

4.3 OUTPUT 3. Partnerships developed and capacity enhanced for improving the health and fertility of soils of all stakeholders

Rationale

Managing soil fertility for improved livelihoods requires an approach that integrates technical, social, economic, and policy issues at multiple scales. To overcome this complexity, research and extension staff need the capacity to generate and share information that will be relevant to other stakeholders working at different scales (i.e.: policy-makers, farmers). Thus the activities of Output 3 are founded on building the human and social capital of all TSBF-CIAT stakeholders for research and management on the sustainable use of tropical soils.

The challenge of building the social capital encompasses both the new and existing networks of scientists and other stakeholders (e.g.: AFNET, MIS, CSM-BGBD project). Within these networks, as within the individual project activities where TSBF-CIAT works in partnership with others (NARES, ARI's, NGO's), building social capital means ensuring that communication and co-learning support effective institutional collaboration and build confidence in the collaborative advantage afforded by partnerships. Networks run best with diligent coordination that responds to internal and external challenges. However, partnerships become truly empowering when stakeholders themselves recognize and exploit research and development opportunities. The activities prescribed here envisage tapping the potential of South-South collaboration and establishing strategic partnerships that can build learning strategies that to institutionalize ISFM approaches.

The second challenge, of building human capacity, is particularly acute in sub-Saharan Africa and Central America, where the lack of strong tertiary education systems and the chronic under-funding of NARES hamper the professional development of many of our partners. Since ISFM approaches are inherently holistic, effective training demands interdisciplinary cooperation to instill both a specialized knowledge and a competent understanding of the context(s) in which to apply it (the so-called "T-shaped" skill set). Again, working through new and existing networks and partnerships, TSBF-CIAT will continue to support training that offers cutting-edge bio-physical science, laboratory techniques, and also embraces holistic understanding of social, cultural, economic, and policy issues related to soil fertility management.

Building human capacity also applies to the relationship land users have with the products of research. At present, many ISFM technologies remain little used by farmers. This is commonly conceived of as a failure to disseminate the results of research, but can also be seen as indicating a fundamental failure of research to recognize, value, and address farmers' conditions and knowledge. Greater involvement of farmers in the technology design process (to adapt solutions to actual conditions) will not only generate more relevant and adoptable ISFM technologies but is also expected to facilitate the potential dissemination and up-scaling of these technologies through the better interaction and integration of indigenous and formal knowledge systems.

Finally, the lack of an enabling policy environment is made manifest by the often-contradictory policies relating to farm, village, or regional-level conditions. The poor functioning of local input and output markets distorts the incentives for resource conservation. Coherent policy options are needed to address the low added value of farmers' products, the general lack of marketing opportunities on the one hand, and the lack of appropriate infrastructure and mechanisms for input delivery on the other.

Milestones

- By 2005, AfNet, MIS, SARNET and BGBD Networks restructured and strengthened.

- Publications (i.e., journal papers, books, extension materials, policy briefs, etc.), workshops, documentaries, field days implemented by each project.
- By 2010, tools for dissemination of research knowledge developed by each project.
- By 2010, appropriate policies and innovative institutional mechanisms developed and promoted.

Highlights

TSBFI-Africa

- A successful 9th AfNet symposium on ‘Improving Human Welfare and Environmental Conservation by Empowering Farmers to Combat Soil Fertility Degradation’ was held in Yaounde, Cameroon, with 155 participants attending.
- Two intensive trainings for AfNet scientists were conducted during the last quarter of 2003 and the last quarter of 2004, one on ‘Participatory research and scaling up’ and one on ‘DSSAT Version 4: Assessing Crop Production, Nutrient Management, Climatic Risk and Environmental Sustainability with Simulation Models’.
- Currently, 9 special projects are providing resources for implementing AfNet trials and training activities across the whole continent.

TSBFI-Latin America

- Eight soil-plant-water laboratories from Guatemala, Honduras and Nicaragua made initial steps to develop a sub-network to foster quality control and information comparison /exchange on analytical procedures for nutrient management recommendations.
- Partners of the MIS consortium actively engaged in research and validation of the Quesungual agroforestry system.
- Tools, concepts and improved soil management technologies generated by the MIS consortium members under active process of dissemination.

