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## Synthesis Report on the "Commercialization and Transfer of Agricultural Technology in Africa"

Workshop sponsored by USAID Africa Bureau  
4-7 November 1996, Accra, Ghana.

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Coordination Office / Bureau de Coordination

SAFGRAD

01 B.P. 1783, Ouagadougou 01 - Burkina Faso

Tél : 30-60-71/31-15-98

Fax : 31-15-86

Télex : 5381 BF

## WORKSHOP SYNTHESIS

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01 BP. 1783 Ouagadougou CI  
Tél. 30 - 60 - 71/31 - 15 - 50  
Burkina Faso

### **The Workshop**

More than 100 persons participated in a workshop on the Commercialization and Transfer of Agricultural Technology in Africa, held Nov. 4 - 7, 1996, in Accra, Ghana. Participants included representatives from a large segment of African technology development and transfer stakeholders, including African research and development institutions, international research centers, private agribusiness firms, non-governmental organizations, U.S. and African universities and USAID field and Washington offices. The workshop was sponsored by the Government of Ghana and USAID, Africa Bureau, Office of Sustainable Development, Productive Sector Growth and Environment Division.

### **Purpose**

The purpose of the workshop was to provide a forum for dialogue among African - based stakeholders working on technology development and transfer. Participants identified key issues and made recommendations that national and international systems and donor communities can use to accelerate the access and use of agricultural technologies through commercial (private sector) and non-commercial (public sector) means.

### **Introduction**

In Sub-Saharan Africa, agriculture is a major source of employment, income, and foreign exchange and offers opportunities to stimulate economic growth. Capitalizing on these opportunities requires modification in systems of technology development, transfer and commercialization to improve productivity, efficiency and applicability. In plenary and breakout sessions, participants examined opportunities within five thematic areas, identifying major issues and offering recommendations to expedite the process of change.

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## Themes

### I. Enabling Environment

Creating an enabling environment for technology transfer and commercialization is a continuing process requiring attention to four areas - incentives, institutions, investments and infrastructure. The exact interventions needed will vary from country to country, but can occur through reforms in policies, institutions and infrastructure.

Reforms often require the withdrawal of government from activities that can be more effectively performed by the private sector. The role of government is to put in place an incentive structure for the enabling environment that includes activities such as establishing policy guidelines, developing legal and financial frameworks and providing infrastructure support, especially roads and communication systems.

The creation of an enabling environment requires leadership, political stability and careful planning by all stakeholders. Planning is important to mitigate such difficulties as inflationary prices and higher unemployment.

Lack of financial instruments (credit) is often a constraint to technology transfer and commercialization in rural areas. Lack of mechanisms to enable savings is also a constraint because savings increase the amount of credit available and offer non-agricultural forms of investment to food producers.

### Recommendations

1. Governments should consolidate and expand the economic liberalization process and provide institutional, policy, legal and financial incentives to facilitate the active participation of the private sector in technology transfer and commercialization.

2. At all levels, policy dialogue between donors, governments and potential beneficiaries should address the enabling environment for technology transfer and commercialization.

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## II. Generation of Customer Focused Technologies

In agricultural research systems, a customer-focused process is required to ensure appropriate technology development, transfer and commercialization. Customers are end-users (farmers, consumers, input businesses, marketing agents, traders and processing firms) and transfer agents (extension officers).

Customer - focused approaches are also referred to as "demand-driven" or "participatory" approaches. Generally, customer-focused approaches involve joint problem definition with end-users, an understanding of the socio-economic context, integration of relevant disciplines in research and extension, an acceptance of farmers and other customers as experts, and a process of skill building for all persons involved.

For example, Ghana has a system of technology generation and transfer that involves researchers, farmers, agribusinesses, non-governmental organizations and extension staff. Difficulties being addressed include the unfamiliarity of scientists with working in teams and the lack of strong farmer organizations to represent farmers interests.

In Uganda, a unified extension system has reduced duplication, improved coordination and developed priorities across programs, Extension and research are now linked at three levels.

Customer-focused approaches are expensive to maintain but experience suggests they are worthwhile in identifying problems and improving productivity. For example, a review of Ghana's record shows a respectable number of production technologies generated, transferred and commercialized.

Research systems are oriented to initiating and developing new technologies, but some balance must be found between customer-driven research and research that works creatively to meet a potential demand. For example, biotechnology offers considerable promise but requires national strategies and private initiatives to promote its development.

Customer-focused technologies should provide certain advantages. They should offer a high rate of adoption and a high rate of return on investment.

They should be cost-effective, efficient, and broadly applicable. They should contribute to a high quality product, enhance people - level impact and promote partnership among stakeholders.

