

Trees on farm to mitigate the effects of HIV/AIDS in SSA

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Abstract

HIV/AIDS has a devastating effect in sub-Saharan Africa. With most people living in the rural areas, HIV/AIDS has become a rural problem and it is therefore unlikely that the epidemic can be controlled without the effective support of agriculture, both in prevention and mitigation. Agrobiodiversity and related knowledge can be used to mitigate the effects of HIV/AIDS. To enhance rural livelihoods, agrobiodiversity can be used for food security and nutrition, medicinal relief, and income generation, and these components are interrelated through: labour-, cost- and time-efficient provisioning strategies. Agrobiodiversity, including trees, in farming systems plays a modest but nevertheless valuable role in HIV/AIDS mitigation. This article focuses on on-farm trees as being part of the local resource base of agrobiodiversity as a tool in broader efforts to mainstream HIV/AIDS into agriculture and agroforestry.

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1 Introduction

1.1 Agriculture and HIV/AIDS

The UNAIDS epidemic update reports that in 2004 alone, the global HIV/AIDS epidemic killed more than 3.1 million people, and that an estimated 4.9 million acquired the human immunodeficiency virus (HIV). This brings to 40 million the number of people living with the virus around the world (UNAIDS 2005). Sub-Saharan Africa (SSA) remains by far the worst affected: also in 2004, an estimated 25.4 million people in this region were living with HIV, this figure taking into account the 3.1 million people who became infected with HIV and the 2.3 million who died from AIDS. Even countries praised for their consistent efforts to fight HIV/AIDS, such as Uganda, which has shown consistent declines in HIV prevalence levels since the mid-1990s, continue to be burdened with a serious epidemic. HIV/AIDS has now become a permanent feature.

For a long time, HIV/AIDS was seen as purely a health issue, and most financial resources have passed through Ministries of Health towards reducing infection rates, buying Anti-Retro Viral (ARV) drugs, educating and awareness-raising, and, more recently, for increasing home-based care (UNAID 2001; FAO/WHO 2002). Yet HIV/AIDS has implications that reach far beyond health – including great impacts on agricultural and food production systems (FAO 1995; FAO 2001; FAO 2002a,b; FAO 2003a,b,c; FAO/UNAIDS 2003; FAO/WHO 2002; FASAZ 2003; Gari 2002a,b; Gari 2003; Garí & Villarreal 2002; Gillespie 1989; Stokes 2003; Waala & Tumushabe 2003).

In SSA, most infected people live in the rural areas and HIV/AIDS has become mostly a rural problem (UNDP 2002). With its largely rural-based economies, it is unlikely that the epidemic can be controlled without the effective support of agriculture (du Guerny 1999), and this sector is in a strong position to assist in both the prevention and mitigation of HIV/AIDS (Gari & Villarreal 2002). Equally, there are limitations to the extent to which the health or agricultural sector can operate, and for this reason a multi-sectoral approach is crucial (FAO 2005).

HIV/AIDS deepens already existing poverty. Impacts experienced by People Living with AIDS (PLWA) include health constraints, labour shortages and a weakened labour force, social isolation, monetary shortages, impacts within the household (such as redistribution of tasks, and more attention paid to the sufferer at the expense of other necessary activities). PLWA can provide less labour, have less capital and are more in need of risk-management strategies. As they struggle to pay increased medical and other bills whilst at the same time losing their earning capacity, their financial wealth decreases and assets may need to be sold, such as livestock, tools or seed reserves. Cash crop production is often abandoned due to its now excessive financial and labour requirements. All of these aspects contribute to a decline in production in rural communities, and to farm degradation in terms of a decrease in the use and conservation of (agro)biodiversity, a decrease in food quality and quantity, and an abandonment and disinvestment in land. PLWA are less able to grow crops and increasingly shift to gathering for their daily subsistence needs for food, medicine and other products, and there are indications that PLWA in Africa rely more on forest and other available natural resources than non-affected households.

The death of women and men in their economic prime is also accompanied by the loss of their skills and knowledge base. Many are dying before they have time to share these essential

livelihood skills with their children, thereby reducing the range of livelihood options for the next generation. Further disruptions appear when the increased need for medicine and treatment forces productive family members to leave their farms in search of paid employment elsewhere. Children are often taken out of school because their labour is needed on the farms and because there is no longer money to pay for education. The stress of HIV/AIDS on the social capital within communities also erodes the traditional transmission of knowledge between households and communities, and contributes to the demise of local seed-exchange systems.

