40 YEARS FEEDING A HUNGRY WORLD

IFDC's First Forty Years

IFDC

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IFDC'S FIRST FORTY YEARS

By Thomas Hager

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Feeding a Hungry World
IFDC's First Forty Years

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Published by
International Fertilizer Development Center
Alabama, USA

Printed in the USA

All photos are from IFDC's Photo Achives unless noted otherwise

Library of Congress Cataloging-in-Publication Data

Hager, Thomas.
Feeding a hungry world : IFDC's first forty years / by Thomas Hager.
pages cm
ISBN 978-0-88090-201-4
1. International Fertilizer Development Center--History. 2. Nitrogen fertilizers--Research--History. I. Title. II. Title: IFDC's first forty years.
S651.H15 2014
631.8'4--dc23
2014028427

TABLE OF CONTENTS

FOREWORD 4
INTRODUCTION – A CALL TO ARMS 7
CHAPTER 1: THE SHOALS 10
CHAPTER 2: CHIPS 18
CHAPTER 3: OFF THE GROUND 26
CHAPTER 4: BUILDING A HOME 36
CHAPTER 5: A CHANGING WORLD 44
CHAPTER 6: PURE CATASTROPHE 52
CHAPTER 7: A FAST LEARNER 58
CHAPTER 8: AFRICA 62
CHAPTER 9: THE TIRANA EXPERIMENT 68
CHAPTER 10: DOWN TO EARTH 76
CHAPTER 11: UREA DEEP PLACEMENT 78
CHAPTER 12: A SUMMIT IN AFRICA 88
ABUJA DECLARATION ON FERTILIZER 94
CHAPTER 13: GROWTH AND CRISIS 96
CHAPTER 14: VFRC 104
ACKNOWLEDGMENTS 110
THE IFDC HISTORICAL TIMELINE 112
IFDC'S PRESENCE 118
SOURCES CONSULTED 120
INDEX 121

FOREWORD

Fresh from studying fertilizers and engineering, I joined the International Fertilizer Development Center in 1978. I was instantly in awe of the organization's ability to use research that made a difference in people's lives. After more than 35 years, I still hold the same respect for our staff and work as I did the first day I walked through the door.

As president and CEO of IFDC, I hope this book's story will inspire and rally the next generation of agricultural researchers and development workers to move forward fearlessly. I also encourage other like-minded organizations to document their history. We must analyze the past to contribute to the future.

The story of IFDC is not merely a collection of dates and facts; it's a story of resilience. We have been able to survive – and thrive – under changing circumstances because of our staff's ability to create solutions that address critical world problems.

In the early 1990s, when Albania opened up to the world after 40 years of isolation, food production there was faltering. We designed an outside-the-box program auctioning fertilizer to private buyers. This created an open market for agricultural products that helped the country become an exporter of agricultural products. The experience forever changed our approach to supporting smallholder farmers.

While fertilizer is our core, IFDC's work now addresses the much broader context of agricultural and economic development. Year after year we have grown in scope, giving farmers the training and technology they need to make their farms into profitable enterprises. In *Feeding a Hungry World*, Thomas Hager (*Alchemy of Air*) expertly chronicles this progression, from our roots as a fertilizer research and technology transfer organization to a holistic agricultural development center.

IFDC was formed at a time when increasing food and energy prices left hundreds of millions hungry. As we approach a population of 9.6 billion in 2050, sustainably increasing food production is becoming more important than ever. Now we must accomplish this goal using less land and water resources. IFDC's efforts must lower greenhouse gas emissions from agriculture as well as help farmers adapt to climate change.

As challenges rise, and the stakes grow higher with each passing year, the history of IFDC demonstrates that innovation will write the next chapter in food and nutrition security. From our early work in Latin America and Asia to later efforts in Eastern Europe and Africa, we remain vigilant to getting new agricultural technologies into farmers' hands. In Bangladesh, for example, millions of rice farmers are using fertilizer deep placement to increase yields and incomes. In 2006, we implemented the Africa Fertilizer Summit, focusing the world's attention on farmers' need for fertilizers. We're now working with national and regional organizations to enhance soil productivity while simultaneously strengthening the fertilizer supply chain across Africa and connecting farmers to profitable markets.

We are defined by the impact we have on the world. IFDC's character is reflected in the dedication of its staff. We began with just a handful of employees. Forty years later, we have impacted people's lives in more than 130 countries. Currently, our nearly 900 employees operate in more than 25 countries. These agronomists, geologists, soil scientists, economists, technicians, engineers, marketers, training specialists, researchers and analysts are sharing the latest scientific and technological tools with farmers around the globe. I would like to thank IFDC staff, past and present, for their dedication and creativity in carrying out our mission of a food-secure world.

Finally, I would like to thank Tom Hager for truly capturing IFDC's essence through this book.

Amit Roy
President and CEO
International Fertilizer Development Center

A Call to Arms

History was about to be made. It was the fall of 1973 and the mood in the great hall of the United Nations (U.N.) was electric. Delegates gathering for the General Assembly meeting were unusually animated.

Everyone was talking about "the undisputed star of the show," as *Time* magazine put it: Henry Kissinger, America's diplomatic supernova, Richard Nixon's top adviser, go-to man on foreign relations, architect of *detente*, opener of relations with China, and negotiator of the Paris Peace Accords to end the Vietnam War. Three days before the U.N. meeting he had been named United States Secretary of State, making him the first man in U.S. history to simultaneously head that office and serve as National Security Advisor. Kissinger was everywhere, on front pages talking about arms control, on television arriving at high-level meetings, in the Oval Office with the President, in newspaper gossip pages with a beautiful woman on his arm. He was rumored to be shortlisted for a Nobel Peace Prize (and a few months later, won it). He was one of the most powerful men on the planet.

And he was in a world of trouble. His boss, President Nixon, was beginning to feel the undertow of the Watergate scandal. The global economy was sputtering: there was rampant inflation, skyrocketing energy prices, and rumor of war in the Middle East. The Organization of Petroleum Exporting Countries (OPEC) was playing hardball with oil, threatening to cut off supplies to the U.S. So the stakes were unusually high as Kissinger got ready to make his public debut as Secretary of State on the world stage of the United Nations in the fall of 1973. He wanted his initial address to the General Assembly to be positive, forward-looking, something that could highlight America's leadership without arousing doubts about its intentions. It was also a chance to create a new global image for Henry Kissinger, one a bit loftier and more statesmanlike than his earlier reputation as Nixon's *Realpolitik* hardball player.