As research systems respond to customer demand, they will gain better understanding of the mechanisms and processes that promote customer-focused technology.

An additional element in the customer-focused orientation is the element of commercialization and profitability of agriculture, especially for smallholder farmers. There should be an increased focus on the development of appropriate technologies that puts money into the farmers' pockets on a sustainable basis. Products of such technologies should be market-driven and should involve introduction and promotion of high value crops (and trees) as well as increased focus on value-added processes that increase the overall value of agriculture. Sustainability should be a key factor in such technologies.

### **Recommendations**

1. Research institutions should create mechanisms to respond to customer demand. Experience suggests that research and development should be organized along program lines, not disciplines, for example by focusing on a group of commodities, an agroecological zone, a production system, or a client group.
2. Research-development/extension collaboration should be institutionalized in national research and development programs. This could be done, for example, through joint implementation of pilot projects for technology development and transfer.
3. In allocating funds for research, governments and donors should target some funds specifically for integrated research requiring inter-institutional and research-development collaboration for particular agroecological zones.
4. Agricultural researchers should conduct market-demand analyses, wherever appropriate, to assess the demand for new technologies and

identify and address issues of transfer and commercialization during the research process.

### III. Sharing of Technology

A sharing of technologies and information within and among countries can accelerate the transfer and commercialization of agricultural technologies. Given the growing integration of economies and the levels of collaboration in research and development processes, clear rules are needed regarding the ownership of new technologies and the distribution of economic returns from them. Intellectual property rights promote the invention of technologies, protect the interests of inventors and investors and promote the use of inventions/technologies. Local instruments or laws include patents, trademarks and copyrights. Patents and other measures could assist in the sustainable financing of agricultural research by generating funds from royalties.

Having an appropriate legal framework in place is a first step, but a credible well-functioning legal system is needed to implement the laws.

The major problems in the area of intellectual property rights include a lack of public awareness, a lack of knowhow in adapting and commercializing technologies, the costs of licensing, and an absence of links between inventors and investors. Many people do not know that patent offices and free access to patent information exist in their own countries. Inventors themselves are unfamiliar with trademarks and methods of creating a value-added market image for their inventions. Unsuspecting inventors and even public policy makers enter into license agreements with little or no knowledge of the consequences of what they have signed.

In developed countries, there are well-established service support sectors that provide technical, marketing and financial support to help inventors and to assist in transforming inventions into salable commodities. African countries do not appear to have these necessary support sectors.

Numerous examples of successful commercialization and transfer exist in Africa. For example, numerous animal vaccines used in Africa are available because the pharmaceutical companies that invented them were able to patent them and then license African partners to manufacture and use them.

Equipment for improved tillage, of Ethiopian origin, is now in use in more than a dozen countries, in part through the promotion created by its having been patented. Many of the rose varieties being exported to Europe have been patented, increasing their marketability and niche in that market. The introduction of a leguminous tree species, *Calliandra calothyrsus*, as an alternative protein source for dairy cows, has helped to reduce the reliance on commercial dairy meal and increased milk production and profitability for smallholder farmers in the highlands of Kenya. Transfer of this technology was through effective partnership between research and government extension.

Issues relating to the protection of African plant and animal resources could be addressed through intellectual property rights.

Information sharing is a multidirectional process that can be achieved by the use of a combination of mechanisms of dissemination. Throughout Africa, there are numerous examples of information sharing and dissemination that facilitated technology transfer and commercialization. For example, FAO facilitated the transfer of the Chorkor Smoker, a local technology for smoking fish. Transfer was accomplished through training, face-to-face interaction and community mobilization.

The Leland Initiative and AfricaLink are two current efforts to increase information sharing and dissemination through internet linkages. Services available include E-mail, electronic conferences, bulletin boards, file transfer and interactive services.

### **Recommendations**

1. Governments should take the initiative to raise public awareness of intellectual property rights issues, for example, by sponsoring invention competitions and by supporting the creation of Product Development Centers to help fill the gap between inventors with good ideas and investors with the money and connections to market inventions. (Opportunities exist for the private sector to share the risk and cost of such initiatives.)
2. African governments should address the infrastructure, human resource capacity, legal and regulatory constraints affecting information and

communication systems. Electronic communication offers multiple opportunities for training, information sharing and dissemination to accelerate technology transfer and commercialization.

#### **IV. Access to Inputs**

To accelerate the transfer and commercialization of agricultural technologies, improvements in the accessibility and utilization of inputs are essential.

