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IFDC Report

An update on the work and progress of IFDC

An IFDC Core Competency: Fertilizer Voucher Programs

More than 1.5 million farmers and thousands of agro-dealers have access to agricultural inputs (fertilizers, improved seeds and crop protection products [CPPs]) because of IFDC voucher programs implemented in Afghanistan, Albania, Ghana, Kyrgyzstan, Malawi, Mozambique, Nigeria and Rwanda. Vouchers are often called "smart subsidies" because they help farmers obtain inputs while simultaneously building business for rural agro-dealers.

Vouchers are coupons that transfer purchasing power to targeted smallholder farmers either by reducing the input's price below market cost or by providing liquidity as production credit, with repayment at a later date. Farmers redeem the input vouchers through agro-dealers. In turn, dealers receive payment for redeemed vouchers and a specified margin for operating expenses and profit from the program sponsors.

"This approach provides income benefits to both smallholder farmers and agro-input dealers and increases the long-term sustainability of the agro-input supply network and farmers' productivity," stated Dr. Deborah Hellums, senior program support specialist at IFDC. "To be successful, input voucher programs require careful analysis, transparency, detailed planning and rigorous implementation."

The programs must be designed specifically for a country's particular circumstances and reach farmers who most need inputs. IFDC voucher programs also provide benefits that direct subsidies cannot provide – training and technical assistance to both farmers and agro-dealers. Agro-dealers are

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Farmers in Nigeria display their vouchers to receive NPK and urea fertilizer.

FEATURED ARTICLES

IFDC and Mozambique Government Partner to Improve Food Security

Josué Dioné Joins IFDC Board of Directors

IFDC Produces New Fertilizer Video Series

IFDC Report

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IFDC is a public international organization, governed by an international board of directors with representation from developed and developing countries. The nonprofit Center is supported by various bilateral and multilateral aid agencies, private foundations and national governments.

IFDC focuses on increasing and sustaining food security and agricultural productivity in developing countries through the development and transfer of effective and environmentally sound crop nutrient technology and agribusiness expertise.

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IFDC Conducts Successful Training Programs in Nigeria, Thailand and Vietnam

"Developing Private Sector Agro-Input Markets – Designing and Implementing Targeted Subsidy Programs" – October 25-29, 2010

"Fertilizer Granulation and NPK Production Alternatives" – November 1-5, 2010

"Improving Agricultural Productivity and Net Returns Among Smallholder Farmers Through Efficient Use of Nutrients and Water" – December 6-10, 2010

IFDC Divisions: EurAsia (EAD) • East and Southern Africa (ESAFD) • North and West Africa (NWAFD) • Research and Development (RDD)

Acronyms: AGRA – Alliance for a Green Revolution in Africa • CPPs – crop protection products • ha – hectares • ISFM – Integrated Soil Fertility Management kg – kilograms • MOU – Memorandum of Understanding • t - tons • USAID – U.S. Agency for International Development

IFDC/USAID Project Helped Increase Sunflower Yields and Edible Oil Production in Kyrgyzstan

Challenge

Kyrgyzstan consumes approximately 125,000 tons of edible oil per year, but only 29 percent of the country's demand is produced domestically. The rest is imported at considerably higher prices and the consumer bears this cost. Although there is the potential to produce more sunflower oil, Kyrgyzstan does not grow enough sunflowers to meet demand due to a lack of key resources. In 2009 Kyrgyzstan increased the amount of land set aside for growing sunflowers by 15 percent. Nevertheless, because of poor seed quality, a lack of crop management skills and a low use of inputs, there was no significant increase in production. The average yield of oil crops has been nearly 1 ton per hectare (t/ha).

Initiative

The U.S. Agency for International Development's (USAID) Kyrgyz Agro-Input Enterprise Development project, which ended in 2010, promoted expanding the acreage and productivity of oil crops to increase domestic oil production and generate higher farmer incomes. Under the Global Development Alliance with Eurasia Group, nearly 250 ha throughout Kyrgyzstan were planted with high-quality Pioneer sunflower seeds. Participating farmers could get seeds, fertilizer and agricultural machinery service at subsidized prices. The project helped 15,000 farmers adopt more advanced sunflower-growing technologies in order to maximize yields and incomes.

Results

The results were impressive as yields tripled and economic returns improved significantly. This intervention also helped to promote improved agro-inputs and modern agricultural machinery. Kyrgyz farmer Kurbanaly Mitiev planted Pioneer sunflower seed on his nine-hectare field and harvested 3.5 t/ha of dried seeds with an oil output of 46 percent. Using regular seeds, he had previously harvested only 1.5 t/ha and had an oil output of 30 percent. This difference meant Kurbanaly could sell his seeds to oil producers for a price 25 percent higher. "I am planning to increase my sunflower fields to 20 ha next year. I am convinced that by using high-quality seeds and advanced techniques, I can generate more income," said Kurbanaly.

USAID's Kyrgyzstan Follow-On Project Makes Early Progress

The Kyrgyzstan Agro-Input Enterprise Development Follow-On project, which began in September 2010, has made early progress in the achievement of performance targets, which will accelerate its impact on improving agribusiness performance and agricultural productivity. The following is a summary of significant activities and achievements that took place from September to December 2010.

- On December 2, 2010, the Follow-On project entered into a public-private partnership (PPP) agreement with Oasis Agro LLC to develop a sustainable poultry feed industry. The program provides farmers with training and access to key business resources to increase soybean acreage, improve production of high-quality edible oil and increase the domestic production of eggs.
- The project brought 400 ha of previously unused and degraded land in Uzgen and Kara-Suu districts under agricultural production through the rehabilitation of irrigation systems. In addition, the soil fertility of 600 ha bordering the rehabilitated plots will benefit from the improved irrigation systems' proper drainage, better management and weed and erosion control.
- Two field days for 150 farmers were conducted in northern and southern Kyrgyzstan to demonstrate the benefits of hybrid corn in collaboration with the Eurasia Group, the project's Global Development Alliance partner. In the north, the field day included modern mechanized corn harvesting and drying and soybean production.
- The project procured and distributed 120 tons of compound fertilizer for the winter wheat season.
- Two training programs were conducted on the soybean value chain for 74 participants.
- Nearly 100 farmers and agro-dealers participated in three training sessions on integrated pest management.
- A networking roundtable discussion was held with targeted farmers, millers, oil processors and poultry and dairy farmers to discuss soybean and other feed crops.

