing the food security, livelihood and development prospects of poor rural communities. In particular, HIV/AIDS increases labour constraints, disrupts agricultural practices, reduces food production capacities, impoverishes affected households, increases the number of vulnerable groups (such as orphans and female-headed households), and dislocates customary mechanisms for the transmission of indigenous and local agricultural knowledge. HIV/AIDS is an epidemic that impacts not only people living with HIV/AIDS, but also their households. Under heavy prevalence rates, HIV/AIDS is even disrupting the development prospects of entire rural communities. Most existing agricultural policies and programmes are inadequate to address these problematic and evolving scenarios.

The agricultural sector has a major role to play in combating food insecurity and AIDS impact in rural Africa. Practical, affordable and well-targeted initiatives are urgently required, including policy and programme efforts seeking the empowerment of rural people themselves to confront such formidable development problems. The goal of food security requires stimulating agricultural projects with a nutrition focus, improving the nutrition impact of agricultural interventions, and enhancing the sustainability and resilience of agroecosystems. Concerning the HIV/AIDS crisis, the agricultural sector is relevant in care aspects (strengthening the nutrition-health interface) and mitigation (coping with the impacts of this epidemic in the labour, economic and agricultural dynamics of affected households).

On the basis of participatory field research conducted in different rural areas of Sub-Saharan Africa, this paper has argued that agrobiodiversity and the associated indigenous knowledge represent a strategic force in the agricultural sector response to food insecurity and the HIV/AIDS crisis. Agrobiodiversity comprises the different biological resources that sustain agriculture and food production, such as particularly crops, crop varieties, useful plants, and farm animals. In rural Africa, the use of agrobiodiversity is associated to extensive indigenous knowledge. In essence, agrobiodiversity and indigenous knowledge represent, respectively, material and cultural assets for agriculture. However, they are notably absent in mainstream agricultural policies and programmes. They are also under continuing erosion and their roles are even neglected and declining at the community level. This neglect and erosion washes away many agricultural development opportunities to improve nutrition, advance food security and enhance rural livelihoods, particularly in efforts at the rural grassroots level.

In general, agrobiodiversity represents locally available and affordable resources with untapped potential for food security, HIV/AIDS mitigation and sustainable rural livelihoods. In particular, the mobilisation and improvement of agrobiodiversity would empower smallholder farmers and pastoral communities to strengthening their nutrition-health interface, improving the management of their labour force, safeguarding their household economic security, and enhancing sustainable agricultural management.

The proposed strategic action around agrobiodiversity and indigenous knowledge does not belong to any "conservationist" or "back-to-tradition" development agenda. It is rather an alternative development effort that seeks to consolidate and enhance the very agricultural dynamics of rural communities. In this sense, agrobiodiversity and indigenous knowledge require concerted efforts in three integrated lines: (i) recognising their social and ecological values; (ii) stimulating their conservation and use at the rural grassroots level; and (iii) improving their quality and functions through participatory research and targeted technical assistance.

There is growing development experience that shows how agricultural programmes that were based on external recipes and alien resources persistently fail and, even worse, dislocate local agricultural dynamics. Accordingly, the emphasis on agrobiodiversity and indigenous knowledge represents a renewed effort for rural development that primarily focuses on enhancing the local resource base and, implicitly, empowering farmers as primary subjects of development. In this sense, the proposed strategic line emerges from the conviction, deeply rooted in field experience, that rural people need, first and foremost, that their habitual agricultural systems work better and suit their primary needs. That is more pertinent in view of the tremendous food, health and social crises that rural people suffer, which give them little room for joining unfamiliar or bizarre development proposals.

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This paper has identified and examined the following agrobiodiversity components: (i) traditional, neglected and under-utilised crops; (ii) agricultural diversification; (iii) home gardens; (iv) wild food plants; (v) medicinal plants; (vi) community seed systems; and (vii) livestock and agropastoral systems.

