



Center for Sustainable Rural Livelihoods  
**2012 Annual Report**

IOWA STATE UNIVERSITY  
College of Agriculture and Life Sciences





## Director's Message

**Y**oung mothers learning about proper nutrition for their children.

Farmer entrepreneurs learning to use marketing plans to manage their cash crops.

Their stories are inspiring and the word is spreading. This year's annual report of the Center for Sustainable Rural Livelihoods (CSRL) focuses on people and their accomplishments.

Last year the Nutrition Education Center was started at the home of Sabbi Jane, a community nutrition and health worker. The center aims to help young mothers nurse their malnourished children back to health. In its first year, the center has been overrun by women coming from neighboring villages every week for guidance and support. A dedicated team of VEDCO staff, ISU faculty and ISU and Makerere service learning students have worked with Jane to address this critical need.

A greater emphasis has been placed on integrating animal production into farming systems. This strategy promotes nutritional security and financial stability for small landholders. Equipped with increased access to microfinance and up-to-date market information, more program farmers are achieving these goals. Our recent monitoring and evaluation survey revealed these improvements also are reaching nonprogram households. We look forward to determining how widespread the program's impact has been among the parishes we serve.

The Service Learning/School Gardens Program was the most successful ever. More students and schools were engaged, more projects completed and more activities took place within the local community. Student projects were recognized by the World Food Prize Foundation as Borlaug Poster Contest winners. But the real impact was at the primary schools and in the communities, where our ISU students and Makerere University students shared their talents. School administrators and teachers, Kamuli District Administration, ISU and Makerere faculty all deserve special recognition for the continued growth and success of this remarkable program.

**Mark Westgate**  
CSRL Director

# Nutrition Education Center

**The Nutrition Education Center provides comprehensive nutrition education for mothers during pregnancy and through the first 1,000 days of their children's lives. Proper nutrition at this time is crucial as it affects a child's growth and development.**

**T**he center is managed and housed by Saabi Jane, a community nutrition health worker who founded the program in 2011. She provides basic nutrition knowledge and practical skills necessary to nurture young children.

**More than 80 mothers enrolled** in the program, learning about proper nutrition during pregnancy, lactation and the growth of their babies. They gain knowledge to make good decisions for the health of their children; for example, exclusive versus complementary breastfeeding practices, the importance of hygiene and sanitation and monitoring babies' health. They are taught practical skills to implement the knowledge. They learn how to establish a kitchen garden to supplement their food supply. They learn how to cultivate nutrient-rich foods like orange-fleshed sweet potatoes. They learn how to prepare grain amaranth porridge to provide additional protein to their children. They learn the nutritional importance of animal-sourced foods such as milk, meat and eggs.

**"We keep detailed records** of all mothers at the Nutrition Education Center to enable us to monitor progress of mother and child," said Laura Byaruhanga, a VEDCO community nutritionist. "Since the center started, only 10 mothers have dropped out and then only because they moved away from our sub-county. Six women have delivered very healthy babies, weighing between 3.1 to 4.2 kg (6.8 to 9.2 lb). The usual birth weights at the local health center



The Nutrition Education Center provides mothers with education and practical skills to address nutritional challenges.

are less than 3.0 kg (6.6 lb). Midwives at the health center have been amazed by the 'unusual' birth weights of babies delivered by mothers attending our center."

**Attendance at the center** has steadily increased. Mothers remain enrolled until their children reach 1,000 days old. After they "graduate" from the program, mothers are encouraged to join support groups to help them generate income for their families. This reinforces their ability to buy nutritious foods and continue the beneficial practices they have learned. Graduates are eligible to apply for CSRL-supported microfinance to enable them to pursue income-generating enterprises.

**This holistic approach** to support early child development has rescued many malnourished children. It has given young mothers the knowledge and confidence they need to raise healthy children.

## The Tweyambe Mothers' Story

The reach of the Nutrition Education Center has expanded well beyond its original design. Twelve graduates formed their own support group, the Tweyambe Mothers Group.

Besides the 80 young mothers assisted directly by the center, the Tweyambe Mothers Group is influencing even more. These women act as mentors to young girls in their community and have referred some to the center for training. The center supports the group with home visits from the community nutritionist, who monitors children to ensure they continue to be well-nourished.

Because of the work of the center and the Tweyambe Mothers, word has spread quickly to other parishes. One challenge is that many women must walk a very long distance to get to the center in Saabi Jane's home. Setting up satellite nutrition education centers in these parishes would help address this problem and increase the number of mothers and children who could be served. This would require additional trainers, resources and support staff.



A child receives life-saving, nutrient-dense porridge at the Nutrition Education Center.

Also, local health centers do not have the capacity to identify severely malnourished children. CSRL is working with VEDCO staff to identify malnourished children and to collaborate with the health centers to develop community-based solutions such as satellite nutrition education centers and women support groups.



The impact of the Nutrition Education Center can be seen in Joshua, a child of a mother enrolled in the program. He is shown both before and after the program. Children are fed a nutritionally dense porridge to help them recover from malnutrition. Most undernourished children achieve a healthy weight after only a few months. On average they gain 0.3 kg (0.66 lb) per week.