He and his team began crafting a message. It needed to address the world's fast-changing political mood. A few weeks before the General Assembly, many of the world's non-aligned nations had held a meeting in Algiers focused on food: rising prices, shrinking reserves, and looming

shortages. The idea of the non-aligned nations taking global leadership on an important issue caught Kissinger's attention. And food prices were an important issue, especially among the world's poorer nations. Part of the reason for rising prices in 1973 was linked to the rising cost of oil, part to bad weather. Whatever the reasons, when the cost of food rose, the world's poor suffered disproportionately because they had to spend a greater portion of their small incomes on food. Food was especially important in relations with developing nations. Kissinger knew relatively little about agriculture but he realized that feeding the hungry was one of those golden ideas that few people could oppose and almost everyone would support, rich and poor, left and right, East and West. An American proposal around on food would not only be good for the world, but would also boost America's image as a caring nation. At the same time, the U.S. could gently nudge ahead of the non-aligned nations on the issue.

The mood was one of growing excitement as Kissinger prepared to take the podium for his debut at the General Assembly. The hall was buzzing; as they filed in, gathering delegates grabbed every available copy of Kissinger's preprinted speech. His parents were in the audience, and so was Nixon's daughter Patricia (Tricia). Then the man himself, serious, self-assured, strong, started to speak. And in the space of a few minutes, he lifted food to the top of the global agenda. "A world community must assure that all its people are fed," he said. "We must embark on a new scientific revolution to increase agricultural productivity in all lands. No field of human endeavor is so dependent upon an open world for its advancement; no field is so in need of international cooperation." He emphasized his commitment by calling for a great international conclave – a U.N.-sponsored World Food Conference – within a year. It was a bold proposal that caught the imagination of both the U.N. and the general public. The next day, Sept. 25, 1973, *The New York Times* headline read, "World Parley on Food Urged." Newspapers around the world echoed the project. The General Assembly concurred, and plans were laid for a two-week high-level gathering in Rome in the fall of 1974.

This was the start, a call to arms, which – coupled with American technological know-how and growing global hunger – would soon be turned into action in the form of a new organization: The International Fertilizer Development Center (IFDC). This book tells the story of how that organization was formed, how it grew, and how it has helped accomplish its mission to feed a hungry world.

1

THE SHOALS

They say that the Tennessee River sings at The Shoals. It sings because the river gets shallow there, falling and dancing over miles of shallows and rapids, an inspiration for generations of musicians and a hazard for river shipping. It was also recognized as a great site for a dam. Engineers confirmed before World War I that The Shoals was the best place in the nation east of the Rockies to generate large amounts of electricity. Local boosters, dreaming of an electrified renaissance, began calling it the "Niagara of the South." The area needed revival. The Tennessee River valley, cutting through parts of seven Southern states, was one of the poorest regions in the U.S., a place where farmers eked out a living from played out soils on eroding hillsides. Before the dams came, half the people in the Valley were on relief. Only three farms in a hundred had electricity. Hookworm and malaria were endemic.

Construction of nitrate plants began in Muscle Shoals in 1918.

But then there was The Shoals. Investment started with entrepreneurs building locks for shipping and studying the best place for a hydroelectric plant. Interest grew during World War I, when the nation decided to get into the fight and realized it needed a lot more gunpowder to do it. Gunpowder was made with nitrate – a form of fixed nitrogen that was also a basic ingredient in fertilizer – and the need for nitrate drove the federal government to The Shoals. Nitrate factories needed electricity and our military needed nitrates, so along with money for new factories the

Photo taken December 3, 1921, of Henry Ford and Thomas Edison standing at the back of their private railway car. They were visiting the area where they purchased land in Muscle Shoals. Photo © G.W. Landrum, courtesy of the Landrum Collection of Historical Photographs.

government also started building the nation's biggest hydroelectric dam, named the dam after President Wilson, at a spot called Muscle Shoals. Construction started in 1918. The area shook awake, tent cities springing up to house tens of thousands of workers engaged in a crash program to build two huge nitrate factories and the system to power them.

But the War ended before construction did. The dam was a skeleton across the river, only one-third complete, when the Armistice was signed. One of the two factories – a costly and failed attempt to replicate the super-secret Haber-Bosch system used in Germany – never went into full production and was quickly mothballed after the War. The second, which used a different manufacturing approach, did start production, but by then there was no more government demand for gunpowder. Most operations shut down. The workers left.

That's where things stood in 1921 when Henry Ford came to town. He looked at all the unused factory space and river power, and offered to buy the whole thing, the silent factories, the rusting equipment, and a 100-year lease on the Wilson Dam, all for $5 million. All the government had to do was finish the dam and agree to sell Ford all the power it produced. The government's first response was to laugh; it had pumped somewhere around $100 million into the projects at that point – but the people around The Shoals were not laughing. Any small return on investment was tempting. And Ford was offering more than cash. In the long run,

he was offering jobs. He promised to bring dormant facilities back to life, build new ones, and hire thousands of workers. He started lining up backers, local businesspeople and elected officials who were eager to bring the Tennessee Valley back to life.

Ford built enthusiasm by visiting The Shoals area in early December 1921, rolling into Florence in a luxurious private rail car with his wife, his son Edsel, and a good friend: Thomas Alva Edison. The arrival of the world's biggest car maker and the world's leading inventor (the "Twin Wizards," as one newspaper dubbed them) was the biggest thing the region had seen since the Civil War. Schools in Florence were dismissed so that the children could go down to the station and see the great men. A crowd of more than 2,000 – a fifth of the town's population – greeted Ford's train when it arrived. He told reporters that he was there on an inspection tour, to see if he was right about the grand new manufacturing complex he envisioned. Why, once the dam was done, it would generate enough electricity not only for local factories, but for plants in towns up and down the River, forming what he called a "75-mile city." He saw rising along the river a Detroit of the South, employing a million workers making auto parts, fertilizers, steel, aluminum, chemical, cloth, and machinery. The aging Thomas Edison, meanwhile, toured one of the enormous, echoing nitrate plants, and opined that although he didn't know much about fixed nitrogen, he thought it could be turned into "the greatest munitions plant in the country," and that he would "like to wander through it all night."

Ford's interest triggered a land rush. Real estate speculators flocked to The Shoals, buying swampy farmland for next to nothing and selling it as valuable building lots. Neighborhoods were platted, towns planned, and sidewalks laid. Reporters likened the scene to the Klondike Gold Rush. Hucksters from as far away as New York City started selling Muscle Shoals land for ten, twenty, thirty, a hundred times what they paid for it.