Traditional, neglected and under-utilised crops represent a rich portfolio of crop genetic resources that are notably disregarded in the agricultural development agenda. They, however, show significant potential to enhance food security, improve nutrition, facilitate agroecological risk management, alleviate farm labour stresses and provide further income options, if adequate policy and programme support is deployed. For example, traditional, neglected and under-utilised crops comprise resources with the following qualities and potentialities: crops that are highly nutritious; crops that could contribute to diversify and enrich local diets; crops that are appropriate to feed children and sick people; crops and specific crop varieties that are tolerant to agroecological constraints (drought, poor soils or floodable lands); crops and specific crop

varieties that require lower, less intense or flexible labour inputs; crops that contribute to soil conservation and fertilisation; crops that enhance agricultural diversification and low-input agricultural systems; crops that rural women specifically farm and use for household meal preparation or as source of income; crops that can provide food in shorter time periods; crops for which local food preservation and processing practices exist (generally under women's knowledge and skills); crops with market prospects; farmer crop varieties that can be seeded continuously without significant decline in genetic traits (thus contributing to farmer seed security); and crops that allow food production in marginal lands. Traditional, neglected and under-utilised crops become a relevant agricultural asset under an agroecological approach to agriculture, which places emphasis upon the ecological and social interactions in agroecosystems, including biodiversity use and participatory agricultural research. That requires revising agricultural policies and programmes, moving them from the current focus on selected crops and pedigree varieties (which generally serve agricultural commercialisation goals and large-scale farming) towards an agroecological paradigm (which integrates the social and ecological dimensions of agriculture to better serve sustainable agriculture and suit the needs of smallholder farmers).

Agricultural diversification is the agricultural practice that seeks the dynamic integration of the broad natural resource diversity, from the genetic to the ecosystem level. It therefore represents an agrobiodiversity component that genuinely embraces the ecosystemic dimensions of agriculture, integrating elements such as crops, livestock, farming practices, ecological processes, and land uses. The diversification of agricultural systems and practices contributes to integrating and balancing social and ecological variables in agriculture, such as nutrition provision, agroecological management, marketing options, gender equality in farming, conservation of natural resources, optimisation of land uses, and low-input agricultural modes. Agricultural diversification advances through the dialectical integration between indigenous farming knowledge and modern agroecological research. It is not a simple "freezing" of customary polyculture systems, but a thoughtful effort that mobilises indigenous knowledge, agrobiodiversity resources, innovative agroecological science and farmer-based experimentation. The diversity of agricultural genetic resources is a key ingredient in agricultural diversification processes, including traditional and neglected crops, crops farmed by rural women, vegetables, fruit trees, livestock, and aquaculture species. Examples of agricultural diversification efforts include intercropping systems, shifting cultivation, use of cover crops, fodder production, selective weeding, and crop-livestock systems, among many others. In terms of food security and AIDS mitigation, agricultural diversification provides several benefits and services, such as follows: broadening food production; enriching local diets; catalysing ecological practices for integrated pest management and soil fertilisation (which enhance sustainability, low-input agriculture, and farmer economic security); saving and optimising farm labour inputs; coping with labour shortages; creating spaces to recognise and enhance women's agriculture; providing options for farmer seed conservation and production (which contribute to local seed security); increasing opportunities to balance cash and food crops; expanding the means to cope with environmental and market risks; and providing space for cultivating medicinal plants.

Home gardens constitute a distinctive agricultural space that contains notable plant diversity in a relatively small space. They usually include a mix of food plants such as leafy vegetables, fruit vegetables, fruit trees, beans and spices, among others. Women typically manage these small spaces, which are often located close to the homestead, in backyards or next to water sources. The plant diversity in home gardens provides complementary food supplies and excellent sources of nutrients, particularly micronutrients (vitamins and minerals). However, home gardens and their associated plant diversity tend to be neglected in agricultural development programmes, mostly due to gender inequalities, the emphasis on commercial agriculture, and the scarce awareness on the value and potential of horticulture in raising household nutrition and income. In this sense, supporting and improving home gardens would enhance efforts towards food production, household nutrition, farm labour management, gender equality in agriculture, and income generation. In addition, home gardening is an activity that can suit vulnerable households (e.g. AIDS-affected and female-headed households) because it requires small land spaces, it usually demands flexible labour inputs, and it is rather compatible with domestic tasks (such as care for the children and the sick). Developing home gardens requires efforts in the following lines: (a) technical assistance, including diffusion of best practices, organic farming, water management, food processing techniques, seed management and production, and farmer experimentation; (b) nutrition education, including use of crop diversity, micronutrient information, and improved meal preparation skills; (c) deployment of gender approaches to agricultural development, in order to raise recognition and support for home gardens at all scales; and (d) exploration of commercialisation opportunities, helping farmers to produce, process and commercialise vegetable crops for local markets and urban populations.