Two African seed companies have been relatively successful in meeting customer needs. The Kenyan Seed Company was a government-controlled monopoly for 30 years, providing consistent service to Kenya and neighboring countries. The company is now a private firm, competing with national and international seed companies. The Zimbabwe Seed Company started as a cooperative and is now a corporation with shares bought and sold in public auction. Major concerns in both companies are the need to develop varieties for marginal areas and the apparent duplication between the private companies and public research institutions. A majority of African countries lack similar seed companies.

Transport and equipment for processing and storage are major areas of concern. Why have so many post-harvest technologies not been used? Perhaps the problem is the inadequacy of analyses done by researchers. Technology transfer would be facilitated by the involvement of end users in technology development, the collection of accurate information on prospective markets, and ongoing attention to the affordability of technologies to target groups. Demand can be generated by creating technologies that add value and give customer choices.

The high cost of capital and the limitations of infrastructure are major constraints. Post-harvest technologies have long lead times and require assistance from manufacturers who are willing and able to commercialize.

African soils require fertilizer to replenish nutrients and optimize production. Constraints include high fertilizer costs, lack of access and environmental and health problems. There should be increased promotion and support for the use of organic sources of fertilizer and for its combination with inorganic fertilizers.



The existence of a market for the end-product (the one produced using the input) is key to a sustained adoption of inputs by farmers. Cash crops benefit from a coordinated promotion system (availability of credit, guaranteed output market, stable prices, an effective extension system). No similar support is provided to facilitate the use of inputs in food crops.

The removal of subsidies under adjustment has led to a decrease in input use, in particular, fertilizers. In some countries, government has phased out input distribution and the private sector has not filled the vacuum.

Access of small farmers to inputs is a special problem because of lack of training, information and credit. Recently, Zimbabwe initiated training, to encourage farmers to see the benefits of fertilizer use.

### Recommendations

1. As part of creating an enabling environment for technology transfer and commercialization, governments should facilitate the involvement of the private sector in the establishment of seed systems and in the processing of food crops, with emphasis on traditional food grains and roots and tubers. Governments may need to protect emerging new industries from unfair foreign competition.
2. Governments should strengthen regulatory agencies to ensure quality control of inputs. In particular, governments should promote regional harmonization of seed, pesticide and fertilizer laws.
3. National research systems should work with manufacturers to create appropriate post-harvest technologies and monitor their adoption. This work should include increased attention to the small-scale, informal processing sector.
4. National research systems should collaborate with private companies to maximize research efforts and avoid duplication of activities. One area for collaboration is market studies to gain a better understanding of national and regional markets for products and inputs.

5. Governments should make long-term investments to maintain soil fertility and rebuild the natural resource base. Without these investments, the long-term sustainability of the natural resource base will be threatened.

6. Governments, in collaboration with donors, should invest in increasing business and entrepreneurial skills in rural areas to help small business development in input production and distribution. For example, research and extension systems, working through non-governmental organizations and community-based programs, could provide technical support to enable farmers to multiply seed.

## **V. Innovative Partnership Development**

Workshop participants examined several cases in which partnership initiatives facilitated technology transfer and commercialization.

The Farmers' Field School in Ghana illustrates a partnership that brings together several disciplines in participatory, action-oriented research. A Burkina Faso project partnered farmers, agronomists, local scientists and artisans with the Sustainable Energy Center in providing solar energy for the post-harvest storage of potatoes. Both partnerships used a holistic approach to research and extension.

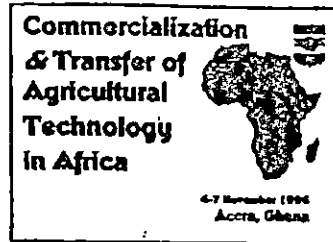
Major issues in partnership development include the need to reduce donor dependency while sustaining research, problems with existing governmental cultures that lack openness, accountability and transparency, difficulties in defining the respective roles of partners, the need for new ways of thinking to accommodate the realities of an increasingly changing global market, and lack of awareness of the activities and comparative advantage among potential partners..

In situations limited by poor infrastructure and a meager resource base, a process approach is needed to integrate institutional components such as research, extension and credit. Cross-border information sourcing and collaboration in local-level partnerships provide viable opportunities to enhance technology development, transfer and commercialization.

Experience shows that innovative partnership development requires institutional commitment, catalytic leadership and sustainable funding. One mechanism for sustainable funding is for government and private sector entities to match donor support in establishing endowments from which accruing interest can be used to sustain funding for technology transfer and commercialization.

### **Recommendations**

1. Agricultural research systems, in collaboration with donors, should develop mechanisms to facilitate partnerships among inventors, manufacturers, end-users, and financial institutions to promote commercialization. Mechanisms should include the clear definition of partner roles and benefits and transparent norms. Experience and lessons learned should be documented and disseminated widely.



