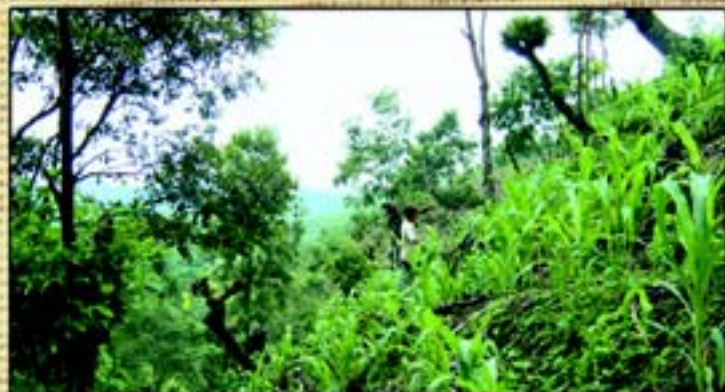


TSBF Institute

Project PE-2: Integrated Soil Fertility Management in the Tropics

ANNUAL REPORT 2006

EXECUTIVE SUMMARY



TSBF Institute

**PROJECT PE-2:
INTEGRATED SOIL FERTILITY MANAGEMENT
IN THE TROPICS**

**Annual Report 2006
Executive Summary**

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Integrated Soil Fertility Management in the Tropics

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1. PROJECT DESCRIPTION AND PROJECT LOGFRAME AS IN CIAT-MTP (2006-2008)

CIAT PROJECT PE-2: TROPICAL SOIL BIOLOGY AND FERTILITY (TSBF) INSTITUTE

Project Description

Goal: To strengthen national and international **capacity** to manage tropical ecosystems sustainably for human well-being, with a particular focus on soil, biodiversity and primary production; to reduce **hunger and poverty** in the tropical areas of Africa and Latin America through scientific research leading to new technology and knowledge; and to ensure **environmental sustainability** through research on the biology and fertility of tropical soils, targeted interventions, building scientific capability and contributions to policy.

Objective: To support the livelihoods of people reliant on agriculture by developing profitable, socially-just and resilient agricultural **production systems** based on Integrated Soil Fertility Management (ISFM); to develop **Sustainable Land Management** (SLM) in tropical areas of Africa and Latin America through reversing land degradation; and to build the **human and social capital** of all TSBF-CIAT stakeholders for research and management on the sustainable use of tropical soils.

External Conditions: Security and political stability does not restrict access to target sites and continuation of on-going activities.

Important Assumptions: Poverty reduction strategies remain central to human development support and funding. TSBF stakeholders remain engaged with TSBF-CIAT strategic priorities and/or TSBF management continues to adapt and innovate in response to changing priorities. Funding for research on globally-important issues continues.

Target Ecoregions: East and Central African highlands (Kenya, Uganda, Ethiopia, Tanzania, Rwanda, DR Congo); Southern African savannas (Zimbabwe, Malawi, Mozambique, Zambia); West African region (Burkina Faso, Niger, Cote d'Ivoire, Nigeria, Benin, Togo, Mali, Senegal, Ghana); Central American hillsides (Honduras, Nicaragua); Andean hillsides (Colombia, Ecuador, Peru; Bolivia); Tropical savannas of south America (Colombia, Venezuela); Amazon rainforest (Brazil, Colombia, Peru).

Beneficiaries and End Users: Principally small-scale crop-livestock farmers and extension workers, NGO's and NARES in tropical agroecosystems of sub-Saharan Africa, Latin America and South-east Asia.

Collaborators: NARES: KARI (Kenya), DRSRS (Kenya), NMK (Kenya), KEFRI (Kenya), NARO (Uganda), NFA (Uganda), NEMA (Uganda), MOA (Uganda), ITRA (Togo), INRAB (Benin), SRI (Ghana), IER (Mali), IAR (Nigeria), INRAN (Niger), INERA (Burkina Faso); CORPOICA (Colombia), EMBRAPA (Brazil), Kerala Forest Research Institute (India), GBP Institute (India), SDREP (India), INTA (Nicaragua), DICTA (Honduras); IC-SEA BIOTROP (Indonesia), RIABGR (Indonesia), FNCRDC (Indonesia), FNCRDC (Indonesia), RRIEC (Indonesia), COSA (Indonesia), IOS (Cote d'Ivoire), ANADER (Cote d'Ivoire), NRMEE (Cote d'Ivoire), MOE (Cote d'Ivoire), INPDMS (Cote d'Ivoire), ESDA (Cote d'Ivoire), UCA (Cote d'Ivoire), UAA (Cote d'Ivoire), BNETD/CCT (Cote d'Ivoire), CNRA (Cote d'Ivoire), (Instituto de Ecologia (Mexico), IEAC (Mexico), UNAM (Mexico), IFCP (Mexico), Centro Exp. Andres (Mexico), Reserve de la Biosfera de Los Tuxtlas (Mexico), **ARIs:** CIMMYT, ILRI, CIP, IFDC, ICRAF, IITA, ICRISAT, IRD (France), CIRAD (France), ETHZ (Switzerland), JIRCAS

(Japan); **Universities:** Nacional (Colombia), UNA (Nicaragua), UNA and EAP Zamorano (Honduras), Uberlandia (Brasil), University of Nairobi (Kenya), USIU (Kenya) Maseno University (Kenya), Methodist University (Kenya), Makerere University (Uganda), Kenyatta University (Kenya), Zimbabwe (Zimbabwe), Sokoine (Tanzania), Universidade Federal de Lavras (Brazil), Universidade Regionale de Lavras-FURB (Brasil), INPA (Brasil), UFAM (Brasil), Universidade De Brasilia (Brasil), Jawaharlal Nehru University (India), University of Agricultural Sciences (India), Kumaon University (India), Sambalpur University (India), Universitas Lampung (Indonesia), Brawijaya University (Indonesia), Gadjah Mada University (Indonesia), Bogor Agricultural University (Indonesia), Université de Cocody (Cote d'Ivoire), Universite D'Adobo-Adame (Cote d'Ivoire), Universidade Veracruziana (Mexico), Instituto Polytecnico (mexico), Leuven (Belgium), Paris (France), Bayreuth and Hohenheim (Germany), SLU (Sweden), NAU (Norway), Cornell (USA), Wisconsin-Madison (USA), Ohio State (USA), Colorado State University (USA), East Anglia (UK), Queen Mary University (USA), Michigan State University (USA), ITC (The Netherlands) University of Exeter (UK), and Wageningen University and Research Centre (Netherlands). **Regional Consortia:** AFNET, MIS, CONDESAN; **NGOs:** CARE, World Vision; CIPASLA, CIPAV.

Project Changes: TSBF-CIAT has developed and published a document on strategy and work plan for 2005-2010. CIAT activities of the Systemwide Program on SWNM are incorporated. Project logframe has been aligned to support goals of MDG, MEA and CGIAR Science Council priorities.

