



IFDC

International Fertilizer Development Center

2018 ANNUAL REPORT

**DEVELOPING
AGRICULTURE
FROM THE
GROUND UP**

TABLE OF CONTENTS

Letter	1
Our Reach in 2018	2
Feature: Taking Tech to the Last Mile	4
IFDC Research	10
North and West Africa	14
East and Southern Africa	23
Asia	32
IFDC International Training	38
2018 Publications and Presentations	40
2018 Financial Statement	44

OUR MISSION

IFDC enables farmers in developing countries to increase agricultural productivity, generate economic growth, and practice environmental stewardship by enhancing their ability to manage mineral and organic fertilizers responsibly and participate profitably in markets.



Cover Photo: Minitubers for More Yields

A key activity of the Resilient Efficient Agribusiness Chain in Uganda (REACH-Uganda) project is to improve access to high-quality potato seed. Quality potatoes begin with tissue culture plantlets, a technology that allows for the development of potato seed. The plantlets are supplied by the Kachwekano Zonal Agricultural Research

Development Institute (KAZARDI) under the National Agricultural Research Organization (NARO) to screen house owners, such as Charles Byarugaba. The screen house owners then produce minitubers using proper fertilizers and sell the high-yielding, disease-free product to farmers. Byarugaba, a highly successful screen house owner, harvests upwards of 50 tons of seed potato per season. The high-quality product not only benefits farmers, but Byarugaba also has increased his income, through producing minitubers and managing his own farm, to build a new solar-powered house.

2018 IFDC BOARD OF DIRECTORS

Board Chairperson
Dr. Jimmy Cheek
United States

Board Co-Chairperson
Dr. Rudy Rabbinge
The Netherlands

Board Co-Chairperson
Mrs. Rhoda Peace Tumusiime
Uganda

Dr. Mohamed Badraoui
Morocco

Dr. Josué Dioné
Ethiopia

Ms. Charlotte Hebebrand
United States

Mr. Douglas Horswill
Canada

Dr. Agnes M. Kalibata
Rwanda

Dr. Mark E. Keenum
United States

Dr. Steven Leath
United States

Ms. Esin Mete
Turkey

Mr. William P. O'Neill, Jr.
United States

Dr. R.S. Paroda
India

Mr. Jason Scarpone
United States

Chairperson Emeritus
Mr. Peter McPherson
United States

Ex-Officio
Dr. J. Scott Angle
Former President & CEO
United States

Ex-Officio
Mr. Patrick Murphy
Interim President & CEO
United States

Letter from IFDC President & CEO and Chairperson of the Board

The year 2018 was marked by an unexpected change in leadership. Dr. J. Scott Angle, after serving IFDC for three years, assumed the role as the Director of the National Institute of Food and Agriculture (NIFA) with the U.S. Department of Agriculture (USDA). Former IFDC board member Pat Murphy stepped in to lead the organization as Interim President and CEO. In February 2019, the board appointed Albin Hubscher as President and CEO.

Many of our field projects had great success in 2018. IFDC established over 1,200 demonstration plots. More than half a million farmers applied good agricultural practices (GAPs), impacting 407,000 hectares. These projects scaled their work, establishing 330 public-private partnerships. We remain committed to raising the success of farming communities that are less privileged, fostering resilient market systems, and ensuring sustainability through appropriate policy influence and the creation of public-private partnerships that allow scaling of market systems and technologies.

We are proud to announce that phase one of the 2SCALE project was successfully finalized, and preparations for phase two were successful. Through more than 50 business incubations, over 600,000 farming families benefit from inclusive market access for their agricultural produce. Thanks to well-structured support on the production side, including productivity-enhancing technologies, scaling up has exceeded expectations. Phase two will start during the first half of 2019, and along with consortium partners Base of the Pyramid Innovation Center (BoP Inc.) and SNV, we are once again expecting stellar results.

The Feed the Future Ghana Agriculture Technology Transfer (ATT) project, funded by the United States Agency for International Development, completed work in 2018, demonstrating success in northern Ghana, specifically focused on certified seed distribution, improved soil fertility, and good water management practices (see page 4). The northern Ghana region is marked by a harsh and dry climate, and farmers lack access to seed and water technology. These factors limit farming to one season. Because of project interventions, many farmers are now practicing the “Double Cropping - Dual Income” methodology, which allows farmers to grow a second high-value crop during the dry season by planting drought-tolerant seed and utilizing drip irrigation technologies. Some farmers who employed these techniques increased their income by more than 35% for the year.

With support from the Embassy of the Kingdom of the Netherlands in Uganda, the Resilient and Efficient Agribusiness Chains in Uganda (REACH-Uganda) project is increasing profitability and resilience of potato and rice farmers (see photo essay on page 21). Using a market systems development approach, REACH-Uganda is linking farmers to markets, assisting farm households to become resilient through practicing climate-smart agriculture, diversifying income, implementing gender equity in joint decision-making, and participating in local savings schemes.

Finally, it is with great sadness that in March 2019, after an extended period of illness, our esteemed board member Dr. Mohamed Badraoui, Director General of Morocco’s National Agronomic Research Institute (INRA), passed away. He served on the IFDC board since 2012. On behalf of the IFDC board and all employees, we express our gratitude to Dr. Badraoui and extend our sympathy to his family.



Albin Hubscher
President & CEO



Dr. Jimmy Cheek
Board Chairperson

A handwritten signature in black ink that reads "Albin Hubscher".

Albin Hubscher
President & CEO

A handwritten signature in black ink that reads "Jimmy S. Cheek".

Dr. Jimmy Cheek
Board Chairperson



BANGLADESH | BENIN | BURKINA FASO | BURUNDI | CÔTE D'IVOIRE | ETHIOPIA | GUINEA | GUINEA-BISSAU | HONDURAS | KENYA | MALI | MYANMAR | NEPAL | THE NETHERLANDS | NIGER | NIGERIA | RWANDA | SENEGAL | SIERRA LEONE | TANZANIA | THAILAND | UGANDA | UZBEKISTAN | ZAMBIA



1,207

**DEMONSTRATION PLOTS
ESTABLISHED**

Management practices and/or technologies tested in farmer fields for dissemination



508,961

**FARMERS TRAINED
(45% WOMEN)**

Direct farmer participants in short-term capacity building on management practices and/or technologies



549,184

**FARMERS APPLYING GOOD
AGRICULTURAL PRACTICES**

Farmers who have applied improved farm management practices and/or technologies

ACHIEVEMENTS IN 2018



CÔTE D'IVOIRE | ETHIOPIA | GHANA | KENYA | MALI | MOZAMBIQUE
BURUNDI | SENEGAL | TOGO | UGANDA | UNITED STATES OF AMERICA



406,984

**AREA UNDER GOOD
AGRICULTURAL PRACTICES**

*Hectares under improved management
practices and/or technologies (managed
or cultivated by farmer partners)*



331

**PUBLIC-PRIVATE
PARTNERSHIPS**

*Agreements between public
and private firms/actors and
research, academic, civil society,
and stakeholder associations*



818

**OUTREACH
ACTIVITIES**

*Dissemination activities –
Workshops, forums, stakeholder
consultations, publications, and print,
radio, and television media*

Taking Tech to the Last Mile

USAID Project Empowers Producers in Northern Ghana



▲ A lab technician of the Ghana Seed Inspection Division participates in a Seed Quality Testing Workshop at a rehabilitated lab in Tamale.

Northern Ghana is often called the nation's breadbasket, but the region has the highest poverty rates and lowest per capita incomes in the country. Smallholder farmers struggle to access agricultural technologies, and erratic rainfall water permits only one farming season.

To transform the region's agriculture sector, the Feed the Future Ghana Agriculture Technology Transfer (ATT) project formed partnerships with smallholder producers, agribusiness entrepreneurs, and government and research institutions. Private agribusinesses grew, expanding their reach to last-mile consumers. Research infrastructure and markets improved, and farmers gained access to improved seeds, fertilizers, and better production methods.

Today, more than 200,000 farmers in remote areas are using agricultural technologies and practices that boost yields, improve income, and build resilience.

Overview

Funded by the United States Agency for International Development's Ghana Mission (USAID/Ghana), ATT addressed technology constraints in Ghana's Northern, Upper West, and Upper East regions from 2013 to 2018. IFDC implemented ATT using a holistic approach that involved strengthening the seed and agro-input value chains and promoting good agricultural practices, integrated soil fertility management (ISFM), and water management technologies. The project built the capacities of the local private sector, government and regulatory bodies, and research institutions to foster a dynamic agriculture sector.



Regional boundaries as of December 2018

Results



Over 200,000 smallholder farmers reached with improved technologies and practices



228% increase in maize yields, 287% increase in rice, and 266% increase in soybean



Over \$7.8 million in incremental sales of seeds and fertilizer by the private sector



124 public-private partnerships formed to bolster the agriculture sector



Over \$2.77 million leveraged in new private sector investment in agriculture

OBJECTIVES

- Increase **private sector's** role and capacity in developing and disseminating improved technologies
- Increase efficiency and transparency of **government functions** to support seed, fertilizer, and ISFM technology development, release, and dissemination
- Increase efficiency of targeted **agricultural research** to develop, release, and communicate technologies that support sustainable agricultural productivity

PARTNERS

To ensure outcomes and opportunities created through ATT are sustainable, the project cultivated extensive partnerships with existing institutions, both public and private.

Government Agencies

- Three northern regional offices of the Ministry of Food and Agriculture
- Ghana Seed Inspection Division
- Plant Protection and Regulatory Services Directorate

International Research Institutions

- Iowa State University
- Centre for Development Innovation of Wageningen University and Research

National Research Institutions

- Savanna Agricultural Research Institute
- University for Development Studies

Local Implementing Partners

- Ghana Agricultural Associations Business and Information Centre
- Local non-governmental organizations
- Local private sector enterprises

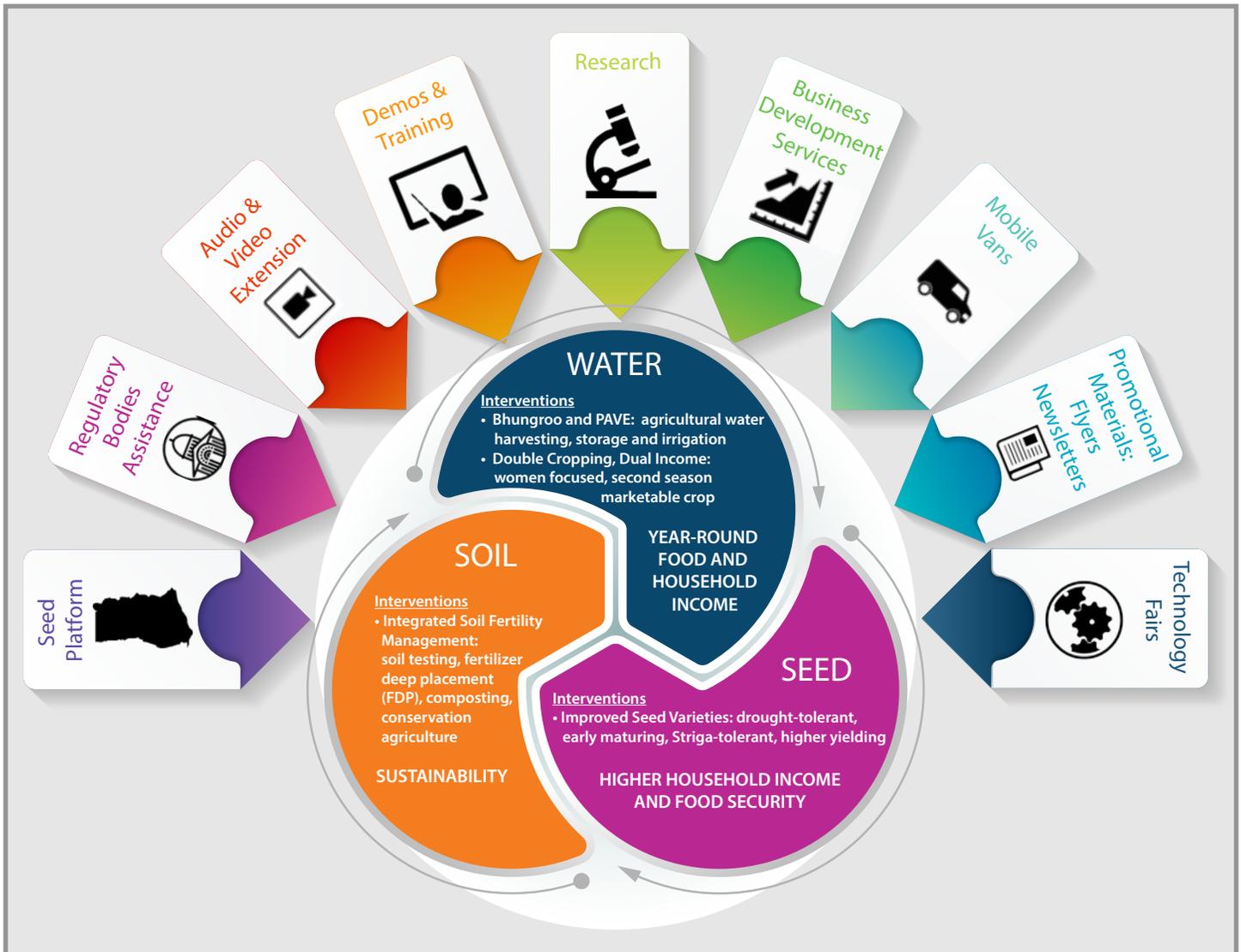
Strategy: Partnering for a Solid Foundation

To establish a firm foundation for sustainable growth, ATT engaged local partners to carry out project interventions at the community level. ATT worked through 33 local implementing partners (LIPs) instead of focusing on direct implementation. The LIPs had worked with local farmers for years and were the main agents of change in communities. This allowed the project to reach a wide area and remain visible in remote communities. It also set up networks and mechanisms to ensure sustainability once project activities ended.

Creating a regulatory and institutional environment that fosters private sector-driven growth was also a major focus of ATT.

This included strengthening national research institutions and regulatory units. Because bringing actors together is vital to a thriving agro-input sector, ATT established platforms to encourage dialogue among all stakeholders in the agro-input value chain. In addition, the project included a \$6 million grant mechanism to assist nascent local organizations, such as private seed and agro-input businesses, public extension agencies, and non-governmental organizations.

ATT's intervention and implementation strategy was to focus simultaneously on the essential elements of agricultural production – seed, soil, and water.



▲ *Seed-Soil-Water: ATT identified scientifically sound and socio-economically appropriate technologies that improve the quality and use of seed, soil, and water. Then, the project transferred the technologies through a variety of interventions, including audio and video extension, demonstrations and training, mobile seed vans, and more.*

Seed: Delivering to the Last Mile

When ATT began in 2013, seed growers' only option for getting their seed certified was through government-operated processing facilities that were in disrepair. In addition, the public sector lacked the capacity to establish an effective seed distribution network. As a result, most seed distributed was poor quality and reached the market too late for the planting season.