## PARTICIPANT LIST (Final)

**Emmanuel Acquah**  
Director, Int'l Programs  
*UMES*  
Princess Anne, MD 21853  
Tel: (410) 651-6192  
Fax: (410) 651-6292  
email: EACQUAH@umes.bird.umd.edu

**Regina Adutwum**  
Deputy Director  
*Ministry of Food & Agriculture*  
P.O. Box M37  
Accra  
Ghana  
Tel: 665421 x4074

**Kwame Afreh-Nuamah**  
Professor  
*University of Ghana Legon*  
Faculty of Agriculture  
Accra  
Ghana  
Tel: (233) (21) 500184

**Jill Ahlstrand**  
Special Project Officer  
*USAID*  
AFR/SD/PSGE  
Dept. of State  
Washington, D.C. 20523-0089  
Tel: (202) 647-5765  
Fax: (202) 736-7130  
email: jiahlstrand@usaid.gov

**Mike Akyempong**  
Deputy Minister  
*Ministry of Food & Agriculture*  
P.O. Box M37  
Accra  
Ghana  
Tel: 663507  
Fax: 668245

**W.S. Alhassan**  
Professor  
*Council for Scientific &  
Industrial Research*  
P.O. Box M32  
Accra  
Ghana  
Tel: (233) (21) 774772  
Fax: (233) (21) 777655

**W.A. Amponsah**  
Associate Professor  
*North Carolina A&T State University*  
1601 E. Market Street  
Greensboro, N.C. 27411  
Tel: (910) 334-7056  
Fax: (910) 334-7674  
email: williaa@athena.ncat.edu

**Albert Ansah**  
Deputy Director  
*Minister of Environment, Science & Technology*  
P.O. Box M232  
Accra  
Ghana  
Tel: 666049  
Fax: 666828

**Pamela Ansley**  
Facilitator  
*Clarkson Systems & Analyses, Inc.*  
2917 8th Street, N.E.  
Washington, D.C. 20017  
Tel: (202) 635-0652  
Fax: (202) 635-3397

**Emmanuel Atayi**  
Coordinator of Eco-Regional Programs  
*IITA*  
PMB 5320  
IITA Oyo Road  
Ibadam.  
Nigeria  
Tel: (234) 22- 412626  
Fax: (234) 22- 412221  
email: E.Atayi@Cgnet.com

**Kwesi Atta-Krah**  
Regional Coordinator (East & Central Africa)  
*ICRAF*  
P.O. Box 30677  
Nairobi  
Kenya  
Tel: (254) 2-521450  
Fax: (254) 2-521001  
email: k.atta-krah@cgnet.com

**David Atwood**  
Acting Division Chief  
*USAID*  
AFR/SD/PSGE  
Dept. of State  
Washington, D.C. 20523  
email: datwood@usaid.gov

**Taye Bezuneh**  
Director of Research  
*SAFGRAD*  
01 BP 1783  
Ouagadougou  
Burkina Faso  
Tel: (226) 311598  
Fax: (226) 311586

**Nayon Bilijo**  
Deputy Minister  
*Ministry of Food & Agriculture*  
P.O. Box M37  
Accra  
Ghana  
Tel: 662961  
Fax: 668245

**Fred Boadu**  
Associate Professor  
*Texas A&M University*  
Dept. of Agricultural Economics  
Blocker Building  
College Station, TX 77843  
Tel: (409) 845-4410  
Fax: (409) 862-1533  
email: fboadu@tamu.edu

**Charles S.K. Boaitey**  
President  
*Adeemera Enterprises, Inc.*  
P.O. Box 266  
82 Oakbriar Court  
Penfield, N.Y. 14526  
Tel: (716) 377-5358  
Fax: (716) 377-8003

**Conrad Bonsi**  
Assoc. Research Director  
*Tuskegee University*  
112 Campbell Hall  
GWC Agric. Expt. Station  
Tuskegee, AL 36088  
Tel: (334) 727-8333  
Fax: (334) 724-4451  
email: cobonsi@acd.tusk.edu

**Henning Bosuner**  
Rural Development  
*European Union*  
P.O. Box 9505 Kia  
Accra  
Ghana  
Tel: 774202  
Fax: 774154

**Johan Brink**  
Asst. Dir., Biotechnology  
*Agricultural Research Council*  
P.O. Box X293  
Pretoria 0001  
South Africa  
Tel: (27) (12) 841-9872  
Fax: (27) (12) 808-1499  
email: biojab@vopi.agric.29