# Integration of Animal and Crop Production into Farming Operations

**CSRL has expanded its investment in small-scale livestock production systems to improve the lives of rural farm families in the Kamuli District. During the past several years, the center has placed greater emphasis on helping farmers acquire animals and training them on the proper care for animals to maximize growth, number of healthy offspring and household income.**

Currently, CSRL supports 258 piggeries, 90 goat operations and 43 chicken enterprises with improved Kuroiler chickens.

**The increased number of animals** on the farms is helping to meet the rising household demand for protein. Greater production also promotes food security of the community by introducing more animal protein into the local food supply. CSRL has helped to ensure that VEDCO staff are properly trained to deliver animal production knowledge and animal health services competently and confidently.

**CSRL strives to help farmers** improve farm productivity and efficiency using integrated crop and livestock systems. Recently, a team of CSRL and VEDCO staff visited program farmers who have been supplied with CSRL-funded animals. The aim was to monitor their progress, evaluate the effectiveness of information and materials and offer assistance where it was most needed.

**The team was led by Max Rothschild**, CSRL associate director, and Dr. Gideon Nadioppe, VEDCO veterinarian. The team provided farmers with updated technical support, advice in animal health management and guidance on proper animal housing and nutrition.

**CSRL is partnering** with other livestock organizations such as International Livestock Research Institute; participating in animal feed value chains workshops; collaborating with other government-sponsored livestock extension services; and investing in cellphone-based information delivery to improve services and knowledge provided to farmers.

## Aidah's Story

After her husband died, Aidah was left to care for four children. Aidah says she was shunned by her community, leaving her feeling depressed and helpless.

At that point Aidah knew she would need help to take control of her livelihood. She made a decision to seek support by joining her local CSRL-VEDCO farmer group. As a member of the group, she received improved crop seed, livestock, training on pig production and management, and the guidance necessary to establish a successful farm.

It turned out to be one of the best decisions she ever made.

Today she is a respected member of the village and has a stable income from her pig operation. She has no problems paying her children's school fees and putting food on the table. She is a member of a credit group and has constructed a beautiful new house that is admired by her neighbors. She also has built an improved ventilated pit latrine that will help keep her family healthy.



Starting a pig operation is one of the best decisions Aidah ever made.

## Ruth's Story

**R**uth used to struggle with long hours working her fields only to harvest low yields.

After hearing a CSRL-VEDCO radio program, Ruth sought out the VEDCO community-based trainer in her area to discover how she could raise more successful crops. As a VEDCO farmer, she learned how to cultivate the entire six acres she owns (instead of only 1.5 acres previously) and grow a wide variety of crops. She also learned how to increase pig production.

Ruth now produces enough to feed her family, sell the surplus and share some produce with her neighbors. She even had enough surplus to give 10 kg of beans to other members of her farmer group.

Ruth is proud that she has been able to increase the supply of diverse food products and help her family achieve food security and better health. She learned new methods of raising pigs and used the income to construct a new pigery. She says the new structure protect her pigs from the elements and keeps them securely confined to her property. Previously, she used to pay fines to her neighbors when her loose pigs ate their food. Now she is happy that the pigs no longer cause conflict. Her animals are growing faster, and improved hygiene and sanitation no longer present a challenge.

Ruth raises pigs and grows a wide variety of crops enabling her to feed her family.



# Providing Market Information

**Current market information** provides an immediate advantage for farmers in rural Kamuli.

Although most are members of local farmer groups, many still are poorly informed about pricing and access to markets. As a consequence, they have limited bargaining power. They struggle to secure fair prices. This is a major impediment to stabilizing their income and improving their livelihoods.

“Since farmers produce agricultural produce, improving agricultural markets is one way we can increase household incomes,” says Ronny Bulibazani, VEDCO program extension officer. “Small changes in how farmers access market information can sharply tip the balance in their favor. With increasing populations in cities such as Kampala, Lira and Gulu, and with the new country of South Sudan, Kamuli farmers should be in a position to generate considerable wealth from their farming activities if given market information.”

To bridge the information gap, CSRL and VEDCO are exploring ways to disseminate timely, reliable market information to program farmers — and to strengthen the capacity of farmers and farmer groups to act on this information.

One method, employed by VEDCO’s community-based trainers, is a bulletin board that lists current market prices. To date, 23 bulletin boards have been established.

Another method under consideration is equipping the community-based trainers and program ex-

ITEM	KAMULI	JINJA	MUKUNYONINGO	IGACA	KATYI	MUKUNYONINGO
KAMULI	2000	2400		2500	2800	2300
JINJA	1500	2300		2500	3000	2000
MUKUNYONINGO	1300	1300		1500	1500	1200
IGACA	370	370		300	350	350
KATYI	1500	1300		1500	1300	1200

Up-to-date market information allows farmers to obtain fair crop prices.

tension officers with smartphones. Most already use cellphones for basic communication, but smartphones would allow them to collect and share more detailed verbal, pictorial and digital information.

VEDCO staff organized value chain workshops to focus on small pig and bean operations. The workshops brought together key market players and institutions to discuss prices, structures, trends, constraints and opportunities. The meetings are helping farmers and input dealers work together to increase their profits.

