Agricultural Value Chains in East Africa: Needs and Opportunities for Value Addition and Market Linkages.

Report on trip July 6 – August 2 by Betty Bugusu and Maria Marshall

This report provides a summary of people contacted, institution visited, and observation made during a visit to three East African countries (Kenya, Tanzania and Uganda) to assess needs and opportunities for value addition and market development for agricultural commodities. The assessment was funded through a seed grant from Purdue University’s Global Policy Research Institute. The goals of the study were to explore opportunities for value addition and market development for agricultural commodities, and to identify potential collaborators on future efforts in the region including local institutions and/or individual researchers. Several institutions were visited including: universities, national research institutions, non-governmental organizations and private entrepreneurs such as women group processors.

Specific objectives:

- Identify a specific commodity of focus for IFTC.
- Identify potential technology adaptation approaches.
- Evaluate transportation impact on food supply capacity and longevity.
- Develop a full proposal for external funding to mobilize available or develop new post-harvest technologies to expand markets for local farmers.

The information gathered from this study will be used to develop grant proposals for programs in food processing to expand markets for local farmers.

Observations

As expected, the value chains are quite diverse in the region ranging from horticultural crops to cereal grains, legumes, and root & tuber crops, thus very difficult to prioritize. There is high dependence on cereal grains particularly maize in Tanzania and Kenya. Different organizations in each of the countries visited have used different criteria to prioritize the commodities of focus. Most depend on availability of funding and expertise in the commodity.

The greatest potential for value addition based on production and potential market demand is in the following categories:

- Fruits – mangoes, passion, avocados, pineapples and bananas
- Root crops – cassava, sweet potato, and yam
- Cereals – maize, sorghum, millet, rice (parboiling – AGRA),
- Legumes – beans, cowpea, soybeans
- Vegetables: Tomatoes, African leafy vegetables
- Dairy – milk

Overall, research and development activities for value addition are extremely limited in the region. All three countries go through the cycle of increased supply and limited demand at harvest (resulting into losses) followed by complete lack of the same commodities when out of season. There is new emphasis by most organizations as well as governments to focus on the whole value chain from production to markets. For the first time in Kenya, the Ministry of Agriculture has established a department on post-harvest.

Most of the on-going work in value addition is still in the research stage. Available improved technologies have not gone beyond pilot scale despite the general sense of availability of demand for the products. The limited adoption of new and improved technologies attributed mostly to lack of funding and equipment to transition to commercial scale production. A few institutions in the region are
developing incubation programs for their graduates (e.g. Makerere University in Uganda and Sokoine Agriculture University in Tanzania).

**Examples of current value addition activities in the region**

- Drying (solar and electric) – fruits, vegetables. Sokoine – solar drying of fruits (DANIDA project), electric drying (UNIDO project)
- Soy processing – various products including milk and milk products, snacks, flour blends
- African leafy vegetables
- Freezing – vegetables

**Current technology adoption efforts in the region**

- Incubation programs for recent graduates (Makerere, Sokoine)

**Common constraints to value addition as identified by the various scientists include:**

- Processing issues:
  - Sample analysis, shelf life analysis - lack of facilities and/or expertise in these areas
  - Refrigerated vehicles for fresh produce
- Packaging and labeling: equipment/materials availability and cost
- Standards
  - Certification. Smallholder farmers lack the ability to meet safety standards required by various markets. For example: the women group processors visited in Kenya expressed their inability to meet the standards set by the Kenya Bureau of Standards.
  - Lack of standards for some of the products e.g. dried fruits in Tanzania
- Lack of markets for some of the products
- Lack of credit for entrepreneurs (mainly beginners)
- Food safety issues – aflatoxin (maize and nuts)
- Storage technologies especially for perishables e.g. cold storage for fresh produce (refrigerated trucks)
- Up-scaling technologies from pilot scale – lack of funding and equipment
- Energy – need for renewable energy sources
- Transportation

**Potential for Collaboration**

Overall, there is great interest in collaboration by all institutions visited. Many are interested in developing joint proposal for research and also in higher education opportunities in food science