Project Logframe

CIAT PROJECT PE-2: TROPICAL SOIL BIOLOGY AND FERTILITY (TSBF) INSTITUTE (2006-2008)

Outputs/Targets	Outputs	Intended User	Outcome	Impact
OUTPUT 1	Biophysical and socioeconomic processes understood, principles, concepts and methods developed for protecting and improving the health and fertility of soils	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia	Principles, concepts and methods inform technology and system development	Improved soil health and fertility contribute to resilient production systems and sustainable agriculture
Output Targets 2006	Impact of three contrasting cropping systems on productivity and nutrient dynamics in hillsides and savannas quantified	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia	Partners testing the promising production systems	
	Standard methods for BGBD (belowground biodiversity) inventory published	CGIAR, ARIs, researchers from NARS and local universities, regional consortia	Partners and other global scientists using standard methods for BGBD inventory	
	At least three indicators of soil health and fertility at plot, farm and landscape scales in hillsides of Africa identified	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia	Partners begin validating indicators of soil health and fertility	
Output Targets 2007	At least three indicators of soil health and fertility at plot, farm and landscape scales in acid soil savannas identified	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia	Partners begin validating indicators of soil health and fertility	
	Land use intensity impact on BGBD evaluated in seven tropical countries participating in the BGBD project	Scientists participating in the BGBD project, ARIs, CGIAR, researchers from NARS and local universities, and farmers	Links between BGBD and land use management established and used as basis for developing sustainability in tropical farming systems	

Outputs/Targets	Outputs	Intended User	Outcome	Impact
	At least two indicators of soil quality used for farmer's decision making in hillsides agroecosystem;	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia	Partners incorporate farmer decision making in new proposals and on-going activities	
Output Targets 2008	Practical methods for rapid assessment and monitoring of soil resource base status developed	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia	Partners are using the methods with farmers	
	The social, gender, and livelihood constraints and priorities affecting the sustainable use of soils have been identified, characterized, and documented through case studies using innovative methods	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia	Partners are working to overcome the identified constraints with new proposals and on-going research	
OUTPUT 2	Economically viable and environmentally sound soil, water, and nutrient management practices developed and tested by applying and integrating knowledge of biophysical, socio-cultural and economic processes	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia	Technologies, systems and soil management strategies \adopted and adapted through partnerships	Adapted technologies contribute to food security, income generation and health of farmers
Output Targets 2006	Decision support framework for ISFM developed, tested with and made available to stakeholders in at least two benchmark countries in Africa	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia	Partners incorporating the DSS in new proposals and on-going research efforts	
	Cereal-legumes and livestock systems, with nutrient use efficiency as an	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers,	Cereal-legume systems and soil management strategies adopted and adapted	

Outputs/Targets	Outputs	Intended User	Outcome	Impact
	entry point, tested and adapted to farmer circumstances in hillsides of Africa	and regional consortia	through partnerships	
Output Targets 2007	Banana, bean and cassava-based systems, with the relation between pest, diseases and ISFM as entry point, including novel cropping sequences, tested and adapted to farmer circumstances in Africa	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia	Banana, bean and cassava-based systems and soil management strategies adopted and adapted through partnerships	
	Cereal-legumes and livestock systems, with nutrient use efficiency as an entry point, tested and adapted to farmer circumstances in acid soil savannas	CGIAR, ARI, researchers from NARS and local universities	Cereal-legume systems and soil management strategies adopted and adapted through partnerships	
Output Targets 2008	Communities in at least three countries demonstrate and test direct or indirect management options that enhance locally important ecosystem services using BGBD	BGBD network, CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, policy makers and global conservation organizations	Researchers, farmers, land users and policy makers and global conservation organizations increase their awareness of the benefits of conserving and managing BGBD	
	Quesungual and other related agroforestry systems, with soil and water conservation as entry point, including crop diversification strategies, tested and adapted to farmer circumstances in Central America	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia	Quesungual system and soil management strategies adopted and adapted through partnerships	

Outputs/Targets	Outputs	Intended User	Outcome	Impact
OUTPUT 3	Partnerships and tools developed and capacity enhanced of all stakeholders for improving the health and fertility of soils	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, young professionals, policy makers	Strengthened and expanded partnerships for ISFM facilitate south-south exchange of knowledge and technologies	Improved institutional capacity in aspects related to ISFM and SLM in the tropics contribute to agricultural and environmental sustainability
Output Targets 2006	At least two capacity building courses on ISFM held	AfNet, MIS	Partners incorporating new knowledge and skills in new proposals and on-going research efforts	
	At least five capacity building courses on BGBD held at the global level and more at participating country level	BGBD partners, researchers, local universities and NGOs	Partners incorporating new knowledge on BGBD and skills in new proposals and on-going research efforts	
Output Targets 2007	Strategy for building capacity for SLM is developed with partners	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, young professionals, policy makers	TSBF-CIAT scientists and partners lead globally-funded research on at least three topics of key relevance to the international community (as identified in GEF, MDG, MEA, CGIAR mission and goal statements)	
	At least three capacity building courses on ISFM held by AfNet and MIS	AfNet, MIS	Partners incorporating new knowledge and skills in new proposals and on-going research efforts	
	Books, web content and papers produced by partners in BGBD project both north and south in seven tropical countries	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, young professionals, policy makers	Partners incorporating new knowledge and skills in new proposals and on-going research efforts	

Outputs/Targets	Outputs	Intended User	Outcome	Impact
Output Targets 2008	Farmer-to farmer knowledge sharing and extension through organized field trips and research activities result practices in at least two sites	Researchers from NARS and local universities, NGOs, farmers, regional consortia, young professionals, policy makers	Farmers realize benefits of knowledge sharing	
	Web content in the BGBD website enhanced to contain data and information on BGBD taxonomy and species identification	Researchers, CGIAR, ARI, local universities	Increased number of biodiversity scientists use the website for proper identification and classification of soil biota to species level	
OUTPUT 4	Improved rural livelihoods through sustainable, profitable, diverse and intensive agricultural production systems	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, young professionals, policy makers	Partners promoting resilient production systems with multiple benefits (food security, income, human health and environmental services)	Improved resilience of production systems contribute to food security, income generation and health of farmers
Output Targets 2006	Components of improved systems promoted by partners in African hillsides	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, young professionals, policy makers	Farmers adopting improved system components, including crops and soil management technologies	
	Strategies for BGBD management tested by partners and farmers in seven tropical countries participating in the BGBD project	Researchers from NARS, local universities and farmers	BGBD and land use management strategies that enhance crop yields and ecosystem services produced and documented	
Output Targets 2007	Components of improved systems promoted by partners in acid soil savannas	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers	Farmers adopting improved system components, including crops and soil management technologies	
	Crop-livestock systems with triple benefits tested and	CGIAR, ARI, researchers from NARS and local	Farmers are testing and adapting improved	

Outputs/Targets	Outputs	Intended User	Outcome	Impact
	adapted to farmer circumstances in hillsides	universities, NGOs, farmers, regional consortia, young professionals, policy makers	production systems in at least 15 sites across five countries	
	Strategies of BGBD management for crop yield enhancement, disease control, and other environmental services demonstrated in seven tropical countries participating in the BGBD project	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, young professionals, policy makers	Farmers and governments adopting BGBD technologies in crop production and ecosystems services	
Output Targets 2008	Improved production systems having multiple benefits of food security, income, human health and environmental services identified	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, young professionals, policy makers	Market-led hypothesis is incorporated in systems experimentation; Different partners linking food security, environmental sustainability and income generation to health	
	Crop-livestock systems with triple benefits tested and adapted to farmer circumstances in savannas	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, young professionals, policy makers	Farmers are testing and adapting improved production systems in at least 15 sites across five countries	
OUTPUT 5	Options for sustainable land management (SLM) for social profitability developed, with special emphasis on reversing land degradation	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, young professionals, policy makers	Principles of sustainable land management integrated in country policies and programs	Reversing land degradation contribute to global SLM priorities and goals
Output Targets 2006	Potential for carbon sequestration estimated for at least one tropical agroecoregion	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, policy	Regional governments develop CDM projects based on the knowledge of carbon sequestration	