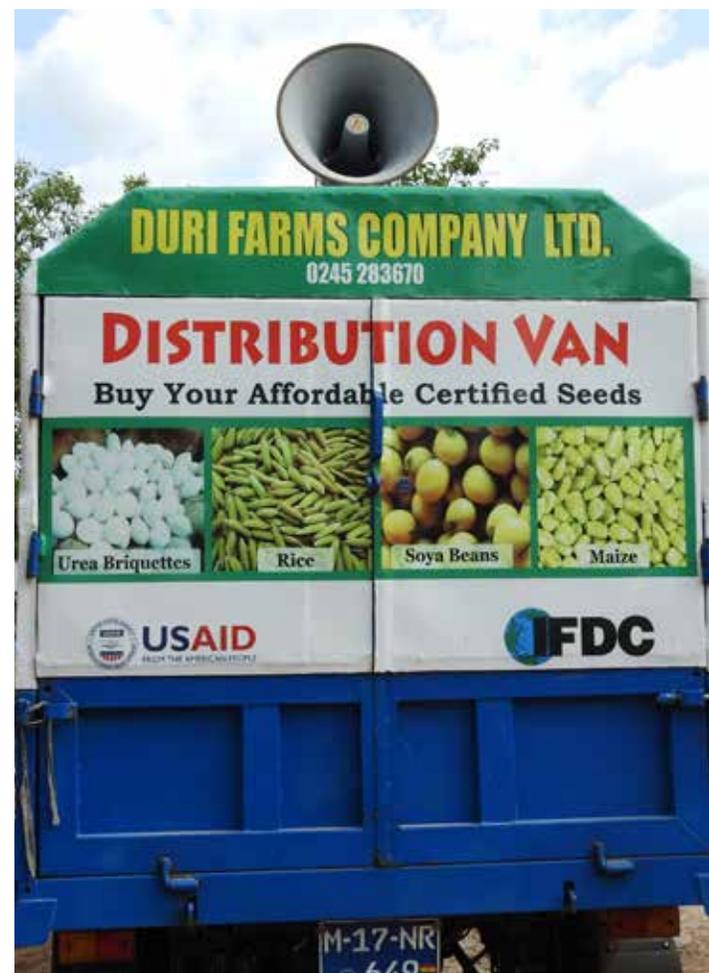
Since ATT has engaged the private sector in certified seed production, registered private firms are now processing seed and marketing it through major input distributors and their trained community-based sales agents. Farmers in hard-to-reach communities – at the last mile – are able to purchase seed and fertilizer supplied by agro-enterprises through the ATT seed van initiative.

ATT also supported public regulatory services to create a more efficient and transparent seed certification system. In order to enhance seed quality assurance practices to meet international standards, ATT helped establish three state-of-the-art seed labs (one per region). The Seed Science Center of Iowa State University trained laboratory staff, and tests that previously took months are now completed in days.

ATT strengthened the research capacity of the Savanna Agricultural Research Institute (SARI), which is mandated to provide agricultural technologies to farmers in northern Ghana. Prior to ATT, SARI's breeding efforts were limited by the region's single planting season. ATT rehabilitated a 10-hectare irrigation scheme at the Wambong Dam, providing SARI stable irrigation to conduct year-round production of breeder and foundation seeds. As a result, SARI accelerated the development and release of new crop varieties.

Demand for certified seed has grown, with its use rising from 10% of total seed use in 2013 to 25% in 2018. The private sector is now producing certified seed for the Government of Ghana's flagship agricultural initiative, Planting for Food and Jobs. By facilitating a more competitive private seed industry and a stronger public research system, ATT has laid the groundwork for further sustainable growth in the agriculture sector.

▼ *Seed Distribution Vans Reach Farmers at the Last Mile: To ensure that certified seeds reach farmers located far from markets, ATT designed an initiative that delivers inputs to farmers and builds business for seed enterprises. Through ATT's small grant support program, 22 vans were provided on a cost-sharing basis to seed producers that travel to communities at the last mile. The vans are motorized tricycles modified to transport seeds, fertilizer briquettes, and other agricultural inputs during the planting season. The vans were branded to promote the seed producers' businesses and equipped with loudspeakers that play jingles and advertisements in local languages. Using the vans, seed producers distributed 260 metric tons (mt) of certified maize, rice, and soybean seeds to farmers across northern Ghana in 2018.*



Soil: Restoring Nutrients to Fight Degradation

Poor crop production practices, misuse of agrochemicals, and burning of crop residues have left soils in northern Ghana “mined” of nutrients, leading to soil degradation and declining productivity. To improve soil health, ATT identified the best soil fertility management technologies for maize, rice, and soybean and conducted more than 80 trials to scientifically confirm the practices. Results were used to generate evidence-based technical packages that ATT disseminated to farmers through various mechanisms, from demonstration plots to technology fairs to video extension.

ATT also established learning centers in irrigation schemes to introduce and scale up certified seed and ISFM practices, including urea deep placement (UDP). With UDP, a fertilizer application practice in which nitrogen is absorbed more efficiently, farmers in the Northern Region improved their rice

output and gross margins significantly. In addition, urea briquette production created profitable business opportunities for local entrepreneurs in rural communities.

Most of the fertilizer recommendations for various crops in sub-Saharan Africa are outdated. Recommended fertilizer rates in Ghana are from soil fertility tests conducted in the 1970s. To help get balanced fertilizer into farmers’ hands, ATT collected more than 15,000 georeferenced soil samples to develop soil fertility maps to aid in creating site- and crop-specific fertilizer recommendations. In addition, ATT introduced soil testing through an emerging private sector soil lab and advanced a national dialogue among stakeholders on soil fertility and fertilizer recommendations through the Northern Ghana Soils and Fertilizer Forum, held April 10-12, 2018, in Accra.



◀ *Opportunities for Women: Because of the employment created by ATT-promoted technologies, the demand for farm labor increased in northern Ghana. Based on ATT’s observations, this demand is being met mostly by women and unemployed youth. For example, ATT encouraged women trained in rice seedling transplanting and UDP application to provide these services for a fee. Now, women in communities near ATT-supported irrigation schemes are forming “transplanting gangs” that perform line transplanting for rice producers. They also provide labor for UDP application. The increased employment opportunities prevent women from migrating to cities in southern Ghana for work, an often dangerous and unfruitful venture.*



▲ *ICT Solutions Enable Widespread Agricultural Education: Digital classroom technology enabled ATT to expand its dissemination of new agricultural technologies from hundreds of farmers attending field days to thousands of farmers viewing video presentations in local dialects. ATT produced 25 videos featuring local farmers (left) who shared their experiences with labor-saving equipment such as bicycle-mounted maize shellers and best practices such as using certified seed, transplanting rice, applying UDP, managing crop residues, and using improved soybean harvesting techniques. Video screening events (right) were hosted by lead farmers or community chiefs and included special guests to provide live testimonies to the community. With this peer-to-peer learning process, farmers told their own stories in their own languages, which built trust and facilitated adoption. In addition, the cost is significantly less than traditional extension systems. ATT video productions reached an audience of 400,000 smallholder farmers.*

Water: Breaking Poverty with New Technology

Smallholder farmers in northern Ghana cultivate cereal crops on just over a hectare of farmland. They must contend with flash floods during the rainy season and drought in the dry season. The region's climate allows for only one farming season, making it very difficult for farmers to increase their incomes or provide their families with nutritious foods. These circumstances keep most smallholders below the poverty line of \$1.25 a day.

ATT found that small farm households can improve, or double, farm income opportunities by integrating the production of high-value crops such as vegetables along with cereal crops. To enable "Double Cropping, Dual Income," ATT explored the potential of PAVE and Bhungroo water-harvesting technologies in partnership with Conservation Alliance and the International Water Management Institute. Both technologies act as "artificial aquifers" that capture and store excess floodwater during the rainy season for use during the dry season.

Through demonstration sites, ATT and partners proved the technical viability of Bhungroo and PAVE for capturing and sequestering floodwater. In just two short seasons, the water-harvesting innovations individually supplied more than 2.3 million liters of water per site (2.5 hectares). The water can be stored in the soil for up to 180 days and provides farmers with at least six months of irrigation. According to a 2018 technical brief by Conservation Alliance, 550 farmers in the Zhiang community who sold vegetables during the dry season increased their income by about 35%.

However, while the technologies have the potential to bring additional income and nutrition to farmers, they need to be more fully explored to overcome challenges, particularly proper system management.



▲ A young woman in the Zhiang community of the Northern Region harvests okra grown using PAVE technology.



◀ *Double Cropping, Dual Income - A Lifeline in Northern Ghana: Fuseina Iddrisu, 49, is responsible for feeding her family, paying her five children's school fees, and caring for fowl and goats. Fuseina was inspired to do more by and for herself after participating in a series of PAVE irrigation trainings. Through the trainings, Fuseina and others learned to participate in household decision-making processes. "Now my husband and I discuss family issues and make decisions together," she said.*

Fuseina also learned about livelihood diversification strategies and managing farm resources, such as fertilizer and water, through the PAVE trainings. The PAVE irrigation project provides another cropping opportunity to farmers in the Zhiang community who otherwise would have been idle during the harsh dry season. "This project introduced dry season farming to the community," Fuseina said. "We didn't know this was possible."

Fuseina and her farmer group grew three crops during the 2018 dry season: pepper, cucumber, and carrot. Because of her initiative and her ability to adopt best practices, Fuseina is able to care for her home with fewer challenges than before. Her husband and children are eating more and better food, and they are thankful for her hard work.



▲ *PAVE: An aquifer (left) is created below the earth and filled with water filtration materials that trap, collect, and store excess water during the rainy season. The stored water is then pumped out and held in an overhead tank (right) to irrigate vegetables. Vegetable fields are managed using drip irrigation technology.*



IFDC RESEARCH

IFDC Research transforms new soil and fertilizer ideas into adaptable and scalable production technologies. Our research system encompasses basic to adaptive and applied research components, involving laboratory, greenhouse and field evaluations, fertilizer manufacturing processes (pilot), product testing and refinement, and technology transfer and delivery mechanisms, with a focus on markets and policy considerations.

The overall goal of IFDC research is to close the yield gap. We want to help smallholder farmers *produce more using less* – less nutrients and lower costs – for more efficient, productive, sustainable agriculture systems with minimal environmental footprint.

Soil and Fertilizer Research

In 2018, the IFDC research team focused on maximizing nutrient use efficiency, particularly focusing on the efficiency of nitrogen- and phosphorus-based fertilizer products through incorporating secondary and micronutrients (SMNs) into NPK fertilizers. This improves overall effectiveness and nutrient uptake. We carried out field and laboratory research trials to measure the effects of various fertilizer management practices, such as fertilizer deep placement, and new fertilizer products, including coated and controlled-release products, inhibitors, and SMNs.

Research trials evaluated the effect of different coatings on the slow release of nitrogen in sync with the crop's needs. This involves coating the fertilizer with a natural or synthetic material that can release nutrients at the right time and rate. Coatings evaluated include sulfur, synthetic and biopolymers, gypsum, and zinc oxide (ZnO), and rice-bran wax, among others (Fugice et al., 2018).

Our researchers are also evaluating several forms of nanotechnologies to improve nitrogen (N) use efficiency. Studies have demonstrated that ZnO nanoparticles and Zn salt vary in their effects on nutrient acquisition in wheat, and that the technologies are relevant for biofortification of Zn for human nutrition. Our results indicate that manganese (Mn) nanoparticles in soil affect nutrient acquisition in wheat and would enable better plant responses when given in foliar forms (Dimkpa et al., 2018).

IFDC's research on balanced plant nutrition follows the Soil-SMaRT framework methodology that integrates Soil analysis, Mapping, Recommendations development, and Technology transfer (Wendt, 2018). For example, through the Feed the Future Ghana Agriculture Technology Transfer (ATT) project, IFDC collected more than 15,000 soil and plant tissue samples across Upper West, Upper East, and Northern Ghana. Using these analyses, soil fertility maps were developed showing spatial distribution of soil pH, organic matter, micro- and macronutrients and their availability in soils. Based on the maps, nutrient omission trials were established in collaboration with partners. Several essential plant nutrients, including nitrogen, phosphorus, potassium, zinc, sulfur, and boron, were identified as limiting crop growth in the regions (Agyin-Birikorang, 2018). With the updated soil fertility maps and nutrient omission trials, researchers in northern Ghana are

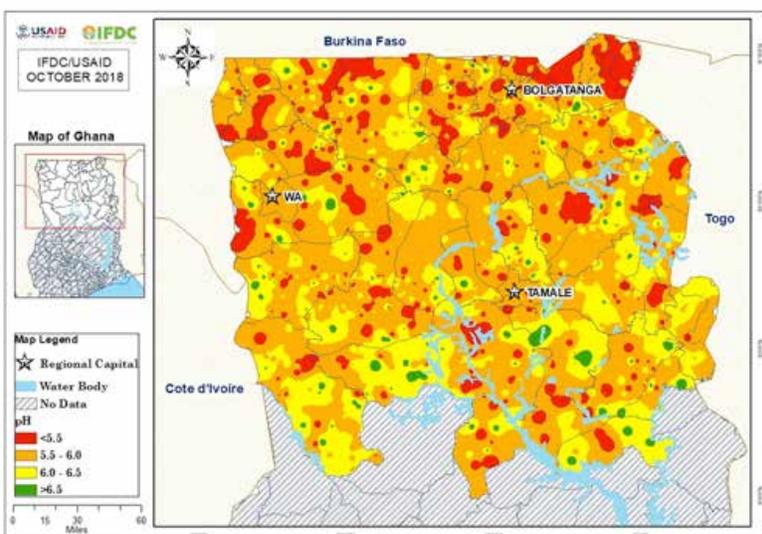


▲ Soil testing using a portable soil test kit in a farmer's field in Rwanda

better positioned to provide fertilizer recommendations that meet crop and soil needs.

Our research shows that most smallholder farmers in sub-Saharan Africa lack access to soil testing laboratories to determine their soil nutrient needs. Currently, there are several portable soil testing kits available commercially in the market for use. However, these kits often vary in performance and accuracy in determining the soil nutrient needs. In 2018, IFDC analyzed the performance of a few kits – Kasetsart, Hach, and SoilDoc – in comparison to standard lab analysis. They were evaluated in terms of their potential for possible scaling and use by smallholders, effectiveness in predicting soil nutrient needs, ability to give rapid testing and results, and affordability (cost). IFDC analysis indicates that while the kits reliably measured soil pH and qualitative values (high, medium, or low nutrient content), their ability to determine actual N, P, and K concentration was inconsistent and varied with different organic matter content and pH levels of soils. Thus, the kits require procedural calibration before soil analysis (Fugice et al., 2018).

During 2018, IFDC's economics and policy work focused primarily on producing evidence-based policy research analysis on fertilizer regulations and market development. IFDC's fertilizer quality assessment team used their findings in Kenya and Uganda as baselines to propose improvements in the fertilizer regulatory system to the countries' governments and the private sector. Quality diagnostics in Kenya identified frequent and severe nutrient shortages in products locally manufactured for foliar application and nutrient shortages at low to intermediate frequencies and severities in granulated imported products. These two quality problems point toward the need to establish inspections at local manufacturing plants and strengthen port inspections. Uganda presented frequent and severe nutrient shortages in granulated products as well as frequent underweight bags. Quality problems in Uganda are mainly explained by the lack of a national regulatory system. Developing a regulatory framework and implementing it will reduce quality problems in the country. Further, the cadmium content in fertilizers traded in both countries was found to be below the European Union tolerance limit. Still, there is need for routine monitoring of cadmium contamination in recommended fertilizers (Sanabria et al., 2018).



▲ Spatial distribution of soil pH in northern Ghana

As a part of advocacy efforts, the IFDC research team also organized stakeholder consultations and workshops in Kenya and Uganda to influence fertilizer policy reform processes through effective engagement of stakeholders – public, private, and civil societies. At the request of Uganda’s Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), the IFDC team engaged in building the capacities of the ministry staff and other stakeholders on the design and effective implementation of input subsidy programs with private sector participation.

In collaboration with Kenya’s Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) and other partners, the Kenya Fertilizer Roundtable (KeFERT) meeting was organized to bring together fertilizer stakeholders and to galvanize fertilizer policy dialogue in the country. KeFERT also resulted in the formation of the Kenya Fertilizer Platform, a public-private stakeholder forum for resolving fertilizer issues and enabling dialogue, coordination, and information exchange. A key outcome of the platform is to create a more competitive fertilizer sector that results in increased accessibility, affordability, and availability of fertilizers to smallholder farmers.



▲ Kenya Fertilizer Roundtable, October 16-17, 2018, Nairobi

RESEARCH FOR RESILIENCE

One of IFDC’s primary research objectives is to advance solutions for feeding an ever-growing population while maintaining climate-smart farming techniques. A promising method is fertilizer deep placement (FDP), the application of fertilizer briquettes, particularly in the form of urea (urea deep placement), deep into the soil closer to plant roots.