**Eloise Carter**  
Assoc. Dir., Int'l Programs  
*Tuskegee University*  
Rm. 219 Kresge Center  
Tuskegee, AL 36088  
Tel: (334) 727-8953  
Fax: (334) 727-8451  
email: ecarter@acd.tusk.edu

**Tony Carvalho**  
Project Manager  
*USAID/Guinea*  
P.O. Box 603  
Conakry  
Guinea  
Tel: (224) 412163  
Fax: (224) 411985  
email: tcarvalho@usaid.gov

**Samuel K. Dapaah**  
Chief Director  
*Ministry of Food and Agriculture*  
P.O. Box M-37  
Accra  
Ghana  
Tel: (233) (21) 666-567  
Fax: (233) (21) 668-245  
email: MOFA@ghana.africaonline.com

**John Durling**  
Chief Executive  
*Seed Co. of Zimbabwe*  
P.O. Box 1422  
Harare  
Zimbabwe  
Tel: (263) (4) 308881  
Fax: (263) (4) 304841  
email: seedco@msasa.samana.co.zw

**Jacques Eckebil**  
FAO Representative in Ghana  
FAO  
P.O. Box 1628  
Accra  
Ghana  
Tel: (233) (21) 665896  
Fax: (233) (21) 234003

**Edward Dennis**  
Deputy Director  
CSIR  
Academy Post Office  
Kumasi  
Ghana  
Tel: 051f-50353

**Joseph M. Fajemisin**  
Research Liaison Scientist  
IITA  
01 B.P. 2551  
Bouake 01  
Cote d'Ivoire  
Tel: (225) (63) 4514  
Fax: (225) (63) 4714  
email: warda@cgnet.com

**Bantayehu Gelaw**  
TDT Specialist  
8350 Greensboro Drive  
Apt. 1017  
McLean, VA 22102  
Tel: (703) 448-8793

**Joseph Gogo**  
Director  
CSIR  
P.O. Box C519 Cantoments  
Accra  
Ghana  
Tel: 779400  
Fax: 773068

**Myron Golden**  
Mission Director  
USAID/Ghana  
Dept. of State  
Wash., DC 20521-2020  
Tel: (233) (21) 228-440  
Fax: (233) (21) 669-598

**Koffi Goli**  
Director General  
IDESA  
01 B.P. 633  
Bouake  
Cote d'Ivoire  
Tel: (225) 63-31-39  
Fax: (225) 63-31-26

**Yeo Guefala**  
Director R&D  
ITT  
04 B.P. 1137  
Abidjan 04  
Cote d'Ivoire  
Tel: (225) 21-2178  
Fax: (225) 21-9745

**Christopher W. Guta**  
Director General  
*Malawi Industrial Research & Technology  
Development Center*  
P.O. Box 357  
Blantyre  
Malawi  
Tel: (265) 623-805  
Fax: (256) 623-831

**Augustine A. Gyamfi**  
*Private Farmer*  
P.O. Box 8296  
Accra  
Ghana  
Tel: 232437  
Fax: 222699

**Daniel Gyimah**  
*USAID/Ghana*  
Dept. of State  
Wash., DC 20521-2020  
Tel: (233) (21) 228-440  
Fax: (233) (21) 669-598

**Michael Hailu**  
Coordinator, Information Programme  
ICRAF  
P.O.B. 30677  
Nairobi  
Kenya  
Tel: (254) (2) 521450  
Fax: (254) (2) 521001  
email: m.hailu@cgnet.com

**Niels C. Hauffe**  
Chairman  
*New World Ventures, L.L.C.*  
1013 Foster Place, S.W.  
Leesburg, VA 22075  
Tel: (703) 777-1727  
Fax: (703) 777-1753

O.B. Hemeng  
Crops Research Institute  
P.O. Box 3785  
Kumasi  
Ghana  
Tel: 233-51-60390

Jeff Hill  
Technology Transfer Advisor  
USAID  
AFR/SD/PSGE/TDT  
1111 N. 19th Street  
Suite 210  
Arlington, VA 22209  
Tel: (703) 235-3787  
Fax: (703) 235-3805  
email: Jhill@usaid.gov

Julius Hukporti  
Assistant Director  
Ministry of Food & Agriculture  
P.O. Box M37  
Accra  
Ghana  
Tel: 665421 x4010

Yong Woon Jeon  
IITA  
Oyo Road, PMB 5320  
Ibadan  
Nigeria  
Tel: 234 2 2412626

Henry M. Kamau  
Development Engineering Manager  
Kenya Vehicle Manufacturers Ltd.  
P.O. Box 1436  
Thika  
Kenya  
Tel: (254) (151) 21711  
Fax: (254) (151) 21689  
email: hmk.kvm@arcc.permanet.org

