

InReF News

Newsletter of the KARI-McGill Project, Innovating for Resilient Farming Systems

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From Project Inception to Season One Review Workshop

by Geoffrey Kamau, InReF News Co-Editor

The Innovating for Resilient Farming Systems project formally began on 1 March 2011. An official project launch was held at KARI HQ on 18 May 2011. Subsequently, thorough consultations amongst KARI and McGill team members concerning site selection and field designs occurred using workshops, planning sessions, informal gatherings, and phone, Skype and email communications. All these interactions contributed towards putting in place sound project management structures.

In a joint meeting between researchers and extension staff held on 26 September 2011, arrangements were made for focal area group discussions to be held in different Focal Research and Development Areas (FRDAs – equivalent to administrative locations) in Machakos, Makueni and Tharaka. The aim of the group discussions was to introduce the project to the communities, do joint identification and prioritization of potential test technologies, and select host groups and sites. A total of 1,000 farmers comprising 316 men and 684 women attended the group discussions in the three counties. A total of 16 technologies were offered for selection on the basis of capacity to recover from shocks (resilience), contribution to food production, income and equity across gender. Each FRDA would then test a set of eight technologies ranked highest by the farmers. In all the 18 FRDAs, three groups were identified to host the Primary Participatory Agricultural Technology Evaluation (PPATE) thus giving a total of 54 sites. Site layouts were thereafter done and planting started on 18 October 2011; by November all sites had been planted, and monitoring and data collection ensued.

Meanwhile, Drs Lutta Muhammad and Festus Muriithi of KARI attended the Global Food Security Conference at McGill University in October 2011. Dr.



Farmer explaining about cowpeas to Deputy Director KARI (second woman from left, in red dress) and other guests during Machakos mini launch at Mwala.

Muriithi presented on behalf of KARI and Kenya's Ministry of Agriculture-Kenya. McGill graduate student Colleen Eidt presented a poster at the same conference, reviewing the findings of her Kenya field study.

By January, sites were ready for field days and the proposed county launches. In total, 10 field days were held in the different FRDAs, three of which doubled up as the project mini launches at the county level. The mini launches kicked off in Tharaka-Nithi county (Nkarini FRDA) on 17 January 2012, presided over by the Local District Commissioner, followed by Machakos county (Miu FRDA) on 19 January, where the KARI Deputy Director of Outreach and Partnerships Department was the chief guest.

See *Workshops*, page 5

Students and New Team Members



In this issue, we introduce some of the new project team members at KARI and students from McGill University.



McGill

Dr. Esther Njuguna, Ph.D. Agriculture Economics, joins the team in Kenya as a Research Associate at KARI, helping in project coordination and data management for the project.

Mr. Linus Origa, M.Sc. in Soil Science, joins the team in Kenya as an Administrative Assistant. In addition, nine Research Assistants joined the team in Kenya to help in field work implementation. They are based in the various districts, each one responsible for two to three FRDAs.

In 2012 several students from McGill University will be working on the project as they carry out their graduate studies. We here profile five students and their research foci.

Colleen M. Eidt is a Ph.D. student in the Faculty of Agricultural and Environmental Sciences at McGill University under the supervision of Dr. Gordon Hickey. She began at McGill University in 2009 as a Master's student. In 2010 she completed field work concerned with food policy and institutions in Kenya. She began the Ph.D. program in early 2011. Her areas of focus are agricultural policies and institutions, knowledge integration, and food security in the semi-arid regions of Kenya. Her research within the KARI-McGill project falls under the policy and institutions research stream. It aims to better understand how policies can contribute to increasing the effectiveness of formal and informal institutions in promoting farmers' innovative agricultural decision-making. Empirical findings generated through other research streams within the project will contribute to the development of this understanding. Her research plays a role in integrating knowledge as it is generated across the project research streams.

