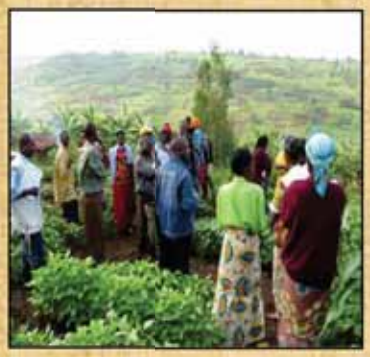
# TSBF Institute

## Integrated Soil Fertility Management in the Tropics




# ANNUAL REPORT 2007

Executive Summary

CIAT
Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

# TSBF Institute of CIAT

INTEGRATED SOIL FERTILITY MANAGEMENT
IN THE TROPICS

**Annual Report 2007**
**Executive Summary**

Centro Internacional de Agricultura Tropical (CIAT)
Apartado Aéreo 6713
Cali, Colombia
South America

TSBF Institute:
Integrated Soil Fertility Management in the Tropics

*Contact address:*
Nteranya Sanginga
Director, Tropical Soil Biology and Fertility (TSBF) Institute of CIAT
ICRAF Campus
P O Box 30677-00100
Nairobi, Kenya
Tel: + 254 (20) 524766 or 524755
Fax: + 254 (20) 524764 or 524763
E-mail: tsbfinfo@cgiar.org

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# 1. PROJECT DESCRIPTION AND PROJECT LOGFRAME AS IN CIAT-MTP (2007-2009)

**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).

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

**Collaborators: NARS:** Kenyatta University, Kenya, VLIR project on food security in Central Kenya; RF soybean project; JKUAT, Kenya, RF banana project; NARO, Uganda and LZARDI, Tanzania, DfID project on striga management in the Lake Victoria Basin; NARO, Uganda, RF project on exploring soybean potential in East Africa; KARI, Kenya, DfID project on striga management in the Lake Victoria Basin; University of Zimbabwe, Zimbabwe, NSF project on soil aggregation; Soil Research Institute, Ghana, NSF project on soil aggregation; INERA, D R Congo, ISAR, Rwanda, DGDC project on legume integration in systems in Central Africa; DGDC project on banana management in Central Africa; ISABU and IRAZ, Burundi, DGDC project on banana management in Central Africa; University of Kinshasa and University of Bukavu, D R Congo, VLIR project on cassava in D R Congo; Forest Dept of CIRAD, France, Kenyan Forestry Research Institute, Kenya, FOFIFA, Madagascar INCO DEV FOREAIM on Bridging restoration and multi-functionality in degraded forest landscape of Eastern Africa and Indian Ocean islands; INERA-DPF, Burkina Faso and Forest Dept of CIRAD, France, project CORAF/Gomme Arabique on Impact de l'inoculation par les rhizobiums sur la productivite de gommeraies plantees ou naturelles et la dynamique de facteurs lies au fonctionnement biologique des sols sous-jacents ; INERA, Burkina Faso, ISRA, Senegal,

FOFIFA, Madagascar, project ANR/MICROBES project on microbial observatories for the management of soil ecosystem services in the tropic; KEFRI, Kenya, Forest Dept of CIRAD, France and Grassland Research Station, Zimbabwe, project INCO DEV SAFSYS on Symbionts in agroforestry systems: what are the long-term impacts of inoculation of *Calliandra calothyrsus* and its intercrops; Antananarivo University, Madagascar and University of Makerere, Uganda project INCO DEV FOREAIM on Bridging restoration and multi-functionality in degraded forest landscape of Eastern Africa and Indian Ocean islands; University of Niamey, Niger and University Cheikh Anta Diop, Senegal, project CORAF/Gomme Arabique on Impact de l'inoculation par les rhizobiums sur la productivite de gommeraies plantees ou naturelles et la dynamique de facteurs lies au fonctionnement biologique des sols sous-jacents; Institut National de Recherches Agronomiques du Niger (INRAN); Niamey/Niger; Institut d'Economie Rurale (IER), Mali; ARS, Chilanga Zambia (Moses Mwale); EARO (Ethiopian Agricultural Research organization), Ethiopia; Ahmadu Bello University, Nigeria; ARI Mlingano, Tanzania; Egerton University, Kenya; University of Nairobi, Nairobi (Kenya) (Rosemary Atieno); Makerere University, Kampala (Uganda) (Elizabeth K. Balirwa, Jonny Mugisha, John Baptiste, Mary Silver); Lake Basin Development Authority (Kenya) (Amos Ameya); Selian Agricultural Research Institute (Tanzania) (Sossi Kweka and Festo Ngulu); Southern Regions Research Institute, Ethiopia; AREX (Department of Agriculture Research and Extension), Zimbabwe**,** IIAM (Instituto Nacional de Investigacao Agronomica), Mozambique; Eduardo Mondlane University, Maputo, Mozambique; Universidade Católica de Moçambique, Beira, Mozambique and DARS (Department of Agriculture Research Services), Malawi

**Advanced Research Institutes:** J Six, University of California Davis, USA, NSF project on soil aggregation; R Merckx, Catholic University of Leuven, Belgium, VLIR project on food security in Central Kenya; E Tollens, Catholic University of Leuven, Belgium, DGDC project on legume integration in systems in Central Africa; R Swennen, Catholic University of Leuven, Belgium, DGDC project on banana management in Central Africa; S Recous, INRA, France, VLIR project on food security in Central Kenya; K Giller, WUR, Netherlands, EU project on AfricaNUANCES; L Brussaard, L Stroosnijder, WUR, Netherlands, WOTRO project on soil fauna and soil aggregation; Institut de Recherche pour le Developpement, France, project CORAF/Gomme Arabique on Impact de l'inoculation par les rhizobiums sur la productivite de gommeraies plantees ou naturelles et la dynamique de facteurs lies au fonctionnement biologique des sols sous-jacents; Institut de Recherche pour le Developpement, France, Centre of Ecology and Hydrology, UK' University of Norway, project INCO DEV FOREAIM on Bridging restoration and multi-functionality in degraded forest landscape of Eastern Africa and Indian Ocean islands; GSF-Munich, Germany and Institut de Recherche pour le Developpement, France project ANR/MICROBES project on microbial observatories for the management of soil ecosystem services in the tropic; Centre of Ecology and Hydrology and, Scottish Agricultural College UK, project INCO DEV SAFSYS on Symbionts in agroforestry systems: what are the long-term impacts of inoculation of Calliandra calothyrsus and its intercrops; BIOFORSK Soil, Water and Environment, Norway; JIRCAS (Japan International Research Center for Agricultural Sciences), Japan; Wye College, University of London (Colin Poulton); Kyoto University, Kyoto, Japan (Atsuyuki Asami); Ishikawa Prefectural University, Japan (Hiroshi Tsujii); University of Kiel, Kiel, Germany (Roll A.E. Mueller); Universite Catholique de Louvain (Eric F. Tollens); Swedish Univ. Agric. Sci (SLU), Uppsala, Sweden (Olof Andrén). University of Natural Resources and Applied Life Sciences (BOKU), Vienna Project on Linking Farmers to Markets; University of Hohenheim, Germany, University of Firenze, Florence, Italy.

**International Agricultural Research Centres:** IITA, Uganda, RF project on ISFM for bananas; DGDC project on banana management in Central Africa; IITA, Nigeria (Alene Arega, David Chikoye, Robert Abaidoo); ICIPE and CIMMYT Kenya, DfID project on striga management in the Lake Victoria Basin; CIMMYT, Kenya, AATF project on striga management in Western Kenya; IFDC, Togo, WOTRO project

on soil fauna and soil aggregation; INIBAP, Uganda, DGDC project on banana management in Central Africa; ICRAF, Kenya, RF project on soil fertility gradients and site-specific soil fertility management; ICRISAT (Niger); Centre d'Etude Régional pour l'Amélioration de l'Adaptation à la Sécheresse (CERAAS/ISRA); West African Rice Development Authority (Patrick M. Kormawa); African Highlands Initiative, Ethiopia.

**International and Regional Agricultural Research Centers:** CIMMYT, Kenya: Hugo de Groote, Mirjam Pulleman; CIP, Kenya: Charles Crissman; ICRAF, Kenya: Frank Place, Steve Franzel, Noordin Qureish, Bashir Jama, Richard Coe, Keith Shepherd; ICRISAT, Kenya: Ade Freeman; ICRISAT, Mali: Tabo; ICRISAT, Niger: Aboudoulaye, Abdoulaye and Mahamane; ICRISAT, Zimbabwe: John Dimes; IITA Ibadan, Nigeria- Abdou; IITA Uganda: Piet van Asten, Cliff Gold, Suleiman Okech; ILRI, Kenya: Patti Kristjanson, Steve Staal, Philip Thornton, Mario Herrero, Dannie Romney; ICIPE: Zia Khan; AATF: Mpoko Bokanga; West African Rice Development Authority – S. Oyke; International Institute for Tropical Agriculture – Alene Arega, David Chikoye, Robert Abaidoo

**NGOs:** FIPS, Kenya, RF project on soil fertility gradients and site-specific soil fertility management; SACRED-Africa, Kenya, RF soybean project; Diobass and Food for the Hungry, D R Congo, DGDC project on legume integration in systems in Central Africa; DGDC project on banana management in Central Africa; UR2PI, Congo ,ANR/MICROBES project on microbial observatories for the management of soil ecosystem services in the tropic; Hunger Project/Burkina Faso; Groupe d'Action pour le Développement Communautaire (GADEC) ; Tambacounda / Senegal; Union des Groupements Paysans de Mekhe (UGPM/ Senegal); Projet Intrants/Niger; Groupement Nabonswendé de Tougouri / Burkina; Entente des Groupements Associés de Toubacouta (EGAT) / Senegal;Caritas-Kaolack/Senegal; AfriAfya (Caroline Nyamai-Kisia); CRS (Tom Remington); Farmers' Own Trading Company (Tony Margetts)
Africa2000 Network, UEEF, Africare (Uganda)

**The Private Sector:** TSBF-Africa is also working with a wide array of private sector and farmers associations. Some of those involved in Kenya as an example include:
Western Seed Company (Kenya)– Saleem Esmail; BIDCO OIL REFINERIES LIMITED (Kenya) – Dileswar Pradhan, Ashish Mandlik; Mukwano Group of Companies (Uganda) – Ibnul Hassan Rizvi; NUTRO MANUFACTURING EPZ LIMITED – Simon Glover; Ebubala Self-Help Group (Shianda Location of Butere Division, Kenya); Tushiauriane Self Help Group (Eluche Sub-location, Kenya); Nabongo Panga Self-Help Group (Matawa Sub-Location, Nabongo Location, Kenya); Jitolee Women Group (Lukohe sublocation, North Marama location, Butere Division, Kenya); Etako Women Group (Lukohe sublocation, North Marama location, Butere Division, Kenya); Bushe Women Group (Butere Division, Kenya); Shishebu farmers' Group (Shianda location, Butere Division, Kenya); Mabole farmers' field school (Shianda location, Butere Division, Kenya); Masaa Men and Women Group; Eluche Mwangaza Community Dev't Organization (Eluche Sublocation, Mumias Division, Kenya); Uriri farmers' cooperative society (Migori District, Kenya); Suna farmers' cooperative society (Migori District, Kenya). AMFRI farms (Uganda), Olivine Indutries, Harare, Reapers (Pvt) Ltd, Harare

**Project Changes:** Following the EPMR recommendations and new agricultural development in Africa TSBF-CIAT has developed a concept note on its renewed strategy:" ***A forward-looking CIAT-TSBF Institute: actualizing the strategic direction"***. CIAT-TSBF has conceptualized its work around three outcome lines: *1) ISFM-based crop production systems for major impact zones in sub-Saharan Africa':* support the livelihoods of people reliant on agriculture by developing profitable, socially-just and resilient agricultural production systems based on ISFM*; 2*) *Sustainable Land Management*: develop sustainable land management in tropical areas through reversing land degradation. These will be described in the MTP.