Outputs/Targets	Outputs	Intended User	Outcome	Impact
		makers	potential	
	Economic valuation of legume nodulating bacteria and soil structure carried out in at least five countries participating in the BGBD project	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, policy makers	Visibility of BGBD economic viability and BGBD technologies appreciated and used by farmers, and disseminated by local, national and regional governments	
Output Targets 2007	Decision tools (GEOSOIL; Decision Tree) available for land use planning and targeting production systems in acid soil savannas	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, policy makers	Local organizations using the decision tools for land use planning	
	Biophysical, social and policy niches in the landscape for targeting SLM technologies and enhanced ecosystem services identified and prioritized	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, policy makers	Methods of SLM are incorporated in the design of landscape research	
Output Targets 2008	Methods for socio-cultural and economic valuation of ecosystem services developed and applied for trade-off and policy analysis used in at least in 2 humid and 2 sub-humid agroecological zones	CGIAR, ARI, researchers from NARS and local universities, BGBD network, NGOs, farmers, regional consortia, policy makers	Methods of SLM are incorporated in the design and evaluation of landscape research	
	In at least four of the countries participating in the BGBD project, policy stimulated to include matters related to BGBD management, and sustainable utilization.	CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, policy makers	Policy issues related to BGBD acquisition, exchange, intellectual property rights (IPR), benefits sharing, etc. included in local, national and regional government policies	

2. CGIAR OUPUT TEMPLATE: CIAT MTP 2006-2008

Output	Output Target 2006	Category	Achieved & Proof of achievement (yes or no)
OUTPUT 1: Biophysical and socioeconomic processes understood, principles and concepts developed for protecting and improving the health and fertility of soils	<ul style="list-style-type: none"> Impact of three contrasting cropping systems on productivity and nutrient dynamics in hillsides and savannas quantified Standard methods for BGBD (belowground biodiversity) inventory published At least three indicators of soil health and fertility at plot, farm and landscape scales in hillsides of Africa identified 	OTHER KINDS OF KNOWLEDGE	YES PE-2 Annual Report 2005, pages 28-63; Journal Articles
		OTHER KINDS OF KNOWLEDGE	YES PE-2 Annual Report 2005, pages 64-65
		OTHER KINDS OF KNOWLEDGE	YES PE-2 Annual Report 2005, pages 66-68 Journal article
OUTPUT 2: Economically viable and environmentally sound soil, water, and nutrient management practices developed and tested by applying and integrating knowledge of biophysical and socioeconomic processes	<ul style="list-style-type: none"> Decision support framework for ISFM developed, tested with and made available to stakeholders in at least two benchmark countries in Africa Cereal-legumes and livestock systems, with nutrient use efficiency as an entry point, tested and adapted to farmer circumstances in hillsides of Africa 	PRACTICES	YES PE-2 Annual Report 2005, pages 116-118 Journal article
		PRACTICES	YES PE-2 Annual Report 2005, pages 119-133
OUTPUT 3: Partnerships and tools developed and capacity enhanced of all stakeholders for improving the health and fertility of soils	<ul style="list-style-type: none"> At least two capacity building courses on ISFM held At least five capacity building courses on BGBD held at the global level and more at participating country level 	CAPACITY	YES PE-2 Annual Report 2005, pages 147-151
		CAPACITY	YES PE-2 Annual Report 2005, pages 152-161

Output	Output Target 2006	Category	Achieved & Proof of achievement (yes or no)
OUTPUT 4: Improved rural livelihoods through profitable, diverse and intensive agricultural production systems	<ul style="list-style-type: none"> • Crop components and soil management technologies of improved systems promoted by partners in African hillsides • Management practice options that increase or maintain BGBD in benchmark agroecosystems demonstrated by partners and farmers in seven tropical countries participating in the BGBD project 	MATERIALS	YES PE-2 Annual Report 2005, pages 179-181
		PRACTICES	YES PE-2 Annual Report 2005, page 182; BGBD Project Report
OUTPUT 5: Options for sustainable land management (SLM) for social profitability developed, with special emphasis on reversing land degradation	<ul style="list-style-type: none"> • Potential for carbon sequestration estimated for at least one tropical agroecoregion • Economic valuation of legume nodulating bacteria and soil structure carried out in at least five countries participating in the BGBD project 	PRACTICES	YES PE-2 Annual Report 2005, pages 202-209; Book chapter
		PRACTICES	YES PE-2 Annual Report 2005, page 210; BGBD Project Report

Categories of output targets to be used are: Materials, Policy strategies, Practices, Capacity, and Other kinds of knowledge.

3. RESEARCH HIGHLIGHTS 2006

Exploration of Integrated Soil Fertility Management for Banana Production and Marketing in Uganda and Kenya - Arbuscular Mycorrhizal Fungi (AMF) improve establishment and production of tissue culture banana: Although once a highly sustainable crop, banana has seen precipitous yield declines in its traditional growing areas in Uganda and Kenya due to a number of pests and diseases. Yields, however, continue to decrease even when pressure to diseases and pests is alleviated. Declining soil fertility has been cited as a contributory factor. According to the Ministry of Agriculture, Ugandan farmers attain approximately 17% of the potential yield from banana (5.9 vs 35 t ha⁻¹). Tissue culture (TC) plantlets offer an excellent means of providing pest and disease-free planting material to farmers. We found that inoculation with proper AMF enhances the early survival of tissue culture bananas. However, the impact of inoculation needs to be visible at the farm level (e.g., through enhanced survival of TC plantlets). Inoculation with AMF showed considerable potential to enhance the growth of tissue-culture bananas. Efforts will be made to continue looking for better AMF strains from existing banana plantations and to quantify the medium-to-long term effects of this better initial growth under field conditions.

Profitability of agro-forestry based soil fertility management technologies: the case of small holder food production in Western Kenya: Persistent food insecurity accompanied by low and declining farm household incomes are a common feature of many small holder maize and bean producers in western Kenya. This has been largely attributed to soil nutrient depletion, among other factors. One way of addressing soil fertility problems in many maize-based cropping systems is the use of agro-forestry based technologies. We carried out a survey in western Kenya aimed at analyzing the financial and social profitability of use of agroforestry based (improved tree fallows) and other soil fertility management technologies among smallholder farmers. The Policy Analysis Matrix (PAM) was used to determine the financial and social profitability of different production systems. Results revealed that use of chemical fertilizers with improved fallows was the most profitable technology. We recommended that farmers be encouraged to intensify the use of chemical fertilizers. To make chemical fertilizers more accessible to farmers, we also recommended that good linkages be made between farmers and micro credit institutions so that small scale farmers are not actually biased against due to lack of collateral when credit is being advanced to clients.

Advances in defining the key principles behind the social acceptance and biophysical resilience of Qesungual Slash and Mulch Agroforestry System (QSMAS): Collaborative research between TSBF-LAC and MIS consortium in Central America for the past 2 years contributed to the following progress: (i) QSMAS is a production system inserted into the landscape to improve livelihoods while conserving the natural resource base; (ii) local biodiversity is favored through the conservation of about 14 species (from 12 families) of trees and shrubs; (iii) soil losses due to erosion are dramatically reduced due to a combined effect of permanent soil cover and presence of stones in soil leading to improved water productivity and quality; (iv) pools of soil nutrients (N and P) maintained or even increased while soil biodiversity and biological activity is enhanced and these improvements in resource quality were related to the spatial distribution of trees and organic resources; and (v) the system is an important source of firewood for domestic consumption and has no significant negative effects on greenhouse gas emissions. Validation of QSMAS in Nicaragua has progressed beyond expected level and the capacity of local farmers and technicians is being enhanced through field days.