Stephanie Shumsky is a Master of Science student working under the supervision of Dr. Gordon Hickey in McGill University's Department of Natural Resource Sciences. In terms of the KARI-McGill project, Ms. Shumsky will investigate factors that

affect community members' access to wild foods and how these products contribute to household food security. The research will be conducted in two phases, beginning with a quantitative analysis of data collected in the baseline household survey to find correlations between use of wild foods and proximity to forests/markets, ecosystem type, socio-economic conditions and other variables. The second phase of the research will begin in June 2012 and involves field work based on interviews, focus group discussions and participatory mapping. Two to three case studies of rural villages will further illustrate the connections between institutional, cultural and environmental factors and the contribution of wild edible plants to food security.

Megan Dilbone is a doctoral student working under the supervision of Dr. Timothy Johns in the Plant Science Department at McGill University. She completed a Master of Science in the School of Environmental Studies at the University of Victoria. In her doctoral studies she focuses on informal seed systems, which are essential to providing dryland farmers with diverse varieties of environmentally and culturally appropriate food crops. These localized systems complement formal seed systems, which distribute improved varieties of seed that are higher yielding than many traditional varieties. While the informal and formal seed systems may balance each other, they often do not work together for the best interest of the farmer. Ms. Dilbone's research examines the interface of informal and formal seed systems in Tharaka District, specifically focused on three food crops: pearl millet (*Pennisetum glaucum*), semi-domesticated leafy greens, and assorted cucurbits. The study will evaluate, through farmer interviews and surveys, the improved varieties, provided through the secondary trials, in relation to active on-farm seed systems. She starts her field research in Kenya in May 2012.

Purity Karuga is a Ph.D. student working in the Department of Natural Resource Sciences under the co-supervision of Dr. Elena Bennet and Dr. Jim Fyles. She completed a Master of Arts degree in Sustainable International Development in the Heller School of Social Policy and Management at Brandeis University where she gained knowledge on integrating environmental conservation, social justice and economic development. In terms of the KARI-McGill project, Ms. Karuga's focus will be on the environmental and natural resource component

See Students & Team, page 4

Farmers' Perspectives

Voices of the farmers taking part in the KARI-McGill project

Thiti Mothers Women's Group: A Life History



Thiti Mothers Women's Group discusses the farming season with KARI and McGill researchers, 7 February 2012.

Thiti Mothers Women's Group is located in Thiti Location of Tharaka North Division. It was formed in 1998 and registered with the Social Services Department in 2002. It has a membership of 15 women. The group was initially formed to campaign against female genital mutilation (FGM). In addition to the FGM project, the group has also engaged in income generating activities and has a poultry project wherein they have layers which are laying eggs at the moment. The group is managed by a team of officials who include the Chairlady, the Vice-Chairlady, the Secretary and the Treasurer. The officials make decisions which are subject to approval by the members. The group has a bank account, as well.

Some of the money raised by the group has gone to support some twelve orphans from the village. Thiti Mothers have sponsored the children's education and succeeded in providing the orphans, who are now teenagers, with a small plot of land on which they engage in farming to support their own livelihoods. ♦

Lyrics of Songs by Kaunguni Farmers' Group *Makindu Mini Launch, 23 January 2012*

Andu ma Kaunguni muyuke tusome (People of Kaunguni come and let us learn)

Namuka kwakya nithambe tene na ngithyi
uvisini nenda kuvika tene ngwatie ripoti
ni ngwendeka umuthi maovisa wa KARI
nimeumbenda umuthi vu
Kaunguni mayuka mambithie
Andu makaunguni muyuke tumone
Andu makaunguni muyuke tumewe muyuke
tusome yiulu wa wiimi na wona twasoma
twakwatya ukya kaunguni nawo niwathela
Mwona mwasoma na mwavua ngui mwalea
kwika undu mwavuya kathungi kituo ko
kaikauma na wona mathi mukameliila

Kuma kwiana ndyaona ou!

(I have never seen anything like this all my life!)