**Project Logframe**

## **2.** CIAT PROJECT PE-2: TROPICAL SOIL BIOLOGY AND FERTILITY (TSBF) INSTITUTE (2007-2009)

| 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 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 | |
| | 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 | |
| | Practical methods for rapid assessment and monitoring of soil | CGIAR, ARI, researchers from NARS and local universities, | Partners are using the methods with farmers | |

| Outputs/Targets | Outputs | Intended User | Outcome | Impact |
|---|---|---|---|---|
| | resource base status developed | NGOs, farmers, and regional consortia | | |
| **Output Targets 2008** | 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 | |
| | Decision tools for soil biota and nutrient management developed and disseminated to stakeholders | CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia | Partners involved in research for development are using the decision tools | |
| Output **Targets 2009** | Knowledge on relationships between soil fertility status and the nutritional quality of bio-fortified crops is used by development partners to target production of these crops | CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia | Stakeholders in research for development focus on food quality in addition to production | |
| | Sufficient knowledge on mechanisms driving tolerance to drought and low soil P is available to guide breeding efforts | CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia | Breeders involve soil scientists in the breeding program | |

| Outputs/Targets | Outputs | Intended User | Outcome | Impact |
|---|---|---|---|---|
| **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 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** | Communities in at least three countries demonstrate and test direct or indirect management options that enhance locally | BGBD network, CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, policy makers | Researchers, farmers, land users and policy makers and global conservation organizations increase their awareness of the | |

| Outputs/Targets | Outputs | Intended User | Outcome | Impact |
|---|---|---|---|---|
| **Targets 2008** | important ecosystem services using BGBD | and global conservation organizations | benefits of conserving and managing BGBD | |
| | Local baselines and interviews show that farmers' understanding of soil processes is demonstrably enhanced within community-based experimentation in at least 5 benchmark sites | CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia | Scientists blend local and new scientific knowledge in the experimental design | |
| **Output**<br>**Targets 2009** | The potential for occurrence of positive interactions between organic and mineral inputs is evaluated for the most common cropping systems in each mandate area. | CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia | Stakeholders appreciate the complementary role of both inorganic and organic inputs and use them judiciously | |
| | Throughout the Institute project life, new questions generated in the evaluation efforts of the different target outputs are addressed and fed back to these evaluation activities | CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, and regional consortia | PM&E is institutionalized and used by all project partners | |

| 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 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 |
|---|---|---|---|---|
| | 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 | |
| **Output Targets 2008** | | | | |
| | 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 Targets 2009** | Profitable land use innovations scaled out beyond pilot learning sites through strategic alliances and partnerships, and application of alternative dissemination approaches. | 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 | |
| | Strategies for institutionalizing of participatory NRM approaches and methodologies established | Researchers from NARS and local universities, NGOs, farmers, regional consortia, young professionals, policy makers | New institutional arrangement catalyse multidisciplinary work and enhance scaling up of technologies and best practices | |

| Outputs/Targets | Outputs | Intended User | Outcome | Impact |
|---|---|---|---|---|
| **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 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 adapted to farmer circumstances in hillsides | 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 | |
| | 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** | Improved production systems having multiple benefits of food security, income, human | CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional | Market-led hypothesis is incorporated in systems experimentation; | |

| Outputs/Targets | Outputs | Intended User | Outcome | Impact |
|---|---|---|---|---|
| **Targets 2008** | health and environmental services identified | consortia, young professionals, policy makers | Different partners linking food security, environmental sustainability and income generation to health | |
| | Validated intensive and profitable systems are being demonstrated, promoted by partners and adopted by farmers in 10 countries | CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, young professionals, policy makers | Increased sustainable productivity and profitability of major cropping systems | |
| **Output Target 2009** | The contribution of multiple stress adapted germplasm in driving overall system resilience is understood for the conditions occurring in all mandate areas | CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, young professionals, policy makers | Farmers pay more attention to the sustainability of their farming system in addition to productivity | |
| | Products of the trade-off analysis are guiding the introduction and evaluation of alternative NRM options, better suited to the farmer production objectives and the environment of the actions sites | CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, young professionals, policy makers | Farmers use results of trade off analysis to make appropriate choice | |

| Outputs/Targets | Outputs | Intended User | Outcome | Impact |
|---|---|---|---|---|
| **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 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 developed for socio-cultural and economic valuation of ecosystem services developed and applied for trade-off and policy analysis in at least in 1 humid and 1 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, | CGIAR, ARI, researchers from NARS and local universities, | Policy issues related to BGBD acquisition, exchange, intellectual | |

| Outputs/Targets | Outputs | Intended User | Outcome | Impact |
|---|---|---|---|---|
| | policy stimulated to include matters related to BGBD management, and sustainable utilization. | NGOs, farmers, regional consortia, policy makers | property rights (IPR), benefits sharing, etc. included in local, national and regional government policies | |
| | 30% of partner farmers in pilot sites used SLM options that arrested resource degradation and increased productivity in comparison with non-treated farms | CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, policy makers | Increased productivity and conservation of degraded landscape | |
| **Output Targets 2009** | 75% of stakeholders in target areas have an improved capacity for collective action and local policy negotiation and implementation of integrated land use practices using integrated agricultural research for development | CGIAR, ARI, researchers from NARS and local universities, NGOs, farmers, regional consortia, policy makers | Improved knowledge sharing and exchange to empower stakeholder to innovate with respect to technologies and best land conservation practices | |

## 3. CGIAR OUPUT TEMPLATE: CIAT MTP 2007-2009

| Output | Output Target 2007 | 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 | • At least three indicators of soil health and fertility at plot, farm and landscape scales in acid soil savannas identified and savannas quantified | OTHER KINDS OF KNOWLEDGE | YES<br>PE-2 Annual Report 2006, pages 32-64;<br>Journal Articles |
| | • Land use intensity impact on BGBD evaluated in seven tropical countries participating in the BGBD project | OTHER KINDS OF KNOWLEDGE | YES<br>PE-2 Annual Report 2006, pages 65-91 |
| | • At least two indicators of soil quality used for farmer's decision making in hillsides agroecosystem; | OTHER KINDS OF KNOWLEDGE | YES<br>PE-2 Annual Report 2006, pages 92-94<br>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 | • 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 | PRACTICES | YES<br>PE-2 Annual Report 2006, pages 116-120<br>Journal article |
| | • Cereal-legumes and livestock systems, with nutrient use efficiency as an entry point, tested and adapted to farmer circumstances in acid soil savannas | PRACTICES | YES<br>PE-2 Annual Report 2006, pages 159-163 |
| **OUTPUT 3:** Partnerships and tools developed and capacity enhanced of all stakeholders for improving the health and fertility of soils | • Strategy for building capacity for SLM is developed with partners | CAPACITY | YES<br>PE-2 Annual Report 2006, pages 169-187 |
| | • At least three capacity building courses on ISFM held by AfNet and MIS participating country | CAPACITY | YES<br>PE-2 Annual Report 2006, pages 188-192 |

| | | | |
|---|---|---|---|
| | level<br>• Books, web content and papers produced by partners in BGBD project both north and south in seven tropical countries | MATERIALS | YES<br>PE-2 Annual Report 2006, pages 193-198 |
| **OUTPUT 4:**<br>Improved rural livelihoods through profitable, diverse and intensive agricultural production systems | • Crop-livestock systems with triple benefits tested and adapted to farmer circumstances in hillsides<br>• Strategies of BGBD management for crop yield enhancement, disease control, and other environmental services demonstrated in seven tropical countries participating in the BGBD project | PRACTICES<br><br>PRACTICES | YES<br>PE-2 Annual Report 2006, pages 211-216<br><br>YES<br>PE-2 Annual Report 2006 , page 217; BGBD Project Report |
| **OUTPUT 5:**<br>Options for sustainable land management (SLM) for social profitability developed, with special emphasis on reversing land degradation | • Decision tools (GEOSOIL; Decision Tree) available for land use planning and targeting production systems in acid soil savannas<br>• Biophysical, social and policy niches in the landscape for targeting SLM technologies and enhanced ecosystem services identified and prioritized | PRACTICES<br><br>PRACTICES | YES<br>PE-2 Annual Report 2006, pages 258-263; Book chapter<br><br>YES<br>PE-2 Annual Report 2006, page 264-268; BGBD Project Report |

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

# 4. RESEARCH HIGHLIGHTS 2006

## Genetic diversity of indigenous rhizobia nodulating six promiscuous soybean varieties in three sites in coastal Kenya

Soybean is an exotic crop introduced in Kenya early this century. Promiscuous (TGx) varieties which nodulate with indigenous rhizobia have only recently been introduced. Genetic diversity of the indigenous rhizobia nodulating TGx soyabean varieties has not been reported in Kenya. Research was carried out to determine genetic diversity and phyllogeny of indigenous rhizobia strains nodulating six introduced promiscuous soybean varieties grown in three sites differing in agroecological zones and soil chemical characteristics in Coastal Kenya which had no known recorded history of soybean cultivation and rhizobial inoculation. Genetic diversity was assayed using the Polymerase Chain Reaction-Restriction Fragment Length Polymorphism (PCR-RFLP) of the 16S-23S rDNA intergenic spacer region and 16S rDNA gene sequencing. PCR-Restriction Fragment Length Polymorphism (PCR-RFLP) analysis of the 16S-23S rDNA intergenic spacer region directly applied on 46 nodules using two enzymes (Msp I and Hae III) distinguished 8 and 9 genetic profiles respectively. The most predominant IGS groups were group A, B, C, D and E which constituted 41.3%, 17.4%, 10.9% , 10.9% and 10.9% respectively while IGS group F, G and H constituted less than 7% of all the analyzed nodules from the three sites. Some IGS groups were specific to sites and varieties. Phylogenetic analysis of the 16S rDNA gene sequences showed that all strains belong to the genus *Bradyrhizobium. Bradyrhizobium japonicum* and *Bradyrhizobium elkanii* related strains were the most predominant and accounted for 41.7% and 33.3% respectively while *Bradyrhizobium species*. and *Bradyrhizobium yuanmingense* accounted for 16.7% and 8.3% respectively of all strains identified. The diversity identified in *Bradyrhizobium* populations from the three sites represent a valuable genetic resource that has potential utility for the selection of more competitive and effective strains to improve biological nitrogen fixation and thus increase soybean yields at low cost.

## Effect of farmer management strategies on spatial variability of soil fertility, crop nutrient uptake and maize fertilizer requirement in contrasting agro-ecological zones in Zimbabwe

Soil fertility variability within and across farms poses a major challenge for increasing crop productivity in smallholder farming systems. A study was carried out to assess the effect of farmers' resource management strategies on soil fertility variability and plant nutrient uptake on smallholder farms in Gokwe South (~650 mm $yr^{-1}$) and Murewa (~850 mm $yr^{-1}$) Districts of Zimbabwe. Farmers were grouped into: resource-endowed (RG 1), intermediate (RG 2) and resource-constrained (RG 3). In Murewa, wealthy farmers applied large amounts of manure (>10 t $ha^{-1}$ $yr^{-1}$) on fields closest to homesteads (homefields) and none to fields further away (outfields) and this created gradients of decreasing soil fertility with increasing distance from the homesteads. Soil available P most concentrated on homefields (8-13 mg $kg^{-1}$) of wealthy farms and to 2-6 mg $kg^{-1}$ on outfields and all fields on poor farms. At both sites, maize grain yields in farmers' fields were largest on the homefields on the wealthy farms (2.7–5.0 t $ha^{-1}$), but poor across all fields on the poor farms (0.3–1.9 t $ha^{-1}$). Maize responded significantly to addition of N and P on homefields in Murewa and all fields in Gokwe, but responded poorly on degraded outfields in Murewa due to deficiencies Ca and Zn. Consideration of key factors driving soil fertility variability including soil type, farmer management practices and agro-ecology is required when developing fertilizer recommendations.

**Ex-ante evaluation of the impact of a structural change in fertilizer procurement method in sub-Saharan Africa**

In June 2006, the African Heads of State made a declaration to support increase in use of fertilizers in the farming systems of sub-Saharan Africa from the present average, about 8 kg $ha^{-1}$, to about 50 kg $ha^{-1}$. One route to attain this goal is to engender regional joint fertilizer procurement to reduce farm gate price and increase fertilizer demand and use. A review of fertilizer use in Africa has shown that structural changes in fertilizer procurement can reduce farm gate price by 11-18%. Using an average of these figures (15%), this study compares the effect of structural changes in fertilizer market (reducing farm gate price by 15%) on total fertilizer demand, total farm income, and additional farm income with the base situation (using FAO data) under three own fertilizer price elasticity of demand scenarios (low: -0.38; medium: -1.43; and high: -2.24) for 11 sub-Saharan Africa countries. Data were analyzed using Microsoft Excel. Result shows that compared with the base level, structural change in fertilizer procurement arrangement (reducing farm gate price by 15%) led to 6% additional farm income (US$125 million) under low elasticity; 22% (US$472 million) under medium elasticity; and 34% (US$730 million) under high elasticity. Switching from one scenario to another indicates the potential to further increase farm income from 20% to 32%. The paper concludes with the support for structural interventions that reduce farm gate price of fertilizers and other inputs. Such interventions increase farmer productivity, total production, and total farm income and lead to improved livelihoods.