While we have proven FDP’s benefits in irrigated rice systems, research is ongoing to determine its effects under stress-prone environments in lowland and upland rice systems and in maize production. In 2018, IFDC engaged in resilience field trials to test FDP’s performance in drought, submergence, and salinity conditions for rice systems in Bangladesh, Myanmar, and Nepal, and in rice and maize systems

in northern Ghana. The objective was to analyze the performance of FDP compared to the broadcast application of prilled urea, which is more widely practiced by farmers.

Results indicate that under drought conditions, FDP increased grain yields of rice by 12% in Bangladesh and 21% in Nepal. Under saline conditions, yield increases ranged from 10% in Bangladesh to 40% in Myanmar while saving urea fertilizer by up to 50%. Similar yield benefits and fertilizer savings were also observed under submerged conditions in Bangladesh, Myanmar, and Ghana (Gaihre et al., 2018; Aung et al., 2018; Agyin-Birikorang et al., 2018).

► A field experiment in drought-prone areas of Nepal evaluated methods of nitrogen fertilizer placement for different rice varieties. Fertilizer treatments included the deep placement of urea briquettes and the deep placement of granular urea (right), among others.



Fertilizer Engineering, Production, and Research

IFDC's fertilizer engineering and research team helps fertilizer producers solve production problems. In 2018, we:

- Conducted research on various binders for use in products for the fertilizer industry.
- Worked on incorporation of a new raw material into existing fertilizer processes.
- Conducted physical properties testing on new fertilizer products introduced into the market.

Research on fertilizer formulations, properties, technical feasibility and overall market feasibility of products is made possible through an interdisciplinary team of engineers, technicians, scientists, and economists.

Engineering and Lab Facilities

- Fully continuous granulation plants
- Phosphoric acid plants
- Bulk-blending unit
- Analytical laboratories for chemical and physical characterizations of fertilizer materials
- Laboratories for fertilizer compaction/granulation, briquetting, pelletizing, tableting, and coating



▲ IFDC Large-Scale Pilot Plant



NORTH AND WEST AFRICA

BENIN | BURKINA FASO
CÔTE D'IVOIRE | GHANA | MALI
NIGER | NIGERIA | SENEGAL | TOGO

IFDC seeks private sector-led solutions to structural problems in the agriculture sector in North and West Africa. Core activities include capacity building of all agricultural value chain actors and facilitation of an enabling policy environment. We support agricultural policy reform processes and provide policy advice aimed at supporting entrepreneurship.

Our work in the region supports the development and implementation of regional agricultural policies within the Economic Community of West African States (ECOWAS) and the West African Economic and Monetary Union (UEMOA). We also work with national public research and regulatory institutions to improve infrastructure and ensure that public services reach the smallholder farmers who need them the most.

IFDC aims to strengthen smallholders' resilience in rural communities in West Africa. The use of balanced fertilizer products and application methods, such as fertilizer deep placement and micro-dosing technologies, is improving nutrient use efficiency and increasing yields and incomes. In addition, we help farmers identify and access profitable markets, usually through public-private partnerships, agribusiness clusters, and farmer-based organizations. Our projects also improve technology transfer, promote integrated soil fertility management, and enable sustainable farming systems.

AFRICAFERTILIZER.ORG

AFRICA-WIDE (ONGOING)

Implementing Partners – International Fertilizer Association (IFA), African Fertilizer and Agribusiness Partnership (AFAP), Argus Media, African Union, Food and Agriculture Organization (FAO) of the United Nations, and International Food Policy Research Institute

The AfricaFertilizer.org (AFO) initiative is the premier source for fertilizer statistics and information in Africa. It is hosted by IFDC and supported by IFA and AFAP. Since 2009, AFO has collected, processed, and published fertilizer production, trade, and consumption statistics for the largest fertilizer markets in sub-Saharan Africa. AFO has an extensive network of fertilizer industry players in the main fertilizer trade corridors and maintains key information on the major producers, their production facilities and capacities, importers/suppliers, various distribution channels, and agricultural service suppliers (laboratory services, research, credit providers, and warehousing/storage services).

2018 HIGHLIGHTS

Fertilizer Technical Working Group workshops were held to validate 2017 statistics data on production, imports, exports, and apparent and actual fertilizer consumption for 12 countries across sub-Saharan Africa.

The 3rd edition of the **Register of Fertilizer Manufacturing and Processing Plants** was published. It included information on 15 manufacturing plants and 59 processing plants.

Retail prices, subsidized prices, and international prices of fertilizers are monitored on a monthly basis in 14 countries in sub-Saharan Africa and form the **FertiNews e-bulletin** that is distributed to more than 3,500 subscribers across Africa and globally.

FEED THE FUTURE ENHANCING GROWTH THROUGH REGIONAL AGRICULTURAL INPUT SYSTEMS (EnGRAIS) PROJECT FOR WEST AFRICA

ECOWAS MEMBER STATES, CHAD, AND MAURITANIA (2018-2023)

Key Partners – ECOWAS, West and Central African Council for Agricultural Research and Development (CORAF), and West Africa Fertilizer Association (WAFa)

Donor – United States Agency for International Development (USAID)/West Africa Regional Mission

EnGRAIS supports African-led regional institutions to address critical issues that constrain the effective supply and use of agricultural inputs, especially fertilizer, in West Africa. The program applies a multi-faceted approach, working throughout the fertilizer supply chain as a facilitator and enhancing strategic actors' ability to improve the business environment and transition to a private sector-led fertilizer market that responds to an effective demand for productivity-enhancing inputs in the region.

2018 HIGHLIGHTS

EnGRAIS assisted WAFa in the organization of the **2018 West Africa Fertilizer Forum (WAFF)** and sponsored the participation of 39 private and public sector attendees from 14 West African countries. An updated version of the **West African Fertilizer Business Information Map** was distributed to WAFF participants.

EnGRAIS developed and began implementation of a **two-year joint work plan with WAFa** to build their capacity and initiate activities to ensure WAFa becomes the representative and chief advocate of the fertilizer private sector in the region.

The **Fertilizer Recommendations for West Africa Map (FeRWAM)** was updated with new fertilizer recommendations and formulas for specific agroecological zones (AEZs) and crops. It now comprises 81 recommendations for 13 crops across AEZs of nine countries in West Africa.

EnGRAIS disseminated the **Regional Fertilizer Subsidy Program Guidance**, which was developed under the West Africa Fertilizer Program, and provided direct technical assistance to several countries, including Burkina Faso and Ghana, to help them reform their fertilizer subsidy programs.

EnGRAIS conducted a comprehensive **Ghana Fertilizer Value Chain Optimization Study**, commissioned by the Government of Ghana and funded by OCP and EnGRAIS, which covered fertilizer cost buildups, formulations, use by region and crop, subsidy programs, recent developments, and a suggested way forward.



FEED THE FUTURE GHANA AGRICULTURE TECHNOLOGY TRANSFER PROJECT (ATT)

GHANA (2013-2018)

Implementing Partners – Iowa State University, Centre for Development Innovation of Wageningen University and Research, and Ghana Agricultural Associations Business Information Centre
Donor – USAID/Ghana

ATT aimed to increase access to and availability of key technologies related to seed, soil, and water across northern Ghana. ATT built the capacity of northern Ghana's agricultural research and extension systems by creating private sector-led agricultural technology transfer mechanisms, linking research-extension systems and producers in a market-driven approach to seed value chain development, and improving access to critical production inputs, including certified seed, affordable finance, labor-saving technologies, and good agricultural practices (GAPs). Through logistics and infrastructure support and public-private coordination, seed labs and research institutions became better equipped with state-of-the-art technologies. ATT worked through 33 local implementing partners to build capacity at the community level and ensure that interventions continue after the project ends.

CUMULATIVE HIGHLIGHTS

Among targeted farmers, yield increased by **228% for maize** (from 1.70 to 3.88 mt/ha), **287% for rice** (from 1.80 to 5.16 mt/ha), and **266% for soybean** (from 1.00 to 2.66 mt/ha).

Demand for **certified seed** grew, with its use rising from 10% of total seed use in 2013 to 25% in 2018. The introduction of improved technologies led to **\$7.8 million in incremental sales** of targeted input commodities (seeds, fertilizers, and soil amendments).

ATT provided **22 seed vans** and training to local private seed companies. In 2018, the vans delivered 259 mt of certified seed and other inputs to **310 communities** in hard-to-reach areas.

ATT confirmed the technical feasibility of harvesting floodwater using **PAVE and Bhungroo water management technologies**. This gives farmers the opportunity to plant two crops in one season ("Double Cropping, Dual Income").

By the end of project, over **98,000 female farmers** had applied one or more improved technologies or management practices, representing nearly half of the total farmers reached (201,700). **400,000 smallholder farmers** were reached through community video screenings on labor-saving equipment and GAPs.



LOCAL GOVERNMENT APPROACH TO THE AGRICULTURAL MARKET IN BENIN - PHASE 2 (ACMA2)

BENIN (2017-2021)

Implementing Partners – CARE International Benin-Togo and KIT Royal Tropical Institute
Donor – Embassy of the Kingdom of the Netherlands in Benin

ACMA2 aims to improve the food and nutritional security of rural populations in 28 municipalities in the departments of Ouémé, Plateau du Zou, and Collines. The target groups are producers, processors, traders, and particularly young people (ages 18 to 35) and women. The project's approach is to facilitate access to local and international markets (particularly Nigerian) for economic actors of agribusiness clusters. This is accomplished through targeted interventions in product value chains (access to inputs and innovations, access to financing, and marketing and professionalization) and multi-stakeholder dynamics, considering the resources and potential within the communes.

2018 HIGHLIGHTS

ACMA2 engaged **9,770 economic actors** (58% women and 35% youth) and **60 agribusiness clusters (ABCs)** involving seven value chains (maize, palm oil, fish, chili pepper, soybean, groundnut, and cassava).

11,852 mt of products were marketed by ABC actors.

155 business meetings were organized between buyers and sellers.

10,283 people (49% women and 46% youth) were trained.

The project organized **three consultation frameworks** between the private sector and municipal authorities to improve the business climate.



NIGER FERTILIZER SECTOR REFORM AND TECHNICAL ASSISTANCE FOR IMPLEMENTATION OF THE REFORM PLAN (PARSEN)

NIGER (2018-2021)

Donor – Millennium Challenge Corporation (MCC)/Millennium Challenge Account (MCA) Niger

IFDC is providing technical assistance for the successful implementation of Niger's Fertilizer Sector Reform Plan, which is expected to significantly improve the contribution of the fertilizer sector to agricultural development in Niger through the private sector. Specific objectives are to: facilitate the development and implementation of a new policy and regulatory framework; assist in the establishment of a renewed fertilizer subsidy system; build the capacity of actors involved in the implementation of the reform; and assist in disseminating gains made in knowledge and ownership by the stakeholders of the reforms.

2018 HIGHLIGHTS

The Government of Niger adopted the **Fertilizer Sector Reform Plan**, which was developed with technical assistance from IFDC.

A **Fertilizer Market Observatory** was created, bringing together the main stakeholders in the fertilizer sector to monitor and regulate the supply and distribution of fertilizer in Niger.

A study was conducted on **fertilizer importers and distributors** in Niger.

SCALING UP FERTILIZER DEEP PLACEMENT AND MICRO-DOSING TECHNOLOGIES (FDP MD) IN MALI

MALI (2014-2019)

Strategic Partners – ACDI/VOCA Cereal Value Chain Project, World Vegetable Center, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Livestock for Growth Program (LAG)-Mali, and Regional Directorates of Agriculture

Donor – USAID/Mali

FDP MD is increasing cereal and vegetable productivity through innovative fertilizer-based technologies (fertilizer deep placement and micro-dosing) while improving resource-poor farmers' access to quality and nutritious food in Mali. The project supports various actors along the rice, millet/sorghum, and vegetable value chains. The main stakeholders include producers, agro-input dealers, rural entrepreneurs, private sector actors in fertilizer production and distribution, research and extension institutions, and government technical bodies responsible for formulating and implementing enabling policies for a productive agriculture sector. Special emphasis is placed on women's involvement in rice, millet, sorghum, and vegetable production.

2018 HIGHLIGHTS

138,000 farmers (26% women) applied FDP or MD technologies in 2018.

Farmers increased their **gross margins per hectare** by \$480 using FDP on irrigated rice, \$117 using MD on millet, and \$123 using MD on sorghum.

1,156 farmer leaders and secretaries of farmer-based organizations (22% women) were trained on **digitization** (developing training materials and field tours into audio and video formats in local languages for wider dissemination at lower costs). Those trained, in turn, trained **230,787 individuals** on FDP and MD technologies using the digitized training materials. The cumulative number of individuals trained on FDP and MD technologies was 231,943 (33% women).

More than **10,000 mt of urea briquettes** were sold by input suppliers over the life of the project. Seventeen briquetting machines are in operation across the country.





SUPPORTING THE MODERNIZATION OF FAMILY FARMS - INPUTS COMPONENT (PAMEFA-Vi)

BURKINA FASO (2015-2018)

Implementing Partners – Association of Agricultural Input Wholesalers and Retailers (AGRODIA), Directorate General of Vegetable Productions (DGPV), and the Institute of Environment and Agricultural Research (INERA)

Donor – Swiss Agency for Development and Cooperation (SDC)

Through the Inputs Component of PAMEFA-Vi, IFDC helped farmers to access quality inputs at affordable prices and advice on their proper use. PAMEFA-Vi strengthened input supply (distributors and their organizations) and demand (producers and their organizations) through capacity building.

SMALLHOLDER AGRICULTURAL PRODUCTIVITY ENHANCEMENT PROGRAM (SAPEP)

BENIN, BURKINA FASO, CAMEROON, MALI, AND NIGER (2015-2021)

Donor – Islamic Development Bank

SAPEP is designed to overcome major productivity challenges, including poor soil health, limited seed production, poor access to markets and finance, and weak research-extension-farmer linkages. The objective is to increase agricultural productivity and smallholder farmers' income for rainfed and irrigated food crops. The program seeks to increase the use of integrated soil fertility management (ISFM) technologies by smallholder farmers, enhance access to improved crop varieties, and improve access to financial services and output markets for smallholders and other producers along the agricultural value chain.

CUMULATIVE HIGHLIGHTS

97 demonstration tests and **207 guided field tours** on improved seeds and appropriate fertilizer formulas and doses were conducted, involving **14,174 producers**.

Five Agricultural Technology Transfer Centers are active in five regions, connecting input distributors and supply firms.

PAMEFA-Vi strengthened the capacity of **1,040 input distributor members** of the Agricultural Input and Commodities Marketing Cooperative (COCIMA) and AGRODIA.

2018 HIGHLIGHTS

Field visits were carried out to provide technical backstopping to project activities.

Baseline and socio-economic studies were conducted in each country.

Value chain analyses for millet, rice, and groundnut were conducted.

Technical specifications were developed for laboratory equipment for **soil, plant, water, and fertilizer analysis**.

Regional workshops were held to reinforce networks of SAPEP countries, focusing on soil, seed, markets, finance, and monitoring and evaluation.



TECHNOLOGIES FOR AFRICAN AGRICULTURAL TRANSFORMATION (TAAT) - SOIL FERTILITY COMPACT

BENIN, BURKINA FASO, MALI, AND NIGERIA (2018-2021)

Lead Implementer – International Institute of Tropical Agriculture

Donor – African Development Bank

The TAAT program goal is to radically transform African agriculture from subsistence to commercial farming to support the “Feed Africa” pillar of the African Development Bank’s agricultural development strategy. TAAT is increasing



agricultural productivity in Africa through the deployment of proven and high-performance agricultural technologies at scale along selected value chains. TAAT operates as a network of interacting “compacts,” with nine devoted to specific commodity value chains and six serving as “enablers” that provide specialist services, such as soil fertility, water management, capacity building, youth, policy, and fall armyworm control. IFDC’s role is to lead the TAAT Soil Fertility Enabler, which is scaling up agro-input technologies for accelerated productivity growth, resilience, and improved livelihoods.