Mbandie muchicha ukanznisya mchicha ukasyaa
ukanznisya kuma kwiana ndyaona ou
Mbandia ndengu ikanznisya na ndengu ikasyaa
ikanznisya kuma kwiana ndyaona ou
Andu ma KARI nimanzomethisye kila kindu
kivandawa kyoka muvya woka na nthooko syoka
nasy ikasyaa ikanznisya kuma kwiana ndyaona
ou!
Andu ma kaunguni muyuke tusome
Andu ma kaunguni muyuke tusome
Nindatite vanda myaka mingi syindu syonthe nivanda
vamwe na ndiketha kindu nyie ndyaona ou ♦



Thiti Mothers Farmer Group threshing millet grown in the PPATE trials at the home of host farmer, Janet Mutuura, Tharaka North, 7 February 2012.

Post-harvest Management of Food Legumes

Report from the Post-harvest and Value-addition Stream

by Charity Gathambiri, KARI-Thika

Food legumes, also known as grain legumes and pulses, are those species of the plant family Leguminosae that are consumed directly by human beings, most commonly as ripe dry seeds, but occasionally as unripe green seeds, green pods and seed or leaves. Legumes are good sources of protein and essential amino acids to supplement carbohydrate-rich diets.

Main post-harvest problems in legumes

Many smallholder farmers lack sufficient access to suitable technologies for harvesting, transportation, drying and storage of food legumes. The major problems encountered during post-harvest handling of legumes include:

- Pod shattering in mature crop is severe in a number of legumes, particularly in green grams and field peas.
- Non-uniformity in maturity where elective picking by hand must be carried out (3–4 times) on certain varieties of edible legumes (such as cowpeas, green grams). To ensure a high quality product, the exercise is labour intensive and time consuming.
- Legumes are highly susceptible (more than most cereal grain) to insect infestation both in the pods and in seed, and the infestation that normally starts in the field spontaneously intensifies becoming a liability in storage.
- Bird damage may be severe in certain legumes, e.g., cowpeas, while other legumes (groundnuts and beans) are extremely prone to damage by rodents, baboons and other wildlife.
- A number of legumes have naturally occurring toxins that can reduce nutritive value of the crops. Appropriate post-harvest methods to effectively deactivate such toxins are still lacking at smallholder levels.
- Methods of preparation and cooking necessary to maximize nutritional value and to ensure a digestible product are often lengthy and costly in terms of time and fuel consumption and may be negatively influenced by some drying and storage techniques.
- During storage for periods longer than 5–7 months, certain kinds of beans (*Phaseolus vulgaris*) become progressively harder to cook to a soft and palatable condition.

Due to the above problems, the project aims to promote post-harvest technologies and methods that will:

- Reduce human labour in handling and processing of legumes
- Reduce post-harvest losses during drying, processing and storage
- Improve and ease preparation of edible legumes, maximizing nutritional value and reducing energy and time required in their preparation ♦

Students & Team, from page 2

where she will investigate decisions made by communities on trade-offs of land practices that affect both direct and indirect ecosystem services, and hence, food insecurity in the research area. This will require surveys, interviews and use of satellite images to determine the various land changes from farming and conservation activities. She will also focus on the multi-disciplinary approach of understanding how households can be resilient to changes in climatic conditions and market unpredictability, thus ensuring food security. Finally, Ms. Karuga is interested in other market-based mechanisms and tools such as environmental labelling of products. Ms. Karuga starts the doctoral program in May 2012.

Patrick Cortbaoui is an agricultural engineer and operations expert skilled in developing and implementing post-harvest technologies

See *Students & Team*, page 5

Response

If you want to send in your views, comments, questions, complaints or contributions to this newsletter, please write to the editors, Geoffrey Kamau and Leigh Brownhill at: gkamau@kari.org and leigh.brownhill@mail.mcgill.ca.

Workshops, from page 1

The climax of the launches was in Makueni county (Nguumo FRDA) on 20 January 2012 where the Assistant Minister for Agriculture, Hon. Gideon Ndambuki, was the chief guest. In total 2,563 farmers comprising 1,334 men and 1,229 women attended the field days. In all cases, selected members of the respective groups manned the plots and ably played the role of “kilimo” teachers of the day. The participants were impressed by the performance of the technologies as compared to those in neighbouring plots, and many committed themselves to acquire them in the coming season.