Activities for 2011 include implementing training sessions, developing PPPs on poultry feed, rehabilitating degraded land and launching a voucher program for 4,000 to 5,000 farmers.

Chief of Party Dr. Hiqmet Demiri (right) shakes hands with David Buckner of Oasis Agro LLC after signing an MOU as Follow-On General Manager Alisher Kasymov looks on.

Core Competency *(Continued from Page 1)*

trained to introduce new technologies and teach their farmer-customers how to correctly use inputs.

IFDC uses a variety of security measures such as watermarks, barcodes, indelible ink, photo identification, thumb-printing and serial numbers to protect against fraud and program abuse. An exit strategy is also an important component of successful voucher programs. As farm incomes increase, the value of vouchers can be gradually reduced or become a vehicle for providing crop production credit. "Vouchers are an ever-evolving tool," says John Allgood, director of IFDC's EurAsia Division. "No two programs are the same."

The following are examples of IFDC voucher programs in Afghanistan, Nigeria and Rwanda.

Afghanistan

With USAID funding, IFDC introduced vouchers in Afghanistan in 2002-03 to provide post-conflict emergency assistance. Fertilizers and seed supplied by the program helped increase crop yields. After the harvest, farmers paid their local villages for the vouchers; funds went for infrastructure improvements. The inputs generated about 78,000 tons of wheat, which fed 436,000 people for a year.

IFDC expanded the voucher program in 2005-06, issuing about 600,000 vouchers. The vouchers helped to boost the wheat crop but also included seed and fertilizer for potato and onion crops. Farmers procured seed and fertilizer from private sector agro-dealers, enabling dealers to expand their businesses and build relationships with sub-dealers and farmers across Afghanistan. The wheat yield was 200,400 tons – enough to provide more than one million people sufficient grain for a year.

Afghan farmers with IFDC fertilizer vouchers.

Nigeria

Historically, subsidized fertilizer in Nigeria failed to reach smallholder farmers. "In rural areas you can find items such as cell phones, Coca-Cola and salt for sale, but in many places you cannot buy fertilizer," says Scott Wallace, IFDC's country representative in Nigeria.

In collaboration with the National Program for Food Security, IFDC implemented a pilot voucher program in 2008 in Nigeria's Kano and Bauchi states and then a larger program in 2009 in Kano and Taraba states. In 2010 activities were expanded in Kano and Taraba and extended into Bauchi and Kwara states. The programs were funded by the Nigerian National Food Reserve Agency, federal and state governments, USAID and the Alliance for a Green Revolution in Africa (AGRA).

Using vouchers, nearly 200,000 Nigerian farmers purchased fertilizer in both the 2009 and 2010 programs. Ninety percent of the subsidized fertilizer reached smallholder farmers – a substantial increase from the 20 percent prior to the programs. It was the first time in 10 years that many farmers had gained access to subsidized fertilizers. (For a documentary on the Nigeria voucher program, go to www.ifdc.org/Media_Info/Video_Gallery.)

Rwanda

In 2008 IFDC designed and helped implement the voucher component of Rwanda's Crop Intensification Program, an initiative of the Ministry of Agriculture and Animal Resources (MINAGRI) to help the country become self-sufficient in food production. Farmers used the vouchers to buy fertilizers and improved wheat and maize seeds.

More than 17,000 vouchers were distributed during Rwanda's first cropping season of 2009. MINAGRI and IFDC's Catalyze Accelerated Agricultural Intensification for Social and Environmental Stability (CATALIST) project helped farmers increase production – maize yields rose by 2.5 t/ha and wheat yields rose by 1.5 t/ha.

CATALIST is advising MINAGRI on its next voucher program. The latest vouchers in Rwanda utilize bar-coding technology that produces a voucher specific to each farmer based on the farmer's national identification number (similar to a Social Security number in the United States).

IFDC voucher programs are effective in numerous ways. For federal and state governments, a voucher program reduces fertilizer subsidy costs, decreases fraud, abuse and waste and reaches intended recipients more effectively. For farmers, vouchers help to increase their crop yields, income and often their standard of living. By developing a market for agricultural inputs, vouchers help build the private sector while improving the knowledge, marketing skills and professionalism of agro-dealers.

IFDC Produces New Fertilizer Video Series

A series of educational videos about fertilizers is currently in production at IFDC. The videos focus on fertilizer properties and various aspects of the fertilizer industry.

The first five videos in the series will cover the need for and benefits of fertilizer, as well as overviews of nitrogen, phosphorus and potassium nutrients, secondary nutrients and micronutrients.

As the series progresses, the subject matter will cover additional aspects of the fertilizer value chain. The first videos in the series will be available at www.ifdc.org.

ESAFD

IFDC and Government of Mozambique Partner to Improve Food Security

IFDC President and CEO Dr. Amit Roy shakes hands with Mozambique's Agriculture Minister José Pacheco after signing an MOU to improve food security in the country.

IFDC and the government of Mozambique have signed a Memorandum of Understanding (MOU) to formalize their joint commitment to improve agricultural productivity through sound and sustainable soil nutrient management practices and agricultural policies. The MOU signing ceremony took place February 11 in Maputo, Mozambique.

Under the MOU, IFDC will support the government as it implements its long-term plans for soil fertility management, agricultural intensification and rural development. IFDC projects began in Mozambique in 2006 and include training farmers in sound agricultural practices, improving their access to inputs (fertilizers, seeds and CPPs), strengthening agriculture market development and building the capacity of farmer organizations and agro-dealers in the private sector.