4. PROJECT OUTCOME

Developed dual-purpose soybean value chain and increased income of smallholder farm families and other rural entrepreneurs in East Africa: TSBF-CIAT and its partners contributed to improved rural livelihoods in East Africa (Kenya, Uganda, Tanzania) through enhanced income, improved health, and more sustainable agriculture by increasing the land cropped with dual-purpose soybean and fostering links between production and demand. This outcome resulted from the activities of Output 4 of PE-2 Project (TSBF Institute) on “Improved rural livelihoods through profitable, diverse and intensive agricultural production systems” of CIAT-MTP 2004-2006. The number of farmer groups (15–130 individual members each) growing soybean has increased from three to 16 in three districts in western Kenya in 2005 in less than two cropping seasons. The corresponding area planted to soybean by the groups increased from 4.1 to 16.3 ha in *Migori* district, 1.6 to 6.2 ha in *Butere-Mumias* district. Results in 2006 showed that over 300 networks of farmers’ groups and 4,000 individual farmers from more than 10 districts are presently participating in soybean promotion in Kenya; up from 9 farmers’ groups and 180 individual farmers at project inception. The area cultivated to soybean has increased more than 10-fold, with yields improving from 0.6 to about 1.5 t/ha. Network of farmers’ groups is already supplying large-scale feed/food processing companies with increasing quantities of top quality soybeans with market desired traits. Farmers’ bulking of produce is generating tangible results with some farmers’ groups already delivering grains with market-preferred traits to processing companies at agreed market clearing prices. Many poor farmers testified to increased ability to pay children’s school fees and purchase of inputs (mineral fertilizers, etc.). Some farmers are beginning to remove sugarcane (so-called “cash crop” that no longer brings cash due to market collapse caused by globalization) from their lands, replacing them with soybean.

5. LIST OF PUBLICATIONS

List of publications 2006

Type of publications	Published in 2006	Published in 2007	In press	In review	Total
TSBF-Africa:					
Refereed journal articles	22	2	10	7	41
Book chapters	5	2	22		29
Books edited	1		1		2
Conference proceedings	8	1	2		11
Oral and poster presentations	23				23
<i>Sub-total</i>	<i>59</i>	<i>5</i>	<i>35</i>	<i>7</i>	<i>106</i>
TSBF-Latin America:					
Refereed journal articles	15	2	6	6	29
Book chapters	4		4	1	9
Books edited	4				4
Conference proceedings					
Oral and poster presentations	46				46
<i>Sub-total</i>	<i>69</i>	<i>2</i>	<i>10</i>	<i>7</i>	<i>88</i>
Total	126	7	46	14	194

Please see Annex-1 for the full list of publications.

6. LIST OF PROPOSALS FUNDED

5.1 New proposals approved in 2006

TSBF-Africa: 18

TSBF-Latin America: 5

5.2 On-going special projects in 2006

TSBF-Africa: 32

TSBF-Latin America: 16

Please see Annex-2 for the lists.

7. PROBLEMS ENCOUNTERED AND THEIR SOLUTION

Research related

TSBF-Africa

We are happy to have a strategic plan (2005-2010) that guides our research and its implementation. Every 3 years we monitor our achievements and make reflections on how to adapt these to future challenges. We have just published our first document “TSBF-CIAT’s Achievements and Reflections 2002-2005”. This will serve us well during the EMPR and also for our donors and partners.

We are committed to work across the two Research for Development Challenges (RDCs). We will conceptually be part of RDC on People and Agroecosystems (P&A) and we will make sure that we will play an important role in the development of product lines of the Sharing the Benefits of Agrobiodiversity (SBA) RDC. Of particular interest to TSBF-CIAT are beans, forages and cassava product lines.

Collaborative work in Africa: We are leading some projects in which we have not only asked colleagues from other CIAT projects to join us but also we are contributing to their salaries and operations. Few examples are:

- a) Consortium for Improvement of Agricultural Livelihoods in Central Africa (CIALCA), a TSBF-CIAT project, involves scientific staff from the SBA-RDC (P. Kimani, R. Buruchara) and from People and Agroecosystems RDC (P. Sanginga, A. Farrow).
- b) IDRC project that is equally shared between the Enabling Rural Innovation (ERI) and AfNet under A. Bationo (TSBF-CIAT) and S. Kaaria (ERI) leaderships.
- c) Projects in Southern Africa funded by Austria, USAID and SSA-CP where TSBF-CIAT is contracting ERI staff for help especially for socio-economic work.

Work with colleagues at CIAT HQ: After the cut we experienced in Latin America, we are freshly thinking on how to re-build the soil fertility work there. After the SAC in January 2007, we will advise the management of our research and implementation strategy. We have attempted to work with IPM and forage projects without too much success in concretizing all our discussions. We will pursue this effort. We believe we will make progress on cassava with the role of TSBF-CIAT in the agronomy and adoption part of the cassava project under discussion with BMGF (Bill & Melinda Gates Foundation).

CIAT strength in Africa: TSBF-CIAT will have 17 scientific staff and associates in 2007 and will constitute the major NRM force in Africa. Some centers such as IITA, ICIPE, WARDA and ILRI

recognize this. For example, IITA has decided to delegate or relegate soil fertility research etc. to TSBF-CIAT. Rockefeller Foundation and even BMGF recognize this fact and have engaged TSBF-CIAT as their learning partner on soil fertility issues. We now receive requests from all sorts of stakeholders including Policy makers, Private Sectors and Advanced institutions in the North to either collaborate or implement projects on their behalf. This was not the case 3 years ago. The above examples will constitute CIAT's strength in all negotiations scenarios that eventually will happen for the re-organization of CG in Africa.

TSBF-LAC

Elimination of 3 senior staff positions (Soil Physics, Soil Ecology and Biodiversity, Systems Agronomy) and 13 support staff positions in the TSBF-Latin America team and the departure of two senior staff positions (Ecosystem Services and GIS/Agronomy) during 2006 made it very difficult to continue the work in special projects funded by donors (Water and Food CP, USAID, CRC). To overcome this problem, two senior scientists were contracted as consultants to deliver on donor contracts.

A total of 5 new projects were approved during 2006 in which the staff of TSBF-LAC will participate. Three out of these 5 projects will involve close collaboration with the Forages Program/Product Line and therefore these projects (ZIL-SDC project on cover legumes; SLP project on tradeoff analysis; MADR project on pasture restoration) could be housed with the Forages Product Line. The other two projects (ANR project on amazon biodiversity and environmental services; CGIAR-EMBRAPA project on land quality monitoring system) could also be housed in Forages until the Programs/Product Lines are further developed at CIAT.

Center-commissioned external review (CCER) of CIAT's strategy for natural resource management: Improving management of agroecosystems in the tropics (IMAT) recommended that CIAT should maintain a basic level of soil science expertise at CIAT-HQ with emphasis on soil conservation and soil-water relations for improving nutrient use efficiency. This position is essential to reinvigorate soils research in LAC and to contribute to different CIAT Programs /Product Lines.

Services related

At TSBFI-Africa, off-road vehicles are still in short supply at times, especially since the number of scientific and support staff is continuously increasing. The soil microbiology laboratory is getting established and needs the basic equipment for rhizobia and mycorrhizae analyses.

Funding related

TSBF-Africa

TSBF-CIAT is pleased to share with the CIAT-BOT a general overview of the TSBF –CIAT's financial status during the year 2006, noting that BOT's traditional financial reports will ordinarily concentrate on the global picture for the entire Centre. Contribution to CIAT could be illustrated by the following activities that were geared toward CIAT's interest first rather than TSBF per se:

- a) Belgian Core funding to CIAT negotiated by TSBF–CIAT when Belgian government decided to fund only six centers out of 15. We might play the same role for Sweden in the future.
- b) The Sub-Saharan Africa Challenge Program Lead Center for the Lake Kivu Pilot Learning Site. We lead this effort and recommended that this be managed by CIAT Africa rather than TSBF-CIAT. CIAT has two projects (USD \$500,000 per year for each) out of nine that were awarded from 90 applications by FARA.

- c) We will play the same role when the Alliance for a Green Revolution in Africa (AGRA) jointly funded by Rockefeller Foundation and Gates start in 2007. We are in very fruitful discussion with RF staff and this was very much reinforced when they visited our field work in western Kenya this November 2006. A similar field visit to be jointly conducted by RF and BMGF is envisaged in 2007.

Major issues worthy of note include:

1. *Growth:*

The institute has over the last three years grown from an average annual budget of US\$ 2m to over double that amount at US\$ 4.5m annually. In the year 2006, the income and budget will be at an all time high of nearly 4.9m.