**Balanced Nutrient Management System Technologies in the Northern Guinea Savanna of Nigeria: Validation and Perspective**

Based on experimental evidence that combining mineral fertilizers with organic matter may address poor soil fertility status and result in added benefits, farmer-managed demonstration trials were initiated in 9 villages in the northern Guinea savanna (NGS) of northern Nigeria. The trials had four treatments: (i) a farmers control in which the farmer grows maize according to his usual practice, (ii) the maize technology being promoted by the NGO Sasakawa-Global2000 (SG2000), involving hybrid seeds, proper plant density and fertilizer application practice, and fertilizer application rates that are relatively high for the region (136 kg N, 20 kg P, and 37 kg K $ha^{-1}$), (iii) the Balanced Nutrient Management Systems (BNMS) manure technology that follows the SG2000 package for maize, except that part of the fertilizer quantity is replaced by animal manure; and (iv) a soybean-maize rotation, again with reduced fertilizer rate to the maize. Results from the full 2-year cycle indicated that the improved systems out-yielded the farmers' control treatment by about 1000 kg $ha^{-1}$. Maize after soybean gave yields similar to those obtained with the combined application of fertilizer and manure (BNMS-manure) to maize but slightly higher than the fertilizer-only practice (SG2000). There was large variability in the quantities of manure and fertilizers applied and maize yields obtained among farmers. Over the 2-year cycle, the improved soybean/maize rotation system was economically superior and dominated all the other systems because of its lowest variable costs and highest gross margins. At the end of the season, using an overall satisfaction score based on eight criteria, 94% of the farmers were satisfied with the soybean-maize rotation, 83% with the BNMS-manure treatment, and 29% with the SG2000 treatment. Farmers indicated manure availability as the main constraint for the BNMS-manure system; therefore, further research should focus on closed systems with crop-livestock integration in order to increase the manure availability within the farm. As many farmers were enthusiastic about the soybean-maize rotation treatment, SG2000 in partnership with the Agricultural Development Projects (ADPs) have started promoting this system alongside the SG2000 maize package to farmers in northern Nigeria

## **5**. PROJECT OUTCOME

**Promotion and dissemination of Integrated Pest and Soil Fertility Management Strategies to combat *Striga* and declining soil fertility in the Lake Victoria basin**

*Striga hermonthica* and declining soil fertility are major constraints to maize production in the Lake Victoria basin. The aim of this project, implemented by the Tropical Soil Biology and Fertility Institute of the International Centre for Tropical Agriculture (TSBF-CIAT) and supported by the African Agricultural Technology Foundation (AATF), was to evaluate and disseminate best-bet options to alleviate *Striga* and declining soil fertility constraints in order to boost maize production in the Lake Victoria Basin in the western Kenya. Specific attention was given to soybean-maize rotations, imazapyr-resistant (IR)-maize, and *Desmodium*-maize push-pull intercrops. The expected deliverables were: (i) *a set of best-bet options to alleviate Striga-related production constraints*, (ii) *a set of best-bet legume species/varieties for triggering suicidal Striga germination*, (iii) *recommendations for the best use of herbicide-coated maize*, (iv) *a strategy for farmers to test and disseminate best-bet options to alleviate Striga-related production constraints*, (v) *improved access to inputs (seeds, fertilizer) through linkages with organizations facilitating input availability*, (vi) *various extension materials*, and (vii) *two MSc theses*.

In a set of multilocational demonstration trials, involving 11 farmer associations in 4 districts, it was observed that, although IR-maize reduced *Striga* emergence, its productivity was lower than that of the WH hybrid varieties in presence of fertilizer. The push-pull system substantially reduced *Striga* emergence but only after 2 seasons. In absence of fertilizer, maize yields in the push-pull system are less than those in the mono-cropped system, likely caused by competition for water between the *Desmodium* and maize during seasons with erratic rainfall. *Mucuna*-maize rotations led to a substantial reduction in *Striga* emergence and increase in maize grain yield while this was not true for the soybean-maize rotation. In the latter case, however, the production of grains for food or sale is certainly going to result in better economic returns in the latter treatment. *Striga* emergence reduced substantially between season 1 and season 4 in all treatments, indicating that consistent uprooting *Striga* seedlings before flowering can gradually decrease its seed-bank. Both male and female farmers appreciated the *Striga* tolerant properties of the IR-maize but less its productivity. Fertilizer application was also appreciated, even in terms of *Striga* tolerance, probably due to better maize growth after fertilizer application, even in presence of *Striga*.

During the long rainy seasons of 2006 and 2007, large-scale farmer-lead evaluations of IR-maize relative to locally used maize varieties were conducted. Farmer-managed evaluation during the LR 2006 season with involvement of about 1,000 farmers revealed that in IR maize resulted in less *Striga* germination in the four districts considered (Bondo, Busia, Siaya, Vihiga).This resulted in improved maize yields of IR maize only in Bondo and Siaya districts. More detailed farmer-managed evaluation of IR maize relative to local maize during the LR 2007 season with involvement of about 3,200 farmers revealed that in IR maize scored better than local maize across a number of 9 agronomic traits but was negatively ranked for tasty Ugali, high labor requirement, high input requirement, careful farm management, high management cost, and ease of sell based on color.

In relation to the demonstration trials, field school activities, cross-site visits, and field days were organised to enhance farmer capacity. A total of 732 people attended the various field days, belonging to various farmer associations, local NGOs, and local and international research organisations. In the context of the IR-maize evaluation activities, 1,000 farmers were involved during the long rainy season of 2006 and 3,200 during the long rainy season of 2007. The distribution of IR maize seeds was accompanied by a number of technical extension materials. Two MSc projects have been completed in the context of the project. In order to facilitate access to inputs, links with Western Seed and Leldet Seed companies have been established through our own project for the dual purpose soybean varieties and through partner institutes for the *Desmodium* and IR maize seeds. Links with Farm Input Promotions (FIPS) Africa, a NGO promoting external inputs in affordable quantities at affordable rates, have also been established.

## Economic Evaluation of the Contribution of Below Ground Biodiversity: Case Study of Biological Nitrogen Fixation by Rhizobia

Although it is common knowledge that soil microorganisms form an important constituent of below ground biodiversity and provide ecosystem services, such knowledge does not often lead to formulation of policies to conserve and manage these soil microorganisms, or to strategies that lead to explicit use of these resources. Applying the knowledge gained from several experimental stations and from on-farm research [supplemented with necessary assumptions on FAO-sourced secondary data on soybean (*Glycine Max*) from 19 countries in Africa], this study attempts to increase the awareness on the importance of these microorganisms by quantifying the economic value of nitrogen fixation of legume nodulating bacteria (LNB) associated with promiscuous soybean. Computation of economic value (of nitrogen fixation) was based on the method of cost replacement or cost savings in terms of mineral nitrogen fertilizer that would have been required to attain the same level of nitrogen fixed biologically. Result shows that the economic value of the nitrogen-fixing attribute of soybean in Africa, especially the promiscuous varieties, annually amounts to about US$200 million across the 19 countries. The study concludes with recommendations on various ways of increasing the chances of smallholder farmers benefiting from the nitrogen-fixing attribute of LNB, especially since many of them cannot afford adequate quantities of inorganic fertilizers required for increased crop productivity.

## Investment options for adoption of Integrated Soil Fertility Management (ISFM)

CIAT-TSBF was involved as a learning partner and played an important role in developing the Soil Health strategy of the Alliance for a Green revolution (AGRA) funded by the Bill and Melinda Gates Foundation.., and in suggesting different investment scenarios and especially those based on ISFM principles and practices. This report provides a strategy to better manage soil fertility and sustain crop productivity through Integrated Soil Fertility Management (ISFM) in Africa. These goals will be achieved through the increase in fertilizer agronomic efficiency (AE) as its use grows from an average of 8 to 50 kg nutrients $ha^{-1}$, as recommended by the technical committee of the African Fertilizer Summit (AFS), recently held in Abuja, Nigeria. We define ISFM as *'The application of soil fertility management practices, and the knowledge to adapt these to local conditions, which optimize fertilizer and organic resource use efficiency and crop productivity. These practices necessarily include appropriate fertilizer and organic input management in combination with the utilization of improved germplasm.'* Maximum benefits from ISFM practices and technologies can only be obtained within an enabling context, where such factors as viable farm input supply and produce markets, functional institutions, and good policy are in place. Dissemination of successful ISFM case studies such as micro-dosing of fertilizers or crop rotation and intercropping of legumes with cereals, will lead to more sustainable and profitable agriculture in sub-Saharan Africa. ISFM strategies must be targeted to different agro-ecological zones (AEZs) where their use will affect the maximum number of Africa's farming households.

Two investment options are suggested that can result in large-scale impact in a relatively short time: (1) Disseminate ISFM in dry-lands in Sahelian West-Africa and (2) Enhance fertilizer use through cereal-legume intercropping and rotations in moist-savannas of West, East and Southern Africa. Three investments options are suggested in which ISFM can create substantial impact through initial pilot projects: (3) Establish ISFM guidelines for cassava in humid lowland areas of West and Central Africa, (4) Develop ISFM practices for 'New Rice for Africa' (NERICA) upland rice in West and Central Africa, and (5) Integrate ISFM principles into conservation agriculture (CA) in cereal croplands of West, East, and Southern Africa. Two final investment options are required for backstopping the above: (6) Operationalize country-level projects designed to advance ISFM, and (7) Establish a Centre of Excellence for ISFM in Africa. Total funding required for the 7 investment options for 11 countries is estimated at $152 million for an initial period of 5 years. Investment in options 1 through 5 would directly empower 545,000 households (or approximately 3.8 million persons) to produce an additional 321,000 tons of additional food worth about $52 million per year. By year 2 the average benefit: cost ratio is 9.8. Similar improvement could be expected through year 5 as the number of cumulative participating households' increases to 10.4 million.

## 6. LIST OF PUBLICATIONS

**List of publications 2007**

| Type of publications | Published in 2007 | In press | In review | Total |
|---|---|---|---|---|
| **TSBF-Africa:** | | | | |
| Refereed journal articles | 29 | 7 | 7 | 43 |
| Book chapters | 38 | 4 | | 42 |
| Books edited | 1 | 1 | | 2 |
| Conference proceedings | 18 | | | 18 |
| Oral and poster presentations | 53 | | | 53 |
| **Total** | **139** | **12** | **7** | **158** |

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

## 7. LIST OF PROPOSALS FUNDED

**7.1 New proposals approved in 2007:**
**TSBF-Africa: 6**

**7.2 On-going special projects in 2007:**
**TSBF-Africa: 32**

Please see Annex-2 for the lists.

## 8. PROBLEMS ENCOUNTERED AND THEIR SOLUTION

**RESEARCH RELATED**

A strategic plan "from knowledge to implementation (2005-2010)" guides CIAT- TSBF's research for development agenda. The staff and its partners are dedicated to generating scientific knowledge on soil biological processes and Integrated Soil Fertility Management (ISFM), translating this knowledge into practical soil and land-management strategies and empowering farmers through participatory technology development and adaptation. CIAT-TSBF also recognizes that maximum benefits from ISFM practices and technologies can only be obtained within an enabling context, where factors such as viable farm input supply and produce markets, functional institutions, and good policy are in place. The Institute makes full use of, and contributes to, the knowledge base from research for development challenges of the "People and Agroecosystems" and "Sharing the Benefits of Agrobiodiversity" within CIAT and within and outside other CGIAR centers. Of particular interest to TSBF-CIAT are beans, forages and cassava outcome lines. Every three years we monitor our achievements and reflect on how to adapt these to future challenges and opportunities. Our contribution to the mission of CIAT has been rated as excellent by the External Management and Program Review (EMPR) in 2007.

**CIAT – TSBF tomorrow**

CIAT and the other CGIAR centers need a proactively supported TSBF Institute that is closely linked to the needs of the poor rural farmers .The Institute will continue to embrace ISFM as an inclusive framework to maximize farmers' net returns from agriculture and environmental sustainability. This implies a new approach grounded in inter-disciplinary thinking, encompassing a range of spatial scales and interactions with a wide range of stakeholders. We will invest in scaling up current successful ISFM technologies and practices to prove impact in the intensification zones in the Sahelian drylands, the humid zones and the moist and dry savanna agro-ecological zones of Africa. We will strengthen the capacities of African countries to implement ISFM as a component of their rural development agendas. To promote increased knowledge on ISFM, we propose the creation of national institutions where education (teaching) is strongly linked to research and extension. Linkages with advanced research institutes will be indispensable to ensure inclusion of state-of-the-art methods and approaches. We will establish international networks with a critical mass of expertise to provide a key foundation for upgrading both the physical and human capacity for soil science research in Africa. CIAT-TSBF will build a platform or a Center of Excellence for ISFM research and development, as described below, to achieve the productivity and income gains from soil fertility improvement for Africa's smallholder farmers. This platform will backstop all capacity building activities and drive the generation of new knowledge and approaches to disseminate ISFM practices in a cost-effective manner.