But not everyone wanted to sell to Ford. Political sides were drawn up, with Southern states strongly favoring taking the Ford offer, while representatives from other parts of the nation began wondering what else might be done to get something out of all that government investment in The Shoals. A big question for the nation's farmers was the production of fertilizer: Would Ford give them cheaper nutrients for their crops? Public power advocates opposed the sale, encouraging public rather than private control of the Tennessee River's electrical production. Ford was painted as a greedy monopolist. While debates continued, the government decided that one way or another, it might as well finish the Wilson Dam.

It was not until 1924 that a decision was reached. Ford's offer was rejected. He didn't much care – tired of the delay, he'd moved on to other grand plans.

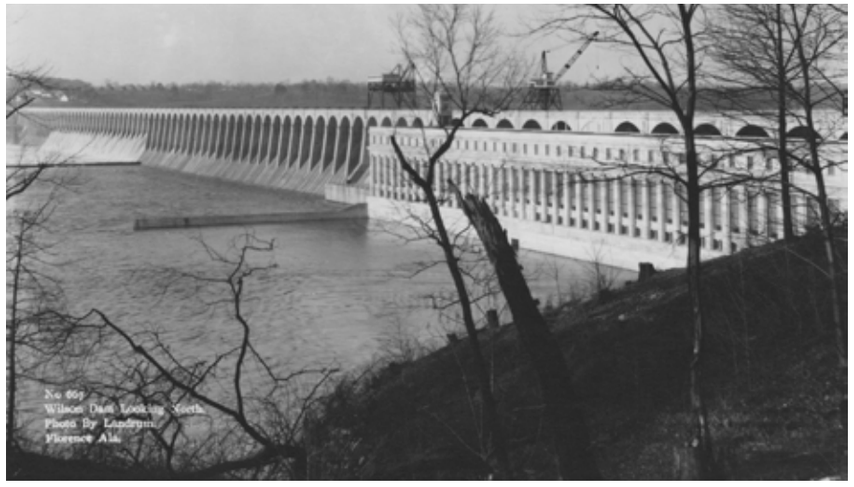


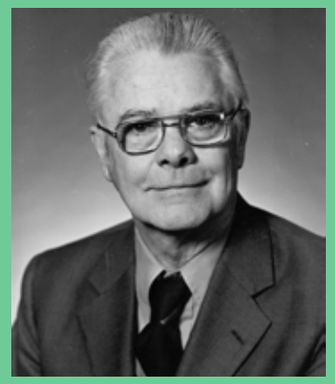
Photo taken in 1926 of the completed Wilson Dam. © G.W. Landrum, courtesy of the Landrum Collection of Historical Photographs.

Among the few things that remain today from that short boom is a small town called Ford City, and the weedy remains of a few long-abandoned street developments from the 1920s (making The Shoals area one of the few places in the nation where you can hunt quail from the sidewalk).

The government said no to Ford because it had big plans of its own. The discussion now centered on how the government could manage the area for the public good. The leader of that discussion was veteran Nebraska Senator George Norris, an old Teddy Roosevelt-style progressive Republican, a fierce proponent of farmer's rights, and an equally fierce opponent of corporate malfeasance. Norris had seen the Ford offer as a naked attempt to enrich the automaker more than the region. Agreeing to it would have been the worst land deal, Norris said, "since Adam and Eve lost title to the Garden of Eden."

He helped scuttle Ford's offer in the Senate, made sure the Wilson Dam got built, then started putting forward his own ideas designed to put the public in charge of development at The Shoals. One Norris plan after another was defeated or vetoed until 1932, when a new President was elected – one who promised to bring The Shoals alive.

When Franklin Delano Roosevelt arrived in Sheffield in January 1933, he attracted a crowd even bigger than the one that had greeted Ford a decade earlier. They stood half a dozen deep on the sidewalks, peering from the tops of buildings, murmuring and craning their necks. And here he came, grinning from the back of an open-top Cadillac, looking just like he did in the newsreels. Riding with him was George Norris.



Travis Hignett

Travis Hignett, often called "the father of fertilizer technology," was born in the farm community of Maxwell, Iowa, in 1907. While still in high school he had already earned a reputation for raising some of the state's best chickens. But his real love was chemistry, and he followed that passion to a job with the U.S. Fixed Nitrogen Research Laboratory. TVA hired him in 1938. When Hignett arrived in Florence, Alabama, at the height of the Depression, he remembered seeing cotton fields, sharecropper's shacks, and a sleepy downtown with a half-dozen Fords and Chevys on the street.

After an unpromising start as night shift pilot plant supervisor at a TVA phosphate plant, he quickly rose through the ranks, becoming chief of the Development Branch in 1947 and Director of Chemical Development in 1962. Among the innovations made under Hignett's direction were improved pilot plant demonstration programs, advances in continuous ammoniation and granulation processes, and the development of diammonium phosphate and superphosphoric acid. His ideas were always guided by the phrase "better and cheaper."

His success – Hignett held 15 patents and wrote more than 150 scientific papers – was rooted in an unusually broad understanding of the field. Hignett not only knew how to run an experiment and design a factory; he knew about the availability and cost of raw materials and shipping, appreciated corporate priorities, understood what farmers were looking for, and tracked market trends.

After serving at TVA for 35 years, Hignett was named a special consultant at IFDC, a position he held for more than a decade until his death in 1989. He was IFDC's one-man brain trust, top advisor to Don McCune, and, as one observer put it, the resident "senior guru." In his honor, IFDC named its extensive collection of books, journals, and research materials – including Hignett's working files – the Travis P. Hignett Memorial Library.

FDR had just been elected a few weeks before, hadn't even been inaugurated yet, but still he made the Tennessee River Valley one of his stops as President-elect. "My friends," he told the crowd, "I have always believed that when a government or an individual is engaged in any great project, one of the first things which those who have the responsibility ought to do – is to see the place of the project." He had come to see for himself the spot a few miles away where he intended to mount one of the most ambitious peacetime projects in U.S. government history: A public/private investment in a string of dams, power plants, transmission lines, and associated research and outreach efforts that would produce cheap, plentiful electricity, power factories and farms, and bring prosperity to the South. It was to be a keystone of Roosevelt's "New Deal" for the nation. The crowd cheered.

In its final form, the Tennessee Valley Act of 1933 established a public board, the Tennessee Valley Authority (TVA) to oversee Norris' and Roosevelt's grand vision. Passage of that bill was the biggest thing to ever happen to the area. When news that it had become law reached Florence, one resident remembered, the townspeople danced in the street until dawn.

TVA was a huge do-it-all agency, overseeing everything from dam construction to chemical research, electrical production to soil conservation. Among many other things, the Act directed TVA "to establish, maintain, and operate laboratories and experimental plants and to undertake experiments for the purpose of enabling the corporation [TVA] to furnish nitrogen products for military purposes and nitrogen and other fertilizer products for agricultural purposes in the most economical manner." In other words, TVA was in the fertilizer business. Muscle Shoals became the center of the nation's search for better ways to get farmers the phosphates and nitrogen products they needed.