Kumbirayi Kangai  
Minister  
Ministry of Lands & Water Resources  
8th Floor, Kurima House  
89 Baker Avenue  
Harare  
Zimbabwe  
Tel: (263) (4) 729-223  
Fax: (263) (4) 708-162

Bakary Kante  
Directeur de l'Environnement  
Ministere de l'Environnement  
B.P. 6386  
Dakar  
Senegal  
Tel: (221) 210-725  
Fax: (221) 226-212

N. Samuel Kassapu  
Senior S&T Officer  
FAO  
Regional Office for Africa  
P.O. Box 1628  
Accra  
Ghana  
Tel: 666851  
Fax: 668427

Peter Katjavivi  
Vice Chancellor  
University of Namibia  
P.B. 13301  
Windhoek  
Namibia  
Tel: (264) (61) 2063937  
Fax: (264) (61) 242644

Walter Knausenberger  
Environmental Advisor  
USAID  
AFR/SD/PSGE/ENV  
1111 N. 19th Street  
Suite 210  
Arlington, VA 22209  
Tel: (703) 235-3826  
Fax: (703) 235-3805  
email: WKNAUSENBERGER@usaid.gov

Sylvester Korang-Amoako  
Director of Training & Extension  
Ministry of Food & Agriculture  
P.O.B. M37  
Accra  
Ghana  
Tel: (233) (21) 665282  
Fax: (233) (21) 665282

Nana O. Koranteng  
Development Program Officer  
Canadian High Commission  
P.O. Box 1639  
Accra  
Ghana  
Tel: 233-21-228566  
Fax: 233-21-773792

Esther Kwawu  
Assistant Director  
Ministry of Food & Agriculture  
P.O. Box M37  
Accra  
Ghana  
Tel: 668329

**Albert Makita-Mbama**  
Administrative Delegate  
OAPI  
B.P. 887  
Yaounde  
Cameroon  
Tel: (237) (20) 3911  
Fax: (237) (20) 1844

**Mywish Maredia**  
Assistant Professor  
*Michigan State University*  
Dept. of Agricultural Econ.  
East Lansing, MI 48824-1039  
Tel: (517) 353-4618  
Fax: (517) 432-1800  
email: maredia@pilot.msu.edu

**Fadima Siby Mariko**  
Directrice  
UCODAL  
B.P. 1580  
Bamako  
Mali  
Tel: (223) 227467  
Fax: (223) 224331

**Rob McCaleb**  
President  
*Herb Research Foundation*  
1007 Pearl Street, Suite 200  
Boulder, CO 80302  
Tel: (303) 449-2265  
Fax: (303) 449-7849  
email: rmccaleb@herbs.org

**Hector Mercer-Quarshie**  
*Savannah Agric. Research Institute*  
P.O. Box 52  
Timala  
Ghana  
Tel: 71-22411

**Millie Morton**  
Facilitator/Technical Writer  
USAID  
AFR/SD/PSGE  
1111 N. 19th Street  
Suite 210  
Arlington, VA 22209  
Tel: (703) 235-3827  
Fax: (703) 235-3805  
email: mmorton@usaid.gov

**Menwuyellet Moussie**  
Technology Transfer Advisor  
USAID  
AFR/SD/PSGE/TDT  
1111 N. 19th Street, Suite 210  
Arlington, VA 22209  
Tel: (703) 235-3803  
Fax: (703) 235-3805  
email: MMOUSSIE@usaid.gov

**John Baptist Mubiru**  
Director of Extension  
*Ministry of Agriculture, Animal Industry  
& Fisheries*  
P.O. Box 102  
Entebbe  
Uganda  
Tel: (256) (42) 20004  
Fax: (256) (42) 20319

**Sam Muchena**  
Managing Director  
*African Center for Fertilizer Development*  
P.O. Box A469  
Avondale, Harare  
Zimbabwe  
Tel: (263) (4) 860421  
Fax: (263) (4) 860423

**Maria Mullei**  
Program Specialist  
*USAID/Kenya*  
P.O. Box 320621  
Nairobi  
Tel: 751613  
email: mmullei@usaid.gov

**Naboth Mvere**  
Attorney  
*Messrs. Honey & Blackenberg*  
Box 85  
Harare  
Zimbabwe  
Tel: (263) (4) 726041  
Fax: (263) (4) 728489

**Mortimer Neufville**  
V.P., Academic Affairs  
UMES  
JT Williams Building  
Princess Anne, MD 21853  
Tel: (410) 651-6508  
Fax: (410) 651-6085