## The Mobile Phone Story

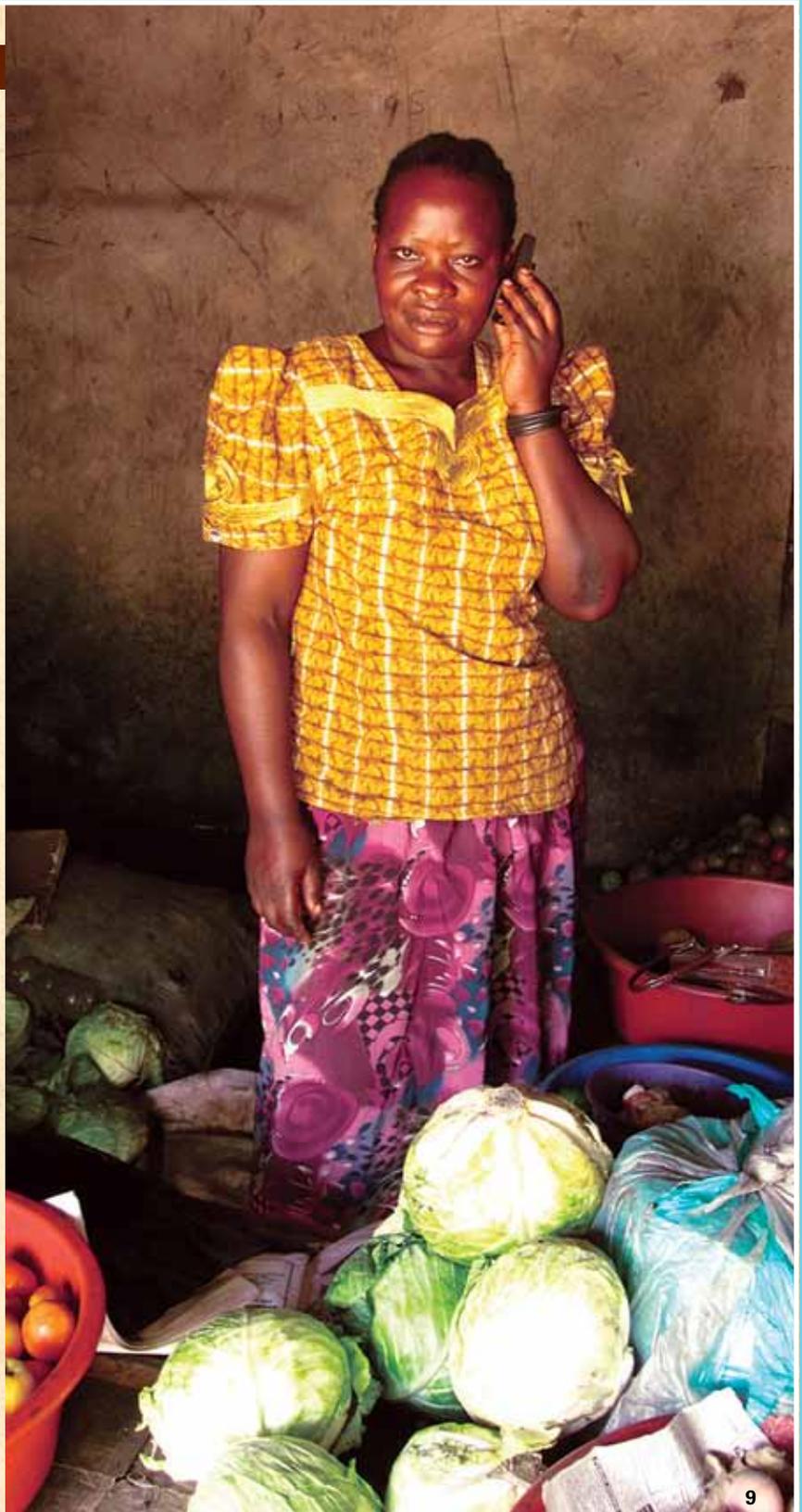
In only a short time, mobile phones have become a crucial resource for Kamuli District farmers.

Now, half of farm households report having at least one mobile phone. Seventy percent of households with a phone say they use it to check market price information. They often call businesses in surrounding towns to check prices before making their marketing decisions. Some also call businesses in Kampala, the capital city.

A 2010 study by ISU's Brandie Martin found that two-thirds of women with access to a mobile phone use it for at least one agricultural purpose. Some adopt cell phones mainly to connect to extended family members.



With current pricing information, farmers can confidently market their crops.



# Microfinancing for Small Enterprises

**Microcredit**—providing small agricultural loans—has proven to be a successful strategy to help farmers move beyond basic food security and achieve prosperity for their families and increase assets for their communities.

**C**SRL offers microloans to farmers who have achieved household food security, with the intent to encourage their entrepreneurial activities and increase access to assets that will help them achieve more success. Farmers selected to participate receive training on savings and credit. Most use their loans to successfully increase crop and livestock production.

**The program started in 2007** with 11 million Uganda shillings (UGX) or about \$5,500 in American dollars (USD). In 2011, the portfolio had grown to nearly 28 million UGX (\$11,000 USD) and was serving 25 credit groups composed of 135 members.

**Recent dry weather** severely stunted crop production in Kamuli District. Without crop insurance, farmers faced crippling crop losses that made paying back loans on time impossible. The repayment structure on many loans was revised to link payments to harvest.

**Farmers like Monica and Nathan** (see their stories on page 11) experienced extensive crop losses due to the extended dry spell. Fortunately, both Monica and Nathan had sufficient financial resources to recover from the losses.