**CIAT-TSBF and the Soil health initiative of the Alliance for a Green Revolution in Africa (AGRA)**

The Bill and Melinda Gates and Rockefeller Foundations have invested about 200 million USD for five years in Soil Health Program of AGRA this September 2007. This program will be implemented by AGRA and its partners from January 2008 onwards. CIAT-TSBF was involved as a learning partner and played an important role in developing the Soil Health strategy, and in suggesting different investment scenarios and especially those based on ISFM principles and practices. In this strategy, we will contribute to the following investments: (i) ISFM research in cassava, NERICA and conservation agriculture in maize, (ii) building capability of national partners to adapt soil management and fertilizer use practices, (iii) initiating large-scale adoption of proven soil management and fertilizer use practices by conducting large-scale demonstrations in fertilizer micro-dosing in cereal-legume intercropping and rotation systems, (iv) strengthening a pan-African network of scientists and agronomists that conducts collaborative research and dissemination of technologies developed,, and (v) supporting the development of a digital soil map of Africa. Work in these investments will be linked to some other AGRA initiatives such as the Program on Agricultural Seed Systems (PASS), Water, Market and Extension.

**CIAT-TSBF: a platform for ISFM research for development in Africa**

Reviews of the CGIAR centers in SSA and the views of its national partners point to the need to build capacity in soil fertility research and for consolidation of the efforts of the CG centers located or working

in Africa. We will foster innovative partnerships by playing catalytic and brokerage roles between ARIs (advanced research institutions both private and public), national agricultural research systems (including universities), and the private sector. To generate and deliver science, technologies and knowledge for which there is demand on the above outcome and impact, the Institute will position itself with relevant strategic partners. CIAT–TSBF will serve as a platform on Integrated Soil Fertility Management for the CGIAR as a whole. Some CG centers such as IITA recognize this and have delegated soil fertility research to CIAT-TSBF, rather than developing its own soils programs. Different mechanisms will be used, including networks, e.g. the African Network for Tropical Soil Biology and Fertility (AfNet), a pan-African network that is able to mobilize about 400 scientists that conduct collaborative research and engage in dissemination of results, and consortia, e.g., the Consortium for the Improvement of Agriculture-based Livelihoods in Central Africa (CIALCA) that is a composed of three CGIAR centers (IITA, Biodiversity and CIAT).

**CIAT – TSBF beyond Africa**
It is conceivable that such rationalization of the Institute's programmatic coordination for Africa could also be considered in other CGIAR regions through global initiative such as the Conservation and Sustainable Management of Belowground Biodiversity (BGBD) project funded by UNEP and the World Digital Soil Map project, to be funded

## SERVICES RELATED

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

## FUNDING RELATED

### Financial and human resources

In 2007, CIAT-TSBF has 17 internationally recruited staff (IRS) and associates and 34 nationally recruited staff (NRS).The staff is located in two hubs: East Africa with the main office at ICRAF Nairobi, and Southern Africa with an office in Harare, Zimbabwe. Work in West Africa is being carried out through ICRISAT in Niger and IITA in Nigeria. The Institute has over the last three years grown from an average annual budget of US$ 1.6 million in 2003 to over triple that amount at US$ 4.9 million in 2006. In the year 2007, the income and budget will be at an all time high of nearly 6.5 million. We project an annual budget of US$ 10 million in 2010 that is almost equivalent to that of a small size CG center. Because of changing donor preference, our core funding has progressively moved away from an average of 21–26% in 2003 to the present level of about 4% only. The Institute thus operates for 97% on restricted project funds which implies that a reasonable level of flexibility in finances can only be exercised on overhead funds.

***Management of Overhead and Indirect Costs***
With all due diligence and prudence in place, our financial stability is threatened by:

- *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.
- *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.

- *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.
- *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. Thus, this figure is also set to go up as all new projects become chargeable.
- *Research and Technical Support (R&TS) charge:* These are new charges taken on already signed contracts and amount to about 80,000 USD in 2007.

***Need of core and bridging funds to CIAT-TSBF***

We would like to appeal to CIAT's management and BOT to seriously consider revising the core allocation to the different research groups according to CIAT's response to the EPMR and the Science Council. Although it will be prudent to wait until the full strategy is in place, it seems that in the interim period, CIAT is organized into three global programs i.e. RDC1, RDC2 and TSBF. TSBF, being one of these programs, can ask for a fair share of the core allocation. During the transitional period we need additional two scientist positions paid by core (one in Africa and one in LAC), in addition to the Director. This is just about US$ 0.7 million compared to US$3.6 million and US$ 2.0 million for RDC1 and RDC2, respectively. Allocation of bridging funds for Principal Staff whose project funds are late in coming is another possibility. We have been working on major projects with AGRA and other donors and we do not have any doubt tat these will be funded during the last quarter of 2008. The major Rockefeller grant that was sustaining three of our staff, i.e., AfNet coordinator, ISFM officer, and the social scientist, stops in January 2008. We are therefore requesting for a bridging funds for 8 months to cover two staff positions from January to August 2008.

## **9**. STAFF LIST

**TSBF Institute -Director**
Sanginga, Nteranya (Soil Microbiologist)

**TSBF Institute – Africa Staff**

**Senior Staff**

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)
Misiko, Michael (Social Scientist)
Roing, Kristina (Agronomist)
Thierfelder, Christian (Soil and Water management)
Vanlauwe, Bernard (Soil Scientist)
Zingore Shamie (Soil Scientist)

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

**Consultants**
Woomer, Paul (Soil Scientist. ISFM project)
Mokunywe, Uzo (Economist, BGBD Project)
Swift, Mike (BGBD Project)

**Research Assistants**
Ekise, Isaac (Asst Scientific Officer),
Kankwatsa, Peace (Research Asst, Kampala)
Kihara, Job (Asst Scientific Officer)
Magreta, Ruth (Research Asst, Lilongwe)
Mapila, Mariam A.T.J. (Research Fellow, Lilongwe)
Mombeyarara, Talkmore (M.Sc., Research Asst, Harare)
Mukalama, John (Snr Scientific Assistant)
Rusinamhodzi, Leonard (Research Asst, Harare)
Wangechi, Helen (Asst Scientific Officer)
Waswa, Boaz (Asst Scientific Officer)

**Technical Staff**
Kadzere, Chengetai (Field worker, Harare)
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)
Murombwi, Hope (Admin. Assistant, Harare)
Ngwira, Evelyn (Accounts Asst, Lilongwe)
Ngutu, Charles (Finance/Admin. Officer)
Nyamhingura, Isabella (Admin. Asst, Harare)
Ogola, Juliet (AfNet Administrator)

## 10. SUMMARY OF 2007 BUDGET

| SOURCE | AMOUNT (US$) | PROPORTION (%) |
|---|---|---|
| **TSBF** | | |
| Unrestricted Core | 290,611 | 4% |
| Restricted Core | 0 | 0% |
| **Sub-total Core** | **290,611** | **4%** |
| **Restricted** | | |
| Special projects | 5,229,197 | 80% |
| Sub Sahara Africa Challenge Program | 88,160 | 1% |
| Water and Food Challenge Program | 47,269 | 1% |
| **Sub Total Restricted** | **5,364,626** | **82%** |
| **Direct Expenditures** | **5,655,237** | **86%** |
| Non Research Cost | 893,371 | 14% |
| **Total Expenditures** | **6,548,608** | **100%** |

(1) Excluding Non Operational expenses: Phaseout and Fixed Assets adjustment.

## 11. ANNEX-1: LIST OF PUBLICATIONS

***Refereed journal articles published***


Andren, O., Kihara, J., Bationo, A., Vanlauwe, B. and Katterer, T. (2007) Soil climate and decomposer activity in sub-Saharan Africa, estimates from standard weather station data – used in soil carbon balance calculations. *Ambio 36, 379-386*.

Bationo, A., Waswa, B.S., Abdou, A., Bado, V., Bonzi, M., Iwuafor, E., Kibunja, C., Kihara, J., Mucheru-Muna, M., Mugendi, D., Mugwe, J., Mwale, C., Okeyo, J., Andrén, O., Röing, K. and Tabo, R. (2007) Lessons learnt from long-term experiments in Africa. *Royal Swedish Academy of Agriculture and Forestry. pp 30-35. Nr 9-146.*

Chianu, J.N., Tsujii, H. and Manyong, V.M. (2007) Crop-livestock interaction in the savannas of Nigeria: nature and determinants of farmer decision to use manure for soil fertility maintenance. *Journal of Food, Agriculture and Environment JFAE. Vol 5 (2), 295–301*

Chianu, J. N., Tsujii, H.and Mbanasor, J. (2007) Determinants of the decision to adopt improved maize variety by smallholder farmers in the savannas of northern Nigeria. *Journal of Food, Agriculture and Environment-JFAE. Vol 5 (2), 318–324*

Delve, R.J., Huising, J.E. and Bagenze, P. (2007) Target area identification using a GIS approach for the introduction of legume cover crops for soil productivity improvement: A case study of eastern Uganda. *African Journal of Agricultural Research 2, 512-520*

Faye, A., Saidou, S., Chotte, J.L. and Lesueur, D. (2007) Soil bio-functioning under Acacia nilotica var. tomentosa protected forest along the Senegal River. *Nutrient Cycling in Agroecosystems, 79 35-44.*

Ihedioha, D., Odoemena, B. Ibana, S. and Chianu, J. (2007) Effects of drying of drying cowpea grains on consumer acceptability of moin-moin. *Journal of Agriculture and Food Sciences 4 (2), 125–131*.

Maltas, A., Corbeels, M., Scopel, E., Oliver, R., Douzet, J.M., da Silva, F. A. M. and Wery, J. (2007) Long-term effects of continuous direct seeding mulch-based cropping systems on soil nitrogen supply in the Cerrado region of Brazil. *Plant Soil 298, 161-173.*

Mairura, F.S., Mugendi, D.N., Mwenje, J.I., Ramisch, J.J., Mbugua, P.K. and Chianu, J.N. (2007) Integrating scientific and farmers' evaluation of soil quality indicators in Central Kenya. *Geoderma 139: 134–143.*

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CIALCA: Consortium for Improved Agricultural Livelihoods in Central Africa, poster presented at various local planning and partner meetings in DRC and Rwanda.

Chikowo, R., Corbeels, M., Tittonell, P., Vanlauwe, B., Whitbread, A. and Giller, K.E. (2007) Using The Mechanistic Crop Model APSIM To Generate Functional Relationship For An Integrated Summary Model Of Smallholder African Cropping Systems: Aggregating Field-Scale Knowledge For Farm-Scale Models. Summary of presentation in: Innovations as key to the Green Revolution in Africa: exploring the scientific facts. (eds) Bationo, A., Okeyo, J.M., Waswa, B.S., Mapfumo, P., Maina, F. and Kihara, J. *p.137.*

Corbeels, M., Affholder, F., Scopel, E., Jourdain, D. and Macena, F. (2007) Mulch and cover crop based cropping systems: do they fit into small scale farms of the tropics? Poster at International Symposium: Methodologies for Integrated Analysis of Farm Production Systems, 10-12 September 2007 - Catania, Sicily, Italy

Corbeels, M., Scopel, E., Macena da Silva, F.A., Bernoux, M. and Nunez Cardoso, A. (2007) Stockage potentiel de carbone dans les sols avec des systèmes de culture en semis direct avec couverture végétale (SCV) dans les Cerrados brésiliens. Presentation at International Congres: Les sols tropicaux en semis direct sous couvertures végétales. Madagascar, 3-7 décembre 2007. (Extended summary).

Scopel, E., Maltas, A., Corbeels, M., Macena, Da Silva F.A., Affholder, F., Douzet, J.M., Oliver, R., Schaller, N., Nunez Cardoso, A. (2007) Dynamique et valorisation de l'azote dans les systèmes de culture en semis direct avec couverture végétale (SCV) des Cerrados Brésiliens. Presentation at International Congres: Les sols tropicaux en semis direct sous couvertures végétales. Madagascar, 3-7 décembre 2007. (Extended summary).