Located in southeastern Africa, Mozambique's total land area is 799,380 square kilometers (sq km), nearly twice the size of the state of California. About 360,000 sq km of arable land is available for farming, but only 11 percent of this is utilized for cultivated crops.

In 1987, the government established a series of macro-economic reforms designed to stabilize Mozambique's economy, which was one of the poorest in the region. In 2008, the country launched its Plan of Action for Food Production, which consists of national programs utilizing public-private partnerships to achieve an increased, competitive and sustainable food supply. These steps, combined with donor assistance and political stability, have led to dramatic improvements in the country's growth rate. As of 2008, the gross domestic product of Mozambique was $19 billion, with an ongoing growth rate of about seven percent. Despite the successes to-date, however, 70 percent of the population continues to live in poverty.

The *Abuja Declaration on Fertilizer for a Green Revolution in Africa*, written at the Africa Fertilizer Summit in 2006, calls for African Union member states to increase their level of fertilizer use to 50 kilograms per hectare (kg/ha). Fertilizer use in Mozambique is only 4.0 kg/ha, which is below the African average of 8.0 kg/ha and far below the *Abuja Declaration* target.

IFDC is currently implementing the Agricultural Input Market Strengthening II (AIMS II) and Mozambique Agro-Dealer Development (MADD) projects in the country, among others. Funded by USAID, AIMS II promotes private sector investment in agro-input technologies and improves farmers' access to these technologies through competitive markets and stronger agro-dealer networks. Building on these efforts, MADD (funded by AGRA) is strengthening and expanding agro-dealer networks in Mozambique's Maputo and Tete provinces. For more information on these and other IFDC projects in Mozambique, go to www.ifdc.org/Nations/Mozambique.

The MOU establishes formal and continued collaboration between IFDC and the government of Mozambique. Additional areas of partnership include:

- Developing legal frameworks and regulations for fertilizers.
- Training agro-dealers in locations not yet covered by current projects.
- Continuing to implement subsidy programs.
- Conducting training sessions in Integrated Soil Fertility Management (ISFM).
- Creating conditions necessary for implementation of the *Abuja Declaration*.

"IFDC staff members look forward to continuing to work with the government of Mozambique to increase farmers' crop yields and financial well-being through agricultural intensification efforts," stated Dr. Amit H. Roy, IFDC president and CEO. "In addition, IFDC is helping to build the capabilities of existing Mozambican agro-dealers and to train new dealers. IFDC staff members have been working in Mozambique for several years and look forward to continued progress and improvement in the nation's agricultural sector."

Fighting "Fake" CPPs in East and Southern Africa

As developing world farmers increase their use of agro-inputs (improved seed, fertilizer and CPPs), there is a growing trend in counterfeit agro-inputs infiltrating local markets. Although not systemic by most accounts, adulteration of inputs has become troublesome in some African nations.

Estimates by a group of nine East and southern African countries suggest that 20-50 percent of all liquid CPPs in their markets are either counterfeit or greatly diluted. In extreme cases, entrepreneurs produce packaging that mimics popular products, counterfeit the labels and insert inferior generic replacements.

As with fertilizer, the majority of CPP inspections take place at major ports, but oversight rapidly diminishes as these products move inland. Those agencies responsible for oversight, inspection and enforcement simply lack the knowledge or manpower to effectively enforce government regulations nationwide (if regulations exist at all). The unintended consequence of the shortfall in inspection is an enabling environment for profiteers in this illegal trafficking.

"As more unscrupulous individuals and groups see that adulteration or counterfeiting can be profitable – and that their activities may go largely unchecked by authorities – the potential reward far exceeds their risk," said Dr. Richard Jones, program leader for agribusiness in IFDC's East and Southern Africa Division.

According to Dr. Joaquin Sanabria, IFDC scientist and biometrician, counterfeit products at the farm level are often hard to spot. Leading IFDC's fertilizer quality control efforts in Africa, Sanabria stated, "African smallholder farmers already face so many variables in crop success or failure," referring to weather, irrigation, soil health and the quality of various inputs. "If the farmer was sold adulterated fertilizer, or counterfeit seeds or CPPs, it would be nearly impossible to identify the cause for a low crop yield without extensive testing," he added.

It's the inability to conveniently test product quality that continues to be an underlying issue. Such testing is still very much a manual process – and without the ability to perform chemical analysis on-site, the tendency is to rely on certification papers, dealer assertions of quality and package labeling.

Recognizing these various shortfalls, IFDC is seeking more effective solutions to eliminate counterfeit and adulterated inputs from the supply chain. With cost-share funding from CropLife International, the Center is organizing a pilot program focused on creating security measures for CPPs in East and southern Africa's agro-chemical sector.

The security program utilizes special label codes that can be verified by a Mobile Authentication Service (MAS) using the Short Message Service (SMS) feature of a cellular telephone. Similar programs have been piloted recently in Nigeria with successful results.

"Single unit containers will be given unique 12-digit codes and identification numbers either printed on the container or adhered as a label," explained Jones. "A scratch-off coating conceals the numbers until the customer reveals the code and verifies it through the SMS process, receiving a message of either 'Genuine' or 'Fake,' " Jones added.

Both SMS messaging and the scratch-off technology are popular in Africa, giving developers of the pilot confidence the system will quickly be adopted by smallholder farmers. Organizers suggest that the pilot will require 36,000-48,000 liters of CPPs outfitted with the special labels in order to quantitatively assess the effectiveness of the program.

Uganda is the proposed pilot location, due largely to a network of more than 2,000 agro-dealers and the Uganda National Agro-Dealer Association, a strong national association.