The reaction by the agricultural sector can be twofold: to alleviate the disruptive effects of HIV/AIDS and to build resilience against further impact. This may be through the development of labour-saving technologies and practices, knowledge preservation and transmission, more responsive rural institutions and capacity building, enhancing gender equality, improving nutrition, and promoting social and economic safety nets (Gari & Villareal 2002). Regardless of the strategy chosen, it should start with generally mainstreaming HIV/AIDS as an openly discussed cross-cutting issue throughout all agricultural research and extension activities.

Involving the agricultural sector also needs to occur at the policy and decision-making levels: with regard to land rights, food aid, seed legislation and so on. Whilst this is beyond the scope of this article, it is important to involve community level stakeholders in the policy circle as well as in providing good channels for feedback to influence change at such levels.

1.2 Agrobiodiversity and Local Knowledge for strengthening rural livelihoods

Strengthening the agricultural system means a focus not on problems, but on internal strengths and external opportunities. African communities have, over centuries, developed a diverse resource base of cultivated and wild plants, trees and livestock, and site- and gender-specific knowledge which has enabled them to sustain and enhance their livelihoods. This diversity of plants and animals is termed “agricultural biological diversity” – Agrobiodiversity - and the knowledge about these resources – here termed Local Knowledge. Agrobiodiversity and Local Knowledge are two very important internal strengths of rural communities.

Agrobiodiversity (AB) and Local Knowledge (LK) are invaluable resources in their contribution towards strengthening and stabilising rural communities – in fact they are essential for their very survival. However, their value has been undermined by the relatively recent encouragement to adopt “improved” externally sourced crop varieties, seeds and inputs, and market-orientated production. The local resource base is now further under threat due to the impact of HIV/AIDS, which strikes at the heart of these livelihood strategies (Gari 2002a,b; Gari 2003; Gari & Villarreal 2002).

Farmers use agrobiodiversity and its related knowledge in pursuit of their livelihood goals of household food security, income generation, risk management and the optimum use of available land, labour and capital. In fact, the maintenance of LK and AB is an indispensable part of rural society. Farmers adapt their farming systems to respond to their changing needs and capacities. Their livelihoods therefore depend on access to a significant “pool” of agrobiodiversity and local knowledge.

In the face of the HIV/AIDS pandemic, agrobiodiversity and local knowledge are important factors for enhancing rural livelihoods by contributing to:

1. food security and nutrition,
2. medicinal relief, and
3. income generation.

In all of these factors, labour-, cost- and time-efficient provisioning strategies need to be considered (FAO 2005). For example: producing one's own food, and generating income to purchase food, are dependent on the local labour force, which can be strengthened through improved health, and be supported by more appropriate labour strategies. The weakened workforce of PLWA is less able to provide enough strong and timely labour; therefore, labour-intensive production and post-harvest practices become inappropriate for farmers. Production becomes less a measure of "yield per hectare", than "yield per hour" (Kevin Gallagher personal communication). Shifting to other less labour-intensive varieties or species and practices increases harvest security.

Another important cross-cutting issue is gender. Besides the commonly considered gender issues affected by agriculture, such as land rights, tree planting rights, access to agricultural innovations, species choice, cash crop production, etc., HIV/AIDS adds a whole range of gender issues that need consideration. Women are unequally infected by HIV/AIDS, as figures for 2004 indicate that the number of women infected exceeds that of men. Women have less negotiation power in sex and their biology also causes increased vulnerability towards HIV/AIDS. Furthermore, the use of agrobiodiversity for livelihood security is that women are more involved in household economy, local food production and spend more time in home-based care. With the death of the husband, land rights may also be lost and women are often responsible for taking care of orphans, even if they are from extended families of the late husband.

PLWA need more food security, better nutrition, more medicine, more income and increased risk management, and in most cases lower labour- and capital-investment approaches. Trees on farm as part of local agrobiodiversity can be a useful tool in the mitigation of HIV/AIDS. Here we refer to trees on farms that include all woody perennials - trees, shrubs and lianas - above 1.5 meters. Trees in agroforestry systems, parklands or forests are an important part of agrobiodiversity for rural livelihoods. In seeking ways to enhance food security, food quality, medicinal relief and income generation, as well as local coping mechanisms to deal with a weakened labour force, tree species (and local knowledge on them) should not be overlooked.