Tittonell, P., Corbeels, M., van Wijk, M.T. and Giller, K.E. (2007) Simplified summary models of crop production to address questions on resource-use interactions and efficiencies at farm–scale. Presentation at International Symposium: Methodologies for Integrated Analysis of Farm Production Systems, 10-12 September 2007 - Catania, Sicily, Italy

**Oral/Poster presentations at conferences:**

Abaidoo, R.C., Singh, B.B., Nwoke, C., Pypers, P., Diels, J. and Kolawole, G.O. (2007) Evaluation of shoot and root traits for identifying P-use efficient cowpea genotypes, poster and paper presented at the AfNet Conference in Arusha Enhancing the productivity through the integration of grain legumes in maize cropping systems in Central Kenya (Mucheru-Muna, M., Mugendi, D., Vanlauwe, B., Merckx, R., Mugwe, J., Pypers P. and Kung'u, J.), seminar and paper presented at the AfNet conference in Arusha (September 2007).

Adam, M., Leffelaar, P.A., Ewert, F., Rapidel, B., Corbeels, Wery, M, J. and van Keulen, H. (2007) Developing a generic crop Modelling framework: how to use expert knowledge to define crop models? Poster at International Symposium: Methodologies for Integrated Analysis of Farm Production Systems, 10-12 September 2007 - Catania, Sicily, Italy.

Adamu, M.A. and Chianu, J.N. (2007) Improving African agricultural market and rural livelihoods through warrantage: Case of Jigawa State, Nigeria. Paper presented at an International Symposium on "Innovations as Key to the Green Revolution in Africa: Exploring the Scientific Facts" organized by The African Network for Soil Biology and Fertility (AfNet) of Tropical Soil Biology and Fertility (TSBF) institute of CIAT in collaboration with the Soil Fertility Consortium for Southern Africa (SOFECSA), Ngurdoto Mountain Lodge, Arusha, Tanzania, 17–21 September 2007.

Assigbetse, K., Lesueur, D., Odee, D., Mugadi, D., Ochieng, J., Dieng, L. and Chotte, J.L. (2007) Characterization of edaphic conditions in natural forest, forest plantations and fallow lands in Kenya (Kedowa, Rift Valley). International Conference Rhizosphere 2. 26-31 August 2007, Montpellier, France (Poster).

Bernoux, M., Perrin, A.S., Siqueira Neto, M., Blanchart, E., Cerri, C. C., Corbeels, M., Douzet, J.M., Eschenbrenner, V., Metay, A., Nunez Cardoso, A., Piccolo, M., Scopel, E., Seguy, L., Feller, C. (2007) Stockage de carbone dans les sols avec des systèmes de culture en semis direct avec couverture végétale (SCV) dans les Cerrados brésiliens : résultats d'étude synchrones et diachrones. Presentation at International Congres: Les sols tropicaux en semis direct sous couvertures végétales. Madagascar, 3-7 décembre 2007. (Extended summary).

Chianu, J., Huising, J., Danso, S. and Sanginga, N. (2007) Biological nitrogen fixation by rhizobia and mineral fertilizer savings: implications for green revolution in Africa. Paper presented at an International Symposium on "Innovations as Key to the Green Revolution in Africa: Exploring the Scientific Facts" organized by The African Network for Soil Biology and Fertility (AfNet) of Tropical Soil Biology and Fertility (TSBF) institute of CIAT in collaboration with the Soil Fertility Consortium for Southern Africa (SOFECSA), Ngurdoto Mountain Lodge, Arusha, Tanzania, 17–21 September 2007.

Chianu, J., Vanlauwe, B. and Ohiokpehai, O. (2007) Soybean Research-for-development in East Africa (emphasis Kenya. EPMR power-point presentation, KEFRI Center, Maseno, 25th June 2007.

Chianu, J.N., Adesina, A., Sanginga, P., Bationo A. and Sanginga. N. (2007) Ex-ante evaluation of the impact of a structural change in fertilizer procurement method in sub-Saharan Africa. Paper presented at an International Symposium on "Innovations as Key to the Green Revolution in Africa: Exploring the Scientific Facts" organized by The African Network for Soil Biology and Fertility (AfNet) of Tropical Soil Biology and Fertility (TSBF) institute of CIAT in collaboration with the Soil Fertility Consortium for Southern Africa (SOFECSA), Ngurdoto Mountain Lodge, Arusha, Tanzania, 17–21 September 2007.

Chianu, J. N., Mairura, F. and Ekise, I. (2007) Farm input market system in Western Kenya: Constraints, opportunities and policy implications. Second Prize Award winning poster presented at an International Symposium on "Innovations as Key to the Green Revolution in Africa: Exploring the Scientific Facts" organized by The African Network for Soil Biology and Fertility (AfNet) of Tropical Soil Biology and Fertility (TSBF) institute of CIAT in collaboration with the Soil Fertility Consortium for Southern Africa (SOFECSA), Ngurdoto Mountain Lodge, Arusha, Tanzania, 17–21 September 2007.

Chianu, J. N., Mairura, F. and Ihedioha, D. (2007) Socioeconomic and policy factors undermining farmers' access to soil fertility enhancing farm inputs in western Kenya. Paper presented at the 24th Regional Conference of Soil Science Society of East Africa (SSSEA), Izak Waton Hotel, Embu, Kenya, November 2007.

Chikowo, R., Corbeels, M., Tittonell, P., Vanlauwe, B., Whitbread, A. and Giller, K.E. (2007) Using The Mechanistic Crop Model APSIM To Generate Functional Relationship For An Integrated Summary Model Of Smallholder African Cropping Systems: Aggregating Field-Scale Knowledge For Farm-Scale Models. Summary of presentation in: Innovations as key to the Green Revolution in Africa: exploring the scientific facts. (eds) Bationo, A., Okeyo, J.M., Waswa, B.S., Mapfumo, P., Maina, F.and Kihara, J.). *p.137*.

Corbeels, M., Affholder, F., Scopel, E., Jourdain, D. and Macena, F. (2007) Mulch and cover crop based cropping systems: do they fit into small scale farms of the tropics? Poster at International Symposium: Methodologies for Integrated Analysis of Farm Production Systems, 10-12 September 2007 - Catania, Sicily, Italy

Corbeels, M., Scopel, E., Macena da Silva, F.A., Bernoux, M. and Nunez Cardoso, A. (2007) Stockage potentiel de carbone dans les sols avec des systèmes de culture en semis direct avec couverture végétale (SCV) dans les Cerrados brésiliens. Presentation at International Congres: Les sols tropicaux en semis direct sous couvertures végétales. Madagascar, 3-7 décembre 2007. (Extended summary).

Fall, D., Diouf, D., Faye, A., Sall, S., Sylla, S. and Lesueur, D. (2007) Rhizobial inoculation of mature Acacia senegal trees increase gum arabic production and affects the soil microbial functioning. International Conference on Innovations as key to the green revolution in Africa: exploring the Scientific facts. 17-21 September 2007, Arusha, Tanzania (Oral presentation).

Farrow, A., Sonder, K., Delve, R.J., Risinamhodzi, K., and Njuki, J. Using spatial analysis for targeting research and scaling-up opportunities. AfNet conference, Arusha, September 2007

Guto, S., Vanlauwe, B., Okoth, P., Pypers, P., de Ridder, N. and Giller, K.E. (2007) To conserve or not to conserve: Exploring smallholder farmers' knowledge towards soil erosion and the status of conservation farming across the Central Kenya Highlands poster and paper presented at the AfNet Conference in Arusha

Kamaa, M., Shepherd, K., Verchot, L., Mugadi, D., Mburu, H., Awiti, A. and Lesueur, D. (2007) Soil degradation assessment: a comparative analysis of NIRS results with soil microbial communities and enzymatic approaches. International Conference Rhizosphere 2. 26-31 August 2007, Montpellier, France *(Poster).*

Karltun, E., Röing de Nowina, K., Chiwona-Karltun, L., Lemenih, M., Tolera, M., Berisso, T. Making soil quality last – involving stakeholders in improving soil and plant nutrient management. *Submitted to Currents*.

Kimiywe, J., Ohiokpehai, O., Karissa, G. and Kingolla, B. (2007) Mainstreaming nutrition care in the management of HIV/AIDS infected women: A case of Suba District, Kenya. Paper presented at the International Conference on Reproductive Health and the Prevention, Control and Management of HIV/AIDS at the Kenya College of Communication and Technology, Mbagathi, Nairobi, Kenya, 10-12 April 2007.

Kimiywe, J., Ohiokpehai, O., Karissa, G. and King'olla, B. (2007) Strategies for Improved livelihoods for HIV infected women: A case of Suba District, Kenya. Paper presented at the International Conference on From Research to Action: Mitigating HIV/AIDS Impacts on Agriculture and Food Security in West Africa to be held in Cotonou, Benin from 1- 4 October 2007.

Lesueur, D. (2007) Le rhizobium met la gomme a l'acacia. Cirad-News, Juin 2007.

Lesueur, D. and Chikamai, B. (2007) Can better management and production of gum-arabic in sub-Saharan Africa contribute to reaching the Millennium Development Goals? Lesueur D and Chikamai B. ETFRN News, 47/48 91-93.

Lesueur, D., Faye, A., Sall, S., Chotte, J. L. and Sarr, A. (2007) Innovative microbial approaches of Acacia senegal trees management to improve and sustain gum-arabic production in the sub-Saharan Africa. 15th International Conference on the Nitrogen Fixation. 21-26 January 2007, Cape Town, South Africa (Oral presentation).

Lesueur, D., Poshiwa, X., Duponnois, R., Odee, D., Sarr, A., Ingleby, K., Chikumba, N., Sougoufara, B., Plenchette, C., Diouf, D. and Wilson, J. (2007) Field inoculation of woody legumes with microsymbionts (rhizobia amd mycorrhiza fungal): an evaluation of successes and failures in Africa. International Conference on Innovations as key to the green revolution in Africa: exploring the scientific facts. 17-21 September 2007, Arusha, Tanzania (Oral presentation).

Masvaya, E.N., Nyamangara, J. R., Nyawasha, W., Zingore, S., Delve, R.J. and Giller, K.E. Effect of farmer management strategies on spatial variability of soil fertility and crop nutrient uptake in contrasting agro-ecological zones in Zimbabwe. AfNet conference, Arusha, September 2007

Monje, C., Cobo, J.G., Dercon, G., Cadisch, G., Delve, R.(2007) Assessing the Impact of Land Tenure on Maize Crop Response under Small-scale Farming Systems in North-east Zimbabwe. Tropentag, October 9-11, 2007, Witzenhausen

Mugabe, F., Twomlow, S., Mwale, M., Delve, R., Nanja, D., Carberry, P., Howden, M., (2007) Building adaptive capacity to cope with increasing vulnerability due to climatic change in Africa– a new approach. WAFSA-WATERnet conference, Zambia, September 2007

Mugabo, R. J., Mushabizi, D., Gafishi, M., Chianu J. and Tollens, E. (2007) Economic analysis of improved potato technologies in Rwanda. Paper presented at an International Symposium on "Innovations as Key to the Green Revolution in Africa: Exploring the Scientific Facts" organized by The African Network for Soil Biology and Fertility (AfNet) of Tropical Soil Biology and Fertility (TSBF) institute of CIAT in collaboration with the Soil Fertility Consortium for Southern Africa (SOFECSA), Ngurdoto Mountain Lodge, Arusha, Tanzania, 17–21 September 2007.

Ng'ang'a, M.N., Ohiokpehai, O., King'olla, B., Muasya, R.M. and Omami, E. (2007) Farming innovation for food security among HIV/AIDS affected rural households in Western Kenya. Paper presented at the International symposium on 'Innovation as key to the Green revolution in Africa: exploring the Scientific Facts' organized by The African Network for Soil Biology and fertility (AfNet) of CIAT-TSBF in collaboration with the Soil Fertility Consortium for Southern Africa (SOFECSA), Ngordoto Mountain Lodge, Arusha, Tanzania, 17-21 September 2007.

Obi, A., Pote, P. and Chianu, J. (2007) Market access: Components, interactions and implications in smallholder agriculture in the former homeland area of South Africa. Paper presented at an International Symposium on "Innovations as Key to the Green Revolution in Africa: Exploring the Scientific Facts" organized by The African Network for Soil Biology and Fertility (AfNet) of Tropical Soil Biology and Fertility (TSBF) institute of CIAT in collaboration with the Soil Fertility Consortium for Southern Africa (SOFECSA), Ngurdoto Mountain Lodge, Arusha, Tanzania, 17–21 September 2007.

Odee, D., Lesueur, D., Poshiwa, X., Walters, D. and Wilson, J. (2007) Management of symbionts to improve growth, productivity and biological nitrogen fixation in Calliandra calothyrsus based agroforestry systems. 15th International Conference on the Nitrogen Fixation. 21-26 January 2007, Cape Town, South Africa (Oral presentation).

Ohiokpehai, O. (2007) Agriculture and Health Linkages: Strategies and Challenges. Power-point presentation to the Jomo Kenyatta University students (graduates and undergraduates). Nov 2007

Ohiokpehai O. (2007) Soil Fertility, Fertilizer and Nutrition/Health-learning partner for BMGF, Paper presented at the SAC meeting, Harare, Zimbabwe, January, 2007.