Wild food plants are subsidiary food sources. They play relevant food security and nutrition roles in arid and semi-arid ecosystems, in analogous way as that of home gardens in humid and sub-humid lands. The scarce attention to wild food plants in agricultural and environmental programmes washes away affordable and practical means to enhance food production and nutrition. In particular, the sustainable use of wild food plants provides benefits such as: (i) increasing food production through proportionately low and low-intensive labour inputs; (ii) improving the micronutrient quality of local diets; (iii) increasing options for food processing and preservation; (iv) helping poor people cope with food shortage and food emergency periods; and (v) providing further options for food marketing and income generation. In AIDS-affected households, wild food plants can be useful to improve food access and nutrition with low labour and economic efforts; in fact, even children can harvest these resources if adequate indigenous knowledge has been transmitted. The promotion of wild food plants requires parallel support to nutrition education, sustainable biodiversity management, and food processing and preservation practices.

Medicinal plants represent agrobiodiversity resources with direct roles in healthcare. They are already a fundamental component in traditional healthcare systems, yet poorly supported in agricultural and health programmes and policies. The support for medicinal plants and the associated indigenous healthcare knowledge is relevant in view that medicinal plants represent

locally available, affordable and often effective resources for healthcare, when not the only healthcare resources accessible for the rural poor. Medicinal plants are at the core of most traditional healthcare systems, being commonly used and trusted by rural people. In the context of HIV/AIDS, medicinal plants are relevant to address four major health issues: (i) healing sexually transmitted diseases and, thus, helping reducing the risks of HIV infection and re-infection; (ii) supporting immune strength and overall health well-being; (iii) raising appetite, thus helping to arrest the worrying tendency to losing appetite among people living with HIV/AIDS; and (iv) combating some HIV/AIDS opportunistic and associated diseases, particularly digestive, skin and mouth problems. The mobilisation of medicinal plants requires policy and programme efforts in the following lines: (a) closer collaboration between the agriculture and health sectors, including partnerships between research centres, agricultural offices, local health services and community organisations; (b) increased dialogue and co-operation between traditional and modern health practitioners; (c) policy and awareness support around the value and potential of medicinal plants and traditional healthcare knowledge; (d) clinical research on selected medicinal plants and herbal treatments of relevance to the most frequent diseases in tropical Africa; (e) creation of herbal gardens as spaces for the conservation, demonstration, experimentation and diffusion of medicinal plant resources; and (f) support to traditional healers, especially in training and organisational aspects, to empower them as healthcare advisors and providers at the community level.

Community seed systems refer to farmer and community efforts dealing with the conservation, experimentation, improvement, production and distribution of seeds. Their goal is improving seed security at the community level, placing special attention to the poorest and most seed insecure farmers. Building community seed systems requires concerted collaboration between the formal seed sector and farmer seed practices, drawing scientific and technical capacities from the formal seed sector towards strengthening farmer seed systems. Relevant initiatives for building community seed systems include, among others, community seedbanks, participatory crop genetic conservation and breeding, rural seed fairs, support for traditional seed storage practices, on-farm seed production and commercialisation, and appropriate seed technology transfer. Community seed systems represent affordable, effective and socio-ecologically sound responses for seed security at the farmer level. They enhance farmer capacities to conserve and use genetic resources, whilst expanding community co-operation and solidarity around seed access. Community seed systems would assist every rural household to plan and conduct agriculture according to their specific agroecological conditions, labour and economic situation, nutrition needs, and marketing prospects.