2. *Elimination of Operational Deficits*

The TSBF-CIAT has eliminated the recurrent operational deficits. Starting from an inherited deficit of over US\$100,000, we have managed through stringent controls to stay in marginal surplus since the Year 2004.

3. *Widening Donor base*

In addition to bringing new donors on board, we have retained the goodwill of TSBF-CIAT's traditional donors to the extent that even with shifting focus, especially from core to project based funding, the overall outlay has increased from the same donors.

4. *Management of Overhead and Indirect Costs*

With all due diligence and prudence in place, our financial stability is threatened by:

a) Progressive decrease in core funding:

Because of changing donor preference, our core funding has progressively moved away from TSBF-CIAT historical average of 21 – 26% to the present level of 7% only. We are thus 93% on restricted project funds which implies that reasonable level of flexibility in finances can only be exercised on overhead funds.

b) Decrease in overhead margin allowed on grant funds:

The overhead margin has similarly diminished to an average of 6%, a total of US\$ 272,576 in 2006. Several Projects / donors have expressly disallowed institutional overheads.

c) Increase of overheads charged by ICRAF and CIMMYT on sub-contracted services:

Our present institutional circumstances have made it unavoidable to do most local business in the legal image of ICRAF (in Kenya) and CIMMYT (in Zimbabwe) at an overhead rate ranging from 13 - 18%. This percentage is set to increase to 16 - 23% from January, 2007.

In year 2006, we paid a total of about US\$ 100,600 to ICRAF and CIMMYT. This figure is projected to increase to about US\$ 129,000 when the proposed increases are applied.

d) Increase in rent of office space at ICRAF:

ICRAF has also increased rent by 25 – 30%. Whereas we paid US\$ 33,000 in year 2006; the projected increase will bring this cost to about US\$ 42,000.

e) The need to share overhead earned with CIAT HQ as our contribution to the rebuilding of CIAT Reserves:

We understand and appreciate the need and obligation to make contribution towards stabilizing CIAT through contribution to reserves. Towards this end we shall share with CIAT HQ the US\$ 272,576 earned in 2006 by turning over 34% (US\$ 99,472). This is the effect of charging an average of 7.5% on new projects coming on board from 2006 with an average of 13% OVH on the 32 projects we have. Some of the old projects still running are exempt. Thus, this figure is also set to go up as all new projects become chargeable.

TSBF-LAC

As indicated in the strategic notes on proposed core resource allocation of 2007 as part of the vision and strategic direction for CIAT, soils research in Latin America is in a phase out process since the decisions of 2006. Key staff from TSBF-LAC are retained to work on plant nutrition as part of the forage and bean research. The IRS position on plant nutrition is transferred to the Sharing of the Benefits of Agrobiodiversity Research for Development Challenge. A few additional NRS positions are being phased out. Because of these changes, the output targets of TSBF-LAC team for 2008 and 2009 will be completely eliminated in the CIAT-MTP (2008-2010).

8. STAFF LIST

TSBF Institute -Director

Sanginga, Nteranya (Soil Microbiologist)

TSBF Institute – Africa Staff

Senior Staff

Amede, Tilahun (Soil Scientist)
Andren, Olle (Soil Scientist, Modeler)
Bationo, André (African Network Coordinator (Soil Scientist))
Chianu, Jonas (Socio Economist)
Coorbels Mark (Soil scientist, modeler)
Delve, Robert (Soil Fertility Management)
Huising, Jeroen (BGBD Coordinator (GIS Scientist))
Jefwa, Joyce (Microbiologist)
Lesueur, Didier (Microbiologist)
Ohiokpehai, Omo (Food & Nutrition Scientist)
Okoth, Peter (Information Manager)
Pypers, Peter (Soil scientist)
Ramisch, Joshua (Social Scientist)
Roing, Kristina (Agronomist)
Vanlauwe, Bernard (Soil Scientist)
Verma, Ritu (Anthropologist),
Zingore Shamie (Soil Scientist)

Visiting Scientists

Merckx, Roel (Katholiek University, Belgium)
Andren, Olof (Upsalla University, Sweden)
Junko Sato (Kyoto University, Japan)

Consultants

Danso, Seth (Rhizobiology, BGBD project)
Osgood, Diane (Economist, BGBD Project)

Swift, Mike (BGBD Project)

Research Assistants

Ekise, Isaac (Asst Scientific Officer),
Kankwatsa, Peace (Research Asst, Kampala)
Kihara, Job (Asst Scientific Officer)
Mukalama, John (Snr Scientific Assistant)
Rusinamhodzi, Leonard (Research Asst, Harare)
Wangechi, Helen (Asst Scientific Officer)
Waswa, Boaz (Asst Scientific Officer)

Technical Staff

Muthoni, Margaret (Laboratory Attendant)
Ngului, Wilson (Laboratory Technician)
Nyambega, Laban (Field Technician)
Njenga, Francis (Laboratory Attendant)
Muranganwa, Francis (Field worker Harare)

Administrative Staff

Agalo, Henry (Driver / Field Assistant)
Akech, Caren (Secretary)
Akuro, Elly (Driver / Field Assistant)
Chisvino, Stephen (Driver/OA, Harare)
Kareri, Alice (Administrator)
Meyo, Rosemary (Administrative Assistant)
Mulogoli, Caleb (Finance/IT Asst)
Ngutu, Charles (Finance/Admin. Officer)
Nyamhingura, Isabella (Admin. Asst, Harare)
Ogola, Juliet (Senior Administrative Secretary)

TSBF Institute – Latin America Staff

Senior Staff

Amézquita, Edgar (Soil Physics) (until August 2006; Consultant from October 2006)
Ayarza, Miguel (Agronomy) MIS Coordinator, Honduras (until August 2006; Consultant from October 2006)
Barrios, Edmundo (Soil Ecology and Biodiversity) (until August 2006)
Rao, Idupulapati (Plant Nutrition and Physiology) (40% PE-2, 30% IP1, 30% IP5)

Senior Research Fellows

Rondón, Marco (Ecosystem services) (until August 2006)
Rubiano, Jorge (GIS/Agronomy) (until July 2006)

Consultants

Amézquita, Edgar (Soil Physics)
Ayarza, Miguel (Agronomy)
Estrada, Ruben (Resource Economics)

Research Associates

Asakawa, Neuza

Research Assistants

Borrero, Gonzalo
Corrales, Irlanda
García, Edwin
Girón, Ernesto (until June 2006)
Hurtado, María del Pilar
Molina, Diego (until October 2006)

Ocampo, Gloria (until October 2006)
Quintero, Jenny (until January 2007)
Quintero, Marcela
Rivera, Mariela
Rodríguez, Marcela (until June 2006)
Rodríguez Maryory (until March 2007)
Trejo, Marco (until July 2006)

Specialists:

Galvis, Jesús Hernando
Rodríguez, José Arnulfo
Melo, Edilfonso

Secretaries:

Cervantes, de Tchira Carmen
Núñez, Cielo (until January 2007)
Escobar, Vilia

Technicians:

Alvarez, Arvey
Herrera, Pedro (until October 2006)
Mina, Hernán
Molina, Jarden
Otero, Martín
Rodríguez, Carlos
Rojas, Gonzalo (until October 2006)
Sánchez, Amparo (until October 2006)
Trujillo, Carlos Arturo (until October 2006)

Workers:

Cayapú, Joaquín (until November 2006)
Ortega, Viviana (until October 2006)
Salamanca, Josefa

9. SUMMARY OF 2006 BUDGET

SOURCE	AMOUNT (US\$)	PROPORTION (%)
TSBF-Africa		
Unrestricted Core	429,032	11
Restricted Core		
Sub-total	429,032	11
Special projects	3,607,323	89
Total-Africa	4,036,355	100
TSBF-Latin America (CIAT-HQ)		
Unrestricted Core	164,321	22
Restricted Core: Japan	130,000	17
Sub-total	294,321	39
Special projects-South America	154,037	20
Special projects-Central America	28,339	4
Water and Food CP	277,114	37
Total-Latin America	753,810	100
Total Project	4,790,165	