Much of the early TVA research centered on phosphates (the old nitrate plants were never put back into full production, and it wasn't until World War II that a new nitrogen-fixing ammonia plant was built to supply fixed nitrogen products for explosives, with the excess sold to farmers through farm cooperatives). TVA's public fertilizer work led to some natural tension with private fertilizer producers that made and sold competing products, generally for higher prices. The "Fertilizer Trust," as opponents called the private producers, opposed TVA from the start, and things hadn't gotten better as the Agency started making significant amounts of chemical fertilizers. As one observer of the day, Travis Hignett, put it, "Relations between TVA and the fertilizer industry were hostile."

Hignett, a brilliant fertilizer developer, was put in charge of TVA's Process Engineering Branch in 1946. He worked to find common ground between the government program and private producers, and shifted TVA toward a more cooperative stance. TVA would study, experiment, test, and measure new fertilizers, finding improved forms and techniques, then share those advances with industry, leaving the commercialization to private firms. "Industry became friendly and eager to view our developments and adopted those that seemed useful to them," Hignett said. It set a tone for balancing public need with private enterprise that would carry through the history of both TVA and IFDC.

The effects of TVA's work on the local area were profound. The resulting jobs and mass electrification were major factors in lifting the area out of poverty. But fertilizer played an important role, too. Fertilizer use in the Tennessee Valley through the middle of the 20th century increased at a rate three times the national average. TVA experts not only provided cheap fertilizer, but showed farmers the best ways to use it, along with methods for preventing soil erosion. Forty years after TVA's start, farms in the Valley were producing twice as much food per acre as the average American farm.

Don McCune

Don McCune understood that growing food in distant places was about more than feeding the hungry. It was about establishing America's place in the world. He learned that while working for five years in Chile for the Rockefeller Foundation. It was his first real job after receiving his Ph.D. in plant physiology from Purdue in 1957, and the tough, no-nonsense World War II veteran found that he got great satisfaction from helping farmers improve their yields. It also gave him a sense of how interconnected the world is. "My stint in Chile left me with a feeling," he said later. "We must help others improve their living standards if we are to maintain our own."

After Chile, he took a job at TVA in 1962 as assistant director of agricultural development. The combination of scientific know-how and foreign experience soon made him the go-to guy for TVA's international efforts, earning him the title of Director of International Fertilizer Development Staff. When IFDC began to take shape in the early 1970s, McCune was a logical choice to head it.

But it took more than logic. McCune had a leader's temperament. He was energetic, focused, and direct. He knew how to marshal facts. He knew what he wanted and how he wanted to get it. He got excited about projects and came on strong when he was pushing an idea – sometimes too strong for some people – but that strength was necessary to help IFDC get started. "He was bold, daring, but believable," remembered John Malcolm, a USAID official who worked closely with McCune. "He is the father of IFDC who gave it its form and vitality."

The effects on industry were just as important. After World War II, TVA became the world center for fertilizer innovation, developing a range of new products and a number of important advances. High points included TVA's development of triple superphosphate, calcium metaphosphate, urea phosphate and diammonium phosphate, improved methods for granulation and coating, better liquid fertilizers, successful bulk blending, and systems for direct injection of ammonia into soils. It is said that more than two-thirds of the fertilizers commonly used today were born at TVA.

Its fertilizer program encompassed the entire chain of research and development, from the chemical analysis of raw materials to improved methods of production, from factory design to field testing. At every step, careful and meticulous records were kept, providing the world with a vital source of information on the field. The federal government gathered all the nation's fertilizer research efforts at TVA's headquarters in Muscle Shoals, creating the National Fertilizer Development Center (NFDC) in 1963. From the start, NFDC recognized that it wasn't enough to make better fertilizers. They also had to be sold at a fair price and delivered efficiently to farmers who knew how to use them. Markets mattered. The whole fertilizer process, from formulation to end use, mattered. As Travis Hignett summarized it, "A research and development organization is more likely to be successful if it is thoroughly familiar with all steps in the distribution and marketing process." He made sure that TVA studied and improved every link in the chain.

In the mid-1960s, TVA's fertilizer programs took a new turn. By then, U.S. agricultural techniques were advanced, fertilizer was plentiful and cheap, and crop yields were reaching record levels. The perception grew that there was little need for more fertilizer research.

At least that was true in the U.S. Internationally, need was growing. For years America had provided food aid to hungry nations around the world, to Europe following World War II, and then increasingly in the developing nations of Asia and Africa. By the mid-1960s the U.S. office for foreign aid, the U.S. Agency for International Development (USAID), was looking for ways to do more than simply ship excess American grain to the world's needy. A more comprehensive approach was aimed at enabling the recipient nations to produce more of their own food. Fertilizer was an important part of the effort, and USAID staff began talking with people at TVA about ways to help developing nations get the nitrogen and phosphates they needed (USAID Officer Frank Parker, a former Assistant Director General of the Food and Agriculture Organization of the United Nations [FAO], helped develop these ties). TVA had the expertise and the information needed to help farmers in developing nations get the most out of their fields. TVA and USAID started working together in 1965, when small teams of TVA experts, funded by USAID, began traveling the world, assessing needs and recommending responses. The need was growing fast. The mid-1960s was the start of the Green Revolution, when new strains of high-yielding grains adapted to the climates of developing nations were being introduced. To reach their full potential, these new strains needed to be fed with more powerful fertilizers. The teaming of high-yield grains with improved fertilizer use was the heart of the Green Revolution that began to boost yields, alleviate hunger, and raise living standards in many of the world's developing nations.

USAID and TVA generally worked well together. But there was a problem on the international front. TVA's original charter limited it to doing work solely in the national interest. It wasn't chartered or funded to do international work. So almost anything it did outside the country with USAID had to be done on the side, on short-term contracts, with personnel for the international teams temporarily pulled from existing staff, their salaries offset with USAID funds. As the importance of the international programs grew, so did the need for dedicated staff and more secure funding.