2018 HIGHLIGHTS

National inception and annual **planning meetings** were held in Benin, Burkina Faso, Mali, and Nigeria.

Four subcontracts were signed with **national public research partners** in each country for mobilizing implementation of technical backstopping services. A Memorandum of Understanding was signed with ICRISAT to facilitate joint activities on sorghum and millet crops in Burkina Faso, Mali, and Nigeria.

Five subcontracts were signed with private partners in each country for **mapping agro-input dealers**, strengthening their capacities in finance and managerial skills, linking farmers to agro-input dealers, and conducting **georeferenced soil sampling, analysis, and mapping**.

22 demonstrations were established to test fertilizers, including secondary and micronutrients, to aid in the development of fertilizer recommendations for sorghum and millet in Burkina Faso.

Agricultural extension agents in Burkina Faso and Nigeria were trained on scaling up **Rice Advice Technology**.



TRANSFORMING IRRIGATION MANAGEMENT IN NIGERIA (TRIMING)

NIGERIA (2017-2018)

Implementing Partner – National Agriculture Extension and Research Liaison Services

Donor – World Bank through the TRIMING project under the Federal Ministry of Water Resources in Nigeria

TRIMING assisted farmers in Nigeria’s northern irrigation schemes to increase their agricultural productivity through improvements to the irrigated agronomy and value chain development. IFDC’s consultancy role provided supervisory extension services to four state-level Agricultural Development Programs (ADPs) and introduced and promoted modern agricultural technologies, particularly urea deep placement (UDP) technology.

2018 HIGHLIGHTS

TRIMING strengthened the capacity of **ADP staff** through regular supervision of their activities to targeted beneficiaries.

UDP was deployed to more than **190 farmer field business schools** comprising about **4,000 farmers**.

The project facilitated **access to finance** to more than 300 smallholder farmers in Sokoto State in collaboration with the Nigeria Incentive-Based Risk-Sharing System for Agricultural Lending (NIRSAL).



TOWARD SUSTAINABLE AGRIBUSINESS CLUSTERS THROUGH LEARNING IN ENTREPRENEURSHIP (2SCALE)

CÔTE D'IVOIRE, ETHIOPIA, GHANA, KENYA, MALI, AND NIGERIA (2012-2018)

Implementing Partners – Base of the Pyramid Innovation Center (BoP Inc.)

Donor – Netherlands Directorate-General for International Cooperation and private sector co-investment

2SCALE worked with the private sector, public sector agencies, development organizations, universities, and others to stimulate agribusiness development, strengthen capacity, and accelerate the adoption of improved technologies. 2SCALE was fundamentally about inclusive business and coordinated grassroots actors to build local networks, enabling farmers, traders, processors and others to work together as equal partners for mutual benefit. Pilot programs initiated through 2SCALE have helped develop and market a range of affordable, nutritious food products to low-income families. Work continues under a second phase (2019-2023), which incubates and accelerates inclusive business through partnerships with companies that wish to build commercially viable strategies in African food industries.



CUMULATIVE HIGHLIGHTS

2SCALE partnerships have benefited more than **620,000 farmers (36% women)** in nine countries.

More than **50 public-private partnerships** have been established in multiple value chains: food staples, vegetables, potatoes, oilseeds, and livestock. To date, the private sector has co-invested more than \$70 million.

More than **2,500 producer groups and farmer cooperatives** have improved their technical and business skills; nearly 2,400 of these have invested in at least one innovation.

1,900 agribusiness firms have participated, buying produce from, selling inputs to, or providing services to 2SCALE farmer groups.

As a result of training and linkages through 2SCALE, farmer groups and businesses were able to obtain **loans of more than \$2 million** in 2018, for working capital, input purchases, and equipment.



USAID FOUR-COUNTRY COTTON PARTNERSHIP (C4CP)

BENIN, BURKINA FASO, CHAD, AND MALI (2014-2018)

Implementing Partner – Cultural Practice and International Centre for development oriented Research in Agriculture (ICRA)

Donor – USAID/West Africa

The USAID C4CP project increased incomes for cotton producers and processors in West and Central Africa by introducing competitive and sustainable strategies to boost farm productivity and improve post-harvest processes. The project focused on partnerships that support cotton sector development and addressed the challenges women face in cotton-producing households. C4CP developed a broad network of partners comprising 40 cotton sector stakeholder structures in West and Central Africa.

CUMULATIVE HIGHLIGHTS

Seven innovative, **gender-sensitive training modules** were organized into three training manuals: GAPs for the production of conventional cotton and rotational crops (cereals and legumes), post-harvest technologies, and GAPs for the production and marketing of organic cotton.

22 training and demonstration farms, mostly led by women, were set up to test agricultural technology packages.

Several **forums and regional workshops** were held to disseminate agricultural technology packages and enhance partnerships in the cotton sector. **250 delegates participated** in two forums on women's access to productive resources and agricultural technologies.

A **three-year study on soil health** led to the development of two new fertilizer formulas by National Agricultural Research Services to control soil acidification under cotton and rotational crops.

C4CP strengthened the capacity of 2,036 people, including 96 women. Partners who were trained, in turn, provided training to **13,724 producers**, including 1,236 women, on agricultural technologies.



© N. KOUJARE / IFDC

▲ Farmers gather for a digitization session in Kiffosso, Sikasso, Mali.

SUCCESS

An Innovative Alternative To Traditional Demonstrations

The Scaling Up Fertilizer Deep Placement and Micro-Dosing Technologies (FDP MD) in Mali project is funded by the United States Agency for International Development's Mali Mission (USAID/Mali) with the purpose of providing support for the scaling up of two fertilizer-based technologies, namely FDP on rice and vegetables and MD on millet and sorghum. The program focuses on Mali's Feed the Future zone of influence, specifically the regions of Segou, Mopti, Sikasso, and Timbuktu.

During its first two years, the FDP MD project focused on the dissemination of the technologies using traditional demonstration and guided tours of demonstration plots in the various intervention sites. This method was effective, but it proved costly, slow for adoption, and unsuccessful at mobilizing women and young people. It also required a lot of effort in monitoring and coaching.

In light of this, the project considered implementing a digitization approach beginning in the 2016-17 crop year. Digitization is an innovative ICT-based activity developed by the project to reach many targets in the intervention areas within a short time period. It consists of two parts:

- Producing films of a field-guided tour of a demonstration plot, with testimonies of direct actors who have already applied these technologies and understand the stages of their application and advantages.
- Creating short animated videos describing the technologies' benefits and application techniques in various national languages.

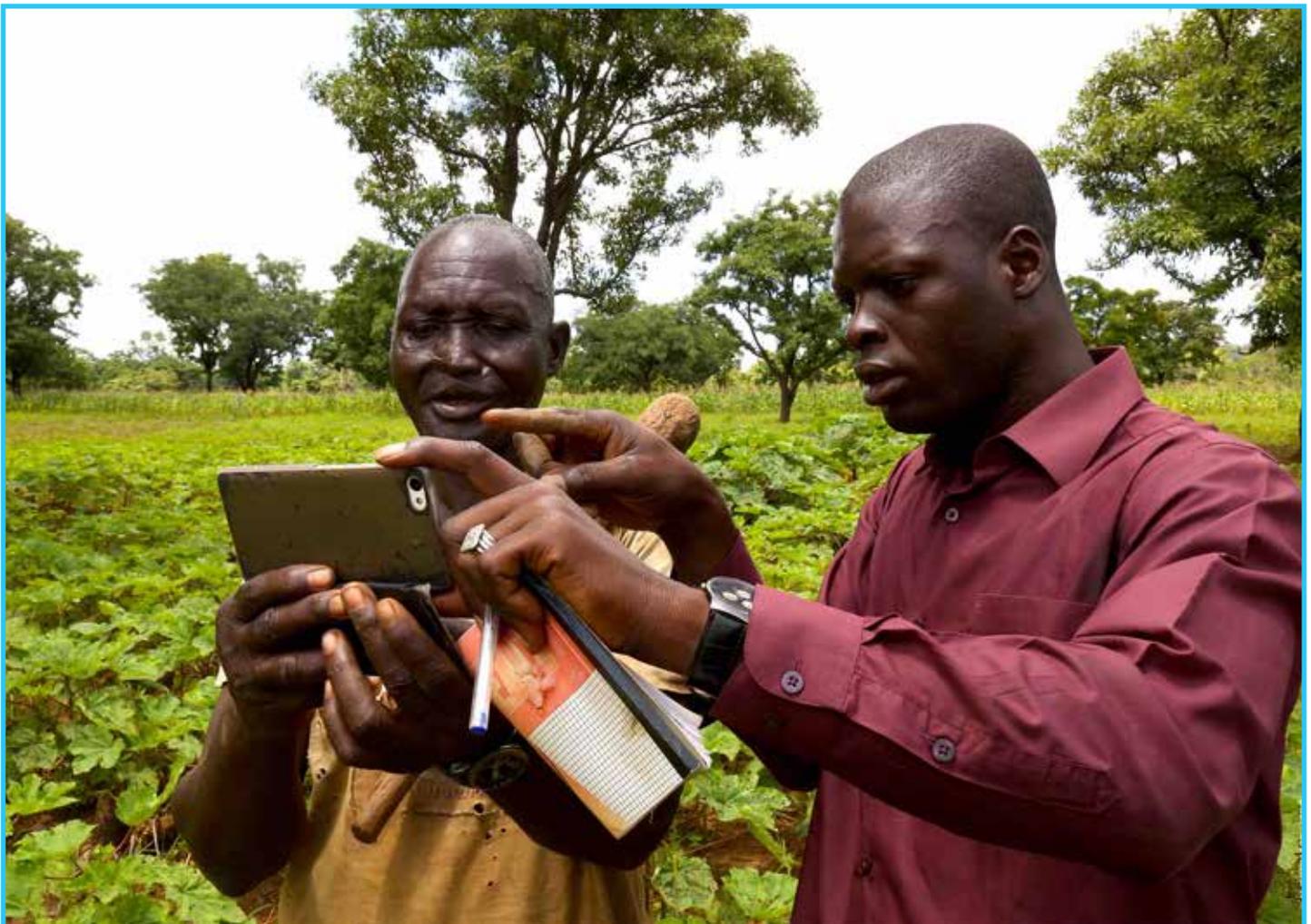
These films are then converted into several formats to enable their broadcasting on all media (i.e., TVs, computers, mobile phones, tablets and radios) and dubbed in eight national languages. They are shared using USB storage drives, CDs, and smartphones and broadcasted during meetings with producers and local implementing partners or during cascade trainings among farmers.

Compared to the conventional or traditional demonstration approach, digitization has advantages, like lower per-unit cost and more efficient reach.

In 2017-2018, a total of \$11,513.98 was spent organizing guided tours that attracted 1,233 individuals versus \$19,853.22 spent on digitization to reach 10,184 individuals. The digitization approach spends \$1.95 per individual versus \$9.34 per individual with the guided tour method. Additionally, digitization can be done at any time and takes only 30 minutes to implement compared to five hours under the traditional method. A greater number of women and young people can participate in project activities, because the video stations are always installed in the village. Finally, the videos are available to producers at any time.

In 2018, 1,156 farmer leaders and secretaries of farmer-based organizations were trained on digitization. This made it possible to train 231,943 producers.

“In just a short period of time, we have learned everything about these technologies, namely application techniques and their advantages,” noted Bakary Traoré, a farmer in Nimbougou in the Sikasso region and a digitization training participant. “We farmers prefer to see once rather than to hear a thousand times. Most interestingly, producers like us are speaking in these videos and showing what they have been able to achieve through these technologies.”



▲ Producer Bakary Traoré watching a video on a mobile phone with an IFDC extension officer.



EAST AND SOUTHERN AFRICA

BURUNDI | ETHIOPIA | KENYA
MOZAMBIQUE | UGANDA

IFDC projects in East and Southern Africa bolster local agribusiness. We work to transform livelihoods for smallholder farmers and their communities by creating inclusive income opportunities, facilitating market access, and improving agricultural technologies. On the input side, we link farmers with small and medium enterprises that supply quality fertilizers and seeds. On the output side, we connect farmers with companies that buy their crops. Farmers involved in these agribusiness partnerships collectively sell millions of dollars of crops to buyers. IFDC also works with these agribusinesses and related service providers to increase their capacity to source from smallholder farmers and supply products to domestic and international buyers, including low-income and “last-mile” consumers.

All projects include training and mentoring components. We strengthen farmers’ knowledge of good agricultural

practices (GAPs), integrated soil fertility management (ISFM) technologies, and other crop management practices that help farmers build resilience to climate shocks. IFDC emphasizes balanced fertilization and crop nutrition, particularly the use of secondary and micronutrients. To ensure farmers in the region have access to fertilizers that meet specific soil and crop needs, IFDC employs its SMaRT framework (Soil testing, Mapping, Recommendations development, and Technology transfer). Regional activities also focus on association building, policy analysis and reform, and market information access.

By collaborating with agribusinesses, service providers, national and regional partner organizations, research institutions, governments, and donors, we support the development of competitive and sustainable agricultural value chains and create an enabling environment for agricultural intensification and private sector development.

AFRICAFERTILIZER.ORG

AFRICA-WIDE (ONGOING)

Implementing Partners – International Fertilizer Association (IFA), African Fertilizer and Agribusiness Partnership (AFAP), Argus Media, African Union, Food and Agriculture Organization (FAO) of the United Nations, and International Food Policy Research Institute

The AfricaFertilizer.org (AFO) initiative is the premier source for fertilizer statistics and information in Africa. It is hosted by IFDC and supported by IFA and AFAP. Since 2009, AFO has been collecting, processing, and publishing fertilizer production, trade, and consumption statistics for the largest fertilizer markets in sub-Saharan Africa. AFO has an extensive network of fertilizer industry players in the main fertilizer trade corridors and maintains key information on the major producers, their production facilities and capacities, importers/suppliers, various distribution channels, and agricultural service suppliers (laboratory services, research, credit providers, and warehousing/storage services).

2018 HIGHLIGHTS

Fertilizer Technical Working Group workshops were held to validate 2017 statistics data on production, imports, exports, and apparent and actual fertilizer consumption for 12 countries across sub-Saharan Africa.

The 3rd edition of the **Register of Fertilizer Manufacturing and Processing Plants** was published. It included information on 15 manufacturing plants and 59 processing plants.

Retail prices, subsidized prices, and international prices of fertilizers have been monitored on a monthly basis in 14 countries in sub-Saharan Africa and form the **FertiNews e-bulletin** that is distributed to more than 3,500 subscribers across Africa and globally.

FOOD SECURITY THROUGH CLIMATE ADAPTATION AND RESILIENCE (FAR-Sofala)

MOZAMBIQUE (2017-2022)

Managing Organization – Swisscontact
Donor – Swedish International Development Cooperation Agency (Sida)

The FAR project is an integrated program that aims to improve food security and resilience to climate change shocks for 30,000–45,000 smallholder farmer households in the provinces of Manica and Sofala in Mozambique. IFDC is implementing the FAR-Sofala project, which introduces improved farming inputs and climate-smart agriculture (CSA) practices combined with strong market linkages to semi-subsistence and semi-commercial smallholder rice and vegetable farmers. ISFM and slow-nutrient-release products, such as coated urea, are the key innovations used to increase the stable availability of and access to nutritious foods.

2018 HIGHLIGHTS

141 vegetable producers (73% women) were trained in soil preparation for seedbeds, optimal size of seedbeds, sowing rates and depth, daily management of seedbeds, and optimal seedling size for transplanting.

240 soil samples were collected for the development of improved fertilizer blends for rice and vegetable production. IFDC and the fertilizer company Yara developed the **improved blends** to demonstrate on farmers' fields in the 2018-19 cropping season.

140 "baby" and 18 "mother" on-farm demonstration plots were established on farmers' fields in the 2017-18 cropping season.

259 people (248 women) were trained on how to prepare improved and diversified food and processing recipes based on rice. 96 people (93 women) were trained on the development of business plans for selling rice byproducts.