ANNEX-1: LIST OF PUBLICATIONS

TSBF Institute - Africa

Refereed journal articles

Journal articles published in 2006

- Bado, B.V., Bationo, A. and Cescas, M.P. 2006. Assessment of cowpea and groundnut contributions to soil fertility and succeeding sorghum yields in the Guinean savannah zone of Burkina Faso (West Africa). *Biology and Fertility of Soils* 43: 171-176.
- Barrios, E., Delve, R.J., Bekunda, M., Mowo, J., Agunda, J., Ramisch, J., Trejo, M.T. and Thomas, R.J. 2006. Indicators of Soil Quality: A South-South development of a methodological guide for linking local and technical knowledge. *Geoderma* 135: 248-259.
- Bationo, A., Waswa, B., Kihara, J. and Kimetu, J. 2006. Advances in integrated soil fertility management in sub-Saharan Africa: challenges and opportunities. *Nutrient Cycling in Agroecosystems* 76(2-3): 109-136.
- Chianu, J.N., Tsujii, H. and Awange, J. 2006. Environmental impact of agricultural production practices in the savannas of northern Nigeria. *Journal of Food, Agriculture & Environment-JFAE* Vol. 4(2): 00-00.
- Chianu, J., Vanlauwe, B., Mukalama, J., Adesina, A. and Sanginga, N. 2006. Farmer evaluation of improved soybean varieties being screened in five locations in Kenya: Implications for research and development. *African Journal of Agricultural Research* Vol.1(5): 143-150.
- Faye, A., Sarr, A. and Lesueur, D. 2006. Effect of inoculation with rhizobia on the gum-arabic yield of 10-year-old *Acacia Senegal* trees. *Arid Land Research Management*, 20(1): 79-85.
- Kimetu, J.M., Mugendi, D.N., Bationo, A., Palm, C.A., Mutuo, P.K., Kihara, J., Nandwa, S. and Giller, K. 2006. Partial balance of nitrogen in a maize cropping system in humic nitisol of Central Kenya. *Nutrient Cycling in Agroecosystems* 76: 261-270.
- Mafongoya, P.L., Bationo, A., Kihara, J. and Waswa, B.S. 2006. Appropriate technologies to replenish soil fertility in southern Africa. *Nutrient Cycling in Agroecosystems* 76: 137-151.
- Maithya, J.M., Kimenye, L.N., Mugivane, F.I. and Ramisch, J.J. (2006). Profitability of agro-forestry based soil fertility management technologies: the case of small holder food production in western Kenya. *Nutrient Cycling in Agro-Ecosystems* 76(2-3): 355-367.
- Odendo, M., Ojiem, J., Bationo, A. and Mudeheri, M. 2006. On-farm evaluation and scaling-up of soil fertility management technologies in western Kenya. *Nutrient Cycling in Agroecosystems* 76: 369-381.
- Ohiokpehai, O. 2006 Expanding Phane: A nutritionally Rich Local Food in Southern Africa *JFAE* V4 (3&4): 26-32,
- Okalebo, J.R., Othieno, C.O., Woome, P.L., Karanja, N.K., Semoka, J.R.M., Bekunda, M. A., Mugendi, D.N., Muasya, R.M., Bationo, A. and Mukhwana, E.J. 2006. Available technologies to replenish soil fertility in East Africa. *Nutrient Cycling in Agroecosystems* 76: 153-170.
- Ouattara, B., Ouattara, K., Serpantie, G., Mando, A., Sedoso, M.P. and Bationo, A. 2006. Intensity cultivation induced effects on soil organic carbon dynamic in the western cotton area of Burkina Faso. *Nutrient Cycling in Agroecosystems* 76: 331-339.
- Pypers, P., Delrue, J., Diels, J., Smolders, E. and Merckx, R. 2006. Phosphorus intensity determines short-term P uptake by pigeon pea (*Cajanus cajan* L.) grown in soils with differing P buffering capacity. *Plant & Soil* 284: 217-227.
- Pypers, P., Van Loon, L., Diels, J., Abaidoo, R., Smolder, E. and Merckx, R. 2006. Plant-available P for maize and cowpea in P-deficient soils from the Nigerian Northern Guinea savanna – comparison of *E*- and *L*-values. *Plant & Soil* 283, 251-264.

- Ramisch, J.J., Misiko, M.T., Ekise, I.E. and Mukalama, J.B. 2006. Strengthening “Folk Ecology”: Community-based learning for integrated soil fertility management, western Kenya. *International Journal of Agricultural Sustainability*, 4(2): 154-168.
- Rufino, M.C., Rowe, E.C., Delve, R.J. and Giller, K.E. 2006. Nitrogen cycling efficiencies through resource-poor African crop-livestock systems: A review. *Agriculture Ecosystems and Environment* 112: 261-2
- Schlecht, E., Buerkert, A., Tielkes, E. and Bationo, A. 2006. A critical analysis of challenges and opportunities for soil fertility restoration in Sudano-Sahelian West Africa. *Nutrient Cycling in Agroecosystems* 76(2-3): 109-136
- Tabu, I.M., Obura, R.K., Bationo, A. and Mumera, L. 2006. Effect of soil fertility management and nitrogen fertilizer rate on maize yield in smallholder farmers’ fields. *Journal of Agronomy* 5(2): 191-195.
- Tittonell, P., Leffelaar, P.A., Vanlauwe, B., Van Wijk, M.T. and Giller, K.E. 2006. Exploring diversity of crop and soil management within smallholder African farms: a dynamic model for simulation of nutrient (N) balances and use efficiencies at field scale. *Agricultural Systems* 9: 71-101.
- Vanlauwe, B. and Giller, K.E. 2006. Popular myths around soil fertility management in sub-Saharan Africa. *Agriculture, Ecosystems and Environment* 116, 34-46.
- Vanlauwe, B., Tittonell, P. and Mukalama, J. 2006. Within-farm soil fertility gradients affect response of maize to fertilizer application in western Kenya. *Nutrient Cycling in Agroecosystems* 76(2-3): 171-182.

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- Zingore, S., Murwira, H.K., Delve, R.J. and Giller, K.E. 2007. Influence of nutrient management strategies on variability of soil fertility, crop yields and nutrient balances on smallholder farms in Zimbabwe. *Agriculture Ecosystems and Environment* 119: 112-126.
- Zingore, S., H. K. Murwira, R. J. Delve and K. E. Giller. 2007. Soil type, historical management and current resource allocation: three dimensions regulating variability of maize yields and nutrient use efficiencies on smallholder farms. *Field Crops Research* 101: 296 – 305.