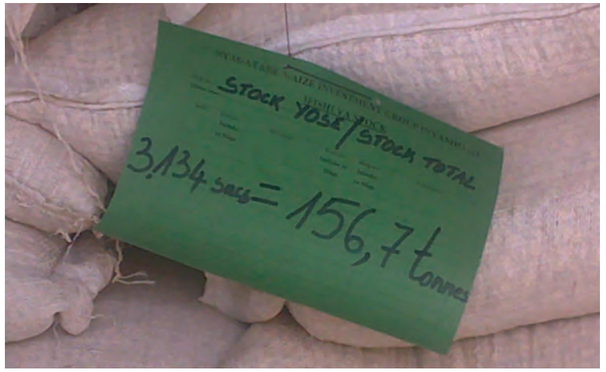
If the effort is successful, one challenge will be to persuade commercial suppliers to adopt the system. Greater security measures require a manufacturer's financial investment, and it is unclear which companies in the manufacturing industry will choose to participate in future programs.

But Jones sees great benefit to manufacturers who adopt the measures. "As these programs grow, farmers will be more likely to choose the inputs that have security measures in place," he said. "Manufacturers who don't adopt the measures may have products that are viewed as risky purchases."

If successful, the project will establish a mechanism that dramatically curtails counterfeiting activities and removes (or at least reduces) substandard products from the market.

"If smallholder farmers have made the choice to spend hard-earned money to improve their productivity and crop yields, they shouldn't be punished by counterfeiters for making that decision," added Jones. "With the support of national partners and the manufacturing community, we believe the program will be very successful in fulfilling its mandate."

CATALIST Project Promotes Inventory Credit System in the Great Lakes Region of Central Africa



Surplus crops are stored in a warehouse to sell at higher prices later.

A warehouse key can open the door to credit for farmers in the Great Lakes Region of Central Africa. Many smallholder farmers in this region are locked into a cycle of poverty because they lack access to credit. Credit is generally unavailable because the farmers don't have any of the traditional collateral normally used to secure a loan.

Access to credit is vitally important, because it allows farmers to invest in their crops by purchasing agro-inputs such as fertilizer, improved seed and CPPs.

Farmers have traditionally borrowed money from informal money lenders at high interest rates. The necessity for prompt repayment required farmers to sell their excess crops at harvest time when market prices are usually at their lowest (due to an abundant supply). As a result, many smallholder farmers stay in debt and are unable to meet basic expenses or invest in agro-inputs.

Attempting to break this cycle, the CATALIST project is promoting an inventory credit system (sometimes called the warranty system or *warrantage* in French) in the Great Lakes Region. An inventory credit system allows farmers to warehouse agricultural commodities until prices rise, therefore raising their incomes. The stored crops can also be used as collateral for loans. Participating in an inventory credit system gives farmers the opportunity to make more money from their crops than they would if their entire crop was sold at harvest.

Kagabo Nkubito, CATALIST's regional credit expert, assists farmers to access funding for inputs, additional labor and other agriculture-related expenses. "IFDC realizes that we can't talk about the success of intensification without financing," said Nkubito. "Farmers across the world are traditionally viewed by financial institutions as not being credit-worthy. Agricultural loans are perceived as risky because of the inherent uncertainty of the industry. Financial institutions cannot be sure that smallholder farmers will realize predicted yields, " explained Nkubito.

Three types of financial institutions dominate in the region – commercial banks, development institutions and microfinance institutions (MFIs). In Rwanda, commercial banks account for only three to four percent of loans to the agricultural sector. This bank/farm relationship primarily involves large farms producing cash crops for export.

A government-run development bank, Banque Rwandaise de Développement, operates on principles similar to a commercial bank with more relaxed rules to encourage investment projects.

Finally, there are MFIs, popularly known as "banks of the poor." MFIs provide short-term loans to the majority of farmers in the country but charge high interest rates. The inventory credit system makes lending to smallholder farmers more appealing to these financial institutions, opening doors that were previously closed.

To participate, farmers bring their surplus crops at harvest time to a central warehouse. Each farmer's surplus is weighed, recorded and stored in the warehouse. Based on the amount stored, a farmer can then use the stored crop as collateral and receive credit against the future sale of the surplus.

When market prices have risen sufficiently above harvest prices, the warehouse contents are sold. Typically, the farmer leaves the surplus in a warehouse for about three months until prices rise to a maximum profit level. Each farmer then receives his or her share of profit from the sale and repays any outstanding loans.

Crops that can last for several months if properly stored are better suited for the inventory credit system than more perishable crops. Therefore, maize, rice and sorghum are often crops held in inventory.

The inventory credit system in the Great Lakes Region is still in its formative stages. Therefore, CATALIST continues to build farmer capacity by approaching banks with convincing projects and also lobbying for lower interest rates. About 600 farmers have applied for bank loans for the upcoming season.

"Agricultural loans are perceived as risky because of the inherent uncertainty of the industry. Financial institutions cannot be sure that predicted yields will be realized, particularly for smallholder farmers."

Kagabo Nkubito, CATALIST's regional credit expert

CATALIST Success Story: Stanislas Mutabaruka

I'm a maize grower in Nyagatare, Rwanda, where I farm two ha, one for myself and one that I rent to others. I was one of the farmers selected to work on the Rwanda Development Organization/CATALIST demonstration plots. I immediately adopted ISFM technology, which helped me to more than double my maize crop. I harvested a yield of 3.7 t/ha; previously my best harvest was 1.8 t/ha.

Access to credit is a serious problem for most farmers, including me. Previously, we sold our harvests in advance to meet the immediate needs of our families, to buy inputs and to pay labor. Lenders used to give us an advance of Rwf 5,000 (US $8.45) during the farming season. At harvest we paid the loan back with a 100-kg bag of maize, worth Rwf 12,000 (US $20.27). Maize farming primarily benefited these lenders, because we did not have access to credit due to a lack of collateral.