Livestock and agropastoral systems are agrobiodiversity components related to the management of farm animals. Livestock is a source of food, nutrition, income, power, clothing, manure, cultural identity and social cohesion. It plays critical roles in the livelihoods of pastoral communities. Agropastoral systems refer to agricultural practices that integrate farm animals and crop farming, providing added social and ecological benefits. Livestock support programmes and policies often overlook the multiple functions of livestock in rural communities across Africa, scarcely attending the needs of small-scale livestock producers. In

this context, priority attention is required over indigenous breeds and the associated indigenous knowledge because of their values and potential. These indigenous livestock resources are result of a nature-society coevolution, which is significantly responsive to the labour, economic and environmental conditions of their holders. Therefore, the promotion and improvement of indigenous livestock breeds is highly recommended to assist poor people to cope with their environmental and socio-economic realities. In this sense, the effectiveness of livestock support and breeding programmes depends on the adequate consideration of livestock dynamics at the community level: from indigenous knowledge to livestock breeds that are tolerant to local environmental conditions, from livestock uses to labour involved in livestock management, and from the ecological benefits to the net economic returns of raising livestock. For instance, some local breeds of small ruminants in Africa require low labour inputs and are well adapted to arid conditions. In addition, crop-livestock systems represent an advanced practice for safeguarding natural resources, improving the sustainability of agriculture, expanding food production and nutrition, assisting farmers in coping with labour constraints, and enhancing low-input agriculture. Accordingly, changes in livestock policies and programmes are required to address the following aspects: (i) incorporate participatory approaches; (ii) improve targeting to the conditions and needs of small-scale livestock producers and pastoral communities; and (iii) conduct effective support, conservation and improvement of indigenous knowledge and resources around livestock.

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The mobilisation and development of the mentioned agrobiodiversity components will empower poor rural households and communities to address food insecurity and AIDS impact. In particular, that will assist farmers in strengthening the nutrition-health interface, coping with labour shortages, safeguarding the household economic security, and enhancing sustainable agricultural management.

In the first place, the proposed strategies will strengthen the **nutrition-health** interface, which is an urgent need in view of the extent of malnutrition and the cumulating degree of health problems in rural Africa. Nutrition is a key issue in vulnerable groups, such as people living with HIV/AIDS, children, and pregnant women. Agrobiodiversity strategies would optimise the use of local crop and food resources, diversifying the diets, improving micronutrient intake, and supporting the roles of rural women in household nutrition. For people living with HIV/AIDS, nutrition is the first medicine; for instance, adequate micronutrient intake helps them building their immune system and raising their health status, therefore confronting HIV/AIDS more effectively. Overall, agrobiodiversity resources are practical and effective means to conduct nutrition-oriented agricultural initiatives and to enhance the nutrition impact of agricultural interventions. In addition, the use of medicinal plants enhances primary healthcare systems.

Furthermore, access to, and appropriate use of agrobiodiversity will assist rural people to manage their **farm labour** force, optimising their labour inputs and helping them to cope with

labour losses. In particular, the use of agrobiodiversity expands agricultural practices that save labour, optimise labour inputs, and diffuse labour through time: e.g. certain crops require low-intensive labour; agricultural diversification tends to reduce and optimise the overall farm labour inputs; home gardening entails a flexible labour timing; use of indigenous goat breeds involves proportionately low management efforts; provision of a limited oxen stock would provide poor farmers with draught power and reduce their farming efforts; and certain crop varieties can provide successive harvestings without requiring a new agricultural cycle. In this sense, the critical approach is not to "identify" or "breed" the crop or crop variety that would solve farmers' labour problems, but to ensure that farmers have access to, and skilled use of agrobiodiversity resources so to plan and conduct agriculture in ways that are responsive to their specific labour conditions. In addition, agrobiodiversity will help rural people to manage and save labour without jeopardising their basic food production, nutrition and income needs.