**Potential Areas of Collaboration**

1. Provide research-based information and technical expertise, particularly to non-governmental organizations involved in technology adoption.
2. Potential for short-term consultancies – FINTRAC, Kilimo Trust (wholesale market for fresh produce expert – immediate)
3. Great interest in Aseptic processing - for dairy (Shambani Graduates, Tanzania), fruit juices, chili, sweet potato
SUMMARY OF VISITS BY INSTITUTIONS

KENYA

FINTRAC
Fintrac is a US-based consultancy company that develops agricultural solutions to end hunger and poverty. The company is implementing the Kenya Horticultural Competitive Program (KHCP), a 5-year project funded by USAID. The goal of the project is to help smallholder farmers (target 300,000 farmers) and allied businesses in the horticulture industry to take advantage of local, regional and global markets opportunities. They focus on the whole value chain including:

1. Production
2. Value addition and post-harvest
3. Value chain coordination, marketing and trade promotion
4. Improved business environment and institutional capacity.

Current activities: the project focus is on horticultural value chains including flowers, fruits (passion, mangoes), and vegetables (AIVs).

Kenya Agriculture Research Institute (KARI)
KARI is the national agricultural research institute in Kenya with centers with different mandates all over the country. We visited the head office, and 2 regional centers (Kakamega in Western and Katumani, Machakos in Eastern Kenya).

KARI-Head Office: Visited the assistant director for horticulture and industrial crops. Have identified priority value chains (listed in order of priority): guavas, mangoes, avocados, bixa, citrus, coconut (linked to survival of HIV aids victims – lauric acid coats viruses thus decreases multiplication). Current activities are centered on production and disease/pest management. Value chain analysis studies for many of the priority crops has been conducted – reports will be made available on KARI website.

KARI-Kakamega: KARI-Kakamega is already engaged with Purdue Horticulture in African leafy vegetables – looking at the whole value chain from production to consumption. They are starting a new program that subdivides the value chain into producers, processors, and marketers and targeting their outreach efforts for these categories. Commodities of interest include: millet, cassava, sweet potatoes, fruits (bananas, pineapples), soybeans, and dairy (yoghurt production). Currently have funding for cassava processing.

KARI-Katumani: Mandate is on developing technologies for dryland farming (drought tolerant). Commodities of focus are: sorghum, millets, sweet potatoes, cowpeas, beans and livestock. Center limited in expertise in post-harvest research thus interested in collaboration.

Kenya Industrial Research and Development Institute (KIRDI)
KIRDI is a research institution focusing on commercialization of research and development and innovations through the incubation process. KIRDI provides networks and resource for incubatees through workshop, seminars, etc both in-house and virtual. KIRDI recently completed a project on amaranth and sorghum processing. Have market-ready products that need up-scaling. Joseph Wanyeki, a KIRDI incubatee and entrepreneur (started East African Nutraceuticals) is processing sorghum, millet, and amaranth grain. He works with small-holder farmers to source the raw materials he needs. His major...
constraints are related to standards, packaging (materials), labeling, markets for his products, promotion of products and sustainability as it pertains to financial resources.

**Alliance for a Green Revolution in Africa (AGRA)**
AGRA is a partnership-based organization that works with smallholder farmers in Africa through integrated programs in seed, soils, market access, policy, partnership and financing. We met with the director of market access program – currently working on warehousing projects in East and Southern Africa. Opportunities for value addition exist in almost all commodities.

**University of Nairobi**
We met with the Dean of the Faculty of Agriculture, the Chairs of the Food Science and Agricultural Economics Departments, and food science faculty. Department of Food Science is the oldest in the region. Opportunities for value addition: cereal milling, horticultural crops (e.g. fresh produce, mostly vegetables), root crop processing. The department has 2 solar dryer models: The dryers have been used for vegetable such as carrot, amaranth, cowpea leaves, and cabbage. We were shown two drying technologies that they are using to dry fruits and vegetables.