By 1970, an increasing number of TVA teams are working not only with USAID, but also U.N. groups like FAO, gathering information, performing assessment and technical studies, and offering advice. The demand for international work was growing so fast that money was found to hire a coordinator, TVA agronomist Don McCune, and a few additional staff – the core group included John Shields, Owen Livingston, Paul Stangel and Marjorie (Marge) Engel (later Brashier) – but because of the charter limitation most of the teams were still made up from temporary TVA assignees. "The demand was getting to be so great," recalls Shields, "it was putting a lot of pressure on the small staff to do the work. We were able to get it done because at that time at TVA we had over 400 chemists and chemical engineers. We had anywhere from 25 to 30 agronomists, another 35 to 40 economists, and of course we had all of the production people . . . We had all kinds of brain power." McCune's international group tapped that brainpower. Operating just slightly under the radar, cobbling together contract funds, by the early 1970s McCune's international group was fielding numerous teams a year in developing nations. In addition, hundreds of fertilizer executives and technicians from less developed countries were brought to the U.S. for training by NFDC staff at Muscle Shoals.

The program was becoming so successful that pressure grew for TVA to create a bigger, more official new division for international work. But any official growth would require a change in TVA's charter, which would require an act of Congress.

Then Henry Kissinger entered the picture.

2

CHIPS

IFDC was born from the conjunction of two forces: TVA's growing international work and Henry Kissinger's political needs.The mid-1970s was a turbulent time, marked by the fall of the Nixon White House, oil crises, resource shortages, and a resurgence of global hunger. While U.S. citizens were enjoying record harvests and food surpluses, much of the rest of the world was suffering through food shortages tied to bad weather, political instability, and rising energy costs. The price of oil was particularly important when it came to producing chemical fertilizers. All fertilizers depended on fossil fuels for production and transportation. When oil prices spiked, fertilizer prices spiked soon after. Farmers in the U.S. could pay higher prices for fertilizer and still produce; they simply charged a little more and saw smaller profits. But smallholder farmers in poor countries often faced a different choice: fertilizers for next year's harvest, or food for tonight's table. There often was simply not enough money to do both. When fertilizer prices rose in the developing world, use dropped immediately and crop yields fell. Food became scarcer and more expensive for everyone. Hunger grew.

With oil prices shooting up in the mid-1970s, "The shortage of fertilizer and the steep rise in its price is a problem of particular urgency," Kissinger told a special assembly of the United Nations on April 15, 1974. This was his second appearance before the General Assembly, halfway between his call for a World Food Conference the previous fall and the Rome meeting later that year.

Then Kissinger offered a solution. "We . . . urge the establishment of an international fertilizer institute as part of a larger effort to focus international action on two specific areas of research: improving the effectiveness of chemical fertilizers, especially in tropical agriculture, and new methods to produce fertilizers from non-petroleum resources. The United States will contribute facilities, technology, and expertise to such an undertaking."

This was the first public mention of the effort that would eventually become IFDC.

Underlying Kissinger's idealistic vision of a world without hunger lay deeper, more practical political goals tied to the role that soil nutrients and hunger issues played in world trade, geopolitics, relations with the U.N. and OPEC, and the desire to burnish America's image in the developing world. There was an emphasis in early planning documents on lessening the fertilizer industry's reliance on oil. Decoupling fertilizer from oil would, among other things, help corral OPEC's ability to affect global food prices – a part of Kissinger's strategy to improve America's bargaining position with oil-producing nations.

"We . . . urge the establishment of an international fertilizer institute as part of a larger effort to focus international action on two specific areas of research: improving the effectiveness of chemical fertilizers, especially in tropical agriculture, and new methods to produce fertilizers from non-petroleum resources. The United States will contribute facilities, technology, and expertise to such an undertaking."

– Henry Kissinger

With Kissinger's backing, events moved quickly. His call for an *international* fertilizer research effort resonated well at the U.N., but led to a few problems at home. The main issue was America's role, both in terms of expertise and funding. Kissinger did not want the USA to foot the entire bill for his proposed institute. USAID – which reported to Kissinger in the Department of State – was already working on a possible solution. Their relationship with McCune's international group at TVA was spurring discussions about the fertilizer needs of developing nations, especially how fertilizers developed for temperate climates were often not appropriate for use in the tropics and subtropics, where temperatures, rainfall, soil types, and crops could be dramatically different. One of USAID's few fertilizer experts, a young assistant administrator in USAID's Technical Assistance Bureau, listened closely.

His name was Joel Bernstein. In January 1974, three months before Kissinger's speech at the U.N., Bernstein wrote a memo for his bosses at

USAID summarizing the world fertilizer situation and proposing needed new efforts in the field. The current situation was "disquieting," he wrote. "Average prices of fertilizer, about doubled between 1971 and 1973, and recent quotes are much higher. . . . Rising petroleum and natural gas costs are aggravating the problem." As populations increased in less developed countries, demand for fertilizer was going to do nothing but grow, putting strain on the existing fertilizer supply chain. He suggested focusing on efforts to increase overall fertilizer production, improving the marketing of existing fertilizer supplies, and developing new ways to reduce the cost or improve the efficiency of fertilizers, thus easing access to fertilizers for farmers in the developing world.

But why or how would USAID get into the fertilizer business? "This situation raises questions of appropriate response for AID, given our mandate to assist LDC (less developed countries) efforts to accelerate food production," Bernstein wrote. "What should AID do directly, what should it encourage others to do, and what should it leave alone?"

When it came to fertilizer, USAID depended on the experts at TVA. But TVA was limited by charter to national efforts, and Kissinger wanted an international research institute. In the international field there were other players out there – including the United Nation's FAO and the recently founded Consultative Group on International Agricultural Research (CGIAR) – but neither were putting an emphasis on fertilizers. The world center for fertilizer research was in the U.S., at TVA.

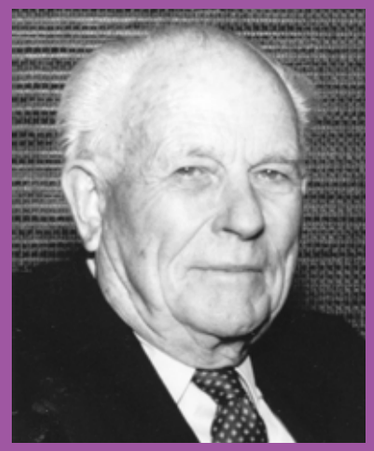
That led back to McCune. He was a forceful administrator, and the international group at TVA was his first real chance to show what he could do. He not only built an increasingly important approach to assessing the fertilizer needs of developing countries, but also promoted his ideas to others. A letter he had written in late 1973 to an Australian official, for instance, outlined his views on the different needs for fertilizers in the tropics. Nitrogen broadcast on a tropical rice paddy was much less efficient than the same fertilizer plowed under an American wheat field. Phosphates solubilized in different ways in the tropics. Micronutrient needs were not the same. "Other problems peculiar to the tropics can no doubt be elucidated," McCune wrote. Then he proposed mounting a research effort specifically for fertilizers in the tropics and subtropics, either through an expansion of work at TVA, or by setting up a center for fertilizer technology in some tropical country, or a combination of both. He had already floated this idea, he wrote, to USAID.