When the inventory credit system was introduced, I was one of the first people to open an account at Duterimbere (a microfinance institution). I was given credit guaranteed by seven tons of maize stored at the Nyagatare Maize Investment Group warehouse. I received enough money to pay labor for weeding and I anticipate a profit when I sell the maize to the World Food Program.

Some of the benefits of the inventory credit system are:

- I am not "forced" to sell at a low price at harvest. More importantly, I am able to avoid prohibitive interest rates demanded by "money lenders."
- My harvest is professionally stored in accordance with national quality standards. This has enabled me to secure seeds from MINAGRI.
- Rather than keeping all my money at home as I used to in the past (with all the inherent risks), I now have an account that allows me to efficiently manage my finances. The account also opened doors for me to establish a good relationship with Duterimbere, which I can contact to request other loans.

Extending Agro-Input Dealer Networks (EADN)

Improving the financial returns of farmers is central to establishing food security and alleviating poverty in rural areas of Kenya, Tanzania and Uganda. The EADN project is increasing smallholder farmers' productivity through access to modern technologies and yield-enhancing agricultural inputs.

Agro-dealers play a key role in linking smallholder farmers to input and output markets. EADN increased the knowledge of 535 small-scale agro-dealers in 2010. The project helps agro-dealers organize into associations and trains them to provide technical and advisory services to farmers.

EADN also establishes crop demonstrations and field days to show farmers the benefits and correct use of agro-inputs. In the photo to the left, farmers are admiring a sunflower crop at a demonstration plot in Tanzania. In 2010, nearly 4,300 farmers participated in EADN field days.

The three-year EADN project (2008-2011) is funded by the International Fund for Agricultural Development (IFAD) and supports IFAD investment projects in the region.

CATALIST and SEW Projects Educate with New Videos

Integrated Soil Fertility Management (ISFM) is the topic of a video currently being produced by IFDC's CATALIST project. Concurrently, a video about improved carbonization techniques is being produced by the CATALIST-affiliated Sustainable Energy Production Through Woodlots and Agroforestry (SEW) project. The videos will be used extensively in the projects' Central African focus countries – Burundi, the Democratic Republic of Congo and Rwanda.

ISFM was pioneered by Dr. Henk Breman, chief of party of the CATALIST project. According to Breman, "ISFM is the key to increasing agricultural productivity while protecting the environment and maintaining (or even enhancing) the soil resource base." ISFM strategies center on the combined use of mineral fertilizers and locally available organic amendments (crop residues, compost and green manure) to replenish lost soil nutrients, improving its fertility and enhancing crop growth. Continued Breman, "Organic soil amendments interact with mineral fertilizers to replenish soil nutrients, improving both soil quality and the efficiency of fertilizers and other agricultural inputs – seeds, CPPs and water."

In addition, ISFM promotes improved crop management practices, measures to control erosion and leaching and techniques to improve soil organic matter maintenance. Farmers who have adopted ISFM technologies have more than doubled their agricultural productivity and increased their farm incomes by 20 to 50 percent.

Wood and charcoal continue to be the main sources of energy (particularly for cooking) in the Great Lakes Region. This dependence contributes to an increase in deforestation and a corresponding decrease in wood supplies. To address the ongoing energy crisis, CATALIST/SEW is working to strengthen the fuel wood value chain in the three countries.

"Charcoal producers have been eager to learn about a new technology – the improved carbonization kiln – which increases the amount of charcoal produced while using less wood," stated André de Groot, SEW project coordinator. "SEW is teaching 'charcoalers' and others in the fuel wood value chain about this more efficient method of producing charcoal. Improved kilns create less waste and damage to the environment while boosting production and income potential for charcoal producers."

Filming an educational video in Burundi.

Both videos are being filmed and directed by Dr. Toon Defoer, who has specialized in the development of interactive innovation approaches and tools for natural resources management. Defoer earned a Master of Science in agricultural and environmental sciences at Ghent University in Belgium. He later earned a Ph.D. at Wageningen University in the Netherlands. His focus was on "Participatory Learning and Action Research for Integrated Soil Fertility Management."

Prior to beginning his own video production company, Defoer worked for a number of prestigious organizations (United Nations Food and Agriculture Organization, DHV Consultants, Royal Tropical Institute, International Center for Development - Oriented Research in Agriculture and WARDA, the Africa Rice Center). He held such positions as agricultural research and development advisor, senior scientist and training consultant. During his career, Defoer has worked throughout Africa and in Europe and Pakistan.

To see a short clip from the carbonization video, please visit http://www.dailymotion.com/video/xgispg_makala_news.

Project for the Prevention of Seed Cotton Contamination in West Africa *(European Union/Common Fund for Commodities Project)*

Harvested cotton awaits collection from a rural area in Mali.

Challenges to Clean Cotton

Cotton plays a significant role in the fight against poverty and the development of national economies in many West African countries, generating foreign exchange and providing employment and income to millions of farm families. Historically, West African cotton has been highly valued for its intrinsic quality, and the fact that it is harvested by hand should give it a comparative advantage in the international market.

However, some of its value is being lost during the harvesting and post-harvesting processes because of contamination by foreign matter such as plant debris, insects and polypropylene sack fibers. A recent study by the Commonwealth Scientific and Industrial Research Organization of Australia indicated that the contaminant level in West African cotton is the highest in the world; Burkina Faso, Côte d'Ivoire and Mali were on the list of "most contaminated" sources of cotton.

Contamination is a serious challenge that has hurt West African cotton's reputation for quality and its overall profitability in recent years. Prices paid for contaminated cotton can be five to 20 percent less than what is paid for average quality cotton. The most harmful contaminant is polypropylene, which typically originates from old sacks and tarps used for cotton harvest. A small piece of polypropylene can go undetected throughout the ginning, spinning and weaving processes and only becomes visible during the dyeing process, leading to the rejection of the final fabric or garments.