Hygienic dryer consisting of a solar panel and drying bed

**Climate Change Agriculture and Food Security (CCAFS)**
CCAFS is a program within the CGIAR housed at the International Livestock Research Institute in Nairobi Kenya (http://ccafs.cgiar.org/). They are implementing a 5-year project (with likelihood of extension to 10 years) to help farmers deal with climate change through development and use of appropriate technologies and policies. Current work is in East Africa, West Africa and Indo-Gangetic plains. Their work is focused around 4 major themes”
1. Adaptation to progressive climate change
2. Adaptation through managing climate risks
3. Pro-poor climate change mitigation, and
4. Integration for decision-making

CCAFS is developing a program for providing weather forecasts and for disseminating climate change-related technologies through radio in Eastern Kenya.

**AMPATH/Family Preservation Institute (FPI)**

FPI provides income generating programs to help HIV-positive patients and their families get back on their feet. The initiative is a part of AMPATH, a program that provides HIV preventative and treatment services to the public. FPI currently operates a passion fruit processing plant in Eldoret.

**Women Group Processors**

**MUDIFESOF:** This group is located in the outskirts of Mumias, a small town in Western Kenya. They process soy-based products (milk products, soy snacks, etc). The project is a part of the soy-bean value chain development in Kenya funded by TSBF Institute affiliated with CIAT.

**Neema Women Group Support:** Has 87 members (men and women), some of them are HIV-positive thus are supported by AMPATH/FPI. Are engaged in both agricultural production and processing. Currently processing soy products (flour, milk products, snacks, etc) – processing equipment was donated by FPI. They grow the soybeans. Also grow orange-fleshed sweet potatoes and African leafy vegetables. Group is looking to extend their line of products to include tomato paste and peanut paste.

**Rural Outreach Program (ROP)**
ROP is a grassroots-based development organization focusing on socio-economic activities aimed at reducing poverty in rural Kenya, currently working on AIVs and bananas (tissue culture). New projects: avocado production and marketing using farmer group (in collaboration with SNV Netherlands); up-scaling integrated soil fertility management.

**Moi University/Chepkoilel Campus**
Meeting was with Faculty of Agriculture and Consumer and Family Sciences, hosted by the Head of the Consumer and Family Sciences Department. Faculty from food science, nutrition, biotechnology, environmental sciences, agricultural economics, home economics, seed science, and production were present at the meeting. All expressed interest in collaboration.

**Mace Foods Ltd.**
This is a small food processing company that is processing chilies, AIVs, and herbs. They source the raw products from small-holder farmers on a contract basis.

**TANZANIA**

**Sokoine University of Agriculture**
We met with several faculties in the school of Agriculture from different departments including: Agriculture Economics and Agribusiness, Food Science and Nutrition, and Agriculture Engineering & Land Planning. We visit a drying incubation unit managed by the department of Food Science – equipped with solar and electric dryers. Current value addition activities at the incubation center are focused on fruit and vegetables processing (drying and freezing) including: pineapples, mangoes, leafy vegetables, and roselle plant (high in Vitamin C and iron). They also have outreach activities with women group processors in Morogoro and Bagamoyo (Coastal town) to process pineapples, bananas, mangoes and tomatoes. The dept. works in collaboration with the largest food company in Tanzania (AZAM). The center also serves as a business incubator for recent graduates interested in developing start-ups.

**Shambani Graduates Enterprises Ltd.**
Shambani is a dairy processing company owned by former graduates of Sokoine University. Main products are pasteurized milk, fermented milk, butter and ghee; they are exploring yoghurt production. The company is interested in aseptic processing technology.