**But this highlights** one of the most pressing challenges for rural microfinance programs. “Our greatest challenge is unpredictable weather patterns,” says John Sembera, VEDCO’s microfinance officer. “When farmers borrow, they do not have a



Farmers learn about savings and credit when chosen to receive microloans.

guarantee that there will be enough rains to support the growing crop.”

**Sembera noted that microcredit** repayment needs to be structured in a way that does not require households to sell capital assets such as livestock to repay the loans. Also, microcredit needs to be available to young men and women to promote their active involvement as entrepreneurs within the community. These changes are underway.

**Also, CSRL is seeking to partner** with organizations that offer affordable crop and animal production insurance. This would provide a financial safety net against unforeseen production failures.

## Nathan's Story

**N**athan and his wife struggled to provide for their nine children. Although he owned about 10 acres, Nathan was farming only four of them.

Thanks to the CSRL microloan program, Nathan now farms more land—eight acres—and uses the remaining land for grazing livestock. The increased income Nathan receives enables him to pay for his children's school fees (about 1 million UGX or \$400 USD) and medical expenses.

He joined the Mpayenda credit group and borrowed 200,000 UGX to start a small business, a banana plantation. Now he sells bananas and banana suckers in the Kamuli District. It's been a tremendous success. This past season his profit was 1,200,000 UGX (\$480 USD). He reinvested the profits into a maize mill and a sugarcane huller business that employs six people.

Nathan is proud of his accomplishments. He continues to use the microloan program to grow his businesses. He hopes to employ more youth in his village and help others succeed as he did.

## Monica's Story

**M**onica is a Kamuli farmer and a mother of seven. She and her husband own 20 acres of land, but prior to her involvement with CSRL, she farmed only 5 acres.

After receiving training from the microfinance program, Monica joined the Kisakye credit group and obtained credit that she used to purchase clean, high-quality seed. This allowed her to increase the number of acres she farms to 12. Now she is specializing in commercial groundnut and maize production.

Monica says that in the past year she has sold about 1 million UGX (\$400 USD) worth of groundnuts. This has enabled her to pay her children's school fees of nearly 800,000 UGX (\$320 USD). Monica also is increasing her profits by growing several acres of maize, soybeans, sweet potatoes and common beans to sell in the market.

As evidence of her hard work, Monica successfully has increased her loan portfolio through the years. The first loan she received was 200,000 UGX (\$100 USD), which she used to increase groundnut production. After she had paid back her loan with the profits from that crop, she and her husband opened a bicycle and motorbike spare parts retail shop at a nearby trading center. This new venture brings in additional income for the family.

Monica used a second loan of 350,000 UGX (\$150 USD) to expand the retail shop and purchase more groundnut seed. Once she paid back the loan, she was eligible for a third loan of 500,000 UGX (\$225 USD), which she used to buy maize and groundnut seed to expand her cropland and to start a piggery.



Commercial maize is one of the crops that Monica now specializes in.

# Demonstrating Improved Approaches

**The partnership between CSRL and VEDCO has proven highly successful. The majority of families involved in the program are now food secure—they have access to enough food for at least two meals per day and consume a variety of foods to meet their nutritional needs. Many families also generate a surplus, which allows them to sell extra crops for a profit. They use the income to purchase agricultural inputs that, in turn, ensure even better crop yields the next season.**

In several ways, CSRL and VEDCO are demonstrating approved approaches to continue to help farmers and families make progress.

**For farmers who still struggle** to produce enough food to meet their family's needs, CSRL and VEDCO continue to provide support. Along with training in better crop management practices, farmers are provided improved crop seed—the majority of seeds are for staple crops like cassava, common field beans and soybeans—that help them attain greater and more stable yields. Average bean yield on small landholder farms in Kamuli District is only about 300 to 400 kg per acre. Maize yields average 700 to 800 kg per acre. While program farmers are expanding crop acreage, sustainably increasing yields of staple crops remains a daunting challenge.

**The VEDCO team has established** numerous demonstration gardens in Kamuli District to show how using improved seed from national agricultural programs can return more profit than using the traditional farmer-saved seed.

**They have developed** multiplication gardens in partnership with farmer groups to increase availability of improved seed and disease-resistant planting



Multiplication plots are used to propagate improved cassava plants.

materials. In 2012, four multiplication plots of cassava were established to increase availability of new disease-resistant germplasm from Uganda's National Agricultural Research Organization.

**CSRL continues to build upon alliances** with organizations such as the National Agricultural Research Organization to help farmers achieve greater crop and livestock productivity.

**VEDCO also is demonstrating** agroforestry practices that can rejuvenate eroded and nutrient-

depleted farmland between crop rotations. Traditionally, the practice of leaving a field fallow meant leaving it unseeded for a period of time to allow it to restore fertility naturally.

**VEDCO is demonstrating** an improved fallow system to rejuvenate farmland faster than ordinarily would occur if the land was left unseeded. The VEDCO team is training farmers how to use leguminous (nitrogen-fixing) shrubs to replenish essential nutrients in the soil during the long rainy season. The team has initiated several test plots at schools and demonstration sites. The agroforestry test plots will be seeded following their fallow period to demonstrate the effectiveness of improved fallow systems that incorporate indigenous nitrogen-fixing plants. Field days are held to educate farmers about improved fallow practices and let them observe the benefits.