3.1 Strengthen networking on ISFM methods

TSBFI-Africa

Published Work

The African Network for Soil Biology and Fertility (AfNet)

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Soil fertility degradation has been described as the single most important biophysical constraint to food security in sub-Saharan Africa (SSA). Soil fertility decline is not just a problem of nutrient deficiency but also of 1) Inappropriate germplasm and cropping system design, 2) Interactions with pests and diseases, 3) The linkage between poverty and land degradation, 4) Often perverse national and global policies with respect to incentives, and 5) Institutional failures. Tackling soil fertility issues thus requires a long-term perspective and a holistic approach. The African Network for Soil Biology and Fertility (AfNet) of Tropical Soil Biology and Fertility institute of CIAT is devoted to overcoming this challenge. AfNet's ultimate goal is to strengthen and sustain stakeholder capacity to generate, share and apply soil fertility management knowledge and skills to contribute towards improved livelihoods of farming communities. This African-wide network has over 200 members from National Agricultural Research and Extension Services (NARES) and universities from various disciplines mainly soil science, social science and technology transfer. This paper highlights AfNet's main activities which include: Network field research activities, information and documentation, training and capacity building.

Research highlights on integrated soil fertility management in the Sahel

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Soil fertility is the most limiting factor for crop production in the Sahelian zone of West Africa. The region shelters the world's poorest people with the majority gaining their livelihood from subsistence agriculture. Per capita food production has declined significantly over the past three decades. Increasing population pressure has on the other hand decreased the availability of arable land and it is no longer feasible to use extended fallow periods to restore soil fertility. Therefore, there is urgent need to restore/maintain soil fertility in order to increase agricultural production in this region and improve the farmers' livelihood. In the recent past, scientists have evaluated the potential of different technologies in addressing the soil fertility problem in the Sahel as approaches to increase food production. Research results have reported that yields can be increased three to five times with the improvement of soil fertility with organic and inorganic fertilizers. The combinations also improve an array of soil properties such as Organic carbon content, Cation Exchange Capacity (CEC) and pH. The main constraint to combining inorganic-organic is the high costs of inorganic fertilizers and the low availability of organic fertilizers at the farm level. Crop rotation and intercropping systems are especially important in yield improvement as compared to continuous practices. Rotation systems increase nitrogen derived from the soil and fertilizer use efficiency. Similarly, methods of application of organic and inorganic fertilizer sources enhance use efficiency. For example, hill placement of inorganic fertilizers and manure is superior to broadcasting. Another potential is use of locally available phosphate rock, which could be an alternative to use of high cost imported P fertilizers. Since P is the most limiting factor on most sahelian soils, its correction not only improve yields but also the efficiency of N and water use. A bottleneck to the use of these profitable

soil fertility-enhancing technologies that have been researched is the low capacity of farmers to invest in these technologies. In order to have these technologies to reach millions of farmers, a new integrated soil fertility management (ISFM) paradigm has been adopted which integrates biological, physical, chemical, social, economic and political factors. Future research challenges include combining rainwater and nutrient management strategies to increase crop production and prevent land degradation, increasing the legume component for a better integration of crop-livestock production systems, exploiting the genetic variation for nutrient use efficiency and integration of socio-economic and policy research with the technical solutions. Another very important issue for research is how to increase crop biomass availability at farm level to alleviate the constraint of non-availability of organic amendments. Use of decision support systems, modeling, and GIS is important in order to extrapolate research findings to other areas in which the successful technologies can be expanded/ scaled out to reach several farmers.

This activity is through a continuing project that has developed and implemented a multi-institutional project in eastern Uganda – INSPIRE (Integrated Soil Productivity Initiative through Research and Education).

Dissemination and sharing of information on improved technologies: FFS field days, farmer exchange visits, feedback workshops, publications, radio programmes and training workshops for community development facilitators from government, NGOs and research originations, have enabled improved technologies to benefit more communities; sensitization of local leaders and policy makers; share project outputs among partners within the Consortium.