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- Bationo, A., Kihara, J., Vanlauwe, B., Waswa, B.S. and Kimetu, J. 2007. Soil organic carbon dynamics, functions and management in West African agro-ecosystems. *Agricultural Systems* (in press).
- Chianu, J., Ohiokpehai, O., Vanlauwe, B., Adesina, A. and Sanginga, N. 2007. An approach for promoting a versatile crop that has remained minor: Case of soybean farming systems of Kenya. *Food policy* (in press).
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- McNair, W.B., Bado, V.B., Bationo, A., Soler, C.T., Hoogenboom, G. and Jones, J.W. 2007. Soil carbon dynamics and crop residue yields of cropping systems in the Northern Guinea Savanna of Burkina Faso. *Soil and Tillage Research* (in press).
- Ohiokpehai, O., Kimiywe, J., Mbithe, D. and Sanginga, N. 2007. Feeding patterns and practices among households with children aged 6-59 months in Mbita Division Suba District Kenya. *JFAE* (in press).
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- Amede, T. and Bekele, A. 2007. Niches for Integration of Green Manures and Risk Management through Growing Maize Cultivar Mixtures in Southern Ethiopian Highlands. *Journal of Agronomy and Crop Science* (in review).
- Amede, T. and Delve, R.J. 2007. Improved decision making for achieving the Triple Benefits of Food Security, Income and Environmental Services through Modeling Cropping Systems in Ethiopian Highlands. *Agricultural Systems* (in review).
- Bagenze, P., Robert J. D., and Huising, J.E. 2007. Target area identification using a GIS approach for the introduction of legume cover crops for soil productivity improvement: A case study eastern Uganda. *African Journal for Agricultural Research* (in review).
- Zingore, S., Gonzalez-Estrada, E., Delve, R. J. and Giller, K.E. 2007. Evaluation of resource management options for smallholder farms using an integrated modelling approach. *Agricultural Systems* (in review)
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- Zingore, S., R.J.Delve, H.K. Murwira and K.E.Giller (2007) Variable grain legume yields, responses to phosphorus and rotational effects on maize across soil fertility gradients on African smallholder farms. *Nutrient Cycling in Agroecosystems* (in review).
- Zingore, S., R. J. Delve, J. Nyamangara and K. E. Giller. 2006. Multiple effects of manure: a key to maintenance of soil fertility and restoration of depleted sandy soils on smallholder farms. *Nutrient Cycling in Agroecosystems* (in review).

Book Chapters

- Adamou, A., Bationo, A., Tabo, R. and Koala, S. 2007. Improving soil fertility through the use of organic and inorganic plant nutrient and crop rotation in Niger. In: A. Bationo, B. S. Waswa and J. Kihara (eds). *Advances in integrated soil fertility management in sub-Saharan Africa: Challenges and Opportunities*. Springer, the Netherlands (in press).
- Amede, T. and Taboge, E. 2007. Optimizing Soil Fertility Gradients in the Enset (*Ensete ventricosum*) Systems of the Ethiopian Highlands: Trade-offs and Local Innovations. In: A. Bationo, B. S. Waswa and J. Kihara (eds). *Advances in integrated soil fertility management in sub-Saharan Africa: Challenges and Opportunities*. Springer, the Netherlands (in press).
- Baaru, M.W., Mugendi, D.N., Bationo, A., Louis, V. and Waceke, W. 2007. Soil Microbial Biomass Carbon and Nitrogen as Influenced by Organic and Inorganic Fertilisation in Kenya. In: A. Bationo, B. S. Waswa and J. Kihara (eds). *Advances in integrated soil fertility management in sub-Saharan Africa: Challenges and Opportunities*. Springer, the Netherlands (in press).
- Bado, B., Bationo, A., Lompo, F., Cescas, M.P. and Sedoso, M.P. 2007. Mineral fertilizers, organic amendments and crop rotation managements for soil fertility maintenance in the Guinean zone of Burkina Faso (West Africa). In: A. Bationo, B. S. Waswa and J. Kihara (eds). *Advances in integrated soil fertility management in sub-Saharan Africa: Challenges and Opportunities*. Springer, the Netherlands (in press).
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- Delve, R.J., Chitsike, C., Kaaria, S., Kaganzi, E., Muzira, R. and Sanginga, P. 2006. Smallholder farmer-market linkages increase adoption of improved technological options and NRM strategies. In: T. Amede, L. German, C. Opondo, S. Rao and A. Stroud (eds). 2006. Integrated natural resource management in practice: Enabling communities to improve mountain livelihoods and landscapes. Proceedings of a conference held on October 12-15, 2004 at ICRAF-Headquarters, Nairobi, Kenya. Kampala, Uganda: African Highlands Initiative.
- Delve, R.J., Gonzalez-Estrada, E., Dimes, J., Amede, T., Wickama, J., Zingore, S. and Herrero, M. 2006. Evaluation of a farm-level decision support tool for trade-off and scenario analysis for addressing food security, income generation and NRM. In: T. Amede, L. German, C. Opondo, S. Rao and A. Stroud (eds). 2006. Integrated natural resource management in practice: Enabling communities to improve mountain livelihoods and landscapes. Proceedings of a conference held on October 12-15, 2004 at ICRAF-Headquarters, Nairobi, Kenya. Kampala, Uganda: African Highlands Initiative.
- Delve, R., and Ramisch, J.J. 2006. Impacts of land management options in Eastern Uganda and Western Kenya. In: S. Benin, J. Pender, F. Place and S. Ehui (Eds.) Strategies for sustainable land management in the East African highlands. (Washington, D.C.: International Food Policy Research Institute, pp. 319-332.
- Huising, E. J. 2007. Description and classification of land use at sampling locations for inventory of BGBD. Chapter 10. In: F. M. de Souza Moreira, D. E. Bignell and E. Jeroen Huising (eds.), Standard Methods for Assessment of Soil Biodiversity in the Context of Land-Use Practice.
- Huising, E.J., Huang, S.P., Cares, J., Louzada, J., Zanetti, R., Moreira, F., Susilo, F., van Noordwijk, M. and Konate, S. 2007. Sampling Strategy and Design for the Inventory of Below-Ground BioDiversity. Chapter 2. In: F. M. de Souza Moreira, D. E. Bignell and E. Jeroen Huising (eds.) , Standard Methods for Assessment of Soil Biodiversity in the Context of Land-Use Practice.
- Karunditu, M.W., Mugendi, D.N., Kung'u, J. and Vanlauwe, B. 2007. Fertilizer nitrogen recovery as affected by soil organic matter status in two sites in Kenya. In: A. Bationo, B. S. Waswa and J. Kihara (eds). Advances in integrated soil fertility management in sub-Saharan Africa: Challenges and Opportunities. Springer, the Netherlands (in press).
- Kathuku, A.N., Kimani, S.K., Okalebo, J.R., Othieno, C.O. and Vanlauwe, B. 2007. Integrated Soil Fertility Management: Use of NUTMON to Quantify Nutrient Flows in Farming Systems in Central Kenya. In: A. Bationo, B. S. Waswa and J. Kihara (eds). Advances in integrated soil fertility management in sub-Saharan Africa: Challenges and Opportunities. Springer, the Netherlands (in press).
- Kaya, B., Niang, A., Tabo, R. and Bationo, A. 2007. Performance de diverses espèces agroforestières en jachère améliorée de courte durée et leurs effets sur la fertilité des sols et les rendements du sorgho au Mali. In: A. Bationo, B. S. Waswa and J. Kihara (eds). Advances in integrated soil fertility management in sub-Saharan Africa: Challenges and Opportunities. Springer, the Netherlands (in press).
- Kihara, J., Kimetu, J.M., Vanlauwe, B., Bationo, A. and Mukalama, J. 2007. Increasing land productivity and optimising benefits through nitrogen and phosphorus management in legume-cereal rotations in western Kenya. In: A. Bationo, B. S. Waswa and J. Kihara (eds). Advances in integrated soil fertility management in sub-Saharan Africa: Challenges and Opportunities. Springer, the Netherlands (in press).
- Kihara, J., Kimetu, J.M., Vanlauwe, B., Bationo, A., Waswa, B. and Mukalama, J. 2007. Optimising crop productivity in Legume-Cereal Rotations Through Nitrogen And Phosphorus Management In Western Kenya. In: A. Bationo, B. S. Waswa and J. Kihara (eds). Advances in integrated soil fertility management in sub-Saharan Africa: Challenges and Opportunities. Springer, the Netherlands (in press).
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- Rodríguez, M., Amézquita, E., Chaves, J.A., Galvis, J.H. and Campo, J.M. 2006. Alternativas para mejorar la productividad de suelos infértiles y degradados. 1. Calidad química. Oral presentation at 'XIII Congreso Colombiano de la Ciencia del Suelo', Bogotá, Colombia, October 2006.
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- Zarate, L., Barrios, E. and Sanchez De Prager, M. 2006. Functional diversity of arbuscular mycorrhizal fungi in soil structure modification. XIII Colombian Congress of Soil Science. 2006. Bogota, Colombia.