1.3 Access to knowledge and germplasm

Faced with HIV/AIDS, farmers often abandon market-oriented and high external-input agricultural practices and shift over to subsistence farming (FAO 1995). To be relatively successful in subsistence farming, PLWA require access to germplasm and knowledge: farmers can only plant what is available and what they perceive as useful. A focus on local cultures, knowledge and agrobiodiversity is crucial to any HIV/AIDS mitigation strategy (Gari 2002; FAO 2005). However, local knowledge alone is insufficient to provide timely coping strategies for the HIV/AIDS pandemic. Working together with extension and research to improve a practice or technology, then transferring it between community and region, is fundamental to address the needs of PLWA. It is beyond the scope of this article to discuss this in detail, yet it should be clear that addressing these components is a priority (FAO 2005).

1.4 Forests and other natural resources

The natural forest area throughout Africa is decreasing (FAO 2003d). The extraction of useful products such as high-value timber and non-timber forest products is depleting forests. As PLWA are less able to grow crops, they increasingly shift to gathering for their daily subsistence needs. Wild foods are free, nutritious and require little labour input and are particularly needed in times of stress (Overstorey 139; 145). The HIV/AIDS pandemic has also generated a greater need for medicine, and most plant-based medicine is sourced from the forest.

There are indications that PLWA in Africa rely more on forest and other available natural resources than non-affected households (FAO 2003e). It would appear that natural forests are an essential safety net for PLWA for their livelihood; for food and medicine, but also for firewood, fodder and other income means, this corresponds with other findings in processes of impoverishment (Overstorey 139; 145). The particular HIV/AIDS related impact of this increased dependence on natural resources is not clear, but there is concern for the sustainable use of at least part of these resources (FAO 2003e). It is however beyond the scope of this paper to enter into detail on how the pandemic affects the forest and other natural resources and how forests can be optimised as a safety net.

2 Food, medicine and income

2.1 Food security

Food security - a daily balanced diet, sufficient in both quantity and quality - is fundamental for remaining healthy and alleviating illness. There is increasing acceptance that a sound diet is a critical basis for any further palliative medical care whether it be traditional or allopathic ("conventional") (Fawzi et al 2004; WHO/FAO 2002). With a sufficient, balanced daily diet, physical vulnerability to illness decreases, and strength increases - thus enabling PLWA to live fuller and longer lives. The emphasis on improving health thus changes from one of pure medication to one which incorporates food and nutrition.

The enhanced management of agrobiodiversity and local knowledge to ensure a balanced daily diet involves ensuring sufficient quantity and quality: *Neither pharmaceuticals nor traditional medicines can work effectively without this basis: the best medicine is sufficient food.*

Food Crops

Staple food crops grown on a field scale, such as maize, sweet potato, cassava, groundnut, cowpea, rice and sorghum, provide the bulk of the diet for rural households in SSA. Trees are however an important source of food and an essential part of the diet (Baumer 1995; Salim 2005). In many countries, more than half of the indigenous food plants consist of tree species (Ruffo et al 2001; Maunda et al 1999; PAM 2003). Most famine foods consist of tree species as well (UoP 2002), famine having a number of parallels with the HIV/AIDS pandemic.

2.2 Medicinal relief

As HIV/AIDS attacks the immune system, PLWA have to deal with a whole range of health problems. Common illnesses and symptoms associated with HIV/AIDS infection include loss of appetite, change in the taste of foods, diarrhoea, digestive problems, vomiting, mouth sores, skin problems, depression, influenza and fever, besides a higher susceptibility to major illnesses such as tuberculosis and malaria (which are usually the final killers of PLWA in Africa). Besides improving their nutrition, more health care and medicine is needed.

Allopathic and traditional medicine

Medicines used by the majority of the population of most developing countries originate from medicinal plants (WHO/IUCN/WWF 1988). Large segments – estimates are 80% - of the populations of developing countries depend on traditional plant medicines (Holley and Cherla 1998; World Bank 2001a,b; WHO 1999). Traditional medicine is particularly relevant for the poor, many of whom cannot access and afford the cost of allopathic ("conventional") medicines. For instance in most places, health-enhancing anti-retroviral medicines are prohibitive, either because they are not available, or because they are way out of range in terms of cost. HIV/AIDS amplifies other poverty issues and has itself become a poverty disease, thereby increasing the need for traditional medicine.

With timely diagnosis, allopathic medicine may be more effective; however, the costs of medicine, health care, logistics, and the fact that it needs to be taken on a full stomach, not to mention that people often only accept or realise that they have AIDS at a late stage and then take the medication when it is too late, counts against it.