And USAID was running with it. An ambitious proposal was sent on April 29, 1974, to CGIAR, calling for the establishment of a new International Plant Nutrition Institute (IPNI) that would encompass a broad range of activities, from basic research to application in the field. There would be three priority areas: First, finding new ways to control and increase the biological fixation of nitrogen and microbial solubilization of soil nutrients; second, maximizing the conservation and reuse of plant nutrients in farm and other wastes; and third, improving chemical fertilizers, especially for the tropics. The chemical fertilizer group, the proposal suggested, could become its own unit within the larger Institute, with its own name, like the International Fertilizer Development Center (IFDC, the first appearance of this title). Its mission would be developing better nutrients for the tropics and subtropics; getting them to the people who needed them, especially poorer farmers; and making sure that they were used in the best possible ways. This chemical fertilizer research center could conceivably be located anywhere in the world, but USAID suggested Muscle Shoals, Alabama. Here the proposed IFDC could take advantage of existing production and testing facilities built by TVA, freeing the proposed institute from the prohibitive costs – somewhere in the hundreds of millions of dollars – of building its own. The way was already clear, the proposal noted, as "The Board of Directors of TVA has indicated willingness to cooperate in an international effort by allotting land for offices, laboratories, and other facilities."

While CGIAR deliberated through the summer, McCune kept networking. This was his chance to lead something much bigger than TVA's international effort. He talked up the idea of a new fertilizer center for tropical and subtropical agriculture with State Department people at USAID, his superiors at TVA, and anyone he knew on the international front. In May he was asked to attend a full-day meeting for planning the upcoming Rome World Food Conference in Washington, D.C., where he got to know more of the major players and further developed his growing friendship with John Hannah, who would be heading the U.S. delegation to the Rome talks. Hannah (see sidebar on page 22) was an amazing, get-it-done administrator, a former president of Michigan State University who had headed USAID for years, believed in food issues deeply – and had the advantage of being a personal friend of the new U.S. President, Gerald Ford.

Two weeks after Kissinger made his pitch for an international fertilizer institute on April 15, USAID sent its IPNI proposal to CGIAR. But it was July before CGIAR's Technical Advisory Committee (TAC) finished reviewing the USAID proposal, and the verdict was mixed. They were positive about the part of the proposal dealing with chemical fertilizers, but decided that more time needed to be taken on the other areas, the biological fixation and farm waste sections. In general, they concluded, more study was needed.

At least one man was tired of waiting. On August 13, Secretary of State Kissinger held a meeting with Secretary of the Treasury William



John Hannah

John Hannah was a consummate administrator who combined vision with practicality, and political know-how with humanitarian ideals. He was an ideal founding leader of the IFDC Board of Directors.

Before going to Washington, D.C., Hannah was best known for building a little-known regional institution, Michigan State College, into a national powerhouse called Michigan State University. Here, as President for over a quarter century, he honed his skills as a boss: He was a good listener, a careful planner, a forceful spokesman, and a man who was unafraid to take action when it was needed. He judged his staff on results, not words. And he was dedicated to bettering humankind. After World War II, he wrote, "I came to believe that not much of lasting importance is likely to be settled on battlefields. The only hope for the human race, I am convinced, is to find a way for peoples of all colors, all races, and all religions to agree, not necessarily on politics or economic philosophies, but on how to get on with peaceful efforts at solving the most important human problems."

That conviction fueled his work in education, civil rights (Eisenhower named him the first chairman of the U.S. Commission on Civil Rights in 1957), aid to developing nations (head of USAID 1969-73), and food issues (director of the World Food Council, 1975-78; Chairman of the IFDC Board, 1974-1990).

Simon, Federal Reserve Board Chairman Arthur Burns, National Security Deputy Assistant Brent Scowcroft, and a smattering of deputy, assistant, and undersecretaries. The subject was the energy crisis and relationships with oil-producing nations. Kissinger was committed, at all costs, to avoiding another oil embargo. To do that, he needed to be able to negotiate with the players, especially OPEC nations. And to negotiate, he needed to be able to offer something. "What we need to do is to preempt the structure of relationships in the area and to develop a flow of benefits which they won't want to lose," Kissinger said. "Whatever happened to the fertilizer idea that I have in my United Nations speech?" The answer came from his assistant secretary for economic and business affairs, Thomas Enders.

Enders: "Well, the problem we have there is with AID. This is a case in which AID believes that to do something well means to do something slowly."

Kissinger: "Look, isn't AID under me? I simply can't accept this. There is no reason why AID can't respond when I want something done."

Enders: "To get a multilateral institute on fertilizers set up simply takes time."

Kissinger: "But I need assets in Saudi Arabia. I don't give a damn about a well distributed world fertilizer industry. In fact, a badly distributed industry is probably in our interest."

Enders: "We are moving slowly at the level of the institute itself. But we are moving fast on bilateral levels."