INTEGRATED SEED SECTOR DEVELOPMENT (ISSD)

BURUNDI (2014-2018)

Implementing Partner – KIT Royal Tropical Institute
Donor – Embassy of the Kingdom of the Netherlands in Burundi

To strengthen the seed sector in Burundi, ISSD focused on building the capacity of seed producers in entrepreneurship and seed product technologies for potato, bean, maize, and rice. The goal was to ensure farmers' access to quality seeds at affordable prices. The project worked to increase the volume of quality seeds produced and commercialized by seed enterprises in Burundi.



CUMULATIVE HIGHLIGHTS

The number of **registered commercial seed producers** increased from 249 to 833 (234%).

48 market-desired, superior seed varieties became registered and available (maize: 11, beans: 10, banana: 6, potato: 6, rice: 15).

48% of registered active seed producers participated in a pre-ordering system that increased their access to early-generation seed.

Capacity-building methodologies were tried, tested, and tailored to support ambitious seed producers in growing their businesses.

Targeted farmers more than doubled their maize, potato, and bean yields by intensifying production through the use of **fertilizer, quality seed, and GAPs**.

2018 HIGHLIGHTS

449 farmers (59% women) were trained using the FFBS model and **1,318 beneficiaries (56% women)** were trained indirectly through various learning platforms, including field days, conferences, and agricultural fairs. A total of 12 lead farmers were trained as FFBS facilitators.

31 farmers (18 female) signed **contracts to supply potato** to two buyers. The project linked the farmers to Agri-wallet, a mobile-based financing platform.

The project formed **working relationships** with agrochemical companies, soil nutrition companies, and financial institutions, which supported the project by providing technical advice and free samples of their products used in demonstrations.

PRIVATE SEED SECTOR DEVELOPMENT PROJECT (PSSD)

BURUNDI (2018-2022)

Implementing Partner – KIT Royal Tropical Institute

Donor – Embassy of the Kingdom of the Netherlands in Burundi

PSSD seeks to rapidly grow the market for quality seed and firmly establish commercial seed production and marketing in Burundi. The project will ensure the availability and use of high-quality seed through the establishment of a commercially viable and self-governing seed sector, supported by client-oriented seed services. PSSD focuses on scaling up emerging commercial seed producers, building the capacity of national seed traders, unlocking Dutch and other international private sector expertise to the Burundian seed sector, and promoting quality seed to expand the market to a stable, self-sustaining commercial sector. PSSD is a follow-on project to ISSD, which completed its activities in 2018.



POTATO VALUE CHAIN CAPACITY BUILDING (PCB) PROJECT

KENYA (2018-2020)

Implementing Partners – IPM Potato Group, Kenya Plant Health Inspectorate Services, Kevian Kenya Limited, Kirinyaga Seed Company, National Potato Council of Kenya, Nyandarua County Government, Sustainable Food Systems Ireland, Teagasc
Donor – Irish Aid, Embassy of Ireland in Kenya

PCB is working with small-scale farmers to increase their revenue from potato farming by at least 30% and with public and private partners to ensure market linkages. The project promotes the adoption of new technologies, including certified potato seed and new varieties that are more productive and marketable, consistent use of GAPs, improved farm management skills, and market access. The project's mainstay is farmer education facilitated through government extension workers and lead farmers. The hands-on training approach is referred to as the farmer field business school (FFBS) and covers the entire potato-growing season – from land preparation to harvesting.



PROMOTION OF NUTRITION-SENSITIVE POTATO VALUE CHAINS IN EAST AFRICA (PNSP)

UGANDA (2017-2021)

Implementing Partners – KIT Royal Tropical Institute and Uganda National Potato Platform

Donor – Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

The project is designed to increase smallholder potato productivity and strengthen potato sector coordination while improving household-level nutrition through dietary diversification. PNSP-Uganda encourages diversified diets, particularly for pregnant and breastfeeding women, through the integration of nutrition and potato productivity at the farmer business school and community levels.

2018 HIGHLIGHTS

30 FFBS facilitators were trained on an **agronomy and nutrition curriculum**.

120 FFBSs were formed in three project districts consisting of **2,818 registered farmers (61% women)**.

1,387 FFBS members (58% female) were trained on **GAPs for sustainable potato production**.

521 FFBS farmers were trained on key nutrition areas, including the linkage between nutrition and agriculture, kitchen gardening, and dietary diversity (70% women). **30 kitchen garden demonstrations** were established to promote dietary diversity at the household level.

15 local seed producers were identified and trained on seed potato production.

RESILIENT EFFICIENT AGRIBUSINESS CHAINS IN UGANDA (REACH-Uganda)

UGANDA (2016-2020)

Implementing Partner – Cardno Emerging Markets

Donor – Embassy of the Kingdom of the Netherlands in Uganda

REACH-Uganda is an agribusiness project that aims to improve farmers' market engagement, strengthen household resilience, and increase the availability of agricultural support services for 40,000 farmers and businesses organized into 800 farmer groups in the rice and potato value chains in Eastern and Southwestern Uganda. The project employs the market systems approach to ensure that markets can function more effectively, sustainably, and beneficially for poor farmers through connecting low-income entrepreneurs to small and medium enterprises (SMEs)/agribusinesses. In addition, partnerships with financial institutions are improving access to credit for smallholders.

2018 HIGHLIGHTS

19 firms/SMEs were engaged in REACH-Uganda market systems activities and increased turnover by 27% through the decentralization of primary processing and direct procurement of produce from farmer business groups.

REACH-Uganda improved access to food at the farmer level with over **5,119 mt of rice** and **7,351 mt of potato** bulked and sold collectively by 58 rice farmer business groups and 36 potato farmer business groups, respectively.

44 kilometers of **rural feeder roads** are being rehabilitated to facilitate **market access** for farmers in partnership with District Local Governments through matching funding.

23,122 farmers (61% women and 37% youth) were trained in Farming as a Business (FaaB), GAPs, and resilience. 39% of project farmers are reaching optimal yield levels of 2 mt/acre for rice and 5.5 mt/acre for potato, which is a 29% increase from the baseline of 10%.

71% of project farmers have applied resilience measures: climate-smart agricultural practices, joint decision-making, access to finance, and income diversification.



SUPPORTING AGRICULTURE PRODUCTIVITY IN BURUNDI (PAPAB)

BURUNDI (2015-2019)

Implementing Partner – Alterra, Wageningen University and Research, Oxfam Novib, and ZOA

Donor – Embassy of the Kingdom of the Netherlands in Burundi

PAPAB is promoting market-oriented, climate-resilient, and sustainable agricultural techniques, supported by targeted fertilizer subsidies. The project is reforming the fertilizer subsidy system to improve farmers' access to fertilizer and knowledge of improved farming methods. PAPAB uses a participatory approach (known as PIP) to boost farmers' motivation and morale to create their own business plans for a sustainable future.

2018 HIGHLIGHTS

866,494 farm households registered to receive fertilizer under the 2018 subsidy program, an increase of 14% from 2016.

37,468 farmers (57% women) are involved in the PIP approach, a holistic framework in which all members of a farmer's family are actively involved in planning improvements to their homes and businesses.

1,227 Solitary Savings and Credit Groups are active, comprising nearly 20,000 members who collectively saved more than \$680,000.



TOWARD SUSTAINABLE AGRIBUSINESS CLUSTERS THROUGH LEARNING IN ENTREPRENEURSHIP (2SCALE)

CÔTE D'IVOIRE, ETHIOPIA, GHANA, KENYA, MALI, NIGERIA (2012-2018)

Implementing Partners – Base of the Pyramid Innovation Center (BoP Inc.)

Donor – Netherlands Directorate-General for International Cooperation and private sector co-investment

2SCALE worked with the private sector, public sector agencies, development organizations, universities, and others to stimulate agribusiness development, strengthen capacity, and accelerate the adoption of improved technologies. 2SCALE was fundamentally about inclusive business and coordinated grassroots actors to build local networks, enabling farmers, traders, processors, and others to work together as equal partners for mutual benefit. Pilot programs initiated through 2SCALE have helped develop and market a range of affordable, nutritious food products to low-income families. Work continues under a second phase (2019-2023), which incubates and accelerates inclusive business through partnerships with companies that wish to build commercially viable strategies in African food industries.

CUMULATIVE HIGHLIGHTS

2SCALE partnerships have benefited more than **620,000 farmers (36% women)** in nine countries.

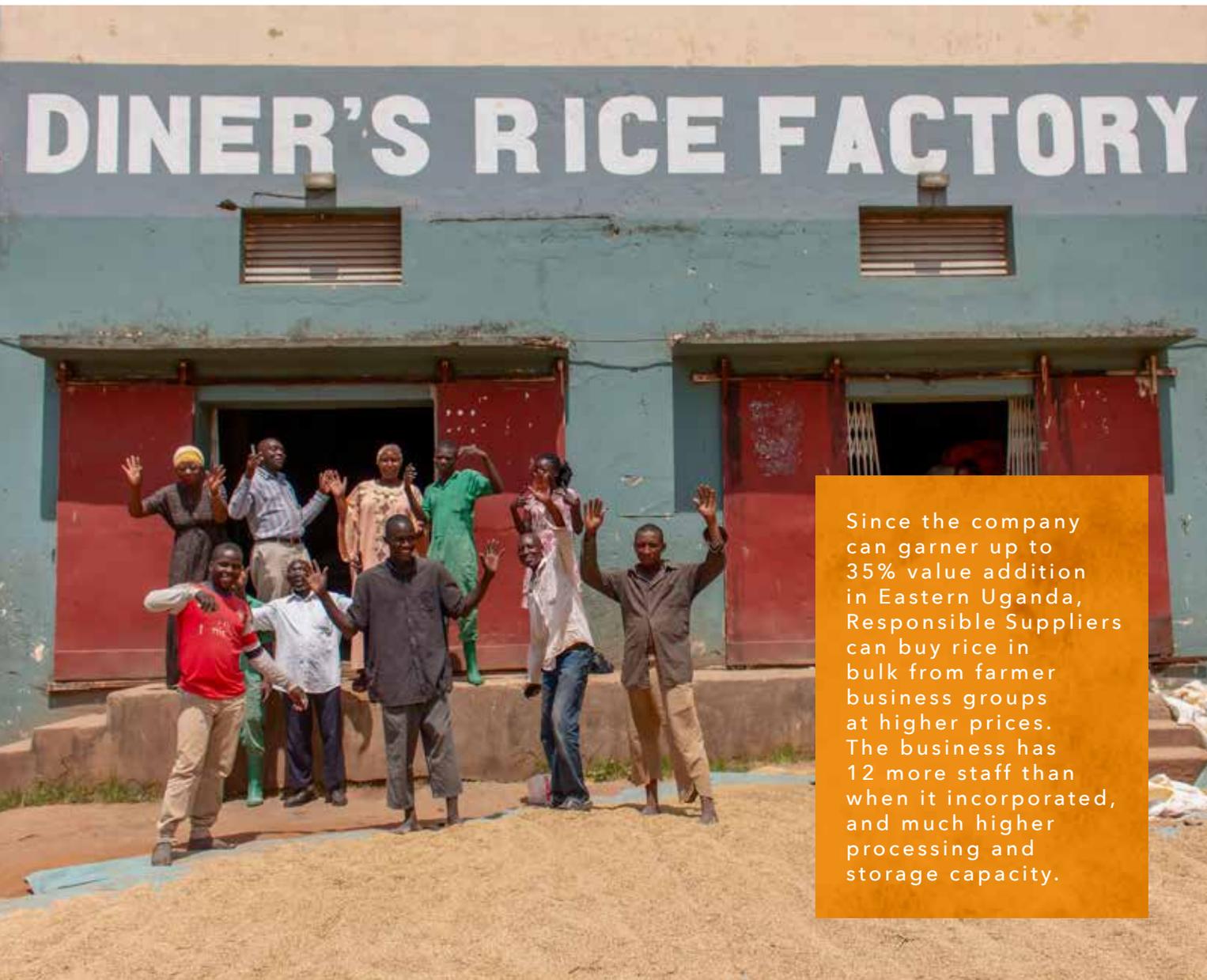
More than **50 public-private partnerships** have been established in multiple value chains: food staples, vegetables, potatoes, oilseeds, and livestock. To date, the private sector has co-invested more than \$70 million.

More than **2,500 producer groups and farmer cooperatives** have improved their technical and business skills; nearly 2,400 of these have invested in at least one innovation.

1,900 agribusiness firms are buying produce from, selling inputs to, or providing services to 2SCALE farmer groups.

As a result of training and linkages through 2SCALE, farmer groups and businesses were able to obtain **loans of more than \$2 million** in 2018, for working capital, input purchases, and equipment.





Since the company can garner up to 35% value addition in Eastern Uganda, Responsible Suppliers can buy rice in bulk from farmer business groups at higher prices. The business has 12 more staff than when it incorporated, and much higher processing and storage capacity.

SUCCESS

REACH-Uganda Boosts Household Resilience in Communities

IFDC's Resilient Efficient Agribusiness Chains in Uganda (REACH-Uganda) project implements a market systems development (MSD) approach. MSD fosters linkages among project stakeholders to create sustainable transformation. REACH's efforts, made possible by donor support from the Embassy of the Kingdom of the Netherlands in Uganda, are significantly impacting market development and household resilience among farmer communities.

Farmers are implementing resilience measures: diversifying income, practicing joint decision-making, participating in savings schemes, and practicing climate-smart agricultural practices.

This photo essay demonstrates the achievements of these producers and their communities in Uganda due to REACH's work.



Idudi Rice Farmers Cooperative Society received training from REACH on good agricultural practices (GAPs), financial literacy, and farming as a business. The cooperative was linked to **Responsible Suppliers**, which buys the rice in bulk from Idudi, and grades it at no extra cost. Cooperative members **Evelyn Kotoko** (left) and **Azarikah Naikoba** (right) have benefited greatly. Both farmers have built new houses, and Evelyn bought cows as an additional source of income. “We used to harvest two bags in an acre of land,” Azarikah said. “Now we harvest 20!” The entire cooperative has increased rice yields from 500 to 2,300 kg/acre, with 28% higher prices than before.



According to **Duse Asuman**, secretary of Kyadongho Hwagate Farmers’ Group, many farmers now feel empowered to set higher prices for their rice harvest. An infrastructure rehabilitation project in partnership with the District Local Government at the Doho Rice Scheme in Butaleja has increased farmers’ access to markets and social amenities. More than 30,000 individuals will benefit from the road project.



“Before, we had nothing in our house, but now we are becoming rich!” says **Gertrude Tumuhimbise**, treasurer of the Nyabyondo United Women’s group in Kabale District. After her farmer business group received gender sensitization training, she and her husband started working together, their teamwork increasing their income enough to buy goods for their home and send their five children to good schools.



Niber Twahirwa is a young entrepreneur using newfound financial literacy to better himself. A member of the Bukimbiri Potato Growers and Marketing Cooperative Society in Kisoro District in Southwestern Uganda, Niber participated in his cooperative’s Village Savings and Loan Association to grow seed potatoes. With his income, he paid back the loan and reinvested in his own education.





“We were selling potatoes as if we were selling dead cows: at a giveaway price,” recalls **Dinavence Kobusingye**. But now, in partnership with the Kanungu District Local Government, a road rehabilitation project is changing everything. “Now we can bargain for higher prices,” says Kobusingye. The group benefits not only from better sale prices but access to affordable household items that come from outside the village, growth in timber business, specialized healthcare services, and education options for their children.





ASIA

BANGLADESH | MYANMAR | NEPAL

IFDC in Asia serves one of the most diverse areas of the world. Our work seeks innovative ways to develop sustainable agricultural production systems by adopting a holistic approach throughout the entire value chain involving firms, traders, and farmers. This includes developing and testing efficient nutrient technologies and agronomic practices at the farm level, strengthening agri-entrepreneurship, and influencing policy reform through evidence-based economic analysis.