The linkage between the INSPIRE partners has enabled the Consortium to bring together researchers, extension workers, policy makers and farmers to conduct research for development. Through support from the Consortium, farmers are being linked to government development programmes such as NAADS and other source of agro-inputs, information and technical advice, such as, the NARO research centers and ARDCs. INSPIRE continues to bring other organizations on board to handle issues arising that concern land policy, marketing, gender and HIV/AIDS. For example, VEDCO and TASO.

TSBFI-Latin America

On-going Work

Existing diagnosis and recommendation criteria for MIS-member laboratories

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The MIS consortium organized a 2-day workshop at Zamorano, Honduras in September 2003 with representatives from 8 soil-plant-water laboratories in Guatemala, Honduras and Nicaragua. Purpose of this workshop was to a) inventory lab procedures and services, and 2) explore development of a laboratory network for Central America.

All laboratories carry out soil analysis. Five of the them do also plant analyses, and 3 analyse fertilizers and lime materials. Six laboratories indicated having equipment for plant digestion and access to atomic absorption and spectrophotometers.

All laboratories determine exchangeable soil acidity with a 1 M KCl extract, but two of the labs extract exchangeable bases with an NH₄OAc solution adjusted to either pH 4.8 or 7.0. Among 5 labs reporting methods used for extracting soil P and micronutrients, one uses NH₄Oac. Six laboratories provided information on the criteria used for lime and fertilizer recommendations. Two of these labs recommend lime based on soil pH and the rest use a combination of exchangeable acidity and critical % Al saturation values. All labs base N recommendations on regional experience, but 4 labs make additional adjustments based on variables like soil organic matter, pH and/or textural analysis. Fertilizer P recommendations in 4 of the labs consider whether soil test P is low, medium or high; but none of the labs could provide prior field and laboratory calibration trials as a basis for their ranking of soil test P data.

Laboratory representatives were very interested in developing a sub-network to foster quality control and information comparison/exchange on analytical procedures and recommendations. The group prepared a 9-page draft of guidelines and procedures for a ‘Regional Network of Soil-Plant-Water Analysis Laboratories in the Agricultural Sector’, based on guidelines currently in use by a similar network within Costa Rica.

3.2. Develop strategic partnerships in capacity building to empower stakeholders

Detailed reporting of activities relating to the work of TSBF in linking to the projects of the Enabling Rural Innovation team in support of activities in management of natural resources, farmer experimentation etc are highlighted in the IPRA Annual Report.

3.3 Improve dissemination of knowledge on ISFM

TSBFI-Africa

On-going Work

Increase the visibility of knowledge-based and social solutions to soil fertility problems

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One of the key demands of farmers involved in participatory research is that experimental results are never fed back to them, which makes sharing the findings of research (even if done hand-in-hand by researchers and farmers together) between farmers difficult. Many researchers have been strong on involving farmers in monitoring and evaluating the progress of jointly run experiments, using the Farmer Field School (FFS) methodology. However, once crops have been harvested many farmers feel that research “loses interest” and that activities where results are presented and discussed are still only “an after thought” or lead too immediately into planning for the next season without allowing farmers themselves to digest and interpret the findings on their own.

To help overcome these problems, TSBF-CIAT has been attempting to summarize and synthesize its research activities in western Kenya. This has taken a variety of forms, and is still being guided by feedback from farmers on which types of data and which manners of presentation are the most instructive and the most useful. Currently, the most popular format is printing the results of a given collective experiment on a single sheet of double-sided A4 paper, using colour photos of at least some of the group participants and presenting the yield data and some of the comments or observations made by the FRG and the research team in a variety of visual and numeric formats. These leaflets are inexpensive to produce and are easily printed locally if the need arises. Once the standard format was agreed to the greatest constraints are a) ensuring the information is properly presented in the most relevant local language (i.e. KiSwahili or KiTeso) and b) that appropriate photos demonstrating the key points are available using the local participants.