Protecting Cotton Quality

To address the challenge, IFDC is implementing the Project for the Prevention of Seed Cotton Contamination in West Africa (PPCC), which is funded by the European Union and the Common Fund for Commodities. The project is reducing contamination along the entire value chain, from production to ginning, and works to ensure that higher prices are paid for non-contaminated cotton. The project has been working in three intervention countries – Burkina Faso, Côte d'Ivoire and Mali – in close partnership with cotton companies and in synergy with other ongoing cotton projects in the sub-region. (The EU-funded project activities in Côte d'Ivoire have been suspended temporarily as of late February 2011.)

The general objective of PPCC is to increase smallholder cotton farmers' incomes by reducing fiber contamination through: 1) farmer training; 2) promoting sacks and tarps made from cotton for harvest and transport; and 3) seeking a higher price in the world market for non-contaminated cotton and price premiums for farmers producing non-contaminated cotton.

Farmer Training

Farmer training materials were prepared by specialists from the participating cotton companies (Compagnie Malienne pour le Développement du Textiles and its Filiale Sud in Mali, SOFITEX in Burkina Faso and Ivoire Coton in Côte d'Ivoire) and adapted to the conditions in each of the three countries. Training specialists in each country trained 88 extension workers from the cotton companies, who then trained more than 9,000 farmers in proper harvesting and storage practices. Training of the transporters (120) and ginning staff (361) was conducted to teach practices that ensure that no contamination takes place during transport and ginning.

Promoting Cotton Harvesting Kits

Cotton farmers typically have had access only to polypropylene sacks for harvest. The project facilitates access by farmers and their producer cooperatives to special cotton harvesting kits. Each kit contains seven harvesting bags, two purchasing tarps and one storage tarp, all made of cotton. In 2010, 9,000 kits (3,000 in each country) were distributed to participating farmers.

Ginning of the seed cotton has started in Mali and Côte d'Ivoire and will begin soon in Burkina Faso. Ginning is expected to end in March 2011. More than 28,000 tons of seed cotton are expected by the participating cotton producers, which should yield about 12,000 tons of non-contaminated lint.

Marketing Cleaner Cotton

PPCC also works with cotton buyers to promote non-contaminated cotton in the world market and to ensure that it receives a premium price. Eventually, such premiums will hopefully be transferred to the cotton growers who are producing non-contaminated cotton. To start, an impact study of cotton contamination on prices will help those involved to understand the relationship between contamination and price. Efforts will also include facilitation of visits to the region by traders and buyers; the project just facilitated a successful visit by Asian buyers to Burkina Faso and Mali in January.

Numerous Options Available to Build Soil Quality

Crop residue left in the field to degrade back into the soil.

Farmers around the world have practiced soil amendment techniques for millennia. As early as 450 B.C., pre-Columbian tribes added charcoal produced from wood, bone and manure, creating highly fertile Amazonian soil. Around 2,000 years ago, Chinese farmers applied calcined or lime-treated bones to build soil health. Evidence shows that by 100 A.D., early Britons were applying marl, a calcium carbonate-rich clay found in lake and river beds, to their soils.

In the early- to mid-1800s, ground animal bones and bat guano were exceedingly popular soil amendments. (In fact, a war was fought over control of the guano.) However, supplies of these organic soil amendments were finite, and those supplies were soon exhausted. Then sodium nitrates found in the soils of the Atacama Desert of South America were used as fertilizer. Again, as the supply decreased, prices rose. In the early 20th century, the first chemical (inorganic) fertilizers were introduced.

But even with major improvements in chemical fertilizers, the search for organic methods to build soil nutrient quality continued. Proponents of natural methods to build soil fertility gained ground in the 1940s, and they continue their "green" efforts today.

Biochar: An Old Remedy Gains New Ground

Terra Preta was discovered in the mid-20th century in higher elevations of the Amazon River basin of South America. Terra Preta is a type of very dark, fertile anthropogenic soil, characterized by high carbon and phosphorus content and high pH. These Terra Preta soils are pre-Columbian and were created by humans between 450 B.C. and 950 A.D. This soil can reach two meters (6.5 feet) in depth, and has been reported to regenerate itself at the rate of one centimeter (0.4 inch) per year.

Terra Preta was created by burning plant residue, trees, pottery, animal waste, bones and other materials at low temperatures. The burning debris was then covered with topsoil and left to smolder. The resulting charcoal dramatically increased the levels of carbon, phosphorus and microbial activity.

Modern efforts to replicate this method have gained traction over the last decade and have evolved into the biochar industry. Biochar is created through pyrolysis, or the high temperature burning of biomass in the absence of oxygen. In addition to solid biochar, pyrolysis results in the creation of liquid (bio-oil) and gas (syngas) products – all of which have high potential in commercial markets.

An additional benefit is biochar's ability to turn the treated area of land into a geological carbon sink. In the natural carbon cycle, plant matter decomposes rapidly, releasing carbon dioxide (CO_2) into the atmosphere. By taking biomass out of the regular decomposition cycle, biochar removes CO_2 from the air – almost permanently sequestering the carbon, creating a carbon-negative environment.

Biochar is one of the most promising organic technologies available to increase soil fertility. Its ability to produce effective solid, liquid and gas derivatives – while offering one solution in the quest to reduce carbon emissions – makes it a technology with high potential for future agricultural applications.

Nature Farming: Holistic Approach to Soil Care

According to the U.S. Department of Agriculture (USDA) publication, *Sustainable Agriculture: Definitions and Terms*, "Nature Farming grew out of the philosophy and methodology of Japanese philosopher Mokicho Okada in the mid-1940s. The theory of Nature Farming rests on a belief in the universal life-giving powers that the elements of fire, water and earth confer on the soil..."

Kyusei Nature Farming was an early outgrowth of the Okada movement, but farmer adoption was slow. The farming practice eventually gained strength in the 1980s when Dr. Teruo Higa of the agricultural department at the University of Ryukyu in Japan added science to the spiritual philosophy.