**Morogoro Ben’s Wine:** The Company produces wines and cereal products
UGANDA

SASAKAWA Africa Association (SAA)
SAA Uganda was incepted in 1997 and operates in all regions of the country – Central, Eastern, Southwestern, and the North – ecologically selected. They have an MOU with Ministry of Agriculture (MOA) and Ministry of Fisheries (MOF). SAA operates in four themes
1. Crop productivity enhancement and extension: works with the national research institute to demonstrate developed technologies. Currently testing recommended fertilizer rates for maize
2. Post-harvest handling and agro-processing –have a variety of processing equipment adopted from research organizations (maize shellers, cassava chipper and cassava graters – both manual and motorized. The machines are adapted to the local conditions. Also trains local entrepreneurs to fabricate. Works with WFP
3. Public private partnerships: identifies partners to work with – currently working with NARO, National Agriculture Advisory Services (NADS – extension), input dealers. Helps organize farmers and link them to markets (training in business management e.g. record-keeping)
4. Monitoring and Evaluation: learning and sharing

Value chains: SAA has jointly with farmers put up farmer centers consisting of agro-processing facilities e.g. drying units, multipurpose processing machines, storage facilities and small shops for sale of inputs and products. Major value chains of focus: Maize, cassava, beans, sorghum, millets, rice, cowpea, pigeon peas, sweet potatoes. No much emphasis on perennials and horticultural crops. SAA generally tries to focus on crops that other organizations are not working on. Current value addition activities: vitamin A sweet potatoes, cassava products – flour and gari (targeting West Africa communities in Kampala), fish drying. Challenges: lack of markets for many products, pests and diseases e.g. cassava mosaic – causes root rot. Attended a field day demonstrating the technologies

Kilimo Trust
Kilimo Trust started off as a foundation making grants to fund agriculture research and development through competitive grant processes. Beginning Jan 2011, the organization stopped making grants and became an implementing institution for agricultural development programs within the East African Community (EAC) and occasionally Africa-wide. The countries of focus include Kenya, Uganda, Tanzania, Rwanda, Burundi and Southern Sudan. They intend to implement 3-5 long-term projects across various agricultural value chains. Current activities:
1. KT recently completed a commodity ranking exercise in which they identified the 10 priority commodities. The criteria for ranking included: potential for productivity growth, total production in EAC as a block, size and potential to impact smallholder household; value of commodity, past
investments by governments and donors, and likelihood of scale-up. The 10 commodities in
descending order of priority include: maize, cassava, dairy cattle, plantains and bananas, beef
cattle, sweet potatoes, Irish potatoes, dry beans, groundnuts, and sorghum
2. Have an agreement with the Government of Rwanda to provide support in three areas – Irrigation, post-harvest management, and market access. The first assignment is to establish a wholesale market for fresh produce.
3. Working on a project proposal to FAO on development Agro-Industry and Agro-Enterprise for the EAC.
### Trip Itinerary