An alternative method now being employed for presenting information that has longer-term relevance than annual trial data was suggested by several of the FRG, namely the production of calendars. The idea is to use the calendar as a vehicle to feature information on the agronomic and ecological lessons gained from the group’s experimentation (e.g. on managing home garden vegetables for food security). This information is presented in small sections arrayed around a prominent photo of the entire research group. Most households in the area keep calendars with attractive photos on display in their homes long after the passage of the end of the year, which ensures that the information that accompanies the groups’ own photos will remain accessible much longer than a leaflet or brochure would ever be.

Assessing Approaches for Dissemination of Research-based Information to Farmers within their Livelihood Situations in Tororo District, Uganda.

Agwaru, G., Matsiko, F., Delve, R.J.

MSc thesis being finalized

Approaches to extension, like Conventional, and Training and Visit, that have been used in the past to disseminate information to the grass root farmers have often left out the farmers and at times treated them as objects of technology transfer. Recent approaches by NAADS and NGO's have emphasized participation of farmers in this process. This is intended to integrate indigenous knowledge with scientific knowledge that farmers obtain from a variety of sources, to enhance technology generation and dissemination. This study aims to assess the mechanisms used by NAADS, NGOs and research to reach different categories of farmers, what are the farmers' sources of information and what preferences do they have for the format and presentation of this information, and how the channels and formats used influence exchange of information. The livelihoods framework, which considers farmers' assets and environment, has been used to provide the basis for assessing the approaches through qualitative and quantitative methods. The research findings indicate that farmers are involved in multiple activities but lack important information, for example, on sources of improved seed, and post harvest-handling techniques. The use of indigenous knowledge has not fully solved most of these problems, whilst present extension approaches have not been able to target their efforts towards specific categories of farmers. The poor are left out because they lack the necessary assets; natural, social, financial, human and physical, needed to participate in these projects. Assessing technology demands and targeting information to different categories of farmers is critical if they are to be able to interpret and utilize this information.

Production of extension materials

Country	Topic
Western Kenya, Eastern Uganda, and Northern Tanzania	Integrated control of Striga, stemborers and declining soil fertility

Organisation of field days etc

Country	Topic
Central Kenya	Integrated Soil Fertility Management
Western Kenya, Eastern Uganda, and Northern Tanzania	Integrated control of Striga, stemborers and declining soil fertility

On-farm training of trainers, students

Date	Destination	Event or purpose
April 2004	Kenya	Training for PhD students working in Kenya on ureide technique for biological N fixation
August 2004	DR Congo	Training for trainers on improved soil fertility management practices

Training

Two intensive trainings for AfNet scientists were conducted during the last quarter of 2003 and the last quarter of 2004.

- 1) Participatory research and scaling up organized by AfNet in September 2003 at Arusha, Tanzania. This helped the scientists in better communication of research results with the end user (the farmer).
- 2) DSSAT Version 4: Assessing Crop Production, Nutrient Management, Climatic Risk and Environmental Sustainability with Simulation Models held in Arusha Tanzania, 23rd –28th August 2004. This training course was organized by the African Network for Soil Biology and Fertility (AfNet) of the Tropical Soil Biology and Fertility (TSBF) institute of CIAT and Project 5 of the Challenge Program on Water and Food- Volta Basin coordinated by ICRISAT and presented by the International Consortium for

Agricultural Systems Applications (ICASA), the training workshop introduced DSSAT v4 to 33 scientists, working in nine (9) different African countries. DSSAT is a comprehensive computer model for the simulation of crop growth and yield, soil and plant water, nutrient and carbon dynamics and their application to real world problems.

In the year 2003/ 2004, a total of 10 Msc and PhD students have been and are being trained within AfNet.

TSBFI-Latin America

Technical Bulletins

Two Bulletins published in Spanish are available for partners in the region and these were distributed at the Latin American Soils Congress held at Cartagena and Soil Quality Indicators workshop held at CIAT-Palmira.

- a) Why and how to build-up an arable layer
- b) A manual for the use of the minisimulator of rainfall.

A Colombian national workshop on soil quality indicators was held at CIAT-Palmira with the financial support of the Ministry of Agriculture and Rural Development of the Government of Colombia. This event was held from the 20 to 22 of October. The experiences gained at this event will be used to organize another workshop in Central America on soil quality indicators. Based on the outcomes of these two workshops, a position paper will be prepared with regional perspectives on soil quality and land degradation for the next International Soil Congress to be held in Philadelphia USA.