The proposed agrobiodiversity strategies will also contribute to agricultural practices that safeguard the **household economic security**. In this sense, certain agrobiodiversity components, such as may be the use of cover crops and the implementation of intercropping practices, help farmers to reduce the economic inputs in agriculture and increase farm net returns. The goal of low-input agricultural systems is to help poor and impoverished families to divert their scarce economic resources from agriculture to critical healthcare and education needs. Agrobiodiversity and indigenous knowledge are valuable ingredients in this effort, particularly through enhancing agroecological systems and low-external-input agriculture.

Finally, these agrobiodiversity strategies will enhance **agricultural management** towards more ecologically and socially sustainable modes. In particular, agrobiodiversity upholds certain agricultural practices that balance ecological and social aspects, serve farmers to cope with environmental risks, improve the resilience of agroecosystems, facilitate farmer experimentation, conserve natural resources, reduce the use of external material inputs, incorporate marginal lands into food production, optimise the use of small land areas, and overall safeguard the prospects of agricultural reconstruction and development.

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The effectiveness of the proposed agrobiodiversity strategies relies upon three transversal actions: (i) agroecological approaches, (ii) gender equality, and (iii) community mobilisation.

Firstly, the science of agroecology constitutes a new paradigm for agricultural development. It conceives and shapes agroecosystems as integrated spaces between ecological and social processes. In this sense, agrobiodiversity and indigenous knowledge represent grassroots ingredients for developing agroecological systems and practices, with due support from appropriate technologies, innovative research and farmer experimentation. Agroecology is an alternative agricultural development effort that designs agroecosystems as spaces for the dialogue between ecological and social dynamics, resulting particularly responsive to the labour, economic, nutrition, livelihood and cultural concerns of smallholder farmers.

Secondly, the proposed agrobiodiversity strategies rely on, and simultaneously underpin gender equality. Raising recognition and support for the whole agricultural resources, knowledge and capacities at the rural grassroots level inherently enhances the roles of rural women in agriculture, food production and nutrition. It also stimulates the cooperation between men and women on agriculture, as well as facilitating cross-gender exchange of resources, practices and experiences that are relevant to improve rural livelihoods.

Finally, the prospects of agricultural and rural development in Africa are highly dependent on community mobilisation as a means to empower farmers and intensify social cohesion. For instance, community mobilisation is essential to build community seed security, stimulate labour support mechanisms, foster orphans, improve land access, enhance social cohesion, advance gender equality, facilitate the transmission of agricultural knowledge to rural youth, and craft reconstruction efforts in cases of agricultural and humanitarian emergencies. In this sense, the proposed agrobiodiversity strategies are notably connected to community mobilisation efforts because their implementation appeals to community efforts. In other words, community mobilisation will enhance the prospects for agricultural development, whilst the implementation of the proposed agrobiodiversity strategies will stimulate community mobilisation and cooperation.

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In conclusion, this paper calls for agricultural policy and programme efforts towards recognising, promoting and improving agrobiodiversity, as the basis for stimulating and reinforcing grassroots responses for nutrition, health and sustainable livelihoods. That is a suitable goal in view that agrobiodiversity is already available in many rural communities; otherwise simple to rescue and easy to deploy. Implementing agrobiodiversity strategies proportionately requires low technical and financial support, yet this should be well-targeted and incorporate high doses of grassroots participation. The inherent aim is engaging and empowering farmers as leaders of their development process. Consequently, these strategies are likely to become appropriated and remain viable at the community level.

The proposed strategies emphasise the need to support and cooperate with farmers for a better use and improvement of the local agricultural resource and knowledge base. That will enhance and adapt their agriculture towards their most pressing needs and evolving circumstances. This process challenges agricultural development actors to shift towards an agrobiodiversity perspective, to consistently engage in participatory development efforts, and to recognise and support the dignity and capacities of farmer themselves. The goal is to mobilise, expand, improve and further develop the agrobiodiversity and indigenous knowledge that subsists in rural communities. Accordingly, these agrobiodiversity strategies will support farmers and communities in their habitual practices of planning, experimenting, decision-making, and labouring around agriculture.