In an area of the world where the effects of climate change are already evident, improving fertilizer efficiency is a major focus of IFDC research in Asia. Climate-smart agricultural technologies, like fertilizer deep placement (FDP), are helping farmers earn more income and mitigate agriculture's impact on the environment. We are also building the capacity of national scientists in measuring greenhouse gas (GHG) emissions from

improved technologies compared with traditional practices. In addition, IFDC's work in the region promotes agribusiness models that engage women and youth. In 2018, we continued to empower women farmers in Bangladesh to improve horticulture production. As a result, more than 32,000 female farmers are using improved technologies and management practices.

In 2019, IFDC will expand work into India to diffuse improved agricultural technologies to peri-urban farmers through good agricultural practices (GAPs), capacity building, and micro-enterprise development.

ACCELERATING VEGETABLE PRODUCTIVITY IMPROVEMENT (AVPI)

BANGLADESH (2017-2019)

Donor – Walmart Foundation

AVPI is empowering low-income women horticulture farmers with enhanced agricultural production technologies to improve income and nutrition of farm families. The project strengthens farmers' knowledge of GAPs, enhances their access to market information, and expands the use of FDP technology in fruit and vegetable production. In addition, AVPI is introducing a method for producing seedlings using polynet houses with trickle irrigation.

CUMULATIVE HIGHLIGHTS

More than **32,000 female fruit and vegetable farmers** are applying new agricultural technologies, including GAPs, on 11,750 hectares (ha) and FDP on 7,500 ha.

Incremental yield increased by 15-16% for 2018 summer vegetable crops. Average incremental income per farm was \$208.

To increase their income from crop sales, more than **600 women** participated in marketing seminars to learn more about market information, including crop demand, supplies, and post-harvest practices. These farmers are now assuming leadership roles in their communities.

AVPI established **25 demonstration plots** on seedling raising and crop production using polynet houses and trickle irrigation. A total of **1,000 female horticulture farmers** participated.



DRY ZONE AGRO-INPUT AND FARM SERVICES PROJECT

MYANMAR (2015-2020)

Implementing Partners – Private sector input and service providers (ISPs), Myanmar Department of Agriculture (DOA), and financial institutions

Donor – Livelihoods and Food Security Trust Fund (LIFT), United Nations Office for Project Services (UNOPS)

The Dry Zone project is improving farm advisory services by strengthening a network of agricultural ISPs and building the capacity of public sector extension workers to complement private sector advisory services. The project works with private sector ISPs to develop and distribute products, services, and information that enhance farmer productivity and profitability. These include inputs, such as seed, fertilizer, and crop protection products (CPPs), along with crop management services and agri-machinery for land preparation, harvesting, and post-harvest processing. With an extension through 2020, the project will conduct tractor operator training and expand activities into the Upland Region.

2018 HIGHLIGHTS

53 ISPs are accessing finance to enable them to serve a customer base of about **31,000 farmers**. ISPs initiated nine demonstration plots, held nine farmer field days, and organized 20 farmer trainings in cooperation with IFDC, the Myanmar DOA, and/or industry representation.

201 farmer training sessions and **90 farmer field days** were held with 14,878 farmers (5,204 women) on conservation agriculture, safe use of CPPs, and effective and efficient use of seeds, fertilizers, and other agro-inputs.

Trained farmers received **input vouchers** to redeem at project ISPs. As a result, the ISPs reported increases in sales in 2018.

146 DOA extension workers (84 female) participated in farmer trainings, demonstration plots, or field days.



FERTILIZER REGULATORY AND VALUE CHAIN ASSESSMENT IN MYANMAR

MYANMAR (2017-2018)

Donor – International Finance Corporation of the World Bank Group

IFDC conducted an assessment of fertilizer quality in Myanmar with a focus on fertilizer regulatory and distribution systems. The assessment will inform fertilizer policy recommendations to the Ministry of Agriculture, Livestock and Irrigation (MOALI) and support efforts of the Government of Myanmar toward improving the quality of fertilizers available to and used by Myanmar farmers.



FEED THE FUTURE NEPAL SEED AND FERTILIZER (NSAF) PROJECT

NEPAL (2016-2021)

Lead Implementing Partner – International Maize and Wheat Improvement Center (CIMMYT)

Donor – United States Agency for International Development (USAID)

As a sub-grantee to CIMMYT, IFDC's role under NSAF focuses on fertilizer and integrated soil fertility management (ISFM) and includes strengthening the institutional capacity of the newly formed Nepal Fertilizer Entrepreneurs Association (NeFEA). Under the NSAF fertilizer component, IFDC seeks to update ISFM and fertilizer recommendations, commercialize more precise fertilizer application equipment, and build agro-input retailer and farmer cooperative knowledge of ISFM and fertilizer management using the "4R" approach (right fertilizer source, right rate, right time, and right place). The project also explores options for policy reform in collaboration with the Government of Nepal and facilitates an increased private sector role in fertilizer distribution.

2018 HIGHLIGHTS

The project assisted **NeFEA** in preparing the association's **business development strategies** and in creating a conducive environment for **policy advocacy**. With project support, NeFEA has strengthened its relationship and communication with the Government of Nepal.

Training materials were finalized. These include **factsheets** on best management practices, **training manuals**, and **flip-files** for rice, wheat, maize, cauliflower, tomato, and onion.

A **market assessment** was carried out to evaluate precision fertilizer application tools, and an **economic analysis** of polymer-coated urea and urea briquettes was conducted.



FERTILIZER SECTOR IMPROVEMENT (FSI+)

MYANMAR (2014-2019)

Implementing Partner – Syngenta

Donor – USAID

The FSI+ project seeks to increase the production and profitability of crops in rice-based farming systems and to improve the capacity of service providers to supply and advise farmers. FSI+ promotes the judicious application of balanced fertilizer with urea deep placement (UDP) and the use of good quality seed, seeding rates, and GAPs. The project targets smallholder farmers in rice-rice and rice-gram cropping systems and has a small pilot on maize production in southern Shan State. The project is strengthening the supply system of agricultural inputs, particularly the manufacture and sale of urea briquettes for UDP. In addition, FSI+ builds the capacity of fertilizer retailers to improve their business management and provide advisory services to farmers.

2018 HIGHLIGHTS

Nearly **14,000 farmers** applied improved technologies or GAPs on nearly 80,000 ha.

Approximately 95 retailers and three briquetting machine owners received training and are providing services to farmers. A total of **336 small businesses** have been trained since the project started.

Field trials are used to test **adaptation of new technology** and answer questions arising from extension activities. Nine trials were harvested from the dry season 2017/18 and nine were established for the wet season 2018. FSI+ has completed a total of **112 trials**.

IFDC drafted a **Soil Fertility and Fertilizer Management Strategy** for Myanmar and presented it to the Permanent Secretary of MOALI.

SUSTAINABLE SOIL MANAGEMENT COMPONENT (SSMC) OF THE OCP FOUNDATION AGRICULTURAL DEVELOPMENT PROJECT

BANGLADESH (2017-2019)

Implementing Partners – Bangladesh Agricultural Research Institute (BARI), Bangladesh Rice Research Institute (BRRI), Bangladesh Department of Agricultural Extension (DAE), Bangladesh Agricultural Development Corporation (BADC), International Center for Agricultural Research in the Dry Areas (ICARDA), and Soil Resource Development Institute (SRDI)

Donor – OCP Foundation

The goal of SSMC is sustainable management of soil to enhance yields and farmers' incomes under resilient production systems. Specifically, the project works to evaluate the role of secondary and micronutrients on crop productivity as affected by soil acidity. SSMC also promotes balanced plant nutrient solutions and GAPs for improving crop productivity, crop profitability, and soil fertility, working through extension workers and agro-input retailers. The project is working in collaboration with national research and extension institutions. The project targets rice (wet and dry seasons), maize, potato, lentil, and, to a lesser extent, wheat.



TECHNICAL ASSISTANCE TO BANGLADESHI RESEARCH INSTITUTIONS FOR GHG EMISSIONS MEASUREMENT

BANGLADESH (2017-2019)

Implementation Partners – BRRI and Bangladesh Agricultural University (BAU)

Donors – Government of Bangladesh through Krishi Gobeshona Foundation (KGF) and International Rice Research Institute (IRRI)

Capacity building of national research institutions and scientists is key to sustaining quality research, particularly in the context of developing climate-resilient technologies. IFDC is assisting BRRI and BAU in measuring GHG emissions from FDP technology and ISFM practices, combined with alternate wetting and drying (AWD) technologies compared with farmers' practices of fertilizer application. Emissions measured include carbon dioxide, methane, nitrous oxide, ammonia, and nitric oxide to provide a complete picture of the role fertilizer and water management technologies play in mitigating GHG emissions. The research also includes estimation of carbon credits associated with improved fertilizer and water management.

2018 HIGHLIGHTS

Protocols for establishing **field trials on balanced fertilization** were finalized and handed over to BRRI and BARI. BRRI established four trials and BARI established 13.

The project directly trained **1,370 farmers and 246 retailers (12% women)**.

To demonstrate the results of GAP technology, **60 field demonstrations** were established and **29 field days** were held with **2,956 participants** (24% women).

About **1,350 farmers** are using improved nutrient management technologies or GAPs as a result of project activities.



2018 HIGHLIGHTS

In both labs (BAU and BRRI), the methane gas measurement equipment has been installed, and **total GHG emission measurement** is continuing from farmers' fields across different agro-ecological zones under a rice-based cropping system.

Two scientific papers were published in 2018 in international journals, and results were presented at the 5th International Rice Congress 2018.

Two scientists (one from BAU and one from BRRI) received their PhDs using GHG emissions data.



SUCCESS

Putting Down Roots

Three years ago, U Ko Ko Latt's life looked different. He worked in the Taungtha township for Armo Agricultural Company, a major Burmese agrochemical company. His wife worked for the same company, but she worked more than two hours away in Mandalay, which means they barely saw each other.

Ko Latt had a decent job, but he had bigger plans for himself and his future family. He started a small business on the side as an ISP and set up a shop in the local Taungtha market. Back then he offered about 50 different items: a few brands of urea fertilizers, one brand of compound fertilizers, and a single case of pest management technology.

His stall was small and shadowy in the interior of the market – not the best place for attracting attention. In addition, it was located right next to a food stall with open pots of curries and stews waiting to absorb a waft of urea dust, a potential health hazard for hungry patrons.

With little support from the DOA, Ko Latt did not have knowledge of or access to better technologies. Due to his small inventory, many of his customers would only stop by for one or two items before going to shop somewhere else, limiting his profits.



In 2016, Ko Latt was able to join IFDC's Dry Zone Agro-Input and Farm Services (DZ) project funded by the Livelihoods and Food Security Trust Fund (LIFT). The project aims to increase the capacities of ISPs by forming public-private partnerships (PPPs) between farmers, DOA agents, and ISPs. By linking these actors, all parties will benefit from increased yields, knowledge, and sales while creating better access to new technologies like compound fertilizers, gypsum and other micronutrients, and quality seed.

The DZ project started helping Ko Latt develop partnerships with the DOA and different farmers in the area. Soon after joining, Ko Latt set up a groundnut demonstration plot. The plot demonstrated the effectiveness of compound fertilizers, gypsum use, and quality seed compared with farmer practices and technologies. Farmers began to see how improved inputs can increase yields and result in a better crop. Since then, Ko Latt has worked with IFDC and the DOA to participate in and conduct 17 farmer trainings (Ko Latt initiated five of those), two demonstration plots, and two farmer field days.

By comparing the result of the demonstration plot yields (of peanut) with and without using gypsum, farmers learned the advantages of using gypsum. The demand for gypsum grew significantly. Farmers also became aware that using their traditional seeds gave lower yield than the seeds recommended by DOA.

The farmer trainings, demo plots, and field days have increased Ko Latt's customer base and created a demand for new products, which the DOA helped him secure. With more products to offer and an increasing clientele, he was able to move to a bigger shop with better visibility and display. Now he offers between 400 and 500 different products, including gypsum, a wider variety of fertilizer blends, safety equipment, and a range of pest management solutions. He also began selling high-quality seed – hybrid seed, green gram, cotton, and groundnut, along with vegetables.



Ko Latt has become a one-stop shop for many of his customers. Since then, business has been booming.

“Soon after joining with IFDC, I was able to open up a bigger shop in a better location,” Ko Latt said. “Before, I earned only \$2,000 annually for selling inputs. But last year my annual income increased to \$20,000.”

So what did he do with the extra money? Ko Latt first invested more in his business by buying new supplies and equipment to sell or rent. Second, he opened an entirely new storefront several blocks away in a new building where he could safely store his products. Third, he was able to donate to local religious organizations — a key part of Burmese social customs.

But more than that, he and his wife were finally making enough money to quit their jobs with Armo and focus on the shop full time. This meant that they could finally live together, and they are now beginning to focus on starting a family.

“I'm very happy to be living and working with my wife,” he said. “She helps with the second store and keeping accounts. IFDC provided us with a laptop and taught us good business practices so we can manage our business effectively.”

Ko Latt wants to continue growing his business by diversifying into the seed industry.

“There is a scarcity of seeds in the area right now, and with the DOA and key farmers, I have a desire to produce seeds required in the area,” he said. “I hope to continue farmer meetings and trainings with DOA in the future.”

But that's not all he wants to grow.

“I've built my business, and now that my wife is with me, I want to build my family.”



IFDC's international training, workshop, and study tour programs are designed for professionals in private, public, cooperative, and non-governmental organizations. Each program is conducted by a multidisciplinary team of experts from IFDC's international staff and partner organizations and companies.

In 2018, IFDC hosted three international training programs in Uganda, Thailand, and the United States, for 106 professionals from 36 countries. Farmer business group leaders, CEOs of agricultural companies, chemists, and fertilizer industry professionals, among many other disciplines, exchanged ideas and learned with and from each other.

"The impact of our trainings is best seen in the networking," says Rob Groot, Director of Business Development and Partnerships. "In 2018, representatives from nearly 40 private companies, local and national governments, development partners, and donors participated in our programs. In designing each workshop, IFDC places a high priority on providing opportunities for networking and collaborative learning."

The 2019 training programs (see sidebar) continue to bring IFDC's core approaches to the forefront, while offering opportunities for professionals from diverse specialty areas to experience the unique multidisciplinary environment our workshops foster. We hope you will join us!



2019 Programs

Delivering Balanced Crop Nutrition to Small-Scale Farmers

Fournir des Formules de Fertilisation Équilibrée des Cultures aux Petits Producteurs

Accra, Ghana

May 27-31, 2019

IFDC/IFA Training on Production of Slow-, Controlled-Release and Stabilized Fertilizers

Frankfurt, Germany

June 24-26, 2019

U.S. Study Tour: Technology Advances in Agricultural Production, Water, and Nutrient Management

USA

August 19-30, 2019

IFDC/IFA Training on Production of Phosphate-Based Fertilizers

Surabaya, Indonesia

October 28-November 1, 2019

Inclusive Agribusiness: Linking Farmers to Markets

Nairobi, Kenya

November 25-29, 2019

Register for our 2019 Programs at

<https://ifdc.org/2019-training-programs/>.



