

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.