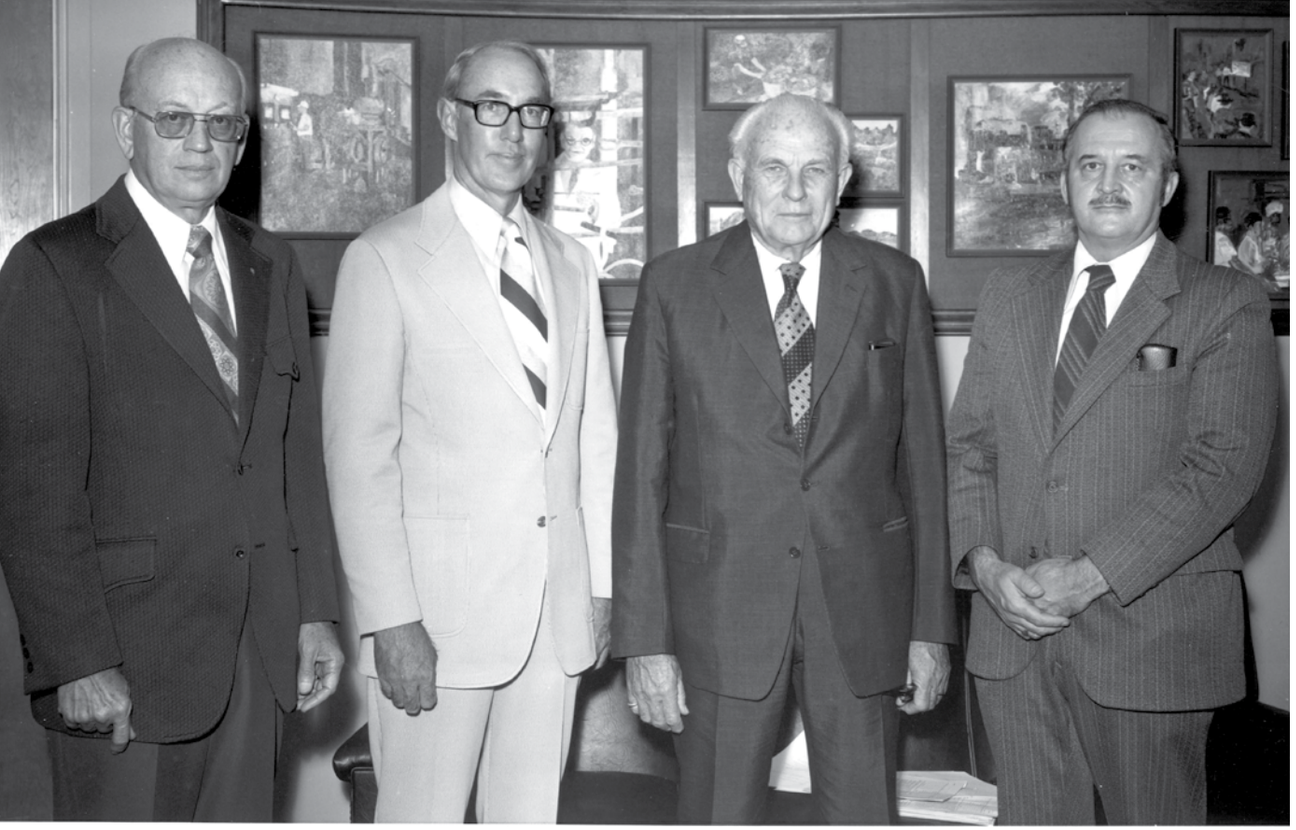
Kissinger: "Who does AID report to? This is not a university. If we can put a nuclear plant into Egypt in eight years and do something in fertilizers in Saudi Arabia, then we have a strategy. Then we have something they don't want to lose. I want a confrontation, believe me. But I need chips."

Kissinger wanted fast action, and USAID made sure he got it. A decision was made to sidestep CGIAR for the moment and start an international institute independently. Joel Bernstein's fertilizer institute proposal was dusted off, supplemented with a request for start-up funds, and fast-tracked for approval. Within a week of Kissinger's request for chips, Bernstein received a memo saying that his "well-written" request for funds for IFDC was seen favorably as "consistent with Sec. Kissinger's comments at the U.N. General Assembly," and that the request for estimated start-up funds – just over a quarter of a million dollars for the first few months – was "sound." John Hannah and Don McCune started making plans.

In September, Kissinger spoke a third time to the U.N. General Assembly, first about nuclear arms, then about food. Again he outlined the pressures of a growing population on world food supplies. Again he stated the U.S. commitment to ending hunger. To make that happen, he said, "We must end once and for all the world's chronic fertilizer shortage."

On October 7, 1974, papers were filed in Birmingham, Alabama, for the incorporation of a new nonprofit corporation called the International Fertilizer Development Center.

The Alabama papers – IFDC's birth announcement – offer the first statement of its official purpose: "To operate a worldwide center for the collection and dissemination of information relative to fertilizer, and for research and development in the technology, use, and marketing of fertilizer, for the training, advisory services and technical assistance in the production, engineering, marketing and use of fertilizer and for cooperation with FAO, the International Bank for Reconstruction and Development and organizations situated in foreign countries for the improvement of fertilizer technology and use to serve the needs of the developing countries with special emphasis on the tropics." This single, very long sentence encapsulates a vision that in broad terms still guides the organization today.



IFDC's first Board of Directors; from left: Webster Pendergrass, Lynn Seeber and John Hannah, with IFDC Managing Director, Donald McCune.

An unusually distinguished three-person Board of Directors was listed in the papers: John Hannah (Deputy Secretary General, World Food Conference); Webster Pendergrass (Vice President for Agriculture, University of Tennessee); and Lynn Seeber (General Manager, TVA).

It all happened, especially by the slow, deliberative standards of most international institutes, very quickly. Kissinger wanted something concrete to take to Rome to show the world that the USA was taking action on food. He wanted the U.S. to show leadership. TVA had the land and offered the institutional support. USAID was a source for start-up funds. Once it got going, international funds would start coming in and IFDC could be folded into the CGIAR international structure.

Beneath all of the politics and jockeying was a deeper, more compelling impetus for creating IFDC, one that drove men like John Hannah: the urgency of the world food problem. "Dr. Hannah's primary focus was to help feed the hungry and provide a better living for the poor in the developing countries from the beginning," remembered John Malcolm, who worked at USAID under Hannah. "He saw IFDC as a key instrument to reach that objective. He was the conscience of IFDC." By starting IFDC, the U.S. government could direct the power of TVA – its world-class researchers, well-equipped laboratories, matchless information resources, outreach teams and production facilities – outward into the developing world, toward the people who needed it most.

By the time the World Food Conference convened in Rome in November 1974, everyone was getting on board. So many politicians wanted to come to Rome that Kissinger ended up fielding one of the largest U.S. delegations ever sent to an international conference: 47 members, including nine Congressmen, 26 representatives of the Executive Branch, and 11 Senators, including one former Presidential candidate, Hubert Humphrey, and a future one, Robert (Bob) Dole. But it was still Kissinger's show. He managed the background politics – the elbowing between State and Agriculture and legislative and executive branches over who did what; working with the U.N. on the international side; the question of public versus private contributions to the effort – while the nuts and bolts of making it run smoothly were handled by the man he put in charge of the U.S. delegation – and new IFDC Chairman of the Board – John Hannah.

Again at Rome it was Kissinger – "the maestro," as one State Department official called him – who excited the audience, making headlines when he challenged the world to ensure that within a decade no child would go to bed hungry. A key factor in making that possible, he said, was fertilizer. And now he had an international center devoted to its development.

FERTILIZER IS THE KEY

"Modern fertilizer is probably the most critical single input for increasing crop yields; it is also the most dependent on new investment. In our view, fertilizer production is an ideal area for collaboration between wealthier and poorer nations, especially combining the technology of the developed countries, the capital and raw materials of the oil producers, and the growing needs of the least developed countries. Existing production capacity is inadequate worldwide; new fertilizer industries should be created, especially in the developing countries, to meet local and regional needs for the long term. This could be done most efficiently on the basis of regional cooperation. The United States will strongly support such regional efforts. In our investment and assistance programs we will give priority to the building of fertilizer industries and will share our advanced technology."