**Mbaye Niang**  
Charge d'Information  
CONGAD  
Sicap Amitie 1  
no. 3089 bis  
B.P. 4109  
Dakar  
Senegal  
Tel: (221) (24) 4116  
Fax: (221) (24) 4413



Pierre Nkepna  
Management Advisor  
*World Council of Credit Unions*  
BP 11617  
Niamey  
Niger  
Tel: (227) 723018  
Fax: (227) 733475  
email: 104471.120@compuserve.com

Johnson Nkuuhe  
Member of Parliament  
*Parliament of Uganda*  
P.O. Box 7178  
Kampala  
Uganda  
Tel: 256-41-220062  
email: naru.hq@mukla/gn/apc/org

Simone Noemdoe  
Nat'l Community Devel. & Program Designer  
*The Rural Foundation*  
Private Bag X5002  
Stellenbosch 7599  
South Africa  
Tel: (27) (21) 8876870  
Fax: (27) (21) 8832927  
email: simonn@wn.apc.org

J. Norman  
Deputy Director General  
*CSIR*  
P.O. Box M32  
Accra  
Ghana  
Tel: (233) (21) 760186  
Fax: (233) (21) 779809

Christine Obeng-Boampong  
Director  
*PPMED*  
P.O. Box M37  
Accra  
Ghana  
Tel: 668264  
Fax: 668245

Stephen Obimpeh  
Minister  
*Ministry of Food & Agriculture*  
P.O. Box M37  
Accra  
Ghana  
Tel: 663036

Gyanteng Oduro-Kwadso  
Chief Executive  
*Irrigation Development Authority*  
P.O. Box M154  
Accra  
Ghana  
Tel: 662050  
Fax: 664286

Ebenezer Ofori  
Marketing Officer  
*CSIR*  
P.O. Box M32  
Accra  
Ghana  
Tel: 777651

Francis Ofori  
Dir., Dept. of Crop Sciences  
*Ministry of Food & Agriculture*  
Box M37  
Accra  
Ghana  
Tel: 233-21-665066  
Fax: 233-21-668245

Roland Pearson  
Executive Director  
*Ebony Development Alternatives (PTY) Ltd.*  
P.O. Box 261276  
Excom 2023  
South Africa  
Tel: (27) (11) 3310016  
Fax: (27) (11) 3312018  
email: P-EDA@DAI.COM

Coffi Prudencio  
Regional Ag. Sector Economist  
*REDSOMWCA*  
USAID  
01 B.P. 1712  
Abidjan 01  
Cote d'Ivoire  
Tel: (225) (41) 4528  
Fax: (225) (41) 3544  
email: yprudencio@usaid.gov

Earnestine Psalmonds  
Vice Chancellor for Research  
*North Carolina A&T State University*  
1601 E. Market Street  
Greensboro, N.C. 27411  
Tel: (910) 334-7995  
Fax: (910) 334-7086  
email: ep@ncat.edu

Linda Raver  
Program Administrator  
*USDA*  
FAS/ICD/DRD  
1111 N. 19th Street  
Suite 240  
Arlington, VA 22209  
Tel: (703) 235-4919  
Fax: (703) 235-4964  
email: LRAVER@usaid.gov

**Sanath K. Reddy**  
Assistant Director  
*REDSOMWCA*  
USAID  
01 B.P. 1712  
Abidjan 01  
Cote d'Ivoire  
Tel: (225) (41) 4528  
Fax: (225) (41) 3544  
email: sreddy@usaid.gov

**Bradley Rymph**  
Conference Logistics  
*AMEX International, Inc.*  
1111 N. 19th Street  
Suite 210  
Arlington, VA 22209  
Tel: (703) 235-9540  
Fax: (703) 235-5064  
email: BRYMPH@usaid.gov

**Kimseyinga Savadogo**  
Professor of Economics  
*SAFGRAD*  
03 B.P. 1783  
Ouadadougou  
Burkina Faso  
Tel: (226) 30-7369  
Fax: (226) 31-2686  
email: savadogo@ouaga.orstum.bf

**Amy Schlosser**  
Conference Logistics  
*AMEX International, Inc.*  
1111-N. 19th Street  
Suite 210  
Arlington, VA 22209  
Tel: (703) 235-3749  
Fax: (703) 235-5064  
email: ASCHLOSSER@usaid.gov

**Baaba Sekyi**  
Director  
*Minister of Food & Agriculture*  
P.O. Box M37  
Accra  
Ghana  
Tel: 664094

**Roy Shaw**  
Consultant  
1950 Tolman Creek Road  
Ashland, Oregon 97520  
Tel: (541) 488-1930  
Fax: (541) 488-1255

**Jimmy Smith**  
Rep./Team Leader  
*ILRI*  
c/o L.W. Lambourn & Co. Ltd.  
26 Dingwall Road  
Croyden CR93EE  
United Kingdom  
Tel: 234-2-241-2626  
Fax: 234-2-241-2974  
email: j.smith@cgnet.com