ANNEX 2: LIST OF PROPOSALS FUNDED

TSBF-Africa - New proposals approved in 2006

Project	CIAT CC & PN *	Donor	Total Budget (US\$)	Amount available to:	
				partners (US\$)	CIAT (US\$)
Linking farmers to markets: Developing sustainable marketing systems to improve the competitiveness of smallholder organic agriculture.		Austrian Federal Ministry of Finance (BMF).	USD700,000		
Combating Soil Fertility Decline to Implement Smallholder Agricultural Intensification in sub-Saharan Africa		IFAD.	USD650,000		
Increasing total farm productivity in vulnerable production systems in Mozambique.		Austrian Federal Ministry of Finance (BMF)	USD600,000		
Soil Fertility Network - Research for Development project.		USAID through Chinyanja Triangle Consortium	USD141,000		
Using market-led approaches to drive investments in soil fertility management and improve production and incomes of rural communities in selected areas of the central watershed of Zimbabwe.		CIDA	CAD100,000		
Improving smallholder food security, nutrition and income through increased production and marketing of climbing beans		McKnight		USD300,000	(60,000 for CIAT)
Integrated Soil Productivity Initiative through Research and Education		Rockefeller Foundation	USD50,000		
Developing a participatory socio-economic model for food security, improved rural livelihoods, watershed management, & biodiversity conservation in southern Africa.		SANREM		1m USD	6000USD for TSBF plus half fully funded US PhD student)
Making Markets Work for the Poor: Unlocking Opportunities		Sub-Saharan		2,000,138 USD	

for Agro-Enterprise Diversification in the Lake Kivu Pilot Learning Site’,		Africa Challenge Program			
Conservation and Sustainable Management of Below-Ground Biodiversity: Tranche II”		GEF funding component		USD 4,007,124	
Soybean processing and utilization for improving health and nutrition of rural households in HIV/AIDS affected areas of Kenya				700,000 USD	
Exploring the multiple potential of soybeans in enhancing rural livelihood and small industries in East Africa.				500,000 USD	
Increasing the productivity, stability, sustainability and profitability of smallholder agriculture in vulnerable production systems through more efficient use of water and nutrients.		FARA Africa Challenge Program		USD1.4 million.	
Innovative management of <i>Acacia senegal</i> trees to improve resource productivity and gum-arabic production in arid and semi-arid sub-Saharan Africa”		CIRAD	1,8 millions of euros	400,000 euros for CIRAD	
Going to scale: Developing strategies for scaling out market-oriented organic agriculture from farmer group to association level		Austrian Federal Ministry of Finance (BMF)		USD650,000	
Building adaptive capacity to cope with increasing vulnerability due to climatic change		IDRC		1.1m CAD	
Scaling up livelihood impacts through farmers organisations and access to markets		Gatesby Charitable Trust.		USD550,000	
Strengthening the capacity for research and development to enhance natural resource management and improve rural livelihoods in Sub-Saharan Africa		Submitted to IDRC		(CAN\$950,000	
Innovation as Key to the Green Revolution in Africa: Exploring the Scientific Facts: Support for the 10th AfNet Symposium		IDRC		CAN\$ 50,000)	
Innovation as Key to the Green Revolution in Africa: Exploring the Scientific Facts: Support for the 10th AfNet Symposium		CIDA Conference		CAN\$ 75,500)	
Soil Fertility Replenishment as the Key to Green Revolution in Africa: Exploring the Scientific Facts: Support for the 10th AfNet Symposium		Ford Foundation		CAN\$ 5,000	

* CIAT CC & PN = CIAT Cost Center and Project Proposal Number

TSBF Africa - List of ongoing special projects in 2006: 32 see 2005 annual report

TSBF-Latin America - New proposals approved in 2006

Project	CIAT CC & PN *	Donor	Total Budget (US\$)	Amount available to:	
				partners (US\$)	CIAT (US\$)
Realizing the benefits of cover crop legumes in smallholder crop-livestock systems of the hillsides of Central America. Collaborative work with ETH and INTA-Nicaragua		ZIL-SDC, Switzerland	425,000	325,000	100,000 for 3 years
Trade-off analysis of using legumes for soil enhancing or as animal feed resource. Collaborative work with ILRI and INTA-Nicaragua.	EFP56	CGIAR- SLP	195,300		195,300 for 2 years
Implementación y difusión de Tecnologías para rehabilitación de praderas degradadas en el Sistema de Producción de Carne en los departamentos de Córdoba, Sucre y Atlántico. Collaborative work with CORPOICA		MADR-Colombia	630,000	560,000	70,000 for 3 years
Biodiversity and environmental services at landscape level in the Amazon		National Research Agency (ANR), France	843,180 Euros	766,820 Euros	76,360 Euros for 3 years
Land monitoring system based on integrated soil quality indicators. Collaborative work with EMBRAPA		Brazil-CGIAR funds	70,000		70,000

* CC & PN = Cost Center and Proposals Number

Latin America - List of ongoing special projects in 2006

Project	CIAT CC & PN *	Donor	Total Budget (US\$)	Amount available to:	
				Partners (US\$)	CIAT (US\$)
Quesungual Slash and Mulch Agroforestry Systems (QSMAS): Improving crop water productivity, food security and resource quality in the sub-humid tropics	NSD30	Water & Food Challenge Program	754,800	257,124	497,676
Payment for Environmental Services (PES) as a mechanism for	NSB30	CGIAR Water & Food	482,602	268,850	213,752

promoting rural development in the upper watersheds of the tropics		Challenge Program–GTZ, CONDESAN, DIIS.			
Ubicación y Medidas de Control de Procesos Erosivos de la Cuenca del Río Cauca	NSR30	CRC, Cauca, Colombia	143,849	0	34,705
Estudio de las limitantes físicas, químicas y biológicas de los suelos de la meseta de Popayán con miras a mejorar su productividad	NSK80	CRC, Cauca, Colombia	34,169	0	34,169
Adoption of the nutrient management support system (NuMass) Software throughout Latin America	NSB40	USAID, USA	161,000	0	161,000
Validation of NuMaSS expert system	NST50	FAO	2,450	0	2,450
Environmental impact of reforestation	NSG50 P-782	CVS, Colombia	62,010	0	62,010
Rehabilitation of degraded lands through silvopastoral systems and reforestation of marginal lands in the Caribbean savannas of Colombia - Carbon trading (not research) project	NSA40	BioCarbon Fund: CVS	50,000	0	50,000
Charcoal Interaction with soils		USAID linkages fund	15,000	0	15,000
Linkages Fund: Black carbon interactions with soil functions		USAID	37,328	0	37,328
Nitrification Inhibition	EF-07	JIRCAS	37,000	0	37,000
Improving cassava drought tolerance through enhanced mycorrhizal symbiosis		Cassava Biotechnology Network-LAC Small Grants DGIS	10,000		10,000
Bean genomics for improved drought tolerance in Central America	GDB42	BMZ-GTZ, Bonn, Germany	740,300	264,000	476,300
Adaptation of <i>Brachiaria</i> grasses to low-P soils	EFG57	SDC-ZIL, Switzerland	SF 346,000	SF\$ 246,900	SF 99,100
Fighting drought and aluminum toxicity: Integrating functional genomics, phenotypic screening and participatory evaluation with farmers to develop stress resistant common bean and <i>Brachiaria</i> for the tropics	P-761	BMZ	Euros 1,100,000	Euros 344,600	Euros 755,400
Evaluation and development of transgenic drought-tolerant varieties. Commissioned research Project	P-839	Generation CP	300,000	264,000	36,000

- CIAT CC & PN = CIAT Cost Center and Project Proposal Number.