Two thirds of the population of most HIV/AIDS affected countries live in rural areas and in remote locations where modern medical facilities are not available; therefore, traditional medicine is often the only alternative. For example, In Botswana with a population of 1.7 million, there are more than 5,000 traditional medicinal practitioners and only 500 allopathic medically trained personnel (Vitalis Chipfakacha from WHO personal communication, 2003).

The allopathic and the traditional health sectors work from very different conceptual frameworks. It is rare to see the two approaches integrate even though traditional medicinal practitioners usually fulfil the four objectives of Primary Health Care: they are acceptable, they are accessible, they are affordable, and since they live in the communities themselves, they know what diseases exist there (Chipfakacha 2003). Nevertheless, neither sector is able to cure HIV/AIDS yet and the HIV/AIDS problem is too large for either sector to either claim or ignore it (WHO 2002; UNAIDS 2002). Although this is a big challenge, building trust between the two sectors and integrating them is essential for maximising the benefits to PLWA.

Plant-based medicine

PLWA – like anyone else – try to prolong their healthy lives. Better health allows PLWA to live useful and meaningful lives, to contribute to the (household) economy and to keep the household from disintegrating. Better health reduces the possibility of mothers infecting their children. Also, better health can reduce the outbreaks of sexually transmitted diseases and thus reduce the risks of

HIV infection and re-infection. Traditional medicinal plants that relieve symptoms of HIV/AIDS can be used to prolong the healthy period of those infected by:

- treating opportunistic infections;
- strengthening the immune system to slow down the progression of the infection;
- serving as food to reduce malnutrition, such as “tonics”, food supplements or to stimulate appetite. (“*Let food be your medicine and medicine be your food*”, stated Hippocrates); and
- serving as an anti-depressant, to cope with severe depressions that result in fatalistic, inactive and suicidal behaviour.

”Herbal” medicine is made from Trees

Plant-based medicine is often called ”Herbal” medicine. This is however a misleading term as most does not come from herbs, but from tree species. Estimates state that more than half of the species known to have medicinal properties are trees (PC 2000, Ameru Traditional Doctors of African Medicine - ATDAM - personal communication; Lengkeek unpublished data). Worldwide, there are over 300,000 flowering plants described, of which 55,000 are known as tree species – not shrubs or lianas (Mabberley 1997). The number of plant species used for medicinal purposes is estimated to be more than 50,000, which covers about 13 percent of all flowering plants (Schipmann et al. 2002); it appears that trees as life form are over represented.

Most farmers already have a few medicinal plants on their farm (Overstorey 135). These can: (i) be deliberately planted or maintained for this purpose; (ii) exist as a by-product of other species (e.g. multipurpose trees); or (iii) grow in hedges and as weeds without the farmer knowing of their medicinal properties. The species planted for medicinal purposes are often the more common species, for common ailments. It is not necessary to create “expert” collections at the household or community level, but there is always potential for PLWA to plant species on their farm for mitigation of AIDS-related diseases. Particularly with medicinal species, farmers need the knowledge and access to the germplasm of these species.

Medicinal garden and exchange of products

In many locations where traditional medicinal practitioners have herbal gardens or sacred forests, tree species form the core of the collection (Lengkeek personal observations). Medicinal gardens are useful for using and conserving important medicinal species, both in terms of planting material and related practical knowledge. They can provide an excellent location for a community-based network for using agrobiodiversity and local knowledge, and a meeting point for PLWA. They can be located at gardens owned by traditional practitioners, NGOs, churches, health centres, schools, etc.

Not all species can be cultivated: agroecological conditions prevent the local growth of some medicinal plants. Traditional medicinal practitioners do not always grow medicinal plants in their gardens for reasons of secrecy. Furthermore, they state that growing conditions are often better in the forest and that special growing techniques are needed to ensure the medicinal properties. Lastly, policy regulations can restrict the growing of medicinal species (Belt et al 2003).

2.3 Income Generation and Substitution

In an increasingly market-driven society, income generation is crucial in order to obtain basic necessities. In the case of HIV/AIDS affected households, the need for income increases with the demand for medicinal relief and funeral costs. At the same time, the capacity for income generation decreases as the labour force is weakened, as the knowledge base is lost, and as assets that can produce income are sold (Stokes 2003). The reduced production activities move to focus only on essential basic staples and neglect cash cropping; commercial land may be abandoned or neglected (FAO 1995). The decrease in previous income-generating activities necessitates adaptive strategies which have to take these current conditions into consideration.