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Where &amp; With Whom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fri, July 8</td>
<td>Morning</td>
<td>FINTRAC - USAID-KHCP (Pauline Mugendi),</td>
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<tr>
<td></td>
<td>Mid-morning</td>
<td>Kenya Agricultural Research Institute (KARI) Head Office (Dr. Lusike Wasilwa)</td>
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<td></td>
<td>Afternoon</td>
<td>Rural Outreach Program – Head Office (Prof. Ruth K. Oniang'o, PhD)</td>
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<tr>
<td>Mon, July 11</td>
<td>Morning</td>
<td>University of Nairobi, Dept of Food Science</td>
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<tr>
<td></td>
<td>Afternoon</td>
<td>CGIAR-ESSP Program on Climate Change, Agriculture &amp; Food Security (ILRI) Dr. James Kinyangi, Regional Leader, East Africa</td>
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<tr>
<td>Tue, July 12</td>
<td>Morning</td>
<td>Kenya Industrial R&amp;D Institute (KIRD), Nairobi</td>
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<td></td>
<td>Afternoon</td>
<td>Dr. Sam Wambugu – Food technologist</td>
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<td>AGRA – Dr. Ann Mbaabu, Market Access Specialist</td>
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<tr>
<td>Wed, July 13</td>
<td>Morning</td>
<td>Travelled to Eldoret</td>
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<td></td>
<td>Mid-morning</td>
<td>Met with Dr. Pamela Obura AMPATH and FMI/travelled to Kakamega/Busia accompanied by Benjamin Andama</td>
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<td></td>
<td>Afternoon</td>
<td>KARI-Kakamega</td>
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<tr>
<td></td>
<td>Late afternoon</td>
<td>Travelled to Busia (Met MUDIFESOF women group processors)</td>
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<tr>
<td>Thu, July 14</td>
<td>Morning</td>
<td>AMPATH clinic in Busia</td>
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<td></td>
<td>Mid-morning</td>
<td>Neema women group - processing soybeans</td>
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<tr>
<td></td>
<td>Afternoon</td>
<td>Travel to Kisumu/Eldoret</td>
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<tr>
<td>Fri, July 15</td>
<td>Morning (Maria)</td>
<td>Moi Chepkoelel University</td>
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<tr>
<td></td>
<td>Afternoon (Maria)</td>
<td>Visit Mace Foods Company, Eldoret</td>
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<tr>
<td>Fri, July 15</td>
<td>All day (Betty)</td>
<td>Rural Outreach Program, Vihiga (Doris Anjawa, Field Coordinator)</td>
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<tr>
<td>Sun, July 17</td>
<td></td>
<td>unscheduled</td>
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<tr>
<td>Mon, July 18</td>
<td></td>
<td>Travel to Nairobi</td>
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<tr>
<td>Tues, July 19</td>
<td>Morning</td>
<td>Flew to Dar Es Salaam, drove to Morogoro, Sokoine University of Agriculture Met with Dr. Fulgence Joseph Mishili</td>
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<tr>
<td></td>
<td>Afternoon</td>
<td>Dept of Ag. Engineering &amp; Land Planning Department of Food Science and Technology</td>
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<tr>
<td>Wed, July 20</td>
<td>Morning</td>
<td>Dept of Ag. Engineering &amp; Land Planning Department of Food Science and Technology</td>
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<tr>
<td></td>
<td>Mid-morning</td>
<td>Dry fruit incubator</td>
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<td></td>
<td>Afternoon</td>
<td>Morogoro Ben’s winery</td>
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<td></td>
<td>Late afternoon</td>
<td>Shambani Graduates Enterprises Limited (dairy)</td>
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<tr>
<td>Thurs, July 21</td>
<td>Morning</td>
<td>Dept. of Agricultural Economics and Agribusiness</td>
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<tr>
<td>Date</td>
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<tr>
<td>Fri July 22</td>
<td>Morning</td>
<td>Departed to Nairobi</td>
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<td>Sat July 23</td>
<td></td>
<td>Unscheduled</td>
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<tr>
<td>Sun July 24</td>
<td></td>
<td>Traveled to Kampala, Uganda</td>
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<tr>
<td>Mon July 25</td>
<td>Morning</td>
<td>Kilimo Trust, Prof. Nuhu H. Hatibu, CEO</td>
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<td></td>
<td>Mid-Morning</td>
<td>USAID-CRSPs meeting – Protea Hotel, Kampala</td>
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<td></td>
<td>Afternoon</td>
<td>CIAT-Kampala, Robin Buruchara and Martha Nyagaya</td>
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<tr>
<td>Tues July 26</td>
<td>All day</td>
<td>Visit Sasakawa office</td>
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<td></td>
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<td>Attended farmer filed day</td>
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<tr>
<td>Wed July 27</td>
<td>Morning</td>
<td>Makerere University – Dr. John Muyonga, Dept Head, Food Science</td>
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<td></td>
<td>Afternoon</td>
<td>Returned to Nairobi</td>
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<tr>
<td>Thurs July 28</td>
<td>All day</td>
<td>KARI-Katumani- Dr. Nguluu, Deputy Center Director</td>
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<tr>
<td>Fri July 29</td>
<td>All day</td>
<td>Jomo Kenyatta University of Agriculture and Technology, (JKUAT)</td>
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<tr>
<td>Mon Aug 1</td>
<td></td>
<td>Depart Nairobi to US</td>
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</tbody>
</table>

**Contacts Visited**

**KENYA**

University of Nairobi
- Peter Lamuka, Lecturer Dept. of Food Science
- Dr. Solomon Shibairo, Dean, Faculty of Agriculture
- Dr. Michael Okoth, head Dept. of Food Science, Nutrition and Technology
- Dr. Fred Mugivane, Head Dept. of Agricultural Economics