Presents an International Training Program

TECHNOLOGY ADVANCES

IN
AGRICULTURAL PRODUCTION,
WATER AND NUTRIENT
MANAGEMENT

*Alabama, Arkansas,
Illinois, Tennessee,
and Washington D.C., USA*

AUGUST 19-30,
2019



An International Training on

Production of Phosphate-Based Fertilizers

Surabaya, Indonesia

October 28-November 1, 2019



IFDC PRESENTS AN
INTERNATIONAL TRAINING

Inclusive Agribusiness: Linking Farmers to Markets

Nairobi, Kenya
November 25-29, 2019



2018 PUBLICATIONS AND PRESENTATIONS

Publications

- 2SCALE. 2018. *Business as Unusual: Insights from the 2SCALE program*. IFDC, BoP, ICRA, KIT, Amsterdam.
- 2SCALE. 2018. *Business INSOLITE. Reflexions sur le programme 2SCALE*. IFDC, BoP, ICRA, KIT, Amsterdam.
- Adisa, I.O., V.L.R. Pullagurala, S. Rawat, J.A. Hernandez-Viezas, C.O. Dimkpa, W.H. Elmer, J.C. White, J.R. Peralta-Videa, and J.L. Gardea-Torresdey. 2018. "Role of Cerium Compounds in *Fusarium* Wilt Suppression and Growth Enhancement in Tomato (*Solanum lycopersicum*)," *Journal of Agricultural and Food Chemistry*, 66:5959-5970
- AGRA. 2018. *Assessment of Fertilizer Distribution and Opportunities for Developing Fertilizer Blends: Burkina Faso*, Consultancy report by IFDC and AFAP.
- AGRA. 2018. *Assessment of Fertilizer Distribution and Opportunities for Developing Fertilizer Blends: Ethiopia*, Consultancy report by IFDC and AFAP.
- AGRA. 2018. *Assessment of Fertilizer Distribution and Opportunities for Developing Fertilizer Blends: Ghana*, Consultancy report by IFDC and AFAP.
- AGRA. 2018. *Assessment of Fertilizer Distribution and Opportunities for Developing Fertilizer Blends: Kenya*, Consultancy report by IFDC and AFAP.
- AGRA. 2018. *Assessment of Fertilizer Distribution and Opportunities for Developing Fertilizer Blends: Malawi*, Consultancy report by IFDC and AFAP.
- AGRA. 2018. *Assessment of Fertilizer Distribution and Opportunities for Developing Fertilizer Blends: Mali*, Consultancy report by IFDC and AFAP.
- AGRA. 2018. *Assessment of Fertilizer Distribution and Opportunities for Developing Fertilizer Blends: Mozambique*, Consultancy report by IFDC and AFAP.
- AGRA. 2018. *Assessment of Fertilizer Distribution and Opportunities for Developing Fertilizer Blends: Nigeria*, Consultancy report by IFDC and AFAP.
- AGRA. 2018. *Assessment of Fertilizer Distribution and Opportunities for Developing Fertilizer Blends: Rwanda*, Consultancy report by IFDC and AFAP.
- AGRA. 2018. *Assessment of Fertilizer Distribution and Opportunities for Developing Fertilizer Blends: Tanzania*, Consultancy report by IFDC and AFAP.
- AGRA. 2018. *Assessment of Fertilizer Distribution and Opportunities for Developing Fertilizer Blends: Uganda*, Consultancy report by IFDC and AFAP.
- Agyin-Birikorang, S., J.H. Winings, X. Yin, U. Singh, and J. Sanabria. 2018. "Field Evaluation of Agronomic Effectiveness of Multi-Nutrient Fertilizer Briquettes for Upland Crop Production," *Nutrient Cycling in Agroecosystems*, 110:395-406.
- Aung, H.H., T.H. Aung, T.T. Aung, A.A. Cho, T. Naing, M.M. Kyaw, and Z.H. Hlyan. 2018. "Urea Deep Placement Technology and Its Extension to Farmers in Myanmar," IN *Myanmar Soil Fertility and Fertilizer Management Conference Proceedings*, pp. 117-134, Nay Pyi Taw, Myanmar.
- Aung, M., Z.Y. Myint, S. Thura, G. Hunter, U. Singh, and J. Sanabria. 2018. "Comparison of Yield Response and Nutrient Use Efficiency Between Urea Deep Place Technology and Farmers' Practice of Surface Broadcasting Urea on Transplanted Lowland Rice in Myanmar," IN *Myanmar Soil Fertility and Fertilizer Management Conference Proceedings*, pp. 47-54, IFDC and DAR, Nay Pyi Taw, Myanmar.
- Bationo, A., and J.O. Fening. 2018. "Soil Organic Carbon and Proper Fertilizer Recommendation," IN *Improving the Profitability, Sustainability and Efficiency of Nutrients Through Site Specific Fertilizer Recommendations in West Africa Agro-Ecosystems*, Volume 1, pp. 1-10, A. Bationo, D. Ngaradoum, S. Youl, F. Lompo, and J.O. Fening (Eds.).
- Bationo, A., D. Ngaradoum, S. Youl, F. Lompo, and J.O. Fening (Eds.). 2018. *Improving the Profitability, Sustainability and Efficiency of Nutrients Through Site Specific Fertilizer Recommendations in West Africa Agro-Ecosystems*, Volume 1, <https://doi.org/10.1007/978-3-319-58789-9>.
- Bationo, A., D. Ngaradoum, S. Youl, F. Lompo, and J.O. Fening (Eds.). 2018. *Improving the Profitability, Sustainability and Efficiency of Nutrients Through Site Specific Fertilizer Recommendations in West Africa Agro-Ecosystems*, Volume 2, <https://doi.org/10.1007/978-3-319-58792-9>.
- Bationo, A., J.O. Fening, and A. Kwaw. 2018. "Assessment of Soil Fertility Status and Integrated Soil Fertility Management in Ghana," IN *Improving the Profitability, Sustainability and Efficiency of Nutrients Through Site Specific Fertilizer Recommendations in West Africa Agro-Ecosystems*, Volume 1, pp. 93-138, A. Bationo, D. Ngaradoum, S. Youl, F. Lompo, and J.O. Fening (Eds.).
- Bindraban, P.S., C. Dimkpa, J.S. Angle, and R. Rabbinge. 2018. "Unlocking the Multiple Public Good Services from Balanced Fertilizers," *Food Security*, 10:273-285. <https://doi.org/10.1007/s12571-018-0769-4>.
- Bindraban, P., L. Mose, M. Hillen, M. Ruiperez Gonzalez, M. Voogt, J. Leenaars, K. Langeveld, and N. Heerink. 2018. *Smart Fertilization and Water Management – Kenya-Netherlands Aid-and-Trade Opportunities*, IFDC Report 2018/1, International Fertilizer Research Center, Muscle Shoals, Alabama, USA.
- Byarugaba, A.A., M. Benon, D. Tibanyedera, and A. Barekye. 2018. "Genotype by Environment Interaction (GxE) as a Measure of Yield Stability of Dutch Potato Varieties in Uganda," *African Journal of Agricultural Research*, 13(17):890-896, <https://doi.org/10.5897/AJAR2018.13061>.
- Conijn, J.G., P.S. Bindraban, J.J. Schröder, and R. Jongschaap. 2018. "Can Our Food System Meet Food Demand Within Planetary Boundaries?" *Agriculture, Ecosystem and Environment*, 251:244-256. <https://doi.org/10.1016/j.agee.2017.06.001>.

- Diagana, B., Alognikou, E., Fuentes, P., Sanabria, J., and L. Nagarajan. 2018. "ECOWAS Fertilizer Regulatory Framework: Implications for the Development of Private Sector-Led Supply of Quality Fertilizers in West Africa," Policy Brief
- Dimkpa, C.O. 2018. "Soil Properties Influence the Response of Terrestrial Plants to Metallic Nanoparticles Exposure," *Current Opinion in Environmental Science and Health*, 6:1-8.
- Dimkpa, C.O., D.T. Hellums, U. Singh, and P.S. Bindraban. 2018. "The Role of Mineral Fertilizers in Climate-Resilient Agriculture: Focus on Myanmar," IN *Myanmar Soil Fertility and Fertilizer Management Conference Proceedings*, pp. 221-241, IFDC and DAR, Nay Pyi Taw, Myanmar.
- Dimkpa, C.O., U. Singh, I.O. Adisa, P.S. Bindraban, W.H. Elmer, J.L. Gardea-Torresdey, and J.C. White. 2018. "Effects of Manganese Nanoparticle Exposure on Nutrient Acquisition in Wheat (*Triticum aestivum* L.)," *Agronomy*, 8:158.
- Dimkpa, C.O., U. Singh, P.S. Bindraban, W.H. Elmer, J.L. Gardea-Torresdey, and J.C. White. 2018. "Exposure to Weathered and Fresh Nanoparticle and Ionic Zn in Soil Promotes Grain Yield and Modulates Nutrient Acquisition in Wheat (*Triticum aestivum* L.)," *Journal of Agricultural and Food Chemistry*, 66:9645-9656.
- Elmer, W., R. De La Torre-Roche, L. Pagano, S. Majumdar, N. Zuverza-Mena, C.O. Dimkpa, J. Gardea-Torresdey, and J.C. White. 2018. Effect of Metalloid and Metallic Oxide Nanoparticles on *Fusarium* Wilt of Watermelon," *Plant Disease*, 102:1394-1401
- Fatondji, D., R. Tabo, T.C. Hash, and A. Bationo. 2018. "Effect of Hill Placement of Nutrients on Millet Productivity and Characteristics of Sahelian Soils of Niger: Analysis of Yield Trend After Three Years of Cropping," IN *Improving the Profitability, Sustainability and Efficiency of Nutrients Through Site Specific Fertilizer Recommendations in West Africa Agro-Ecosystems*, Volume 1, A. Bationo, D. Ngaradoum, S. Youl, F. Lompo, and J.O. Fening (Eds.).
- Fedeczko, J. 2018. "Working in Different Information Environments: Special Libraries and Information Centers," IN *Information Services Today: An Introduction*, 2nd edition, pp. 113-114, S. Hirsh and C. Megaridis (Eds.), Rowman & Littlefield, Lanham, Maryland.
- Fugice, J., S. Agyin-Birikorang, and C. Dimkpa 2018. "IFDC Evaluation of Portable Soil Testing Kits – Lessons Learned," IFDC, Muscle Shoals, Alabama.
- Fugice, J., C. Dimkpa, and L. Johnson. 2018. "Slow and Steady: The Effects of Different Coatings on Nitrogen Release in Soil," *Fertilizer Focus*, September/October, 12-13.
- Gaihre, Y.K., U. Singh, S.M.M. Islam, A. Huda, M.R. Islam, and J.C. Biswas. 2018. "Efficient Fertilizer and Water Management in Rice Cultivation for Food Security and Mitigating Greenhouse Gas Emissions," IN *Myanmar Soil Fertility and Fertilizer Management Conference Proceedings*, pp. 214-220, IFDC and DAR, Nay Pyi Taw, Myanmar.
- Honfoga, B.G. 2018. "Diagnosing Soil Degradation and Fertilizer Use Relationship for Sustainable Cotton Production in Benin," *Cogent Environmental Science*, 4:1422366, <https://doi.org/10.1080/23311843.2017.1422366>.
- IFDC and DAR. 2018. *Myanmar Soil Fertility and Fertilizer Management Conference Proceedings*, Nay Pyi Taw, Myanmar.
- IFDC. 2018. "Etude d'évaluation des politiques existantes d'importation et de distribution des engrais au Niger," IFDC evaluation study.
- IFDC. 2018. "Etude sur l'évaluation de la structure coûts et prix des engrais au Niger," IFDC evaluation study.
- Islam, S.M.M., Y.K. Gaihre, J.C. Biswas, M.S. Jahan, U. Singh, S.K. Adhikary, M.A. Satter, and M.A. Saleque. 2018. "Different Nitrogen Rates and Methods of Application for Dry Season Rice Cultivation with Alternate Wetting and Drying Irrigation: Fate of Nitrogen and Grain Yield," *Agricultural Water Management*, 196:144-153.
- Islam, S.M.M., Y.K. Gaihre, J.C. Biswas, U. Singh, Ahmed, Md.N., J. Sanabria, and M.A. Saleque. 2018. "Nitrous Oxide and Nitric Oxide Emissions from Lowland Rice Cultivation with Urea Deep Placement and Alternate Wetting and Drying Irrigation," *Scientific Reports*, 17623.
- Jayne, T.S., N.M. Mason, W.J. Burke, and J. Ariga. 2018. "Review: Taking Stock of Africa's Second-Generation Agricultural Input Subsidy Programs," *Food Policy*, 75:1-14, <https://doi.org/10.1016/j.foodpol.2018.01.003>.
- Klutse, A.R., A. Bationo, and A. Mando. 2018. "Socio-Economic Determinants and Trends on Fertilizer Use in West Africa," IN *Improving the Profitability, Sustainability and Efficiency of Nutrients Through Site Specific Fertilizer Recommendations in West Africa Agro-Ecosystems*, Volume 1, A. Bationo, D. Ngaradoum, S. Youl, F. Lompo, and J.O. Fening (Eds.).
- Kyaw, D., and G. Hunter. 2018. "UDP Technology and Rice Yields Among Farmer Beneficiaries of Rainfed Lowland Project Areas in Myanmar," IN *Myanmar Soil Fertility and Fertilizer Management Conference Proceedings*, pp. 135-149, IFDC and DAR, Nay Pyi Taw, Myanmar.
- Leonardo, W., G.W.J. van de Ven, A. Kanellopoulos, and K.E. Giller. 2018. "Can Farming Provide a Way Out of Poverty for Smallholder Farmers in Central Mozambique?" *Agricultural Systems*, 165:240-251.
- Lompo, F., A. Bationo, M.P. Sedogo, V.B. Bado, V. Hien, and B. Ouattara. 2018. "Role of Local Agro-minerals in Mineral Fertilizer Recommendations for Crops: Examples of Some West Africa Phosphate Rocks," IN *Improving the Profitability, Sustainability and Efficiency of Nutrients Through Site Specific Fertilizer Recommendations in West Africa Agro-Ecosystems*, Volume 1, A. Bationo, D. Ngaradoum, S. Youl, F. Lompo, and J.O. Fening (Eds.).
- Maatman, A., N. van Dijk, P. Kirimi, D. Magaja, G. Agai. 2018. *Access to Finance in Agribusiness Partnerships: Insights from 2SCALE*, Thematic Paper.
- MOALI and IFDC. 2018. *Soil Fertility and Fertilizer Management Strategy for Myanmar*, Nay Pyi Taw, Myanmar.
- Mwendia, S.W., C.M. Mwangi, S.K. Ng'ang'a, D. Njenga, and A. Notenbaert. 2018. "Effect of Feeding Oat and Vetch Forages on Milk Production and Quality in Smallholder Dairy Farms in Central Kenya," *Tropical Animal Health and Production*, <https://doi.org/10.1007/s11250-018-1529-3>.
- Nagarajan, L., C.E. Pray, and A. Naseem. 2018. "Empirical Analysis on the Impact of Private Sector R&D on Cotton Productivity in India," Chapter 9 IN *Biotechnology for a Second Green Revolution in India: Socioeconomic, Political, and Public Policy Issues*, N. Chandrasekhara Rao, C.E. Pray, and R. J. Herring (Eds.), Academic Foundation Press, New Delhi, India.
- Ouattara, B., B.B. Somda, I. Sermé, A. Traoré, D. Peak, F. Lompo, S.J.B. Taonda, M.P. Sedogo, and A. Bationo. 2018. "Improving Agronomic Efficiency of Mineral Fertilizers through Microdose on Sorghum in the Sub-Arid Zone of Burkina Faso," IN *Improving the Profitability, Sustainability and*

Efficiency of Nutrients Through Site Specific Fertilizer Recommendations in West Africa Agro-Ecosystems, Volume 1, A. Bationo, D. Ngaradoum, S. Youl, F. Lompo, and J.O. Fening (Eds.).

Pray, C., L. Nagarajan, and A. Naseem. 2018 "The Role of Multinational Corporations in the Supply of Agricultural Production Technology to China & India," *World Food Policy*, 4(2):19-30. <https://doi.org/10.18278/wfp.4.2.3>.

Sanabria, J. 2018. "Fertilizer Quality Assessment in the Myanmar Dry Zone," IN *Myanmar Soil Fertility and Fertilizer Management Conference Proceedings*, pp. 242-254, IFDC and DAR, Nay Pyi Taw, Myanmar.

Sanabria, J., J. Ariga, and D. Mose. 2018. *Fertilizer Quality Assessment in Markets of Kenya*, IFDC.

Sanabria, J., J. Ariga, and D. Mose. 2018. *Fertilizer Quality Assessment in Markets of Uganda*, IFDC.

Sharma, S., P. Borah, M.K. Meena, P. Bindraban, and R. Pandey. 2018. "Evaluation of Genotypic Variation for Growth of Rice Seedlings under Optimized Hydroponics Medium," *Indian Journal of Genetics and Plant Breeding*, 78(3):292-301.