Assistant Minister for Agriculture, Hon. Ndambuki (centre, in blue jacket) and District Commissioner Makindu (in beret) during Makueni mini launch, Kaunguni.

Following this, a meeting was held at KARI-Thika on 2 February 2012 to review the performance of the season. Presentations by various site teams were made describing how the field activities were conducted, the challenges faced and the potential opportunities. Various issues were raised, including group dynamics and the need to document the processes, data handling, farmer evaluations and upscaling from primary evaluations (PPATEs) to secondary evaluations (SPATEs).

A technical review meeting was held in Machakos from 27–29 February and was attended by some 70 participants. Notable among the participants were the Director KARI, Dr. Ephraim Mukisira, Drs Kevin Tiessen and Pascal Sanginga of IDRC Canada and Nairobi respectively, Bartholomew Sullivan of Farm Radio International and representatives of four Kenyan Public Universities. During the meeting, it was pointed out that coherence in the different project components is critical, and there should be a clear vision of success. It was also emphasized that the project should not stop at project output but should go further to show impact and development outcomes. Another key aspect of the project is to learn how to manage partnerships for synergy and for partners to change according to the lessons learnt.

In conclusion, the project has marked one year of successful implementation. As the teams gear up for season two activities, it is expected that the project will contribute towards increasing food availability and income in the three counties. ♦

Students & Team, from page 4

for perishable products and increasing value chain competitiveness to improve economic stability and food security in rural areas. He is a Ph.D. student in Renewable Resources – Environment at McGill University working under the supervision of Dr. Nicolas Kosoy. His research focuses on “Building an Agricultural Commodity to Satisfy Food Security Needs.” One of his aims is to contribute to the advancement of knowledge on the theory of value in regards to agricultural commodities, making emphasis on the differences between agricultural crops and commodities, and critically analyzing the role of market incentives in Kenya in promoting food security

Policy Corner

Food security conference statement by the Honourable Beverley J. Oda, Minister of International Cooperation, delivered at the opening of the McGill Conference on Global Food Security, 4–6 October 2011, McGill University, Montreal, Quebec, Canada

“...important ways in which Canada and Canadians are contributing to the global fight against hunger [include] the increasingly important role Canada is playing in agricultural research.”

“In Kenya, you are uncovering the causes of low agricultural productivity and developing farm practices that are much more appropriate to dry areas, making more healthy local food available and helping farmers to support their families. Our experience has shown that when agricultural research is driven by the demands of farmers, it can provide long-term solutions for food security. But it also shows that it takes equitable partnership among research institutions and policy-making bodies.”

Assistant Minister of Agriculture, Hon. Ndambuki, at Makueni Field Day, 20 January 2012: “Our other name in this province is “maize and beans.” But there are other crops that can be grown and this project shows us that.”

District Commissioner Makindu, at Makueni Field Day, 20 January 2012: “We have failed many times to tackle hunger. But failure itself is not bad. What is bad is to give up and stay on the ground.” ♦

from a holistic perspective. This will contribute to the advancement of integrated environmental and economic knowledge by analyzing food security as a complex sustainable issue rather than reducing it to a poverty crisis. ♦

Impact Assessment of Nutritional Outcomes from the Project

Report from the Nutrition Stream

by KEMRI Team: Z. Bukania, Y. Kombe, R. Karanja, L. Kaduka, R. Mutisya, M. Mwangi, L. Muthami

Key to evaluating the project's impacts on nutrition and to understanding how to mediate these impacts is the assessment of nutrition outcomes pursuant to increased consumption of food produced on-farm and/or from improved household income. The imperative of improving nutritional status among the rural population can be seen in the common long-term consequences of malnutrition in childhood, adolescence and young adulthood. These include the increased risk of heart disease and other chronic disease processes in later life.