Communities have traditional safety nets to cope with difficult times, usually based on extended family and community support. These safety nets are however increasingly under pressure due to the magnitude of the epidemic. Increasing financial means is nevertheless essential for stabilising and improving household livelihood security. Two means are possible: by substituting purchased items with those home- or locally produced; and/or by changing strategies to generate more income.

Income substitution

Besides increasing the level of food produced by a household or locally, depending more on local knowledge and techniques (including tree-based) to replace external agricultural and medical advice and inputs can help to save scarce financial resources. Specifically, this includes substituting purchased chemical pesticides (Fuglie 1998) and fertilisers with natural alternatives such as N-fixing trees (Elevitch & Wilkinson not dated), or replacing purchased pharmaceutical products with plant-based remedies (World Bank 2001a,b). PLWA lack cash and need to cultivate or gather most of the products themselves. For instance in Rwanda, a lack in fuel wood was a major component for responding to HIV/AIDS (Gillespie 1989). Trees provide a wide range of products, which include timber, charcoal, construction wood, poles, furniture, beehives, mortars, wedges, tools and tool handles, plant supports, stimulants, spices, fat, soups, drinks, ferments, meat tenderisers, fruit, fruit ripeners, food colouring and food wrapping, ropes, weaving and thatching material, decorations, tannins, gums, animal traps, insecticides, fungicides, etc (Salim et al 2005). In addition to saving costs, some products may be able to be developed into a commercial enterprise.

Income generation

Typical characteristics of income-generating activities appropriate to the context of HIV/AIDS affected communities and households are the following (FAO 2005):

- low labour requirements (especially at the start of the growing season with its peak labour demand);
- dividends to be brought throughout the year;
- being based on local resources and skills (low external-input demanding);
- potentially being in popular local demand (low risk); and
- being of use to the household itself, or at least being multipurpose, and relying less on market fluctuations; for example, farmers cannot eat their own coffee production.

Tree species are a particularly useful source of cash, although coffee and tea, for instance, are increasingly being abandoned because of heavy workloads and low market prices. Yet other tree or shrub species can be used by PLWA. High-value fruit and nut trees have low labour requirements. Also, timber, fodder and to a lesser extent medicines can be harvested and sold. These products may not generate the same high income levels such as coffee (used to), tobacco, French beans or other labour intensive crops. The income levels are not high, but the yield per hour of work is favourable. Many roots and tubers also require low maintenance.

3 Trees as part of agrobiodiversity in HIV/AIDS mitigation

Farmers need to adapt their farming system to cope with their changing needs caused by HIV/AIDS. A careful mix of species can contribute to a more efficient adaptation to the changing farming system (see box on species choice). History has taught that miracle crops or miracle trees do not exist (Ng 1996). Setting priorities among species mix for the mitigation of HIV/AIDS involves an integration of farmers', extension workers' and researchers' perspectives for choosing those species mixes that will give the greatest benefits. Farmers have fewer resources and have labour constraints to meet their livelihood goals of food security, medicine and income and they are also more in need of risk management. Depending on the specifics of farmers' needs and capacities, farmers need to decide what suits them best.

This section shows that the wise use of tree species can mitigate the impacts of HIV/AIDS; it focuses on diversification as a risk-management, production- and labour-saving tool, and it further discusses the services trees provide and the optimised use of existing plants and land.

Agricultural diversification

Most tree species provide several products and services at different times, but a considerable number of species and genotypes/cultivars are necessary to provide the multiple uses needed by individual farmers. There are many tree species that can be used to diversify the farming system. With careful species mixes, agroforestry systems in some localities may provide year-round production. PLWA need a balanced diet, which requires the use of various species, and also plant-based medicine, which is – per disease – based on more than one species (ATDAM personal communication; PC 2000; World Bank 2001a,b; Dery et al 1999). One of the defining attributes of agroforestry is its complexity and its various forms. A common presumption is that low adoption of agroforestry stems from the high knowledge required to follow the techniques. The complexity of agroforestry can however also be its major attraction (Swallow & Kwesiga 2003). The social isolation in which PLWA find themselves calls for self-help groups or active intervention in knowledge transfer and preservation (Gari & Villareal 2003; FAO 2005). Depending on a farmer's needs and capacities, s/he decides what mix of diversity to aim for, in terms of species (or variety) numbers, species composition, location and in evenness of distribution.