Higa developed effective microorganisms (EM), a conglomeration of microbes grown in a controlled setting then distributed as a commercial soil amendment. His research proved that EMs increase the microbial diversity of agricultural soils, which, in turn, enhance the growth, health and yield of crops – increasing the amount of fixed nitrogen (N) available to plants.

The Kyusei method recommends an annual EM application rate of two to three liters per 1,000 square meters. EM has been proven effective in accelerating both seed growth and compost development and complementary uses in other areas of farming. Reports indicate that the system has a positive impact on the production of rice, tomatoes, carrots and peanuts in Japan, Taiwan and Thailand. It is estimated that there are more than 20,000 farmers using EM throughout Thailand, with growing adoption rates in other Southeast Asian countries.

Biotic Fertility: Feeding the Microbes That Feed the Plant

According to John Marler, chairman of the Nutrition Security Institute and senior vice president of Perfect Blend Organics, biotic fertility is the use of living topsoil microorganisms to increase soil quality.

In a recent presentation to IFDC staff, Marler explained that instead of feeding the plant directly as chemical fertilizers do, biotic fertilizers feed microorganisms in the soil. As these microbes die, they release nutrients for plant uptake, primarily in the form of fixed N.

"An acre of healthy topsoil may contain four to five tons of living microorganisms," said Marler. "Biotic fertility is designed to bring depleted soils to those healthy levels."

Marler stated that when sufficient bulk nutrients designed for topsoil bacteria are added to the soil, the reflexive response of the microorganisms is to increase their populations. In essence, the bacteria population 'blooms,' adding large quantities of chelated nutrients to the soil in a single event. In addition to the N levels in topsoil bacteria (14 percent N by dry weight), other elemental nutrients essential to plant growth are promoted.

The primary fuel for this growth is processed chicken waste. Various levels of nitrogen, phosphorus, potassium, secondary nutrients and mycorrhizal spores are added during the manufacturing process.

Marler asserted that extreme experimental conditions have proven the viability of the organic technology. "We once used the process to grow crops in sand with the same success that we've had in more realistic soil conditions," he stated.

Tried and True: Crop Residues Give Back to the Soil

Crop residues, or the plant wastes that remain after grain or fruit is harvested, can be critical to continued soil health. During the life of a crop, it takes up nutrients from the soil. Stalks and leaves are ideally left in the field, or in some cases brought back after processing, in order to decay back into the soil – returning the nutrients that were once were trapped in the plants. This is a key component of ISFM.

This is a common practice in most developed world agricultural systems. However, some developing world farmers find it impractical to utilize crop residues as soil amendments.

"You must remember that many smallholder farmers in the world rely on every part of the crop," said Dr. Sabesh Kanagalingam, senior research project leader at IFDC. "In many parts of Africa, for instance, residues are used to feed livestock; stalks and leaves are used for housing, and so on. There's simply very little left to return to the soil."

Combining Fertilizer and Organic Amendments

According to Kanagalingam, most organically based soil enhancement solutions have viability at one level or another. But the key question is that of concentration. Fertilizer has been popular for 160 years because of its ability to concentrate required plant nutrients into a small delivery system.

However, the benefits of chemical fertilizers do not diminish the potential of organic technologies. In fact, many agricultural experts agree that the combination of both technologies brings a beneficial balance to rebuilding depleted soils around the world.

Dr. Henk Breman, IFDC principal scientist and chief of party for the CATALIST project in Central Africa, pioneered ISFM – combining mineral fertilizers with natural soil amendments.

With an edict to protect the environment while maintaining or enhancing the soil resource base, ISFM actively seeks locally available amendments, establishes standards and methodologies for their use and supervises implementation.

"We're combining the best of both worlds," said Breman. "The amendments feed the microorganisms that build natural soil fertility, while the fertilizer gets the required nutrient quickly and efficiently to the plant." Breman reported that the practices work well together. "The fertilizers used by the plant give the natural amendments time to replenish the soil. It's very symbiotic."

When asked about the future of organic fertility in relation to agricultural development, Breman agreed with Kanagalingam. "Any and all advancements in soil fertility are welcomed. But the technology must be practical, affordable and scalable," he said. "By combining these organic practices with inorganic fertilizers, you get the maximum desired effect. And we must have that in order to rebuild the world's depleted soils."

Note: ISFM is actively supported by IFDC through the CATALIST project in the Great Lakes Region of Central Africa – a region with the highest negative soil nutrient balance in the world. ISFM was also a key component to the holistic agricultural development project, From Thousands to Millions (1000s+), which recently ended successfully in West Africa.

IFDC Study Appraises Fertilizer Adulteration Concerns in Southeast Asia

Each specific fertilizer has a particular color and texture. Adulterated products look very much like the products they imitate.

Many agricultural development experts are at odds when it comes to the breadth and depth of fertilizer adulteration in the world market.

There is agreement that product manipulation does occur, and is even quite common in some areas of the world. But turning anecdotal evidence into empirical data is the challenge – an effort that could shine a light on the true degree of adulteration occurring nationally, regionally and internationally.

International organizations recognize the need for actionable data in this area, and are beginning to focus resources to more precisely identify adulteration issues. In 2010, for example, the World Bank commissioned IFDC to conduct a study to analyze potential adulteration issues in Cambodia.

The resulting report, *Rapid Appraisal of Fertilizer Quality in Cambodia*, was authored by Ian Gregory, an agribusiness specialist at IFDC.

Regarding the concern that adulteration may be present in the market, Gregory and his team analyzed 103 fertilizer samples selected randomly from importers, distributors and retailers in 10 Cambodian provinces.

The primary fertilizer studied was diammonium phosphate (DAP). Although the majority of samples were within acceptable analysis ranges, one sample stood out.