In addition, malnutrition is the main cause of deaths among children under five years. The 2008–2009 KDHS (Kenya Demographic and Health Survey) found that 35% of Kenyan children under five years suffer from stunted growth, with the highest prevalence found in children between 18 and 35 months. This represents an increase from 30% in 2003. Eastern Province's population endures endemic malnutrition and has the highest proportion of stunted children at 42%, compared to Nairobi at 29%.

The general objective of the nutrition research outlined here is to determine the nutritional impacts of the project. This includes assessing nutritional status (with measures such as weight and height); assessing changes in nutritional status after project interventions; and assessing infection status (such as malaria) and food consumption patterns, among other measures. The nutrition team will compare nutritional changes at specified time points and determine factors associated with the nutrition and health outcomes.

The research activities will take place in Machakos and Makueni counties among non-pregnant women of child bearing age (15 to 46 years old) and children aged 6 to 24 months. The participating households will be randomly selected, and all recruited households will be followed at set intervals of between 3 months and 6 months depending on the indicators. Data collection strategies include nutritional assessments, clinical assessments, biochemical assessments and focus group discussions, among others. ♦



Guests walking through PPATE plot during Tharaka mini launch at Nkarini.

What's next

- Long rains season is expected to arrive in mid-March 2012. The Meteorological Department predicts that rain will be erratic and lower than normal in Eastern Province.
- The project's second season of planting begins in March.
- This season, Kenyan and Canadian students will be "in the field" with farmers conducting research on a range of project themes.
- Gender workshops are being organized for May.
- Field Days will be held in June and July. ♦

Focus on the County – Tharaka-Nithi

Tharaka-Nithi County profile

Tharaka-Nithi is one of the twenty-seven counties that form Eastern Province. It covers an area of 1,569.5 sq km and borders three counties, namely Meru to the north, Kitui to the east, and Embu to the west. The county is divided into seven administrative divisions, namely Tharaka North, Mukothima, Turima, Tharaka Central, Nkondi, Tunyai and Tharaka South.

Physiographic and natural conditions

Generally, the county comprises the low, hilly and sandy marginal lowlands of the former large Meru District. In most parts of the county, soils are sandy and stony. The predominant hills in Tharaka are Kinjege and Ntugi both of which have a fair forest cover. Intensive farming and soil erosion have left the earth bare and rocky, while charcoal burning and overgrazing have contributed greatly to the current state of the landscape.

Numerous rivers that originate from both Mt. Kenya and Nyambene hill traverse the county flowing eastwards as tributaries of River Tana. These include rivers Mutonga, Thingithu, Kathita, Thanantu, Thangatha, Kithinu and Ura Gate. The county has a bimodal rainfall pattern with annual rainfall

averaging between 500 and 800 mm per year. Crop failure is frequently experienced, and this explains why less area is put under crops. March to May is the long rains season while October to December is the period when short rains are experienced. Rains are erratic. Temperatures range between 29 and 36 degrees centigrade, though certain periods may go up to 40 degrees.

Settlement patterns

The county has a population of 365,330 people as per 2009 Population and Housing Census. Besides livestock keeping in the larger part of the district, drought tolerant crops such as green grams, millet, sorghum and cowpeas are cultivated.

In the upper zones of rain-fed cropping and mixed farming livelihood zones, crops such as drought tolerant varieties of maize, pigeon peas, dolichos lablab, beans, cowpeas, millet, sorghum and green grams are cultivated. Livestock keeping is also practiced. The livestock kept in the district include cattle (local and cross-breeds), goats (both meat and dairy), sheep, poultry (indigenous and broiler varieties), bees and donkeys. ♦

Food News from Other Counties

Uasin Gishu:

Food Security and Livestock Key to Peace and Reconciliation Initiative

A unique peace initiative is going on in Uasin Gishu County in which members of the Kalenjin and Kikuyu communities have begun exchanging dairy cows to foster peaceful relations. The exchange aims to restock dairy cattle lost by both communities during the post-election violence of 2008. In the first phase of the project more than 64 families in Kapsaret, Kipkaren, Kesses and Burnt Forest division were given dairy cows on a mutual agreement that their first calves would be handed to their neighbours from the opposite community.