Agrobiodiversity strategies equally fulfil the agricultural sector response to HIV/AIDS. They are directly relevant to improve household nutrition as a major healthcare action for people living with HIV/AIDS in rural Africa. Furthermore, agrobiodiversity strategies are helpful to devise agricultural systems and practices that better suit the labour and economic pressures in AIDS affected households. Finally, agrobiodiversity strategies are more likely to maintaining the prospects of "agricultural survival" and rural development in communities that are heavily affected by HIV/AIDS, since the suggested work line emphasises the need to maintaining the local knowledge and resource base for agriculture.

In conclusion, agrobiodiversity and indigenous knowledge represent a strategic force to stimulate grassroots responses for nutrition, healthcare and sustainable livelihoods. Aside from land and water, they constitute the greatest agricultural assets of poor rural people in Africa. In fact, they are locally available and affordable, they are reproducible and dynamic, and they have untapped potential in combating the most pressing needs around food production, AIDS mitigation and sustainable agriculture. Accordingly, agricultural policies and programmes are urgently required to mobilise and develop them. Efforts devoted to agrobiodiversity and indigenous knowledge are equally indispensable to safeguarding the prospects of rural reconstruction in Sub-Saharan Africa: in particular, such efforts will ensure that rural youth and children have steady access to the resources and knowledge required to become good farmers, to farm successfully and to confront the many challenges ahead.



Two farmers, leaders of their respective farmer field schools, examining the root nodules of a local groundnut variety (eastern Uganda).

EPILOGUE

In rural Africa, poor people suffer a formidable scale of natural, social and health emergencies that severely distress their lives and impair their development prospects. This scenario challenges the international community to assume a serious commitment for social justice globally and to urgently reverse the perverse mix of exploitation, exclusion and neglect that afflicts the African poor since long time ago. Whilst assistance is indispensable, there is an equal need to deploy an honest co-operation process that expands solidarity, not just charity, as the prevalent language with the African poor. The strategies proposed in this paper advocate this neglected dimension of development in Africa, placing emphasis on the urgent need to recognise and mobilise the resources, knowledge, capacities and confidence of rural people themselves.



Girl with fonio in Mali

The HIV/AIDS epidemic represents the latest of the African crises and, therefore, justifies a priority attention in the development agenda. However, combating HIV/AIDS is not just providing health and social assistance, but also empowering people and communities to restructure accordingly their whole development path. Otherwise, the AIDS crisis will become an enduring tragedy, impairing the development prospects of entire generations in decades to come. In agricultural development, the HIV/AIDS epidemic demands more intense attention to the maintenance and improved use of the local resource base, especially agrobiodiversity and local knowledge. This is essential to prevent that, in addition to millions of orphans, AIDS escalates the number of agricultural orphans: that is, rural youth and children lacking the agricultural resources and knowledge needed for rural development. The photograph in this epilogue, which shows a girl from the Sahel region confident with a bunch of a traditional cereal, reflects how the unique agricultural dynamics of African rural societies is indispensable to maintaining the basis for social reproduction and to ensuring a development process that is viable in ecological, socio-economic and cultural terms.

Strategies based on agrobiodiversity and indigenous knowledge would equally contribute to the overdue recognition of the dignity of rural people. The deployment of these strategies will inherently empower the rural poor as primary subjects in their

struggle against food insecurity and the HIV/AIDS crisis. That would contest any assumption that the rural poor (including those suffering from, and those affected by AIDS) are hopeless people and predestined to be mere objects of relief and external assistance. In fact, the rural poor in Africa have consistently, if not entirely, relied on their resources, knowledge and innovation ability to confront many and often intricate challenges. Accordingly, supporting and improving their habitual means for subsistence, livelihood and struggle represents a step forward, all the more as other development means are often missing, deficient or unaffordable.