"This particular DAP sample, which fell substantially below acceptable analysis, had been coated with fuel oil," Gregory said. " The intention was to blacken the granules to look more like the DAP produced in the United States, a product highly valued in the Southeast Asian market." The report indicated that the sample also contained large amounts of silica particles, or sand. The product being sold as high-quality DAP was imported into Thailand, then exported to Cambodia to an unsuspecting market.

According to Gregory, the adulterated DAP was relatively sophisticated. "The perpetrator(s) had access to the real DAP, the capability to produce the fake granules and the facilities to blend the products together on a large scale." Getting the product past inspection points may not have been difficult, with either no inspection or with falsified analysis records, possibly taken from the original, unadulterated DAP supply.

Gregory admitted that monitoring on a nationwide scale can be difficult. "It's not just a question of political will to create legislative and/or regulatory oversight," he said. "Those tasked with enforcement must be properly trained and provided with the appropriate testing tools."

The report stressed the need for Cambodia's Department of Agricultural Legislation and its field inspectors to have access to efficient and reliable fertilizer analytical services, stating that visual inspections alone are insufficient. The report concluded by recommending that the nation's Ministry of Agriculture, Food and Fisheries insist on independent quality assurance certificates of analysis from accredited organizations.

Dr. Tom Thompson, a senior scientist in sociology, is one of numerous IFDC advocates for investigation in this area. "We have to find productive ways to turn adulteration rumors, opinions and assumptions into facts that industry and governments can act on," he said. "Any opportunity we have to generate scientific data gets us one step closer to finding solutions to combat the issue."

Sporadic reports of adulteration of inputs continue to surface from Bangladesh to Africa. As fertilizer prices continue to rise, and enforcement remains weak, there is a growing concern that the number of traffickers in adulterated fertilizer will rise.

"It's not just a question of political will to create legislative and/or regulatory environments. Those tasked with enforcement must be properly trained and provided with the appropriate testing tools."

Ian Gregory
agribusiness specialist at IFDC

Dr. Josué Dioné Joins IFDC Board of Directors

Dr. Josué Dioné, director of Food Security and Sustainable Development at the United Nations Economic Commission for Africa (UNECA), accepted a three-year appointment to IFDC's board of directors, effective January 1, 2011.

Dioné has more than 30 years of experience working with development policies, strategies and programs that focus on agriculture, food security and sustainable development in Africa. He is serving on the board's Africa Committee.

Dioné has worked with UNECA, which is based in Addis Ababa, Ethiopia, since 2001. UNECA promotes the economic and social development of its member states, fosters intraregional integration and promotes international cooperation for Africa's development.

Dioné has provided strong leadership and enhanced cooperation among UN agencies working on major sustainable development issues in Africa by providing catalytic support for the establishment of inter-agency groups on water (UN Water/Africa), energy (UN Energy/Africa) and biotechnology (UN Biotech/Africa). He also has spearheaded initiatives to build effective partnerships with the African Union Commission and the African Development Bank on major continental programs regarding land policy and climate and development.

Prior to coming to UNECA, Dioné formulated strategies and policy guidelines as principal policy economist for the African Development Bank. He also coordinated and managed policy research, networking, dialogue and advisory services on agricultural development, food security and poverty reduction in West Africa as regional program coordinator for the Institut du Sahel in Bamako, Mali.

Josué Dioné. *Photograph courtesy of IISD/Earth Negotiations Bulletin*

A citizen of Mali, Dioné holds doctorate and master's degrees in agricultural economics from Michigan State University (United States) and Université Laval (Canada), respectively.

Zinc Biofortification Research Trials in Bangladesh

Zinc, iron and manganese biofortification trials in an IFDC greenhouse.

Millions of people in developing countries suffer from micronutrient deficiencies. The World Health Organization reports that zinc and iron deficiencies rank fifth and sixth among the 10 most important health risk factors in low income countries.

Zinc is vital for the immune system. Low zinc levels reduce and weaken certain white blood cells (specifically, T-cells), which are not able to recognize and fight certain infections. IFDC is working to solve micronutrient deficiencies by raising the levels of zinc and other micronutrients in staple crops (rice, wheat, maize, etc.) in developing countries. IFDC plans to "deliver" bio-available zinc via commodity fertilizer supplies that have been supplemented with zinc and other micronutrients.

IFDC research scientists are now conducting research on zinc-supplemented fertilizers through trials at its headquarters' greenhouses and field trials in Bangladesh. Current biofortification trials involve innovative fertilizers that enhance micronutrient delivery and use efficiency for higher yield and nutrient content.

According to Dr. Upendra Singh, IFDC principal scientist/specialist, the research shows zinc and nitrogen interactions. "Enrichment of grains with zinc is maximized when plants are supplied with sufficient nitrogen. Fertilizer deep placement technology, which was developed by IFDC and introduced to Bangladesh, improves nitrogen use efficiency and plant nutrition."

The three-year biofortification project will link to other IFDC programs currently underway in Bangladesh and will collaborate with local research and extension partners to expand and promote fertilizer deep placement technology.

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2011 International Training Calendar

Training Program	Dates	Location	Program Fee (USD)
1. DSSAT 2011 - Decision Support for Agro-Technology (DSSAT Version 4.5) – Joint Program with Washington State University and the University of Florida	May 9-19	USA (Muscle Shoals, Alabama)	$1,500
2. Phosphate Fertilizer Production Technology (with IFA)	June 20-24	Berlin, Germany	$2,500
3. Fertilizer Policy and Marketing Strategies in Africa	July 4-8	Nairobi, Kenya	$1,200
4. The Fertilizer Value Chain – Supply System Management and Servicing Farmers' Needs	August 22-26	Bangkok, Thailand	$1,500
5. Nitrogen Fertilizer Production Technology (with IFA)	October 3-7	Seville, Spain	$2,500
6. Linking Farmers to Markets in Africa	November 21-25	Accra, Ghana	$1,200
7. Assessing Indigenous Fertilizer Production Opportunities in Africa	December 5-9	Arusha, Tanzania	$1,200