Ohiokpehai, O. (2007) Soybean processing and utilization: an initiative to improve its production in rural households living with HIV. Presented at the ICFMH Food Safety Workshop, University of Stellenbosch, Stellenbosch, RSA, 25th November 01 Dec. 2007

Ohiokpehai O. (2007) Sustainable School Feeding Program: A way forward for sub-Saharan Africa. Presented at the BMGF Roundtable Discussion on School Feeding Programs. Organised by Rockefeller Foundation, Nairobi, Kenya, 16th February 2007 (CIAT-TSBF received a letter of appreciation for a work well done).

Ohiokpehai, O. (2007) The Effect of Climate Change on Food processing and Packaging in Smallholder Household An abstract to the Links between Environmental Stress and Food Security in Africa session at IGBP Congress, Cape Town, May 2008

Ohiokpehai, O. and King'olla, B. (2007) Nutrition and utilization for health and income generation: an incentive for the promotion of legumes in Kenya. Poster presented at the International symposium on 'Innovation as key to the Green revolution in Africa: exploring the Scientific Facts' organized by The African Network for Soil Biology and fertility (AfNet) of CIAT-TSBF in collaboration with the Soil Fertility Consortium for Southern Africa (SOFECSA), Ngordoto Mountain Lodge, Arusha, Tanzania, 17-21 September 2007 (Award winning poster presentation).

Ohiokpehai, O., Hongo, T., Kamau, J., Were, G., Kimiywe, J., King'olla, B., Mbithe, D., Oteba, L., Mbagaya, G. and Owuor, O. (2007). Enhancement of Agricultural Production through Nutrition and Health Intervention Demonstrations: Case Study of Suba. Paper presented at the International symposium on 'Innovation as key to the Green revolution in Africa: exploring the Scientific Facts' organized by The African Network for Soil Biology and fertility (AfNet) of CIAT-TSBF in collaboration with the Soil Fertility Consortium for Southern Africa (SOFECSA), Ngordoto Mountain Lodge, Arusha, Tanzania, 17-21 September 2007.

Ohiokpehai, O., Were, G., Owour, O., Mbagaya, G., Kamau, J., Kimiywe, J., Mbithe, D. and King'olla, B. (2007) School Feeding: A Way To Mitigating The Impact Of Malnutrition Among Rural Communities In Suba District, Kenya. Key note address paper presented at the International Conference on From Research to Action: Mitigating HIV/AIDS Impacts on Agriculture and Food Security in West Africa to be held in Cotonou, Benin from 1- 4 October 2007.

Okoth, P. F., Murua, E., Sanginga, N., Chianu, J., Mungatu, J. Kimani, P.K. and. Ng'ang'a., J.K. (2007) Some facts about fertilizer use in Africa: the Kenyan case. Paper presented at an International Symposium on "Innovations as Key to the Green Revolution in Africa: Exploring the Scientific Facts" organized by The African Network for Soil Biology and Fertility (AfNet) of Tropical Soil Biology and Fertility (TSBF) institute of CIAT in collaboration with the Soil Fertility Consortium for Southern Africa (SOFECSA), Ngurdoto Mountain Lodge, Arusha, Tanzania, 17–21 September 2007.

Pali, P.N., Delve, R.J., Freyer, B. and Kaaria, S.K. (2007) Impact of different market types on investment in soil management technologies: A case study of Ugandan cotton. AfNet conference, Arusha, September 2007

Pali, P.N, Freyer, B., Kaaria, S. and Delve, R.J. Human capacity development for income generation and sustainable organic market linkages in Uganda. 3rd QLIF Congress "Improving Sustainability in Organic and Low Input Food Production Systems"

Pypers, P., Sanginga, P., Kantengwa, S., Lodi-Lama, J.-P., Musale, K., Mapatano, S., Nabahungu, L., Ngoga, T., Ndayisaba, C., Habitigeko, F., Lunzihirwa, J., Bimponda, W., Lubanga, L., Hangy, T., Sanginga, J.-M., Kasereka, V., Chifizi, A. and Vanlauwe, B. (2007) Agronomic and farmer assessment of new bean and soybean germplasm in Rwanda and DR Congo poster presented at the AfNet Conference in Arusha

Röing, K., Andrén, O., Chibole, L. and Nyambega, L. Application of charcoal to soils in Western and Central Kenya – initial analysis of effect on maize yields and soil properties. Poster. International Symposium, African Network on Soil Biology and Fertility, Arusha, Tanzania, September 17-21, 2007.

Sanginga, P.C., Chianu, J., Vanlauwe, B., Bationo, A., Smaling, E., Woomer, P., Mokwunye, U. and Sanginga, N. (2007) Achieving impacts at scale with Integrated Soil Fertility Management Innovations in sub-Saharan Africa: Successes, Lessons and Prospects. Paper presented at an International Symposium on "Innovations as Key to the Green Revolution in Africa: Exploring the Scientific Facts" organized by The African Network for Soil Biology and Fertility (AfNet) of Tropical Soil Biology and Fertility (TSBF) institute of CIAT in collaboration with the Soil Fertility Consortium for Southern Africa (SOFECSA), Ngurdoto Mountain Lodge, Arusha, Tanzania, 17–21 September 2007

Sanginga, P.C., Kaganzi, E., Chianu, J., Engoru, P. and Ferris, S. (2007) Mobilizing producer marketing groups for sustainable production and natural resource management: Prospects and challenges for achieving impacts at scale with 'Green Revolution" in Africa. Paper presented at an International Symposium on "Innovations as Key to the Green Revolution in Africa: Exploring the Scientific Facts" organized by The African Network for Soil Biology and Fertility (AfNet) of Tropical Soil Biology and Fertility (TSBF) institute of CIAT in collaboration with the Soil Fertility Consortium for Southern Africa (SOFECSA), Ngurdoto Mountain Lodge, Arusha, Tanzania, 17–21 September 2007.

Scopel, E., Maltas, A., Corbeels, M., Macena, Da Silva, F.A., Affholder, F., Douzet, J.M., Oliver, R., Schaller, N. and Nunez Cardoso, A. (2007) Dynamique et valorisation de l'azote dans les systèmes de culture en semis direct avec couverture végétale (SCV) des Cerrados Brésiliens. Presentation at International Congres: Les sols tropicaux en semis direct sous couvertures végétales. Madagascar, 3-7 décembre 2007. (Extended summary).

Sonder, K., Farrow, A., Delve, R. and Njuki, J. (2007) Using spatial analysis for targeting development oriented research and scaling-up opportunities. AFRICAGIS 2007 September 17th - 21st, 2007 Burkina Faso

Tittonell, P., Corbeels, M., van Wijk, M.T. and Giller, K.E. (2007) Simplified summary models of crop production to address questions on resource-use interactions and efficiencies at farm–scale. Presentation at International Symposium: Methodologies for Integrated Analysis of Farm Production Systems, 10-12 September 2007 - Catania, Sicily, Italy

Vanlauwe, B., Tittonell, P., Zingore, S. And Giller, K.E. (2007) Soil Fertility Gradients and Farmer Typologies in the Context of Integrated Soil Fertility Management: Evidence from Kenya and Zimbabwe. Tropentag, October 9-11, 2007, Witzenhausen

Wasike, V.W., Vanlauwe, B., Wachira, F., Mungai, N.W., Mumera, L.M. and Lesueur, D. (2007) Genetic diversity of bradyrhizobia nodulating promiscuous soybean varieties in soils amended with phosphorus and lime in two contrasting sites in Kenya. International Conference on Innovations as key to the green revolution in Africa: Exploring the scientific facts. 17-21 September 2007, Arusha, Tanzania (Poster).

Zingore, S., Gonzalez-Estrada, E. Delve, R.J. Herrero, M. J., Dimes, P. and Giller, K.E. Evaluation of resource management options for African smallholder farms using an integrated modelling approach. Farming Systems Design conference, Italy

Zingore, S., Masvaya, E.N., Nyamangara, J., Delve, R.J. and Giller, K.E. Challenges for replenishing soil fertility in depleted fields: evidence from long-term trials in Zimbabwe. AfNet conference, Arusha, September 2007

**Articles in conference proceedings:**

Chianu, J., Huising, J., Danso, S., Okoth, P. and Sanginga, N. (in press) Economic Evaluation of the Contribution of Below Ground Biodiversity: Case Study of Biological Nitrogen Fixation by Rhizobia. In proceedings of the international conference on 'Innovations as Key to the Green Revolution in Africa: Exploring the Scientific Facts', Arusha, Tanzania, 17 – 21 September 2007

Huising, E. J.and Okoth, P. (in press) Exploring below ground biodiversity and related ecosystem services: prospects and perspectives. In proceedings of the 23rd conference of the Soil Science Society of East Africa, 20-24 November 2006 (to be published in March 2008)

Jefwa, J., Ruto, M. L., Elsen, A., Kahangi, E., van Asten, P., Losenge, T., Mwajita, M., Vanlauwe, B., Sanginga, N. Arbuscular Mycorrhizal Fungi (AMF) in the rhizosphere of bananas in farming systems of central Kenya. Poster presentation art the AFNET Symposium, Arusha, 2007.

Lule, A., Mangheni, M., Sanginga, P.C., Delve, R.J., Matsiko, F. and Miiro, R. (2007) Social capital and adoption of soil fertility management techniques in Tororo District, Uganda. In Bationo, A., Waswa, B., Kihara, J. and Kimetu J. (eds) Advances in integrated soil fertility management in sub Saharan Africa: challenges and opportunities.

Mnyazi, J. J., Khayota, B., Ngugi, G., Otieno, V., Musila, W and Okoth, S. Biodiversity and utilization of edible mushrooms by forest margin communities of the lowland coastal forest of Kenya. Oral presentation at the World Fungi Conference 10th -16th Dec. 2007

Muzira, R., Kabale farmer groups, Pali, P., Sanginga, P.C. and Delve, R.J. (2007) Farmers participation in soil fertility management research process. Dilemma in rehabilitating degraded hilltops in Kabale, Uganda. 2007. In Bationo, A., Waswa, B., Kihara J. and Kimetu J., (eds) Advances in integrated soil fertility management in sub Saharan Africa: challenges and opportunities.

Okoth, S., Jefwa, J.M., Karanja, N., Kahindi, J., Muya, E., Okoth, P. and Wachira, P. Exploring the potential of beneficial soil fungi to enhance productivity in agricultural systems. Oral presentation at the AFNET Symposium, Arusha, 2007.

Sanginga, P.C., Kaaria, S., Muzira, R., Delve R.J., Vanlauwe, B., Chianu, J. and Sanginga, N. (2007) The Resources-to-Consumption System: A Framework for Linking Soil Fertility Management Innovations to Market Opportunities. In Andre Bationo, Boaz Waswa, Job Kihara and Joseph Kimetu Eds. Advances in integrated soil fertility management in sub Saharan Africa: challenges and opportunities.