Although diversity is often equated with species richness, diversity is a function of the number of species and the evenness in distribution of species' abundances (Magurran 1988; Purvis & Hector 2000). Ecological experiments and models have shown that diversification of species composition could lead to enhancements of the stability and productivity of ecosystems (e.g. Chapin et al. 2000; Cottingham et al. 2001; Loreau et al. 2001; Norberg et al. 2001; Tilman et al. 2001). Diversification could also reduce risks in an uncertain market environment, or if there are potential

pest and disease problems with a particular species. Increasing the stability and productivity of agroecosystems is one of the objectives to assist PLWA. Diversifying the composition of tree species on farms appears to be a means of reaching this objective.

Example of a diverse production farm niche: the home garden

Home gardening differs from commercially-oriented agriculture. Crops are grown because of their food and nutritional value rather than their market value. It concentrates on smaller-sized family (or community group-run) gardens and - with careful species mixes - produces year-round. It focuses on diversity, including traditional, neglected and under-utilised crops, and fruit trees are an important component of home gardens (Overstorey 147). Home gardens tend to appeal most strongly to women, who are often in charge of selecting, cooking and growing the family's food needs. Being in charge of production of food and medicinal plant products enables women greater control over their family's welfare. Overall, experience indicates that increasing local diversified production strategies improves nutrition more than efforts to increase incomes. Nevertheless, in practice, home garden projects must work hard to promote diversity.

Labour

Most tree species are not labour intensive nor require timely labour, something PLWA may lack to provide. Apart from some watering after (trans)planting the tree species, most tree species require minimum maintenance. Some species even regenerate themselves without intervention. The little maintenance needed generally does not require timely interventions. For example in Meru, Kenya, a 15-year-old orphan managed to survive because his parents had planted macadamia trees. The nuts of the species provided him with a low-labour steady income that helped him keep going. Now, at the age of 18, he has started to cultivate parts of his land that he had abandoned and his future looks bright (Author - personal interview).

In agriculture, high-yielding varieties or breeds may have a higher potential yield, but it appears more beneficial for PLWA to rely on the more diverse traditional varieties (landraces), because of risk management and a more reliably constant yield. Modern varieties, and breeds, are more demanding than traditional ones in terms of inputs and timeliness of crop maintenance. PLWA may not be able to afford or deliver these in terms of labour, cost and time. Given the fact that timely inputs of modern crops affect yield, and that traditional varieties can better withstand shocks and stresses such as drought, traditional varieties produce more per hour.

Tree as service-providers

Farmers are conscious of the micro-climatic variations within their plots and adapt accordingly. By focusing on critical areas, they immediately both address the problem before it gets out of control, and use it to their productive advantage. Trees in agroforestry farming systems can provide many services: they can affect the farm microclimate (cooling and moisture retention), they are more drought resistant, control soil erosion, improve soil fertility (N-fixing, source of compost, tapping into subsoil minerals and aerating soils), provide shade, function as a windbreak, control weeds (through shading or natural repellence) and can serve as a water catchment. For example, research from Rwanda showed that soil fertility was a major result from changed practices due to HIV/AIDS (Gillespie 1989). Trees are therefore vital to increasing stability and resilience of the farming system, particularly important as PLWA suffer from farm degradation. Further, the wider

range of farm niches created provides options to diversify and helps to reduce risks, thus contributing to food security as well as nutritional benefits.

Example: tree fodder

One tree product that needs specific mention is fodder: the protein levels in pods and leaves of fodder trees complement those of most grass species, and these can boost livestock weight as well as milk production (Roothaert 1999). During dry periods, tree fodder is often the only source of food. Raising a cow or even small livestock – poultry, sheep, goats and pigs, can make a substantial contribution to food security by providing protein-rich foodstuffs (particularly important for PLWA), income, draught power, fertiliser and fuel. Animal breeds adapted to the local environment and local feed sources are more persistent. In addition, trees also provide a good source of bee fodder.

Improving the use of existing plants

Many of the plants on and around farms have unknown food and medicinal values, and therefore remain unused, or hardly so. Hedges and wild areas around farms in particular are considered to be "centres of biodiversity" (van Oijen 2002; Kindt 2002; Backes 2001). Many tree, shrub and liana species can be found in hedges. Some of these species are rare and threatened by local extinction, whereas others can be classified as weeds.

More knowledge on species can increase the use of what is readily available. Many trees are already on farm, but their full potential has not yet been realised. For instance, *Prunus africana* in Meru is locally used for timber and medicine but the bark also has an important international cash value (Hall et al 2000). The pods of the common fodder tree and locally weedy *Leucaena leucocephala*, can be eaten as sugar peas. Some local fruit trees are not considered as part of an adult diet, these fruits just being given to children, or used to throw at birds. HIV/AIDS requires a change of diet; eating these fruits, for instance, would assist greatly. Some species already grow on farms, either on wasteland or in the hedges, but farmers have never used them, and this especially applies to some medicinal values about which many farmers are unaware.