**Lane Smith**  
Leland Initiative Coordinator  
*USAID*  
AFR/SD/SA  
Dept. of State  
Wash., DC 20523  
Tel: (202) 647-8503  
Fax: (202) 647-2993  
email: lasmith@usaid.gov

**Ousmane Sy**  
Chief, Technology Development Div.  
*Institut de Technologie Alimentaire*  
B.P. 2765  
Dakar  
Senegal  
Tel: (221) 320070  
Fax: (221) 328295

**Rosetta Tetebo**  
Dir., Women in Agricultural Dev.  
Ministry of Food & Agriculture  
P.O. Box M37  
Accra  
Ghana  
Tel: 233-21-622563  
Fax: 233-21-668245

**About Thiam**  
Africa Regional Coordinator  
*Pesticide Action Network*  
B.P. 15938  
Dakar Fann  
Senegal  
Tel: (221) (25) 4914

**Cleveland Thomas**  
Trade & Investment Officer  
*USAID/Ghana*  
P.O. Box 1630  
Accra  
Ghana  
Tel: 233-21-228440  
Fax: 233-21-231937  
email: cthomas@usaid.gov

**Moctar Toure**  
Executive Secretary  
*The World Bank*  
SPAAR  
1818 H Street, N.W.  
Room J3-089  
Washington, D.C. 20433  
Tel: (202) 473-9008  
Fax: (202) 473-8231  
email: MTOURE@worldbank.org

**Sabou Ibrahima Traore**  
Head, Service of Patents  
*OAPI*  
B.P. 887  
Yaounde  
Cameroon  
Tel: 237-203911  
Fax: 237-201844

**Nathaniel K. Tum**  
Managing Director  
*Kenya Seed Company*  
P.O. Box 40042  
Nairobi  
Kenya  
Tel: (254) (2) 725021  
Fax: (254) (2) 721718

**Rudy Vigil**  
Unit Leader  
*USAID*  
AFR/SD/PSGE/TDT  
Dept. of State  
Washington, D.C. 20523  
Tel: (202) 647-7194  
Fax: (202) 736-7130  
email: FVIGIL@usaid.gov

**J.W. Wagonda-Muguli**  
Permanent Secretary  
*Ministry of Agriculture,  
Animal Industry & Fisheries*  
P.O. Box 102  
Entebbe  
Uganda  
Tel: (256) (42) 20803  
Fax: (256) (42) 21010

**Catherine Watkins**  
Program Administrator  
*USDA*  
FAS/ICD/DRD  
14th & Independence Ave., S.W.  
Room 3223  
Washington, D.C. 20250  
Tel: (703) 235-4973  
Fax: (703) 235-3805  
email: watkinsc@fas.usda.gov

**George Weber**  
Agriculture Specialist  
*CIDA*  
Africa & Middle East Branch  
200 Promenade du Portage  
Hull, Quebec  
Canada K1A 0G4  
Tel: (819) 994-4106  
Fax: (819) 994-6174  
email: GEORGE\_WEBER@ACDI-CIDA.GC.CA

**Peter Weisel**  
Chief  
*USAID/Ghana*  
Box 1630  
Accra  
Ghana

**Charles Whyte**  
Agribusiness Advisor  
*USAID*  
AFR/SD/PSGE/PSD  
1111 N. 19th Street  
Suite 210  
Arlington, VA 22209  
Tel: (703) 235-3788  
Fax: (703) 235-3805  
email: CharlesWhyte@usaid.gov

**Henry Wood**  
Assistant Director  
*Ministry of Food & Agriculture*  
P.O. Box M37  
Accra  
Ghana  
Tel: 665421 x4016

**Kelly Seifu Yohannes**  
Executive Director  
*Hope for Women - Ethiopia*  
P.O.B. 1509  
Addis Ababa  
Ethiopia  
Tel: (251) (1) 162640  
Fax: (251) (1) 510064

**Wayne Youngquist**  
*CIAT*  
Box 2704  
Arusha  
Tanzania  
Tel: 255-57-2268  
Fax: 255-57-8557  
email: CIAT-RWANDA@CGNET.COM

**Paddington Zhanda**  
Chairman  
*ZIMTRADE*  
P.O. Box 2738  
Harare  
Zimbabwe  
Tel: (263) (4) 732-974  
Fax: (263) (4) 706-930

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