Kenya Agricultural Research Institute
- Dr. Lusike A. Wasilwa, Assistant Director, Horticulture and Industrial Crops, KARI Head Office, Nairobi
- Christine Ndinya, Breeder/agronomist, Horticultural crops, KARI-Kakamega
- Isabella Ememwa, Post-harvest specialist, KARI-Kakamega (iememwa@yahoo.com)
- Dr. Simon Nguluu, Deputy Center Director & Principal Research Officer, KARI-Katumani
- Mr. D. Karanja, National Coordinator, Bean Program, KARI-Katumani

Kenya Industrial R&D Institute (KIRDI)
- Sam Wambugu, Senior Research Scientist, Food Science and Technology
- Joseph Wanyeki, Entrepreneur (East African Nutraceuticals)

CGIAR-ESSP Program on Climate Change, Agriculture & Food Security (CCAFS) at the International Livestock Research Institute
- James Kinyangi, PhD, Regional Leader, East Africa (by phone)
• Laura Cramer, Food Security Consultant
• Catherine Mungai.

Alliance for a Green Revolution in Africa (AGRA)
• Ann Mbaabu, Director, Market Access Specialist

Moi University- Chepkoilel University College, School of Agriculture
• Dr. Violet Kadenyeka Mugalavai, Dept. of Family and Consumer Sciences
• Dr. Charlotte Serrem

Rural Outreach Program
• Prof. Ruth K. Oniang’o, PhD, Founder
• Doris Anjawa, Field Coordinator, Western Province
• Sylvester Aura, Intern

AMPATH/FPI
• Dr. Pamela Obura, Purdue staff
• Benjamin Andama, Program Manager, Family Preservation Initiative (USAID/AMPATH Partnership)
• Caroline Amuyunzu, Social Worker, AMPATH, Busia

MUDIFESOF Women Processors
• Ms. Jamila Itambo, Chairperson (mumiassoya@yahoo.com)

Neema Women Group Support
• Caroline Amuyunzu, AMPATH Social Worker (ckamuyunzu@yahoo.com)
• Joyce Yamo, Chair (Ambasador of Hope)
• Regina Bwire, Secretary

Mace Foods
• Ms. Margaret Komen, Director Country Operations (margaret@macefoods.com)

**TANZANIA**
Sokoine University of Agriculture
• Dr. Bendantunguka Tiisekwa, Dean, Faculty of Agriculture
• Dr. Fulgence Joseph Mishili, Department of Agricultural economics and Agribusiness
• Dr. Anna Temu, Agricultural Economist, Dept. of Agricultural Economics and Agribusiness
• Dr. Ntenga S.Y. Mdoe, Professor of Agricultural Economics
• Dr. Bernard E. Chove, Associate Prof of Food Process Engineering & Head, Dept. of Food Science and Technology
• Dr. Bernadatte K. Ndabikunze, Senior Lecturer, Dept of Food Science and Technology Dr. John Msuya, Associate Professor, Nutrition and Development Economics Dept. of Food Science & Technology
• Dr. Valerian C.K. Silayo, Associate Professor, Dept of Ag. Engineering & Land Planning

Shambani Graduates Enterprises Limited
• Victor Mfinanga, Managing Director.
UGANDA
Kilimo Trust
- Dr. Nuhu h. Hatibu, CEO Kilimo
- Banadda Noble, Ph.D., Process Engineer

SASAKAWA Africa Association
- Dr. Rosaline Nyamutale, Country Director
- Emmanuel Kayaayo Battson, Associate Director
- Rugema S. Hilary, Coordinator Crop Productivity Improvement
- James Murangira Mugunisa, Postharvest and Agro Processing (PHAP) Coordinator

CIAT-Africa
- Dr. Robin Buracahara, Regional Coordinator and Breeder
- Martha Nyagaya, Nutritionist

Makerere University
- Dr. John H. Muyonga, Dean, School of Food Technology, Nutrition and Bio-Engineering
- Dr. Dorothy Nakimbugwe, Senior Lecturer, Dept of Food Science & Technology