Exchange of knowledge among farmers, traditional medicinal practitioners and elders, as well as providing the community with external knowledge, may also improve the use of these already existing resources. Exchange between regions or countries also improves the use of local resources.

Better use of remote land

PLWA sometimes need to abandon land because they cannot maintain the farm. Instead of leaving the land to waste, they can plant trees to increase their benefits over the coming years, for their children, and to protect or increase soil fertility in the meantime (if the extra labour of seeding/planting and removing the trees is feasible for the farmer). Additionally, farmers who are about to lose their partner to AIDS, can use tree planting as a good low-capital and low-labour "investment". This is also an option for children who will lose or have lost both parents, and more so for remote abandoned fields. In some locations, tree planting on remote land will ensure ownership of the land but this is not valid throughout SSA; in other locations theft will prevent tree planting on remote land.

4 Tree-planting constraints

Despite the wealth of products and services, tree planting is not always practised. Most importantly, farmers need to be willing and allowed to plant trees, and this depends on all kinds of social, cultural and technical reasons. HIV/AIDS requires that farmers address their changing needs, but the lack of a tree-planting culture cannot easily be dismissed. Furthermore in some cultures, tree planting is linked to property rights on rented or inherited land, and often these are also gender-specific. Lastly, species and their uses and practices are often confined to particular groups in society - for example, women in particular are restricted in tree-planting rights. Local situations determine whether, with respect to local cultural practices, tree-planting activities could be incorporated into HIV/AIDS mitigation strategies.

Experiences with pastoralists in reforestation programmes have shown that without a tree-planting culture, activities in this area do not make the most efficient use of time and resources. Other approaches such as community forest management or parklands management seem more appropriate. Local people can be excellent resource managers, committed to the sustainable use and conservation of local community forests and parklands. This is especially true when they have information that gives them a wider context, in this case the increased dependence of PLWA on forest resources. In the box below, some suggestions are made on what to consider when choosing what tree species to plant.

Species choice

Choosing various species to cultivate helps to adapt the farming system to better meet the changing needs of HIV/AIDS affected households. When choosing species, careful consideration must be made of the following factors:

1. Products of the species: species compositions need to cover most parts of farmers' requirements, such as food security and good nutrition, medicine, fodder, (fire)wood, other products and services, and, where possible, cash.
2. Species characteristics: such as agroecological requirements (soil, climate), seasonal productivity, efficient use of farm niches as well as ability to create micro environments on the farm, duration to harvest time, and diversity between and within species characteristics so that not all species need services or provide produce at the same time.
3. Productivity: choose for species that require low input in terms of labour, timing of labour and cash, and that produce good yields.
4. Risk management: cultivate more species or varieties to ensure production quantities, and select species or varieties with more harvest security.
5. Market options: avoid over-reliance on one crop, and preferably focus on species that can be used for home consumption as well as sales.
6. Policy: consider whether laws may restrict the planting of certain species.
7. Culture: cultural values may influence farmers in choosing certain species, or it may restrict choices for species or species groups.
8. Gender: ensure that women are well represented in the participant groups as their needs and requests are critical - they are often the care givers of PLWA.

Participatory exercises to assist farmers and other stakeholders in species choice can be found in the FAO Manual (FAO 1995)

5 Myths of Agroforestry

Farmers are not always supported in their efforts, even though many traditional farming systems were substantially tree-based. Agricultural research and extension workers are not sufficiently trained in tree cultivation. Due to the shift to subsistence farming of PLWA agricultural extension workers are increasingly left empty handed as their emphasis has been placed on adopting improved farming practices and market-orientated production. Foresters are often more focussed on timber production -often in monocultures- or conservation. These extension groups hold some arguments (myths according to Gupta 1998) against on-farm tree planting, yet all depend on the local situation and the species.

Here are some of these myths:

Land size does not allow farmers to plant trees.

Many research projects have concluded that although the land size may be relatively limited, it is never too small for tree planting. Even in urban agriculture, farmers plant trees. The tree-planting practices of PLWA have not been researched yet; it would therefore be paternalistic to assume that PLWA would not plant trees. Participatory exercises should reveal if and how PLWA should be supported in their tree planting efforts.

Trees take too long to produce.