Sharma, S., H. Malhotra, P. Borah, M.K. Meena, P. Bindraban, S. Chandra, V. Pande, and R. Pandey. 2018. "Foliar Application of Organic and Inorganic Iron Formulation Induces Differential Detoxification Response to Improve Growth and Biofortification in Soybean," *Ind. J. Plant Physiol.* <https://doi.org/10.1007/s40502-018-0412-6>.

Singh, U., M. Aung, and J. Fugice. 2018. "Role of Yield Potential and Yield-Gap Analyses on Resource-Use Efficiency Improvement," IN *Myanmar Soil Fertility and Fertilizer Management Conference Proceedings*, pp. 22-37, IFDC and DAR, Nay Pyi Taw, Myanmar.

Thigpen, J. 2018. "Ongoing Improvements and Applications of the CERES-Rice Model," *Agrilinks Newsletter*, February 28, <https://www.agrilinks.org/post/ongoing-improvements-and-applications-ceres-rice-model>.

Traoré, A., B. Ouattara, H. Sigué, F. Lompo, and Andre Bationo. 2018. "Economic Efficiency of Sorghum Microfertilizing in Smallholder Farms in the North-Sudanian Zone of Burkina Faso," IN *Improving the Profitability, Sustainability and Efficiency of Nutrients Through Site Specific Fertilizer Recommendations in West Africa Agro-Ecosystems*, Volume 1, A. Bationo, D. Ngaradoum, S. Youl, F. Lompo, and J.O. Fening (Eds.).

Wendt, J. 2018. "Accelerating the Delivery of Improved Crop Nutrition to Smallholder Farmers in Africa," *New Agriculture*, June-July.

Wendt, J., and L.W. Mbuthia. 2018. "A Conceptual Framework for Delivering Improved Fertilizers to Smallholder Farmers in Africa," IN *Myanmar Soil Fertility and Fertilizer Management Conference Proceedings*, pp. 169-175, IFDC and DAR, Nay Pyi Taw, Myanmar.

Win, Z.M. 2018. "The Role of Agribusiness in Advisory and Marketing Services in Myanmar," IN *Myanmar Soil Fertility and Fertilizer Management Conference Proceedings*, pp. 181-193, IFDC and DAR, Nay Pyi Taw, Myanmar.

Presentations

Agyin-Birikorang, S. 2018. "Soil Fertility Mapping to Facilitate Site and Crop-Specific Fertilizer Recommendation for Northern Ghana," presented at the 2018 Northern Ghana Soils and Fertilizer Workshop, April 10-12, Accra, Ghana.

Bindraban, P.S. 2018. "Micronutrients for Sustainable Food Production," Keynote at Argus Europe Fertilizer, Athens, Greece, October 24-26.

Bindraban, P.S. 2018. "Phosphorus in Plant and Human Nutrition," Plenary Keynote at International Conference for Research on Phosphates and Derivatives. Mohammed VI Polytechnic University, OCP group, Ben Guerir, Morocco, November 12-13.

Chilande, G. 2018. "Fertilizer Cost Chain Analysis," presented at the Kenya Fertilizer Roundtable, October 16-17, Nairobi, Kenya.

Dimkpa, C. 2018. "Micronutrient Fertilizers as a One-Stop Shop for Improving Crop Production: From Conventional to Nano-Scale," presented at the Materials Innovation for Sustainable Agriculture Symposium, University of Central Florida, Orlando.

Dimkpa, C. 2018. "Role of Micronutrients in Crop Production in a Changing Climate," presented at the Annual Meeting of the Agronomy Society of America, Baltimore.

Fedeczko, J., and N. Gonce. 2018. "The Muscle Shoals Contribution: Soulful Sound and the Soil," poster presented at the 2018 Southern Archivists Conference, Montgomery, Alabama.

Fernando, A. 2018. "Proposed Kenya Fertilizer Platform: A Forum for Public-Private Dialogue," presented at the Kenya Fertilizer Roundtable, October 16-17, Nairobi, Kenya.

Gaihre, Y.K., U. Singh, M. Aung, B.R. Baral, and M. Hasnain. 2018. "Climate Smart Fertilizer Management in Rice Cultivation under Stress Prone Areas for Food Security and Mitigating Greenhouse Gas Emissions," paper presented at the 5th International Rice Congress, October 15-17, Singapore.

Islam, M.R., H. Akter, M.R. Islam, M.A. Ali, Y.K. Gaihre, A.A. Mahmud, and M.M.H. Talukder. 2018. "Influence of Organic and Inorganic Nitrogen on Rice Grain Yields and Nitrogen Use Efficiency in the Non-Calcareous Soils of Bangladesh," presented at the First International Conference on Challenges for Future Agriculture 2018, January 27-28, Bangladesh Agricultural University (BAU), Bangladesh.

Islam, S.M.M, Y.K. Gaihre, U. Singh, J.C. Biswas, M.N. Ahmed, J. Sanabria, B.O. Sander, and M.A. Saleque. 2018. "Impacts of Urea Deep Placement with Intermittent Irrigation on Nitrous Oxide and Nitric Oxide Emissions and Nitrogen Use Efficiency from Lowland Rice Cultivation," presented at the 5th International Rice Congress, October 15-17, Singapore.

Jahan, I. 2018. "Fertilizer Subsidy Policy of Bangladesh and Its Use," presented at the Argus NPK, Water Soluble and Micronutrient Fertilizer India 2018, March 8-9, New Delhi.

- Nagarajan, L., A. Naseem, and C.E. Pray. 2018. "Evaluating the Impacts of Policy Change on Maize Varietal Development and Productivity in sub-Saharan Africa," presented at the 22nd International Consortium on Applied Bioeconomy Research (ICABR) Conference on Disruptive Innovations, Value Chains, and Rural Development, World Bank, June 12-15, Washington, D.C.
- Nagarajan, L., A. Naseem, and C.E. Pray. 2018. "The Role of Maize Varietal Development on Yields in Kenya," presented at the International Conference for Agricultural Economists (ICAE), July 28-August 2, Vancouver, Canada.
- Nagarajan, L., A. Naseem, and C.E. Pray. 2018. "The Transformation of India's Agricultural Input Industries," presented at the 22nd International Consortium on Applied Bioeconomy Research (ICABR) Conference on Disruptive Innovations, Value Chains, and Rural Development, World Bank, June 12-15, Washington, D.C.
- Sanabria, J. 2018. "Fertilizer Quality Problems in Markets of Developing Countries," presented at the American Society of Agronomy Annual Meeting, ASA in Baltimore, Maryland.
- Sanabria, J. 2018. "Kenya Fertilizer Quality Assessment," presented at the Kenya Fertilizer Roundtable, Nairobi.
- Sanabria, J. 2018. "Uganda Fertilizer Quality," presented to the Ugandan government and private sector, July 3, Kampala.
- Sanabria, J. 2018. "Kenya Fertilizer Quality Assessment," presented to the Kenyan government and private sector, July 9, Nairobi.
- Senthilkumar, K., F.S. Sillo, I. Dieng, J. Rodenburg, K. Saito, E. Vandamme, C. Dimkpa, J. Wendt, and P.S. Bindraban. 2018, October. "Effects of Micronutrient on Productivity and Profitability of Rice under Three Growing Environments in Tanzania," International Rice Congress 2018, Singapore.
- Sharma, S., M.K. Meena, P. Bindraban, and R. Pandey. 2018. "Foliar Application of Bacteriosiderophore Improves Yield and Bioavailability of Iron in Soybean and Wheat," Abstract (IPC_2018_ABS_Q6139), submitted to the 4th International Plant Physiology Congress, Dec. 2-5, Lucknow, India.
- Siddique, I.A., A.A. Mahmud, H. Hossain, M.R. Islam, and Y.K. Gaihre. 2018. "Movement and Retention of NH₄-N in Wetland Rice Soils as Affected by Urea Application Methods," presented at the First International Conference on Challenges for Future Agriculture 2018, January 27-28, Bangladesh Agricultural University (BAU), Bangladesh.
- Singh, U. 2018. "Strategic Production and Use of Phosphorus for a Greener Planet," presented at Phosphate Days Conference, Ben Guerir, Morocco.
- Singh, U., and J. Fugice. 2018. "Recent Application of CERES-Rice Model in the Field of Climate Change," paper presented at 5th International Rice Congress, Singapore.
- Singh, U., C. Porter, Y. Gaihre, and J. Fugice. 2018. "Do Existing Crop Models Simulate Soil Processes Adequately for Soil Health and Climate Change Mitigation Applications?" paper presented at the 5th International Rice Congress, Singapore.
- Singh, U., M. Ahsan, K. Glass, J. Fugice, and Y. Gaihre. 2018. "Quantify Climate Mitigation Role of Enhanced Efficiency Fertilizers and Practices," presented at the American Society of Agronomy Annual Meeting, ASA in Baltimore, Maryland.
- Wendt, J. 2018. "A Conceptual Framework for Delivering Improved Fertilizers to Smallholder Farmers in Africa," presented at the 10th New Ag International Conference and Exhibition, March 21-23, Nairobi, Kenya.
- Wendt, J. 2018. "La formulation commerciale: Les différentes options de production des engrais complets," presented at La Réunion de Validation de Nouvelles Recommandations de Fertilisation des sols du Burundi," August 9, Bujumbura, Burundi.
- Wendt, J. 2018. "Balanced Fertilizer Solutions for Smallholder Farmers," presented at Argus Added Value Fertilisers 2018, September 18-20, Cape Town, South Africa.
- Wendt, J. 2018. "The Potential of Soil- and Crop-Specific Fertilizers – The Soil SMaRT Approach," presented at the Kenya Fertilizer Roundtable, October 16-17, Nairobi, Kenya.

2018 IFDC FINANCIAL STATEMENT

2018 Financial Performance

Total revenue for the year was \$46.3 million as compared to \$56.6 million in 2017; a decrease of 10.3 million, or 18.2%. Annual revenue is contingent upon the size of our overall portfolio, project duration, and the level of implementation for each project. The decrease in revenue is attributable to projects that ended in 2017 and slower implementation of new projects. Project implementation rates can vary considerably based on donor, country, staffing, political, or other issues.

Expenses for the year decreased to \$47.8 million in 2018 as compared to \$55.8 million in 2017; a decrease of \$8.0 million, or 14.3%. The largest decrease in expenses was related to field projects, which decreased to \$34.1 million in 2018 from \$41.5 million in 2017; a decrease of \$7.4 million, or 17.8%. Research, development, and capacity building expenses decreased \$0.6 million, or 7.8%, to \$7.1 million in 2018 from \$7.7 million in 2017. Operational expenses and support services remained constant at \$6.6 million year-over-year.

Total assets on December 31, 2018, amounted to \$17.1 million, an increase of \$0.5 million from December 31, 2017. Total liabilities increased from \$18.1 million in 2017 to \$20.0 million in 2018.

Net assets decreased by \$1.5 million for 2018 to a total of (\$2.9) million. The reduction in net assets was mainly attributable to the previously mentioned project implementation rates, lower than expected indirect income related to our ongoing projects, and a one-time charge from a specific project.

In 2018, IFDC secured new projects totaling more than \$75 million, and we are confident we will continue to increase our portfolio in 2019.

IFDC's 2018 Annual Financial Statements are pending external audit opinion. A clean, unqualified opinion is anticipated and will be issued shortly.

Statement of Revenue and Expenses For the year ended December 31, 2018

Revenues & Gains	2018	2017
	US \$'000	US \$'000
ACDI/VOCA		20
Alliance for a Green Revolution in Africa	1,077	266
African Fertilizer and Agribusiness Partnership (AFAP)		102
African Development Bank	493	
Centre for Development Innovation (CDI)		339
Dutch Embassies	18,582	19,488
International Food Policy Research Institute (IFPRI)	906	
International Fertilizer Association	190	183
Islamic Development Bank		441
Embassy of Ireland (Irish Aid)	309	112
Millennium Challenge Authority (MCA)		285
Netherlands Directorate-General for International Cooperation (DGIS)	6,932	8,871
The Fertilizer Institute	62	85
Solidaridad West Africa (SWA)		207
Swisscontact	207	
Swiss Agency for Development and Cooperation (SDC)	443	649
Walmart Foundation, Inc.	537	564
United Nations Office for Project Development (UNOPS-LIFT)	1,335	1,331
U.S. Agency for International Development	10,841	18,137
Others	4,385	5,438
Total revenues and support	46,299	56,518
Expenses and Losses		
Research and development	2,966	3,136
Field projects	34,113	41,531
Capacity building	4,141	4,608
Support activities	6,550	6,523
Total expenses	47,770	55,798
Decrease in unrestricted net assets	(1,471)	720

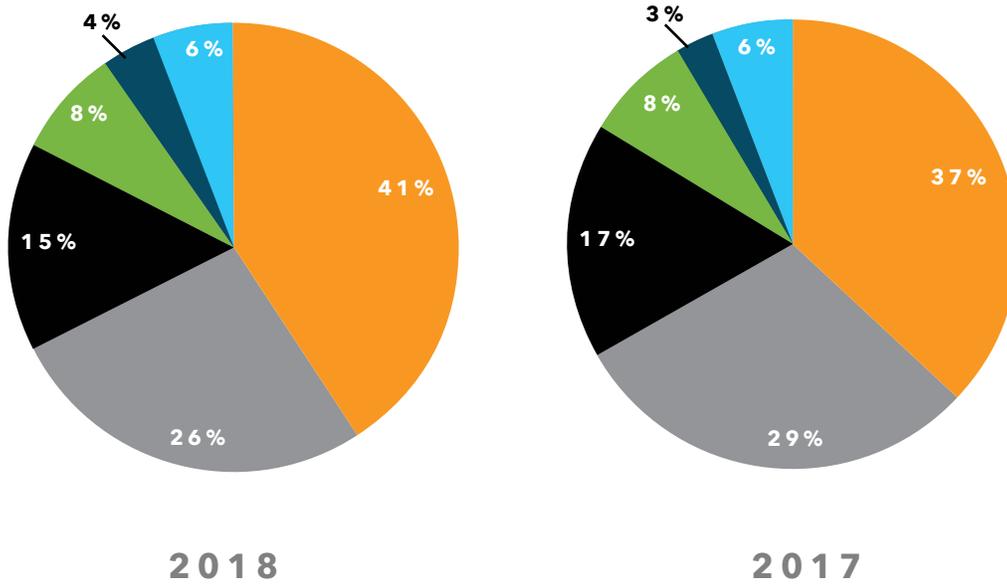
**Balance Sheet
For the year ended December 31, 2018**

	2018	2017
	US \$'000	US \$'000
Total assets	17,126	16,639
Total liabilities	19,991	18,088
Unrestricted net assets	(2,873)	(1,457)
Permanently restricted net assets	8	8
Total liabilities and net assets	(2,865)	(1,449)

**Functional Expenses
For the year ended December 31, 2018**

	2018	2017
Personnel	19,764	20,587
Travel	3,021	3,491
Operations	1,691	1,812
Workshops & training	3,981	4,447
Equipment & supplies	7,093	9,490
Subcontracts & grants	12,220	15,971
Total expenses	47,770	55,798

Functional Expenses



- Personnel
- Travel
- Operations
- Workshops & Training
- Equipment & Supplies
- Subcontract & Grants



Developing Agriculture from the Ground Up

P.O. Box 2040
Muscle Shoals, Alabama 35662 U.S.A.
Tel: +1 (256) 381-6600
ifdc.org

IFDC
Circular IFDC S-42
ISSN-1536-0660
June 2019

PUBLICATION CREDITS

Executive Editor
Andy Thigpen

Senior Editor
Courtney Greene

Design/Layout
Victoria Antoine-Fisher

Contributors

Victoria Antoine-Fisher, Cheick Diarra,
Courtney Greene, Andrea Hovater,
Lauren Johnson, Julie Kohler,
Ramón Lazo de la Vega, Latha Nagarajan,
Edwin Remsberg, Andy Thigpen, James Thigpen,
Aung Ko Win, Josephine Zhane

Cover Photo
James Thigpen

All photographs are from
the IFDC photo archives.