I would not like to finalise this work without a specific commend to the many African rural women who were devoted companions along the field research. Discussing with them about crops, agricultural practices, seed diversity and local foods revealed a vivid language for development that is often disregarded, if not incomprehensible, among scientists, development practitioners and policy-makers. Despite facing formidable problems, rural women in Africa habitually share their smiles, silently revealing that hope subsists. The challenge ahead is to become co-operators in their silent lives and struggles, improving their very means for agriculture, food security and livelihood. In this sense, promoting agrobiodiversity and strengthening local knowledge systems can certainly empower poor rural women in their arduous efforts to nourish their families, care for the orphans and the sick, and leave their children with sufficient resources and knowledge to realise decent livelihoods. In effect, development in rural Africa calls for crafting simple, affordable and timely initiatives that bring tangible benefits to the poorest and most troubled families.

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List of acronyms

AIDS	Acquired Immune Deficiency Syndrome
FAO	Food and Agriculture Organization of the United Nations
FFS	Farmer Field School
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immune Deficiency Syndrome
IFAD	International Fund for Agricultural Development
TAWLAE	Tanzanian Association of Women Leaders in Agriculture and Environment
THETA	Traditional and Modern Health Practitioners Together against AIDS and other diseases (Uganda)
UWESO	Ugandan Women's Efforts to Save Orphans

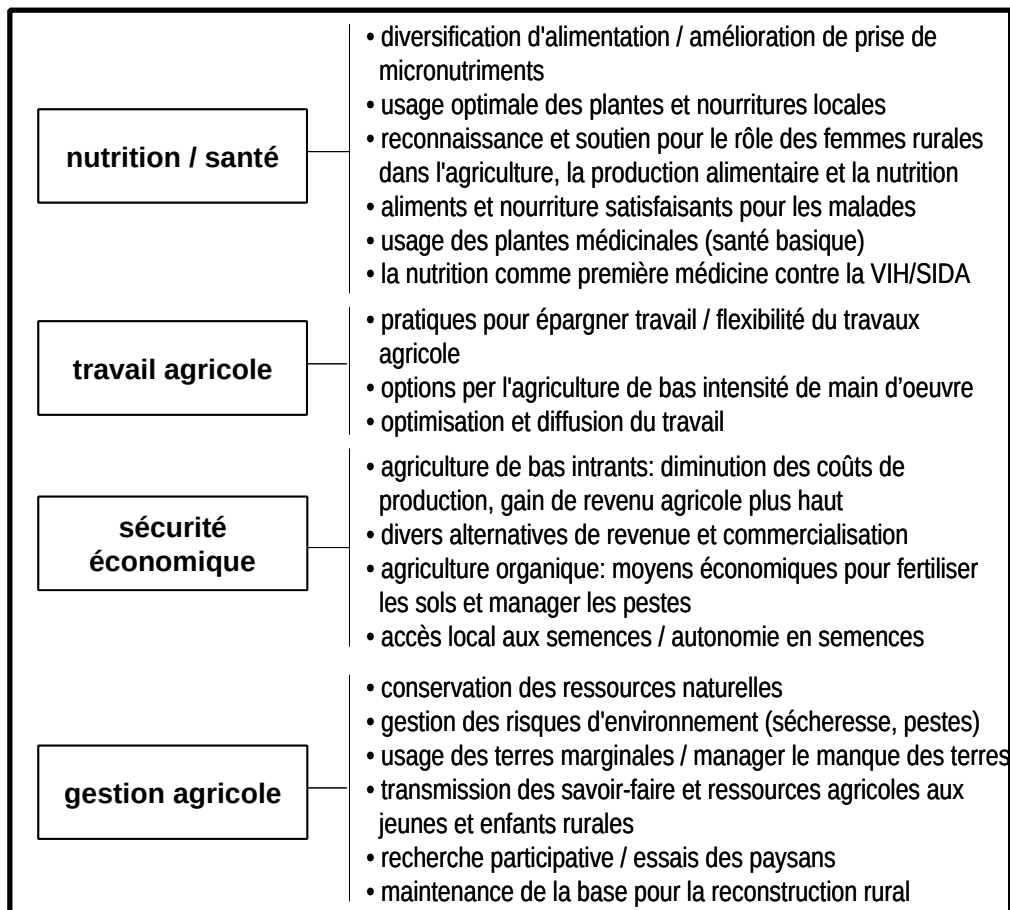
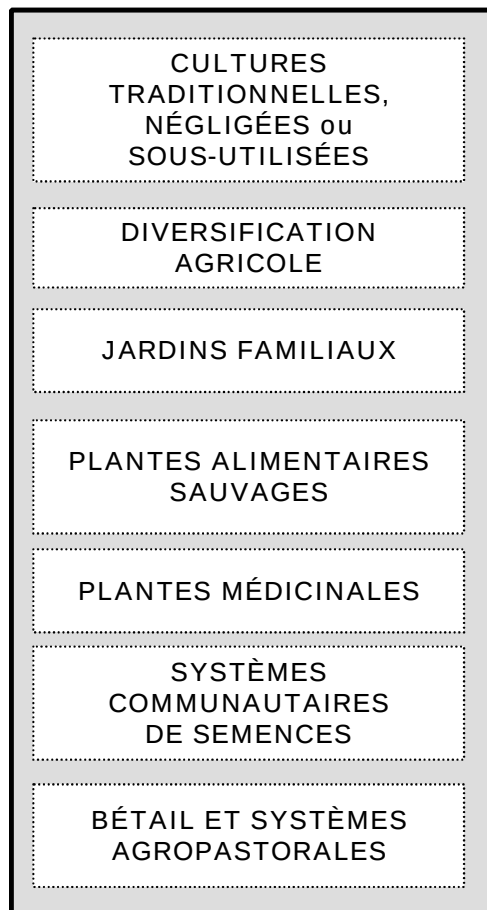