3.4 Strengthen linkage with regional organizations and advanced research organizations

TSBFI-Latin America

Completed Work

Combating land degradation and improving agricultural profitability in savannas and hillsides agroecosystems of Latin America

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In: A. Bationo, J. Kimetu and J. Kihara (eds). International Symposium of the African Network for Soil Biology and Fertility (AfNet) of TSBF Institute of CIAT. Improving Human Welfare and Environmental Conservation by Empowering Farmers to Combat Soil Fertility Degradation. Yaoundé, Cameroon, May 17-21, 2004.

Steep slope hillsides and acid-soil savannas are the dominant ecosystems of Tropical America. Hillsides cover about 96 million hectares in South and Central America and have important roles as reserves of biodiversity and source of water for downstream users. Agriculture in this region is often characterized by farming systems under which soils are degrading through nutrient depletion and erosion losses. It is estimated that 75% of agricultural land is under a process of degradation. Neotropical savannas occupy 243 million hectares in South America and are one of the most rapidly expanding agricultural frontiers in the world. Mono-cropping systems with high levels of inputs and excessive cultivation are accelerating the deterioration of soil physical properties as well as escalation of pest and disease problems. Governments and R & D agencies in the region are seeking for enduring solutions that revert poverty and land degradation problems in these regions. The maintenance of the natural resource base in the hillsides is vital to ensure livelihood of resource-poor farmers and to prevent their migration to urban centers where social problems are already endemic. The intensification of agricultural production in savannas requires acid soil (aluminium) tolerant crop/pasture germplasm, soil fertility improvement and

management of highly vulnerable physical properties. The group of TSBF-Latin America is developing concepts, management principles and tools that help individual producers and rural communities to improve their livelihoods by developing profitable, socially acceptable and resilient agricultural production systems based on Integrated Soil fertility Management. In this paper we summarize the main outputs of our research on: 1) nutrient cycling and soil-plant interactions; 2) integration of local and technical knowledge; 3) development of novel production systems; 4) strategies to replenish soil fertility and improve soil chemical, physical and biological properties and 5) carbon accumulation and gas fluxes in traditional and managed systems. Emphasis is given in the mechanisms developed to scale up/out knowledge and experiences amongst stakeholders in the region (producers, NARS and research institutions) and the possibility to foster South-South cooperation between Africa and Latin America.

The Georeferenced System on Soil Quality Indicators (GEOSOIL)

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The Georeferenced System on Soil Quality Indicators (GEOSOIL) for the Colombian savannas was conceived as a tool of support to the decision-makers in land use planning. It allows to store, consult and process data soil and of his biophysics surroundings on different scales: plot, farm, community, municipality, department, region, and country. It operates from a relational database elaborated in ACCES 2000, composed by a series of structured tables with information at different hierarchic levels to allow the characterization of the properties of the soil. The morphologic and analytical elements of the soil are combined to conform indicators of quality by a qualification system that allows visualizing the degree and the number of limitations that could have a soil to be used in agriculture. The degrees of qualification, used are: (1) without limitation, (2) light limiting, (3) moderate limiting, (4) severe limiting and (5) very severe limiting. The quality of the soil is associated with the degree and number of limitations that diminish their productive capacity. In addition, GEOSOIL has modules in which the user can: (a) add or consult space characteristics and attributes of the soil; (b) visualize the interpretation of the quality indicators, grouped in limitation ranks; (c) determine the general aptitude of the soil for a specific culture by means of the comparison between supply (soil) versus demands (requirements of the crop); (d) calculate the fertilization rates (e) generate reports on the variability in depth of some characteristics, for one or more soil; (f) map the results by means of a link with the Geographical Information Systems, in the specific case for free software MapMaker or Spring (g) also it is possible to generate report to made geostatistical to understand the spatial and temporal variability of the attributes that are being used as indicators..