## 12. ANNEX 2: LIST OF PROPOSALS FUNDED

**TSBF-Africa - New proposals approved in 2007**

| ACTIVE TSBF BUDGET CODES - 2007 | | | | | |
|---|---|---|---|---|---|
| | **Budget Code** | **Title** | **Donor** | **TOTAL BUDGET** | **Principal Scientist / Coordinator** |
| | | **CORE BUDGETS** | | | |
| 1 | TS01 | Integration CIAT-TSBF Holdback | CIAT | 8,800.00 | Sanginga |
| 2 | TS02 | CIDA-Funds to Africa | CIDA | 203,800.00 | Sanginga |
| 3 | TS10 | USAID's Funds to TSBF | USAID | 59,000.00 | Sanginga |
| 4 | TSA25 | France CIRAD Scientist | MOFA - France | 27,293.00 | Didier |
| | | | | | |
| | | **RESTRICTED PROJECTS** | | | |
| 5 | TSA30 | ICRISAT- Desert Margins Programme with GEF Local Areas on Biological Diversity with Relevance to Climate Change and the Reduction of Land Degradation in the desert Margin Areas | ICRISAT | (11,925.00) | Bationo |
| 6 | TSA33 | RIUP-Preperation of proformas for validated outputs Use of social capital to improve NRM | NRI | 13,877.00 | Pascal |
| 7 | TSA34 | Accelerating Prosperity of Rural Communities in the Umatara Province in Rwanda | IFAD | 78,375.00 | Vanlauwe |
| 8 | TSA36 | IDRC - Community-Based Interactive Learning and its Application to Soil Fertility Management (Kenya) Phase II | IDRC | 64,468.00 | Ramisch |

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| 9 | TSA38 | AATF - Striga Control in Western Kenya: Raising Awareness, Containing and Reducing the Infestation and Developing Strategies for Eradication | AATF | 12,119.00 | Vanlauwe |
| 10 | TSA39 | Rural livelihood Diversified soil fertility | CNFA | 141,167.00 | Delve |
| 11 | TSA42 | Scalling up livelihood impacts through farmer organization and access to market | KILIMO | 157,300.00 | Delve |
| 12 | TSA44 | Arusha Wkshop on green revolution | IIE | 5,000.00 | Bationo |
| 13 | TSA49 | Others-Income and Operation Expenses Zimbabwe | CIAT | | Delve |
| 14 | TSA51 | B & M Gates- Soil fertility Learning Partnership reimbursement | B&M GATES | 199,525.00 | Sanginga |
| 15 | TSA53 | RF - Soybean Processing and Utilization for Improving the Health and Nutrition of Rural Households in HIV/AIDS affected areas of Kenya | RF | 127,651.00 | Ohiokpehai |
| 16 | TSA54 | FARA-Increasing the Productivity, stability, sustainability and profitability of smallholder agriculture in vulnerable Production Systems through more efficient use of water and nutrients | FARA | (40,048.00) | Delve |
| 17 | TSA56 | RF - Soybean Processing and Utilization for Improving the Health and Nutrition of Rural Households in HIV/AIDS affected areas of Kenya-PHASE 2 | RF | 201,400.00 | Ohiokpehai |
| 18 | TSA58 | IFDC - Combating Soil Fertility Decline to Implement smallholder Agricultural Intensification in Sub- | IFDC | 309,721.00 | Delve |

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|---|---|---|---|---|---|
| | | Saharan Africa | | | |
| 19 | TSA63 | WOTRO-More Cropping Per Dropping: Optimizing the Water and Nitrogen use efficiency $ Crop Residue Management for Water Conservation Agriculture | Wageningen University | 39,080.00 | Vanlauwe |
| 20 | TSA64 | AUSTRIA - Linking Farmers to Markets. Developing Sustainable Marketing Systems to Improve the Competitiveness of Small Holder Organic Agriculture | AUSTRIA | 52,031.00 | Delve |
| 21 | TSA67 | Increasing Total Farm Productivity in Vulnerable Production Systems in Mozambique through Improved Germplasm Water and Nutrient use efficiencies | AUSTRIA | 244,085.00 | Delve |
| 22 | TSA69 | Evaluation of Nutrient Use Efficiency and Crop Residue Management for Water Conservation under Conservation Agriculture | JIRCAS | 2,100.00 | Bationo |
| 23 | TSA70 | UCLA - The Interaction Between Resource Quality and Aggregate Turnover Controls Ecosystem Nitrogen and Carbon Cycling | University of California | 10,920.00 | Vanlauwe |
| 24 | TSA71 | FAO Activities in the framework of strategy A1 | FAO | 11,083.00 | Ritu |
| 25 | TSA73 | Fertilizer Micro Dosing and Drought Tolerant Varieties Technology Transfer for small Farmer prosperity in the Sahel | CERAAS | 2,905.00 | Bationo |
| 26 | TSA75 | Promoting Use of Indigenous Phosphate rock for Soil Recapitalization Fertility in Sahel | CERAAS | 2,478.00 | Bationo |

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| 27 | TSA79 | ICRISAT-Combining Water Harvesting Techniques and Nutrient Management to sustain food Production in the dry lands of West Africa | ICRISAT | 6,238.00 | Bationo |
| 28 | TSA80 | ICRISAT - Enhancing Rainwater and Nutrient Use Efficiency for Improved Crop Productivity, farm Income and Rural Livelihoods in the Volta Basin | ICRISAT | 16,402.00 | Bationo |
| 29 | TSA81 | RF - Exploring the multiple potentials of soybeans in enhancing rural livelihoods and small Industry in East Africa | RF | 140,300.00 | Chianu |
| 30 | TSA83 | Building adaptive capacity to cope with increasing vulnerability due to climate change | ICRISAT | 40,000.00 | |
| 31 | TSA84 | RF-TSBF/Integrated Soil Fertility Management in the Tropics | RF | 173,856.00 | Sanginga/ Bationo |
| 32 | TSA85 | RF BANANA | RF | 36,262.00 | Vanlauwe |
| 33 | TSA87 | ARUSHA WKSOP on green revolution | IDRC | 42,200.00 | Bationo |
| 34 | TSA89 | RF - Exploring the multiple potentials of soybeans in enhancing rural livelihoods and small Industry in East Africa | RF | 64,553.00 | Chianu |
| 35 | TSA90 | DGDC - Enhancing the resilience of agro-ecosystems in Central Africa: A strategy to revitalize agriculture through the integration of natural resource management coupled to resilient germplasm and marketing approaches | DGIC | 991,447.00 | Vanlauwe |
| 36 | TSA91 | ARUSHA WKSOP | CIDA | 64,701.00 | Bationo |
| 37 | TSA93 | UNEP - Conservation and Sustainable Management of Below- | UNEP - Kenya | 2,678,296.00 | Huising |

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| | | Ground Biodiversity | | | |
| 38 | TSA94 | AATF - Control the Striga weed in Parts of SSA through the use of IR Maize Technology | AATF | 20,480.00 | Sanginga/ Vanlauwe |
| 39 | TSA95 | Use of Mycorrhizal Fungi to Improve Banana Tissue Culture and as a Component of ISFM for Banana Production in Kenya and Uganda | RF | 13,081.00 | Vanlauwe |
| 40 | TSA96 | IDRC -Strengthening the capacity for research and development to enhance natural resources management and improve rural livelihoods in Sub-Saharan Africa | IDRC | 245,945.00 | Bationo |
| 41 | TSA97 | Exploring measures to enhance the adaptive capacity of local communities to pressures of climate change | UoZim | 36,209.00 | Bationo |
| 42 | TSA98 | Over coming soil degradation in Africa | IPGRI | 30,807.00 | Vanlauwe |
| 43 | TSA99 | Going to scale: Developing strategies for scaling out market-oriented organic from farmer group to associate level | Austria | 120,007.00 | Delve |
| | | **NEW PROJECTS AS AT END OF 2007** | | | |
| 44 | TSB39 | Increased understanding and application of Integrated Soil Fertility Management in Africa: Publication of a Reference Manual | Gates Foundation | 181,055.00 | SANGINGA |
| 45 | TSB47 | Promoting Conservation Agriculture to Improve Land Productivity and Profitability among Smallholder Farmers in Western Kenya | KILIMO TRUST | 5,554.00 | Bationo |

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| 46 | TSB52 | Application of isotopic techniques to enhance water use efficiencies in smallholder irrigation systems under water and nutrient limiting conditions | IAEA | 16,000.00 | Delve |
| 47 | TSB82 | Efficient water and nutrient use in cereal grains systems in market based conservation agriculture systems | IITA SSA-CP | 500,000.00 | Delve |
| 48 | TSB90 | Enhancing Grain Legumes Productivity, and Production and the incomes of Poor Farmers in Drought-prone Areas of Sub-Saharan Africa and South Asia | ICRISAT- B & M Gates | 339,742.00 | Chianu |
| 49 | TSB92 | Improving Farmers Livelihoods through the Adoption of Legume Based Soil Fertility Restoration Technologies in Kenya, Uganda and Tanzania | OPEC | 25,000.00 | Bationo |
| | | **TOTAL** | | **7,710,340.00** | |

## 13. ANNEX 3: LIST OF STUDENTS 2007

| Name | Nationality | Degree | Status | Institution | Research theme |
|---|---|---|---|---|---|
| Kibiby Mtenga | Tanzanian | PhD | Second year student | Cornell University | Gender and Soil Fertility Management in Malawi: A Participatory Analysis of Farmers' Incentives to Re-invest in Soil Fertility Management Innovations by Women and Men Farmers |
| Peter Ebanyat | Ugandan | PhD | First year student, | Wageningen University | Dynamics of Soil Organic Matter and Nitrogen in Farmer Field Schools generated Integrated Soil Fertility Management Practices (draft title). |
| Elisabeth Gotschi | Austrian | PhD | First year student | University of Natural Resources and Applied Life Sciences (BOKU), Vienna, Austria | Social Capital in Smallholder Marketing Groups in Sofala Province, Mozambique. |
| Pamela Pali | Ugandan | PhD | First year student | University of Natural Resources and Applied Life Sciences (BOKU), Vienna, Austria | Impact of Organic Agriculture in Uganda: Improving Livelihoods through Sustainable Natural Resource Management |
| Jackson Tumwine | Ugandan | PhD | First year student | University of Natural Resources and Applied Life Sciences (BOKU), Vienna, Austria | Linking Farmers to Market: Challenges and Opportunities of Improving Rural Livelihoods for Communities affected by HIV/AIDS in Uganda |
| Charles Walaga | Ugandan | PhD | Second year student | University of Natural Resources and Applied Life | Organic agriculture development and livelihood improvement in Uganda: Future scenarios and policy measures |

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| | | | | Sciences (BOKU), Vienna, Austria | |
| Juan Cobo | Colombian | PhD | First Year | Hohenheim, Germany | Spatial and temporal management of nutrient and water resources in Zimbabwe and Mozambique |
| Brian Ssebunya | Ugandan | MSc | First year | Makerere University | Comparative advantage of Uganda's fresh produce in major export markets. A case of certified organic fruits and vegetables |
| Wouter Ton | Dutch | MSc | New student | University Twente, Netherlands | Comparison of participatory approaches in Uganda |
| Grace Agwaru | Ugandan | MSc | Second year | Makerere University, Uganda | Assessing Approaches And Developing Methods For Presentation Of Research Results To Farmers Within Their Livelihood Situations: A Case Study In Soroti And Arua Districts |
| Dick Lufafa | Ugandan | MSc | Second year | Makerere University, Uganda | On-farm comparison of the economic profitability of selected dual-purpose live barriers. Second year |
| Kiwanka Achilles | Ugandan | MSc | First year | Makerere University | Environmental and socio-economic impact of organic farming on the livelihood of small- scale farmers in Uganda |
| Jacintha Kimiti | Kenyan | PhD | Continuing | Kenyatta University | Integrating Legumes in the Farming Systems of Eastern Kenya to Enhance Soil Fertility' |
| Charles Collins Ong'aro Ogwan'g | Kenyan | Msc | Continuing | Maseno University | A Comparative Analysis of the Production Potential and Efficiency of Cotton, Soybean, Maize and Sugarcane in Mumias District. |
| Monicah Mucheru | Kenyan | PhD | Continuing | Kenyatta University | N Dynamics as affected by soil fertility status and nutrient replenishment inputs in the central highlands of Kenya' |
| Edward Yeboah | Ghanaian | PhD | 2004-2007 | University of Ghana | Sustaining Crop Productivity: The influence of Organic Resource Quality and Quantity' |
| Pablo Tittonell | Argentina | PhD | Completed | Wageningen University | Exploring options, analysing tradeoffs and deriving indicators of efficiency for integrated nutrient management in smallholder farming systems of East Africa' |
| Pauline Nhamo | Zimbabwean | PhD | Continuing | University of California | Exploring how organic and mineral nutrient combinations interact to regulate nutrient cycling' |
| Judith Odhiambo | Kenyan | | Continuing | Egerton University | Effect of selected legume species on germination of *Striga hermonthica* seeds: a control strategy in maize |
| Telesphoret Ndabamenya | Rwandese | PhD | Continuing | University of Pretoria | Interactions Between Soil Fertilty and Plant Groth Environment as Affected by Resource Competition and |