Stratégies d'agro-biodiversité

pour combattre la insécurité alimentaire et l'impact du VIH/SIDA en Afrique rural

Français.1

composants stratégiques



objectives

BROCHURE DE TERRAIN

-
- approche agro-écologique
 - égalité de genre
 - mobilisation des communautés

Source: Josep A. Garí / SDWP / FAO (2003)



Estratégias de agro-biodiversidade

Português.1

para combater a insegurança alimentar e os impactos da VIH/SIDA na África rural

componentes estratégicos

CULTIVOS TRADICIONAIS,
NEGLIGENCIADOS ou
SUB-UTILIZADOS

DIVERSIFICAÇÃO
AGRÍCOLA

HORTOS DOMÉSTICOS

PLANTAS ALIMENTARES
SILVESTRES

PLANTAS MEDICINAIS

SISTEMAS COMUNITÁRIOS
DE SEMENTES

GADO e SISTEMAS
AGROPASTORAIS



nutrição / saúde

- diversificação da dieta / melhora consumo micronutrientes
- uso ótimo de cultivos e recursos alimentares locais
- reconhecimento e apoio ao papel das mulheres rurais na agricultura, na produção de alimentos e na nutrição
- refeições e dietas apropriadas aos doentes
- uso de plantas medicinais (saúde básica)
- nutrição como o primeiro remédio contra VIH/SIDA

trabalho agrícola

- práticas que economizam trabalho / flexibilização do trabalho agrícola
- opções para trabalho agrícola de baixa intensidade
- otimização e difusão dos insumos de trabalho

segurança
econômica

- agricultura de baixos insumos: menores custos de produção, aumento da renda líquida rural
- diversas alternativas de renda e mercado
- agricultura orgânica: formas economicamente acessíveis de fertilização de solos e manejo de pragas
- acesso local a sementes / autonomia de sementes

manejo agrícola

- conservação de recursos naturais
- manejo de riscos ambientais (seca, pragas)
- uso de terras marginais / lidando com escassez de terras
- transmissão de recursos e conhecimentos agrícolas a crianças e jovens rurais
- pesquisa participativa / experimentação dos agricultores
- manutenção da base para reconstrução rural

objetivos

FOLHETO DE CAMPO

- enfoque agroecológico
- igualdade de gênero
- mobilização comunitária

Fonte: Josep A. Garí / SDWP / FAO (2003)