On-going Work

Indicators of soil degradation and improvement: methodologies and approaches for their successful application to asses impact of land use at several scales in Hillside agroecosystem

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Land degradation is a major concern in the Central American region. Seventy percent of land is in process of degradation. The situation is worsened in hillside agro-ecosystems because of their inherent vulnerability and the high concentration of poor rural population in these areas. There is an increasing concern about this problem among farmers, local organizations, central government and policy makers. However, there is a lack of standardized field methodologies enabling stakeholder groups to assess the impact of interventions on soil fertility. The MIS consortium is organizing a regional workshop for Central America in order to share experiences in the use of tools and field methods to determine soil

chemical, physical and biological degradation. The main objective is to identify simple, robust and reliable indicators to assess impact of a given land use on soil chemical, physical and biological conditions.

Best examples of indicators and methodologies will be presented within the Symposium of Land Degradation at the World Congress of Soil Science organized by the International Union of Soil Science to be held at Philadelphia in 2006.

Geosoil – a decision support system for land use planning

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GEOSOIL is a database tool that allows the storage of soil information from soil profiles and represented it in a soil map. For each new entry, it allows the user to enter the physical and chemical data that are available, without requesting the user to fill in all the fields. For soil characteristics that are not numerical, for example for texture or landforms, it allows the user to choose from a range of options, the choices he want. For a number of soil properties that can be used as indicators of soil quality, it produces a report of a diagnosis, using criteria established for the Colombian llanos. It allows the comparison of soil characteristics with the requirements for a given crop, and when the necessary chemical information is available, can produce a report of fertilization recommendations. The soil requirements can be imported from the CUFUCOL database or be specified by the user. Allows the export of soil data and corresponding geographic coordinates to GIS programs for their mapping, or to geostatistical programs for a spatial analysis of variability and interpolation.

Validation of Geosoil in other Regions collaboration with CENIPALMA

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CENIPALMA the research institution for oil palm in Colombian, requested CIAT collaboration for the characterization of soils in the Central oil palm production area. The work involves the systematization of the information they have in 1:10.000 scale. GEOSOIL will be used to evaluate the soil distribution and its suitability for palm oil plantation. The soil parameters that define suitability will be included into the tool. Besides of that the tool will be improved to include socioeconomic aspects of oil production, farm sizes and tree distribution at different scales from farm to group or farms. The final objective is to define better soil management systems to increase productivity and sustainability through the application of the concept of precision agriculture.

Improving Integrated Soil Fertility Management (ISFM) through South-South collaboration

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TSBF-CIAT

Soil fertility degradation continues to prove a substantially persistent problem both in Africa and Latin America despite proposals for a diversity of solutions and the investment of time and resources by a wide range of institutions. In recognition of this problem, the AFNET network of African soil scientists was formed within TSBF in 1998 while an inter-institutional consortium was formed in Central America in 1998 under the umbrella of the Soil Water and Nutrient Management (SWNM) Program. AfNet and MIS have accumulated enormous experience over the years on ISFM from a systems perspective, which increases the comprehensive fit between research and farmer's experience of land management. However,

all this has been locked up with the specific regions in which each consortium has been in operation. Since each of these networks has a comparative advantage over the other, sharing experiences will be a great achievement. The network alliance will break the communication gap between the networks and the two continents. Each institution will bring the human resources, historical involvement with networks and partners, and an extensive range of research and development sites. A proposal is under development to improve capabilities of researchers, extension agents and farmers to use ISFM to combat land degradation through the South-South alliance between AFNET and MIS. The proposal includes the development of mechanisms to exchange knowledge, methods and tools across continents, the identification of common issues to develop joint proposals and, conduct network trials.

3.5 Promote awareness of ISFM issues with policy decision makers

3.6 Improve understanding of adoption and adaptation processes including identification of policy constraints and responses

TSBFI-Africa

Published work

Integrated soil fertility management: evidence on adoption and impact in African smallholder agriculture

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This paper reviews current organic nutrient management practices and their integration with mineral fertilizers in Sub-Saharan Africa with a view to understanding the potential impacts on a range of input markets. A number of different organic nutrient management practices have been found to be technically and financially beneficial, but they differ considerably as to their effectiveness and resource requirements. A review of African smallholder experiences with integrated soil fertility management practices finds growing use, both indigenously and through participation in agricultural projects. Patterns of use vary considerably across heterogeneous agro-ecological conditions, communities and households, but are stimulated by profitable commercially oriented agricultural opportunities. The potential for integrated soil fertility management to expand markets for organic inputs, labor, credit, and fertilizer is explored. We found that there are few direct analyses of these links and indirect evidence at this point in time is inconclusive.