**CSRL is introducing** simple processing technologies to increase “realized yield” and reduce post-harvest losses. Farmers are eagerly embracing simple methods of processing that allow them to store their crops longer, sell them at higher market prices and use them in more varied ways. Cassava, grain amaranth and beans can be readily processed into flour, which reduces perishability, increases shelf life and has the potential to increase economic and nutritional value.

**One farmer expressed surprise** that she could bake a cake from common bean flour. Growing up, she only knew that beans were to be boiled and eaten. Once shown how to process bean flour, she makes porridge and cakes for her family. She also learned that bean flour cooks faster and requires less firewood than boiling whole beans.

## Ben's Story

**M**usambira Ben is an inspirational figure in his community, always striving to improve his situation.

When Ben became a community-based trainer in his Bugulumbya



Ben always looks for new ways to increase his farm's productivity.

sub-county, he decided to set an example. He needed a sustainable way to generate money for his family. So he planned to become a successful banana producer.

His first plot of bananas failed due to poor management and unfavorable weather. But in 2011, Ben tried again. After visiting with another farmer who grew bananas, he decided to re-establish his banana production business. With assistance from CSRL and VEDCO, Ben did a cost-benefit analysis and marketing risk assessment.

He realized that with proper management, his three-acre farm could generate enough income to support his family. So far he has planted 120 suckers from VEDCO in a new garden, replacing the old ba-

nana plantation. After a year, each sucker will bear a banana bunch valued at 10,000 to 15,000 UGX (\$4 to \$6 USD). Ben expected to bring in a minimum of 1 million UGX from the first planting. By the time the first bunches are harvested, each mother plant will bear at least three young plants, which will take about eight months to one year to bear fruit. He estimates a yearly income of at least 3.6 million UGX (\$1,440 USD). Ben expects to sell 80 of the 120 bunches the first year. The rest he'll keep for household consumption. Ben has observed how farmers' banana plantations often fail after flourishing for about five years. His sustainability plan is to replant fresh banana suckers every four years to keep his banana business thriving.

# Soil and Water Conservation and Natural Resource Management

**As farming enterprises expand, it is essential that farmers receive help to adopt practices that are ecologically as well as economically sustainable.**

This year, one of CSRL's main focuses was introducing agroforestry practices to combat soil erosion caused by intense rainfall during the rainy season. Strategically planting trees and shrubs with crop plants can reduce soil erosion, improve soil quality and help manage soil moisture.

**CSRL distributed 200 tree seedlings** to 20 farmer groups that were trained in soil management and sustainable water conservation practices. The farm-

ers planted the trees on farm contour lines, boundaries and grazing lands. They were encouraged to build innovative structures to prevent soil erosion. Providing the plant resources complements farmers' creative approaches to enhance long-term soil productivity and improve yields.

**CSRL continues to invest** in clean water resources for communities in Kamuli District. To date, 10 boreholes that have installed and maintained are providing an estimated 1,500 households and 2,700 school children with nearly 200,000 liters of clean water each day. Two additional boreholes are planned this year: one to provide drinking water at Busambu Primary School and the second to serve Kabalira village. Both sites are located in Namasagali sub-county.



CSRL boreholes are daily providing clean water to 1,500 homes and 2,700 school children.

# Practitioners' Workshop: Improving the Training Modules

**This year CSRL held its first practitioners' workshop with a goal of improving the current farmer training practices in Kamuli District.**

Community-based trainers and program extension officers who work in the field came together with VEDCO and CSRL to examine how well the current training systems were meeting farmers' needs. The workshop encouraged open discussion and reflection, generated ideas for improvement in training methods and facilitated learning for participants. For example, workshop participants identified new training methods and approaches, including mobile technology (smartphones), illustrated handouts, videos, on-farm demonstrations, household visits and external and local farmer exposure visits.

**One of the aims of the workshop** was to develop strategies for capturing and documenting farmer knowledge. This will help to make existing training content more relevant and help develop training methods readily accepted by farmers.



New training methods to meet farmers' needs were identified by workshop participants.

**This strategy for developing** and improving training materials is in line with CSRL's goal of increasing food security in Kamuli by promoting improved agricultural production methods. New training modules will continue to be tested and tailored to meet farmers' needs, finding ways to work effectively around constraints such as low education levels. Pilot training sessions have begun to provide feedback to ensure the material's quality and relevance. Feedback will be used to further revise the training.

**In the workshop,** the following areas were identified by consensus as topics that need to be improved or incorporated into the new agronomy module:

- Soil fertility management
- Seed and grain storage
- Farm site selection to optimize yield and household nutrition
- Disease and weed control
- Farm economic analysis
- Quality and purity of seed production

**Development of these new topic areas** and expansion of current information is now underway. One community-based trainer expressed his excitement, mentioning that the new agronomy module under development will capture farmer knowledge and integrate it effectively. This is important, he said, because it allows the training to address immediate farmer concerns. Many of his program farmers, for example, have expressed concern about declining soil fertility. The new module will include methods to improve soil fertility and productivity.

**The practitioners' workshop** is one way to work together to shape the future of the program.

# School Gardens and School Lunch Program

**When children go hungry, they are less likely to attend school. If they do attend, they cannot learn effectively.**

**T**he CSRL-funded school lunch program helps to keep children in school and gives them the opportunity to reach their full academic potential.