The project is funded by the Food and Agricultural Organization and is being implemented through the Anglican Church Eldoret diocese. Director of the ACK Church Development office, John Sambu, says Kikuyu and Kalenjin recipients have already

exchanged calves with their neighbours under the project. "This is a peace building and cohesion effort in areas hard hit by post-election violence in the North Rift and already it's paying dividends because affected communities have started exchanging dairy cows to cement relations," Sambu said. "We decided to use livestock because members of both communities value livestock and the exchange of heifers signifies reconciliation," Sambu said.

After the success of the first phase of the project, plans are underway to extend it to other areas.

Source: Extracted from "Kenya: FAO's Cow Project Unites Kikuyu, Kalenjin," by Mathews Ndanyi, 28 March 2011, in the *Star*. ♦

SPATEs – Engaging with Groups and Upscaling of Lessons

Report from the Upscaling Stream

by Immaculate N. Maina, Team Leader, KARI Headquarters

The upscaling stream contributes specifically to Objective 2, which seeks to scale up and scale out prioritized “best practices” of research on resilient integrated farming systems. This is in order to catalyze the adoption of high value traditional crops, integrated livestock, soil, water and pest management practices, and post-harvest technologies in order to make a significant contribution to food and nutrition security and to poverty alleviation.

Initial efforts will focus on the target Primary Participatory Agricultural Technology Evaluation sites (PPATEs or “primary trials”) in each District where each District team will facilitate linkages between these primary trials and at least 10 farmers’ groups at the Secondary Participatory Agricultural Technology Evaluation sites (SPATEs or “secondary trials”). In doing this, the question that the upscaling stream addresses is: what will motivate farmers in the secondary trials to learn from the primary trials and to maintain their interest for continued learning? It is envisioned that the following activities could support upscaling efforts and motivate farmers in secondary trials to learn from those within the primary trials:

- Direct targeted engagement with members of the primary trials
- Scheduled knowledge and experience sharing and exchange between primary and secondary trial members to support continuous learning
- Integration of indigenous and farmer knowledge
- Improved access to current agricultural and market information
- Potential for opportunity to undertake activities in the agricultural product value chain (APVC), e.g., through agro-processing and vertical integration

In carrying out the aforementioned activities, the upscaling team will identify viable farmers’ groups for the secondary trials (SPATEs) and determine and document the opportunities and challenges of the past and on-going institutional and policy initiatives implemented to secure sustainable livelihoods, food and income security in the target counties. This is intended to answer the questions of “what worked

and why?” and also “what did not work and why?” This will inform the appropriate mechanisms of engagement with groups. The identified mechanisms of engagement will then be used in linking farmers within the primary and secondary trials. The following mechanisms of engagement are envisaged:

- Strengthening and/or initiating institutional linkages with Ministry of Agriculture and other practitioners (including NGOs) and other actors at the local level through capacity building
- Support to farmer and producer organizations to identify market linkages to participate effectively in agricultural product value chains
- Policy engagement from the grassroots to the national level
- Farmer-led seed production enterprises and seed fairs
- Enhancing collective action and commercialization

In undertaking this stream, the team will use an action research approach—the Participatory Extension Approach (PEA) and the Participatory Learning and Action Research (PLAR) process. Translation of knowledge from PPATEs to SPATEs will require that researchers, research users and knowledge translation platforms work in innovative ways to ensure that information reaches the decision-makers to inform policy and that it enhances grassroots demand. In ensuring flow of information, the members of this stream will also endeavour to redefine the role of knowledge brokers and foster linkages and exchange across the production system. Ultimately, the stream will examine the non-linear research–extension–farmer linkages to ensure maximum reach of new technologies. ♦



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