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|---|---|---|---|---|---|
| | | | | | Density Plantingin Banana (Musa sp) – Based Cropping Systems in Rwanda |
| Harrison Njoroge Mburu | Kenyan | Higher Diploma | Completed | The Kenya Polytechnic | Use of Denaturing Gradient Gel Electrophoresis as a Molecular Tool to Characterize Soil Microbes |
| Clemence Cantoni | French | Msc | Completed | Sup Agro Montpellier-ESI | Agronomical Surveys of Turkana Villages for Gum Arabic Business. It is the way forward for pastoral people. |
| Agnes Kavoo | Kenyan | MSc | Continuing | Kenyatta University | Interactions between resource quality, aggregate turnover, and C and N cycling in the Central Highlands of Kenya' |
| Alice Murage | Kenyan | PhD | Continuing | Egerton University | Evaluation to the Different Pathways of Disseminating the Push and Pull Technology. |
| Micheal Ochieng | Kenyan | MSc | Completed | Jomo Kenyatta University of Agriculture and technology | On-farm interaction between soil fertility factors, farmer management, pests and diseases and the growth and yields of banana in Maragwa district, Kenya |
| Justin Muriuki | Kenyan | MSc | 2005-2006 | Kenyatta University | Economic evaluation of organic and inorganic technologies for soil nutrient enhancement in Mukuuni and Murugi, Central Kenya' |
| Marion Ng'ang'a | Kenyan | MSc | Continuing | Moi University | Vegetable Legume Intercrop Development for Nutrition and Sustainability of HIV/AIDS Affected Rural Households of Kenya |
| Mr. Tom Hongo Amolo | Kenyan | MSc | Continuing | Kenyatta University | Effect of Soybean Enriched Diet on Nutrition and Health Status of HIV+ and exposed Children (6 mo-59 months) in Suba District Kenya. |
| Joyce Kamau (MSc) | Kenyan | MSc | Continuing | Kenyatta University | Effect of soybean (Glycine max) supplementation on nutritional status of children aged 6-9 years from HIV/AIDS affected households in Suba District |
| Gertrude Were | Kenyan | PhD | Continuing | Moi University | Effect Of Soybean Enriched Diet On The Nutrition And Health Of HIV Infected & Affected Children In Fishing and Farming areas in Suba District, Kenya. |
| Harrison Githinji | Kenyan | MSc | 2005-2007 | Moi University | Effects of conservation tillage and organic residues on crop productivity |
| Dilys Kpongor | Ghanaian | PhD | Continuing | ZEF, Univ. of Bonn Germany | Evaluation of the best-bet soil fertility restoration technologies in Northern Nigeria |
| Michael Misiko | Kenyan | PhD | Completed | Wageningen University | Knowledge and networks: Challenges and opportunities for scaling up integrated soil fertility management regimes |
| Joseph Kimetu | Kenyan | PhD | Continuing | Cornel University, USA | Restoration of Soils in Western Kenya Using Manure and *Tithonia diversifolia* |

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|---|---|---|---|---|---|
| Abdoulaye Saley | Nigerien | PhD | Continuing | North West Univ. South A | Screening forage legumes for adaptation to drought in the dry lands of South Africa |
| Kanako Suzuki | Japan | PhD | Continuing | Kyoto University | Assessment of organic nutrient uptake in Pearl millet in Niger |
| Nelson Castañeda | Colombian | PhD | Continuing | University of Goettingen | Genotypic variation in P acquisition & utilization in *A. pintoi* |
| Martha Bolaños | Colombian | PhD | Continuing | National University | Role of soil enzymes in vegetable banana production systems |
| Andres Rangel | Colombian | PhD | Continuing | Hiversity of Hannover | Mechanisms of aluminum resistance in common bean |
| Annabé Louw-Gaume | South African | PhD | Continuing | ETHZ | Mechanisms of low phosphorus adaptation in *Brachiaria* |
| Alvaro Rincon | Colombian | PhD | Continuing | National University | Integration of maize with forages to recuperate degraded pastures in the Llanos of Colombia |
| Sergio Mejia | Colombian | PhD | Continuing | National University | Identification of candidate genes responsible for adaptation of tropical forage grass, *Brachiaria* to low phosphorus soils |
| Jose Jaumer Ricaurte | Colombian | MSc | Continuing | National University | Impact of aluminium tolerant *Brachiaria* genotypes on soil quality characteristics of an oxisol of the altillanura of the Meta Department of Colombia |
| Ms. Lucy Njaramba | Kenyan | M.A. | Continuing | Institute of Development Studies (IDS), University of Nairobi | Market and demand for soybean by food processing industries and supermarkets in Kenya |
| Sato Junko | Japanese | PhD | Continuing | Kyoto University Japan | |
| Miriam Githongo | Kenyan | MSc | Continuing | Nairobi University/ University of Florida | |
| Ms. SIdibe Diarra | | PhD | Continuing | Borlaug Scholarship, Hawaii University | |
| Job Kihara | Kenyan | PhD | Continuing | University of Bonn | Conservation Tillage: Understanding the Biophysical Processes Affecting its Effectiveness |
| Mr. Amek Tom | Kenyan | M.A. | Completed | Economics Department, University of Nairobi | Ex-ante adoption potential of seven technological options for improving ecosystem services in Kenya |
| Adamou Abdou | | MSc | Continuing | University of Niamey, Niger | |
| Helen Anyanzwa | Kenyan | MSc | Continuing | Moi University | |
| Edwin Rotich | Kenyan | MSc | Continuing | Moi University | |
| S. Some | Burkinabe | PhD | | ZEF, Univ. of Bonn Germany | |
| Kamidodzono Akira | Japanese | PhD | Continuing | JIRCAS | |
| Fatondji Doubedji | | PhD | Completed | University of Bonn, Germany | |
| Sakko Mori | Japanese | PhD | Continuing | JIRCAS | |
| Wasike Victor | Kenyan | PhD | Continuing | Egerton University. | Genetic Diversity of Dual – Purpose Soyabean *[Glycine max (L.)* **Merr**.], Indigenous Bradyrhizobia Strains and Their Potential to Fix Nitrogen in Kenya. |
| Kariuki Felix | Kenyan | Bsc | Continuing | Nairobi University. | Investigating the VAM Root Infection in Soyabean. |

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|---|---|---|---|---|---|
| Musyoki Mary | Kenyan | Msc | Continuing | Kenyatta University | Soil microbiology and bio-functioning. |
| FAYE Aliou | Senegalese | Msc | Completed | IRD-Senegal | Cotribution a l'etude de la diversite de *rhizombiums* et leur impact sur la fertilite du sol sous un peuplement naturel d' *Acacia nilotica subsp tomentosa* willd: exemple de la foret classee de Diara au Senegal. |
| Margaret Mwangi | Kenyan | Msc | Continuing | Kenyatta University | Effects of Trichorderma hirzianum and mycorrhizae on growth and disease management in tea cuttings, tomato seedlings and napier grass cuttings |
| Thomas Ondara | Kenyan | Msc | Continuing | Jomo Kenyatta University of Agriculture and technology | Mycorrhizal status of improved cassava (*manihot esculenta* crantz) cultivars in different fertilizer regimes in western Kenya |
| John Nyaga | Kenyan | Bsc | Continuing | Jomo Kenyatta University of Agriculture and technology | Diversity Arbuscular Mycorrhizal Fungi (AMF) Fusarium wilt (Fusarium oxysporum) in tissue cultured banana |
| Murua Elizabeth | Kenyan | Msc | Continuing | Kenyatta University | Nitrogen Inputs Knowledge in the Management of Highly Degraded Soils in Chakol,Teso District, Kenya |
| Alfred Nyambane | Kenyan | Msc | Continuing | Kenyatta University | Determination of Genetic Co-efficient of Dual Purpose Soybean and their Agro-ecological Potential in Kenya |
| Anne Frayer | French | Msc | Completed | ENGREF-ENSTIB 3 | Charcoal Burning in Isiolo District, Kenya. Estimation of Charcoal Burners' Activity and Consequences for the Local Natural Resource in Acacia Trees |
| Faith W. Wanjau | Kenyan | Msc | Continuing | Moi University | The Influence of Charcoalon Soil Fauna and Soil Fertility in Central and Western Kenya. |
| Esther K. Muema | Kenyan | Msc | Continuing | Moi University | Comparative Effects of Different Quality Organic Resources on Soil Microbial Diversity Under Two Different Environments in Kenya. |
| John Ojiem | Kenyan | PhD | Completed | Wageningen University | Niche-Based Approach to Soil Fertility Improvement by Legumes in Western Kenya. |
| Fulgence Joseph Muhili | Tanzanian | PhD | Continuing | Purdue University | Grain Legume Trade and Marketing in Eastern and Southern Africa: Spatial and Temporal Analysis. |
| Johnstone Kennedy Oyango | Kenyan | Msc | Continuing | Nairobi University | Assessment of Factors Affecting the Use and Management of Plant Organic Resources in Soil Fertility Management. The case of Meru South District, Kenya. |
| Josephat Mugabo | Rwanda | PhD | Continuity | Katholieke University, Leuven, Belgium | Agriculture Intensification Under High Population Pressure in Rwanda: An Analysis of Fertilizer Policy and Legume-Based Systems Economic Incentives. |
| Justina Chianu | Nigerian | Msc | Completed | Ibadan University | Livelihoods Activities and Poverty Among Rural Households in the Farming Systems of Western Kenya. |
| Odongo Nicodemus Ochieng | Kenyan | MA | Continuing | Nairobi University | Demand for Soybeans: A Case Study of Livestock Feed Industry in Nairobi. |

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|---|---|---|---|---|---|
| Bonyo Seline Odhiambo | Kenyan | Msc | Continuing | Maseno University | A Comparative Economic Analysis of Maize, Soybean, Sugarcane and Tobacco Enterprises in the Farming Systems of Uriri Division, Rongo District, Kenya. |
| Miriti Justin Kirimi | Kenyan | Msc | Continuing | Jomo Kenyatta University of Agriculture and technology | Influence of Inorganic Fertilizer and Micronutrients on Yield and Quality Attributes of Tissue Culture Banana (Musa sp), ratoon Crop. |
| Mary Nyawira | Kenyan | PhD | Continuing | Wageningen University | Mycorrhiza (Glomerin). |
| Juma Robinson | Kenyan | Msc | Continuing | Jomo Kenyatta University of Agriculture and technology | Effects of Mixed Isolates of Arbuscular Mycorrhiza Fungi on the Field Establishment and Growth of Tissue CultureBananas |
| Edward Rurangwa | Rwandese | Msc | Continuing | Jomo Kenyatta University of Agriculture and technology | |
| Florence Kyallo | Kenyan | PhD | Continuing | Jomo Kenyatta University of Agriculture and technology | Overweight and Obesity Among School Children (6-11) in Nairobi: Risk Factors and Potential Intervention |
| Judith Okoth Okello | Kenyan | PhD | Continuing | Jomo Kenyatta University of Agriculture and technology | Utilizing Soybean and Local Staples (Cassava) to Enhance the Nutritional Status of Under Five Year Old Children in Western and Kaloleni, Kenya. |
| Edgar Kadenge | Kenyan | Bsc | Completed | Egerton University | Farmer Groups and Agricultural Knowledge and Extension |
| Sarah Atuto | Kenyan | Bsc | Continuing | Egerton University | Community Facilitation Through Farmer Groups |
| Job Ogoda | Kenyan | Msc | Continuing | Egerton University | |
| Geoffrey Okello | Ugandan | Msc | Continuing | Makerere University | Socio-Economic Determinants of Within-Farm Soil Fertility Gradients in Western Kenya |
| Muke Manzehele | Congolese | MSc | Continuing | University of Kinshasa | Technologies to Improve Agricultural Production and Soil Conservation and Scoping Land in Sud-Kivu |
| Julie Lunzihirwa | Congolese | MSc | Continuing | University of Kinshasa | The Impact of Beans and Groundnut Channels on the Productivity and Agricultural Income of Thousands in Cataract Region |
| Rachel Zozo | Conglese | MSc | Continuing | University of Kinshasa | Assessing the Socio-Economic Importance of Legumes on the Livelihoods of Farmers at Mugogo and Mudaka Markets in Ngleshe and Katana Axes, DRC. |
| Leon Nabahuuzu | Rwandese | PhD | Continuing | Wageningen University | Comparing Claims of Wetlands in Eastern Rwanda: Challenges and Opportunities. |
| Roberta Gentille | Canadian | PhD | Continuing | University of California, Davis. | Nutrient deficiencies in Soils of Lalungu, South Kivu, DRC<br>Impacts of Roots on Soil Organic Matter Aggregates and Nitrogen Cycling. |
| Isabella Vandeplas | Belgian | PhD | Continuing | Katholiek University, Leuven | Production in Farmer Groups in Kenya |
| Benjamin Kiborr | Kenyan | PhD | Continuing | Wageningen University | Exploring Diversity and Adoption of Agro forestry Technologies in Mixed Crop - Livestock Smallholder |

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|---|---|---|---|---|---|
| | | | | | Farming in Kenya. |
| Fredrick Ayuke | Kenyan | PhD | Continuing | Wageningen University | Soil Fauna and Aggregates |
| Judith Odhiambo | Kenyan | | Continuing | Egerton University | Effect of selected legume species on germination of *Striga hermonthica* seeds: a control strategy in maize |
| Lele Bonaventure | Congolese | Msc | Continuing | University of Kinshasa | Technologies to Improve Agricultural Production in Cassava-Legume Intercropping Systems |
| Joachim Vansteenkiste | Belgian | Msc | | Catholic University of Leuven | |
| Charles Bucagu | | PhD | | Wageningen University | |
| Mary Koech | Kenyan | PhD | | Moi University | |