**For the past two years**, CSRL has partnered with Namasagali Primary School to provide a mid-day meal. The meals help reduce hunger in class, allow students to focus on their studies and provide nutrition that's essential to growth and development.

**The meals supply** one-third to one-half of the recommended daily nutritional intake of a school-age child.

**"One of the main reasons** that the school feeding program was established was because we urgently needed to tackle the increased absences of students from school due to lack of food at home as well as malnutrition," says Laura Byaruhanga, community nutritionist. "Most children have one meal per day, but the school feeding program ensures that children have at least two meals a day, one of which represents a balanced diet."

**Now that the program** has been in place for two years, CSRL is working to make it self-sustaining.

**The school garden** has been revitalized to provide ingredients for the lunches and to serve as a learning lab where students can practice agricultural skills. Students are learning to cultivate vegetables, bananas, maize and grain amaranth. They



With full stomachs, school children are better able to achieve academic success.

maintain a fruit tree nursery bed, which will be used to establish an orchard. Most of the food harvested from the gardens is used in school lunches. The surplus is sold to purchase other necessities such as oil and salt and to pay the school cook. A successful chicken rearing project is providing eggs for the students' meal plus additional income.

**The garden and lunch** programs piloted at Namasagali Primary School are gaining recognition and momentum in other communities. The programs have expanded to neighboring schools at Nakanyonyi and Naluwoli. Other schools have contacted CSRL and VEDCO staff about initiating similar programs.

**The idea of a school lunch** program has been enthusiastically accepted, as evidenced by a meeting held for parents and teachers at one of the new schools. Parents in the community were willing to contribute resources to the program to ensure that their children get the benefits of a mid-day meal. Parents at Namasagali Primary have already agreed to contribute 3 kg of maize and 2 kg of beans per child, a model that CSRL intends to replicate at other schools.

**CSRL provided support** to increase the size and productivity of the school gardens to ensure all students received a lunch every day. The community nutritionist is helping to incorporate nutrition and health education into school curricula.



Eggs from laying hens provide a ready source of protein for school lunches.

# Service Learning Program

**In 2012, the Service Learning/School Garden Program was the largest ever.**

**B**egun in 2006, the program is an active partnership between Iowa State University's College of Agriculture and Life Sciences, Makerere University's College of Agriculture and Environmental Sciences and the Volunteer Efforts for Development Concerns (VEDCO).

**The school garden provides** an outdoor learning laboratory for primary school students to enhance their knowledge and appreciation of agriculture. The program produces supplemental food for the school lunch program and generates planting materials for

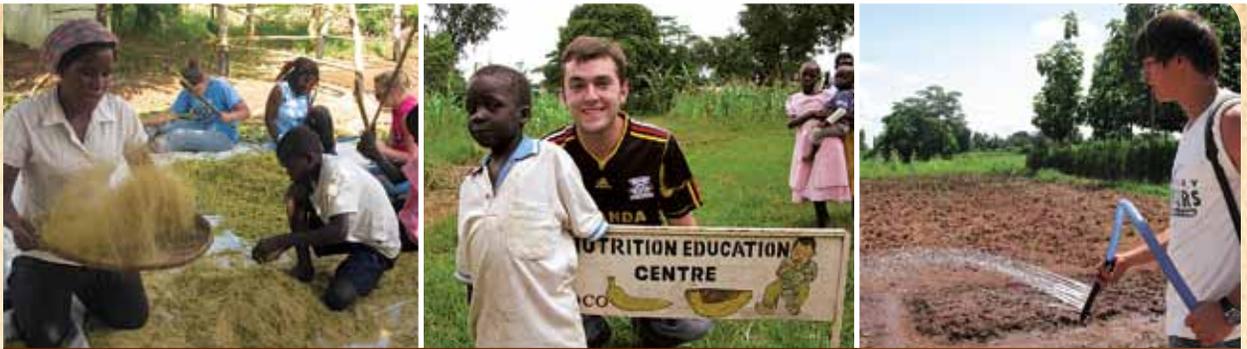
the children to take home. For the university students, the program provides an opportunity to learn from another culture and engage in global resource issues such as food security, water and soil conservation, agricultural methods, nutrition and sanitation.

**In 2012, there were 33 participants**, including 15 Makerere students and seven ISU students. Four ISU faculty, one Makerere faculty and four former Makerere students led the program.

**New programs were initiated** at two schools, bringing to four the number of schools with ISU-Makerere service learning programs. The schools are Namasagali Primary School, Nakanyonyi Primary School, Namasagali College Staff's Children's Primary School and St. Joseph's Naluwoli Primary School.



The 2012 Service Learning Team.



Students threshing grain amaranth for school lunches; helping at the Nutrition Education Center; and watering school gardens.