Contrary to many assumptions, some tree species can be productive in a short period. Of course many trees species are productive in the medium and long term, but there is an enormous variety in species, including many that produce in 2-3 years or faster: *Warburgia ugandensis*, *Moringa oleifera* (of which the leaves are used for medicine and vegetables respectively) and several others produce within a year.

Farmers only want short-term species.

This is not correct; many farmers also appreciate longer-term species, including indigenous ones. That farmers only want fast-return species is one of the most persistent myths of agroforestry (Gupta 1998) An example from Meru, Kenya by Lengkeek (2003) shows that this issue is not always so clear-cut: In a participatory exercise, a farmer mentioned that he did not want to plant a particular species as it took too long to produce, claiming that: "I only want short-term species!" When asked why he then gave a maximum score to another species – one that is long-term- he stated that these two species could not be compared. He had been wanting to have this species for many years, and now that he received it he did not mind waiting for it to produce. In fact, in the same study, an analysis of thirty-one tree species planted per farm did not reveal any preference for short- or long-term species; rather, the deciding factor was the species product and/or service. This research and example however did not have an HIV/AIDS component, and as mentioned, the tree-planting desires and practices of PLWA have not yet been researched.

Farmers only want (tree) crops that give highest income and yield.

Farmers like partial solutions better than optimal solutions. Risk-management issues but also culture prevents farmers from focusing on high income and high production crops only. Even in the days that coffee was a very profitable cash tree crop, farmers had a wide variety of other crops

and trees on their farm. Particularly in subsistence farming, farmers prefer a diversity of crops, including tree crops.

Farmers can only deal with limited diversity.

Farmers are capable of dealing with many crops, crop varieties and trees. Surveys showed enormous tree diversity on African small-scale farms (Kindt 2002; with Cameroon 39 farms with in total 119 species, Western Kenya 201 farms, 175 species, Meru Kenya 35 farms, 297 species and Mabira Uganda 105 farms, 249 species). Another example: in one study, ICRAF tree-planting trials could not quantify the farmer tree species saturation point, as farmers were willing to plant and maintain more species and the trial had to stop at 31 species (Lengkeek & Carsan 2004).

Tree planting does not allow rapid response to changing situations.

The multipurpose character of some species allows PLWA to respond to changes rapidly. For example, although Avocado trees are considered fruit trees, they can also provide good timber, firewood, fodder and the edible leaves have a high iron content which is well known in traditional medicinal circles.

Tree planting costs money.

Planting of tree species does not necessarily require a lot of money; it all depends on the local situation and the species. There is a difference in financial output between trees regenerating accidentally on a farm, allowing them to regenerate, weeding around them, transplanting a species within the farm or from the forest (e.g. Ayuk et al 1999), or direct seeding of trees; with having your own nursery or buying tree seedlings, including grafted material. Only some simple good practices are required in order to make – at least - some tree-planting efforts more efficient and effective. Besides, many trees are already on farms, yet are under-utilised (see section 3).

Trees compete with other crops

This is very true, however this is valid for any crop; they all compete. Planting crops, including tree crops, in any farming system involves a trade off. Farmers weigh the benefits of species; if a species product or service is conceived as more beneficial than that of another species in a particular farming context, the farmer plants that species. What the farmer perceives as beneficial is often not understood by the ‘expert’ agronomist. This may not necessarily be practised by carefully weighing the characteristics of every species, but this is a farmer practice that has evolved over many generations, based on local knowledge as well as ‘new’ knowledge. An increase of knowledge may help farmers to further refine their choices in species diversity management to improve their livelihoods and address their changing needs. Furthermore additive effects of species compositions may also contribute to higher production (e.g. Salim 2005 – *Faidherbia albida* or Kwapong 2003 *Albizia* sp and Cacao)

6 Conclusion

HIV/AIDS has a devastating effect in SSA. With most people living in the rural areas it is unlikely that the epidemic can be controlled without the effective support of agriculture. Expanding agrobiodiversity and local knowledge can be one way to mitigate the effects of HIV/AIDS through enhancing rural livelihoods. Agrobiodiversity can be used to adapt the

farming system to meet this challenge, enabling more people to eke out an existence during these periods of extreme hardship.

Tree species are part of the available agrobiodiversity on African farms. A greater focus on trees within agricultural systems – agroforestry - can help to promote food security and nutrition, medicinal relief, and income generation including the use of labour-, cost- and time-efficient provisioning strategies. Trees also increase the stability and resilience of farming systems. Making more efficient use of tree species can be a valuable part of mainstreaming HIV/AIDS in agriculture, and allow PLWA to live longer and have healthier and more meaningful lives.

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