On-going Work

Linking Farmers to Market: Challenges and Opportunities for Improving Rural Livelihoods in Communities affected by HIV/AIDS in Uganda.

A Ph.D. student has registered at BOKU, Vienna to conduct a study investigating the impact on HIV-AIDS on adoption of technologies and to see if increased income through niche markets is one option for increasing income to improve on food security, quality of the food eaten and access to medicines. Although organic agriculture (OA) is one of the fastest growing segments of the food sector world over, it needs to be noted that the transition to organic management and marketing systems is not only complex but constrained by a range of bio-physical, economic and social factors. While organic agriculture is meant to alleviate poverty, poverty remains one of the biggest barriers to organic

agriculture. Many organic initiatives lack the capacity to focus on strengthening biological processes, building farmers capacity to learn, enabling rural innovations. Little or no research has ever addressed the changes in livelihood strategies and outcomes as a result of the introduction of agricultural innovations such as organic farming and their market opportunities. There is a dearth of empirical studies on the reciprocal effects of HIV/AIDS on organic agriculture, and the opportunities that organic agriculture and other innovations may offer to communities and households affected by HIV/AIDS in Uganda. Similarly, no study has addressed the challenges of increasing the market opportunities and linking farmers to markets in communities and households affected by HIV/AIDS. Whether organic agriculture, and its market opportunities are more suitable to PLWAs than other agricultural technologies. The study will combine participatory rural appraisal methods with conventional household sample survey questionnaires using stratified sampling protocols and desegregated by gender in the district of Kisoro and Hoima. The theoretical and analytical framework will be guided by HIV/AIDS livelihood framework as developed as suggested (Tumwine 2003), gender analysis in agriculture and natural resource framework, and participatory technology development and innovation theory. This proposed research will explore opportunities and challenges of linking farmers to markets, and developing market opportunities for organic agriculture compared to other agricultural innovations in the context of HIV/AIDS pandemic. It will further assist in to improve the understanding the reciprocal linkages between agricultural innovations such as organic agriculture, market opportunities, and health (HIV/AIDS and related illnesses). The results of the study will generate information, which can be used to improve capacity of farmers affected by HIV/AIDS on how they can operate efficiently by strengthening their marketing skills of organic farm products. The findings of this study will further feed into and strengthen existing information on developing appropriate marketing of organic farm products and organic farming practices to promote sustainable agriculture production; and the study findings will be shared with collaborating agencies and organizations involved (BOKU-CIAT) and other stakeholders involved in poverty reduction, national AIDS control and other public health organizations who are important stakeholders.

3.7 Initiate dialogue on issues touching on policies that enhance the attainment of sustainability of the TSBFI outputs

3.8 Develop and construct databases and information systems to be shared out among TSBF project partners

On-going Work

Communication and partnerships strengthened in the CSM-BGBD project through:

- 13 Internet based mailing lists.
- Web-based discussion forum.
- Members web-based database developed based on CIAT's Expertise.
- Project Website developed.
- Prototype Project Database software developed for data and information storage, access, query, sharing and analysis.
- Partnerships formed in the participating countries with farming communities and NGOs.
- Global training workshop on earthworms and ants is planned for December 2004.
- Mexico held seminar at the Benchmark site to create awareness and develop strategic partnerships with people working on the ground in July 2004.
- Kenya held a national workshop to sensitize government ministries, research institutions, farmers and national universities on the project.

- Three members of the Indonesian Team participated in a training course on ‘tools for rapid biodiversity assessment of soil invertebrates in the ASEAN region.
- Several MSc and PhD students are underway.
- India has published its book on BGBD review in India.
- Indonesia has published its book on BGBD review in Indonesia.
- Brazil has published its book on BGBD review in Brazil.
- Kenya has sent its BGBD review papers to be published in a special journal of Tropical Microbiology.