**The activities of the binational teams** of students from ISU and Makerere University included:

- **Teaching:** University students were involved in teaching in classrooms and in the gardens. Classroom lessons centered on agricultural concepts to be applied in the gardens. Teams also presented lessons on science, health and math. The university students developed skills in communicating across cultures, project planning and raising horticulture crops.
  - **Teacher training:** A main goal this year was to improve the agriculture and science curricula with innovative teaching methods and practical sessions to improve student learning. Led by ISU faculty member and teacher educator Mike Retallick, ISU and Makerere faculty conducted a one-day workshop on effective methods to deliver class materials. Participants included teachers and administrators from the four primary schools.
  - **School gardens:** Besides teaching primary students new concepts, the gardens serve as demonstration sites for modern agricultural practices aimed at teachers, parents and the community. Some crops grown this year included fruits, vegetables, maize, grain amaranth, soybean and orange-fleshed sweet potatoes. During the month of November, 41,000 UGX was raised from the sale of eggs and garden produce. The school used the funds to purchase maize, beans and cooking oil for lunches, two new school uniforms, two new mathematical sets, vaccinations and litter for laying hens
- and new bags for improved grain storage. Some funds were used to pay a guard hired to watch the gardens. Trays of eggs were given as gifts to the teacher in charge of the poultry project and to the seventh-year students preparing for their final exams.
  - **Nutrition Education Center:** Service learning students assisted the center in preparing nutrient-dense porridge, training mothers about hygiene, sanitation and nutrition, and helping mothers establish home gardens. Students learned about malnutrition prevention and how to operate a community-based nutrition project.
  - **Field visits:** Service learning students worked directly with the community by assisting farmers. They engaged in local farming practices and provided technical support. They helped to build raised beds for onion transplant production; produced eggplants, collard greens and tomatoes; established banana gardens; managed livestock; established sweet potato gardens; and built sanitation facilities.
  - **Binational team projects:** Teams of ISU and Makerere students engaged primary school pupils in addressing specific challenges facing their schools or communities—agroforestry and plant propagation, irrigation, nutrition, poultry production, beekeeping and hygiene and sanitation. The projects let the university students practice skills in project planning, teamwork, problem solving and resolving real-life challenges in a developing country.

# Research Stories

**A key part of CSRL's mission is to catalyze discovery and application of science-based and indigenous knowledge in cooperation with partners in the developing world. Conducting research to improve food and nutritional security of small landholders—and sharing that knowledge—is central to CSRL's activities.**

## Improving the Production and Appeal of Beans

A five-year research and development project was successfully concluded, addressing the low consumption of beans in Kamuli, despite their nutritional value and productivity.

**Led by Robert Mazur**, CSRL associate director for socio-economics, the research team consisted of students, staff and faculty from ISU, Makerere University, VEDCO, National Agricultural Crops Resources Research Institute and Kigali Institute of Science and Technology. The project was funded by USAID.



Women sort and clean beans before cooking them.

**The main goals were to enhance** the nutritional value, appeal and consumption of this staple crop. Appealing bean-based products were developed. Farmers were taught how to prepare nutrient-rich meals and shelf-stable products. This led to the development of rural microenterprises to sell snacks to schoolchildren and to sell bean products during special community events.

**Research determined the influence** of pre-processing methods on the digestibility of starch and protein in bean products. The team identified micro-nutrients the products provided. The acceptability of bean porridge was ascertained. Culinary and sensory tests of 7 local and 18 improved varieties in Uganda and 16 varieties in Rwanda informed breeders of the best varieties to grow. Seed for two improved varieties were provided to support six farmer groups involved in community-based production and sale of quality seed. A participatory research approach with local farmers focused on improving bean quality and yield.

**Print and video extension materials** were created and translated into Luganda and Lusoga, two prevailing languages in the community. These materials have been used to train nearly 1,000 farmers at 60 demonstration sites. Seventy percent of the farmers were women. After training, farmers better understood market price variations, improved postharvest handling and storage, coordinated bulking and storage at the community level and showed improved negotiation skills. A multistakeholder bean value chain forum was established to enable participants to identify key constraints and solutions for broad-based successful market participation.

**Households working with the research team** increased the area they planted with beans, improved collective marketing and increased their income.



Grain amaranth has the potential to become a viable crop.

## Essential Nutrients from Grain Amaranth

**G**rain amaranth can easily be grown as a staple crop, providing essential nutrients to families who cannot afford animal protein. But farmer acceptance of the crop has been limited, partly due to low yields caused by soil infertility and inefficient farming practices.

**Research on grain amaranth** is addressing these challenges. To evaluate farmer acceptance, the team, led by Dorothy Masinde, interviewed 174 farmers who had grown grain amaranth before and 90 farmers who had never grown the crop. They identified several factors that influenced whether a farmer would grow grain amaranth. Farmer acceptance varied with age, gender, education level and source of income. The research determined that the crop was extremely effective on small areas of land, making it an ideal choice for farmers with limited land resources.

**A second study was conducted** to determine the effect of fertilizer use to address low yields caused by soil infertility. The study conducted in Kenya identified the optimum amounts of organic (manure or compost) and inorganic fertilizers. The new information will be used to help farmers grow grain amaranth successfully and promote popularity and acceptance of the crop.

## Increasing Bean Yields through Nitrogen Fixation

**C**ommon beans are an important source of protein for low-income families, providing about 38 percent of the protein and 12 to 16 percent of the calories required on a daily basis.

**Mark Westgate and his team** are conducting research to determine the possibility of enhancing biological nitrogen fixation to increase bean yields. Field studies are focused on whether seed inoculants would increase biological nitrogen fixation and yield consistently. Lab research is searching for genetic markers to help breeders select for this trait. Demonstrations and trainings were conducted to educate farmers on the potential yield benefits.

**Field trials were conducted** across a wide variety of agroecological zones to test the effectiveness of locally produced and U.S.-produced seed inoculants on harvested yield. Although results in Uganda and Tanzania were inconsistent, field trials in Rwanda showed a large advantage of using inoculants on climbing beans with an average increase in seed yield of 10 percent.

**In the lab**, extensive plant-based (phenotype) and DNA-based (genotype) information was collected on hundreds of bean varieties, many grown in Sub-Saharan Africa. The DNA-based data revealed genetic relationships among many lines collected from Africa, which is useful in identifying the best parental lines. Plant-based data determined parts of the plant that accumulated the highest concentrations of ureides, a chemical indicator of nitrogen fixation by the plant's nodules. Analyses are in progress to relate the results to total nitrogen accumulation, biomass and seed yield.

**The team developed educational materials** to train farmers on the benefits of nitrogen-fixing bacteria, safety precautions during storage of inoculum and procedures to follow when inoculating seeds. Farmer groups that managed demonstration gardens in Kamuli District harvested more beans from their inoculated and fertilized plots, providing clear evidence of the methods' success.

# Scaling Up

**Currently, CSRL and its NGO partner VEDCO directly engage about 1,200 households in rural Uganda. Results of a 2011 household survey indicated that nonprogram farmers in the communities also were benefiting indirectly.**

As more program farmers experience positive results and increased crop yields, the demand in each community for training and market information has increased. Livestock operations also are experiencing growth, with program farmers rearing more animals. Larger numbers of livestock lead to greater levels of food security due to animal protein consumption and higher family incomes when animals are sold at market.

**The CSRL program expects** this trend to continue, recognizing that the sustainable, profitable crop and animal production practices that are promoted reach many more farm families than just those registered in the program. This year CSRL plans to evaluate how adoption of its livelihoods approach is impacting rural communities at the parish level, which include thousands of farm families.

**New information technologies** can play a key role in scaling up the delivery of needed agricultural and food security information.

**In 2010, an ISU study** led by Brandie Martin found that among the Kamuli VEDCO farm households that have at least one mobile phone, 80 percent are using the phone to access agricultural information. Another 70 percent are using mobile phones to access market information. VEDCO group farmers



The success of CSRL programs create a ripple effect beyond those directly impacted.

use mobile phones to take photos of training demonstrations to remind them of the correct procedures. They record audio of group credit agreements so all members can recall what they borrowed and when they pledged to pay back.

**In 2012, Tian Cai of ISU** studied possible uses of small portable battery-operated video projectors to increase farmer knowledge. She found that video messages to farmer groups with minimal facilitation could increase farmer knowledge. She found that women learned proper planting procedures from video training. Women carry out much of the field work but often know less about farming recommendations.



With guidance given by CSRL and VEDCO, the dramatic transformation of Kamuli farming continues.

## A Promising Vision for the Future

**M**r. Mulondo's vision for the future looks promising.

After visiting several farmers who are raising pigs and chickens, Mr. Mulondo, chief administrative officer for Kamuli District and a key partner engaged with CSRL, believes that in five to 10 years, the Kamuli farming landscape will be dramatically transformed by the wave of agricultural, livestock and agroforestry activities promoted by CSRL and VEDCO.

He anticipates the farming community will be more prosperous, with more improved livestock breeds reared, different quality crops grown and greater access to microcredit. He foresees a future among Kamuli farmers where "more money will be coming in than leaving."

# Student Projects: Norman Borlaug Poster Winners

## First Place

### Norman Borlaug Poster Contest

#### Enhancing Consumption of Animal Source Protein through Poultry Production in Kamuli District, Uganda

*Michelle Richardson, Juliet Kukundakwe, Brittany Jurgemeyer, George William Kiwanuka, Elizabeth Ahikiriza, Drs. Tom Brumm, Donald Kugonza, Dorothy Masinde, Gail Nonnecke and Richard Schultz*

A poultry project initiated at the Namasagali Primary School in 2006 teaches students about poultry husbandry and provides eggs for the school lunch program.

In 2012 a group of students worked to improve the poultry house and share their knowledge with the community. ISU and Makerere students added better feeders and hanging water containers and planted Calliandra trees to provide additional nutrients for the birds. They made extensive improvements to the poultry house itself, improving the laying boxes, insulating the ceiling and adding perches.



Peak egg production improved dramatically at Namasagali school.

Plans were developed for a second poultry house to be built in the future. Data collected showed an improvement in peak egg production rate from 57 percent in 2011 (before improvements) to 72 percent in 2012. This increased production means more eggs can be added to student lunches, providing animal protein vital to their growth and health.

The ISU and Makerere students conducted training for primary school students, teachers responsible for the birds and farmers in the community. The VEDCO veterinarian provided guidance during the project.

## Third Place

### Norman Borlaug Poster Contest

#### Reducing Loss of Maize to Insects at Nakanyonyi Primary School, Uganda

*Brittany Jurgemeyer, Austin Schott and Ibrahim Baguma*

#### Expanding Rural Livelihoods through Sustainable Beekeeping Production at Namasagali Primary School, Uganda

*Malcolm Hines, Stanslus Okurut Omadi and Juliet Kukundakwe*

*CSRL student projects were judged in the poster competition held as part of the annual Norman E. Borlaug Lecture at Iowa State University, sponsored by the university's Nutritional Sciences Council.*

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