Address by U.S. Secretary of State Henry Kissinger, World Food Conference, Rome, Nov. 5, 1974

3

OFF THE GROUND

McCune moved fast. He was the natural choice to head the new IFDC. Arrangements were made quickly with his bosses at TVA, and he was made managing director from the moment the organization was created in October 1974. He found himself leading an international center with lofty ambitions, a small budget, a tiny staff, no permanent home, no long-term funding, and undefined relations with every major player around it.

McCune powered through it. IFDC was his baby, and he would make sure it was born healthy. He took some of his top people with him from TVA's international group, found temporary office space in a bank building in Florence, started brainstorming program proposals, held staff meetings, dealt with the Board, looked for money, hired new people, and thought about designs for a permanent new building complex. For the moment, IFDC operated out of borrowed and rented space, including an old medical building that TVA had been using for storage; this was quickly renovated for IFDC's technical work. "We were able to start some laboratory work in the temporary facilities," remembered Travis Hignett. "For example, bench-scale phosphate rock beneficiation facilities were set up in a former medical laboratory, and even a small granulation pilot plant was located in a garage that formerly housed an ambulance."

At the end of January 1975, McCune traveled to Rome to officially introduce IFDC to CGIAR's TAC. CGIAR, a consortium of research institutes in developing countries that had been started by the Rockefeller Foundation and the World Bank, had quickly taken a lead position on international research designed to increase yields in the tropics, primarily through the development of new, higher-yielding crop varieties. But it hadn't done much with fertilizers. And it was wary of the fledgling IFDC, a USA-located center started without its input or advice.

Everyone at IFDC expected that their group would soon become part of CGIAR. McCune's visit was a first step. But his reception was politely chilly. He was told that the TAC had not yet had time to fully digest the previous USAID proposal for IPNI, with its sections on biological fixation, nutrient recycling, and chemical fertilizers. The Americans' quick creation of one part of that proposal, IFDC, had come as something of a surprise. And here was McCune asking them about membership. When he got back to the U.S., McCune wrote in his report: "I had been told that there was a work group for each of the three items [in the original IPNI proposal]," McCune wrote. "Thus, I expected to have the benefit of this work groups [sic] thinking. This, however, never materialized." Instead, "I was asked to explain IFDC and to indicate progress to date." After a half-hour of explaining himself, a discussion was held in which it was made clear that while the TAC was generally inclined favorably toward IFDC, matters needed to be further discussed; there were concerns, especially among the European fertilizer industry, about IFDC's ideas. More meetings were needed. Would he be available to come back to Rome in March? McCune swallowed his impatience and promised that he would try. In the meantime, a subcommittee decided to recommend to TAC that IFDC be considered for CGIAR membership. The last part of the meeting was devoted to a long talk about biological fixation and nutrient solubilization. "The recommendation for both of these items," McCune wrote, "was not to recommend any research and development efforts at this time. Further study and consultation were recommended before a final decision from the subcommittee could be formulated."

Recommendations not to recommend. Calls for more study and consultation. McCune returned to Alabama less sanguine than he had been about full CGIAR membership. For the moment, it was clear, IFDC would have to make its way on its own. And McCune was determined to make that happen successfully.

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Don McCune, as it turned out, was a force to be reckoned with. By early 1976, he had put together a staff of 30 people from five different countries; organized them into four units: one for administration, one for outreach, and two for research and development (R&D); persuaded Travis Hignett, one of the world's top fertilizer researchers, to come out of retirement and head his Fertilizer Technology group; hired an architectural and engineering firm to design a new IFDC building

complex; leased the proposed building site from TVA; and most important, nailed down more funding. USAID earmarked more than $4 million for the new buildings (office space, a greenhouse, prototype plants, and support) and extended core operations funding for three years. That was buttressed with operational funds from the International Development Research Centre (IDRC) of Canada, plus the establishment of a number of contracts for international work, many in conjunction with USAID and TVA. John Hannah, too, had been busy, enhancing the organization's international stature by recruiting three additional board members from other nations, eminent agriculturalists from Brazil, Benin, and India.

There were speed bumps, of course. CGIAR remained a question mark, continuing to find reasons to delay asking IFDC to become a member. Despite the slow pace, "It's our goal to obtain full acceptance and participation in CGIAR," Hannah affirmed in February 1976. Closer to home, relations with TVA, positive as they were, still required a bit of fine-tuning. When McCune came over from TVA, he brought most of the NFDC international staff with him, but not all. There were questions about how responsibilities would be shared out. TVA's existing and continuing international contracts and operations had to be defined (McCune sometimes dated the real start of IFDC to July 1975 when, after seven months of planning and organization, IFDC was officially handed responsibility for TVA's developing country programs). John Shields, one of McCune's TVA international staff, stayed with TVA for a few years after IFDC started and acted as a go-between, helping make sure that everything worked smoothly. The IFDC-TVA relationship comprised a thousand

Left to right: McCune, Hannah, Moise Mensah (Benin), S.K. Mukherjee (India), Fernando Cardoso (Brazil), Webster Pendergrass and John Malcolm (USAID).

details, everything from how utilities would be paid to where the TVA fertilizer library would be housed, from who would provide security to which spokespeople would speak about official U.S. fertilizer policy.

McCune powered through it all. "Really and truly it took a guy like Don McCune who wouldn't take no for an answer – we are going to do this and we are going to do it right and nobody is going to stop us," said John Shields, "Quite frankly, I doubt that this center would have ever materialized like it had if it had not been for that kind of personality. . . . It was his baby."

As IFDC's new buildings began to go up in 1976, John Allgood, an early IFDC hire, remembers McCune roaming the building site and pausing at the site of the training center classroom. "He walked into the training center," Allgood remembers, "and he said, 'Hell, this is not going to work.' The civil engineer that was in charge of it said, 'What do you mean it won't work?' McCune said, 'When we designed this training center, I wanted it to be a theater-style setting where you had the seats slope down and you had a stage at the bottom.'" The problem was that the builders had put in a flat floor, not a slope. "McCune said, 'You've already put the damn roof in. We can't go up,'" Allgood recalls. "And the guy said, 'Well, we can tear the damn roof off and we can still build that theater style.' And McCune says, 'Yeah, that puts us behind further.'"

So McCune did what he was good at: He came up with a fast, practical solution. Instead of tearing off the roof and going up, he told the builders to create the room he wanted by digging down. He got the slope he wanted by putting the seating below ground level. The room has been in use ever since. "He was looking for a result," Allgood remembers. "And that's what IFDC has always done, you know: We look for results."

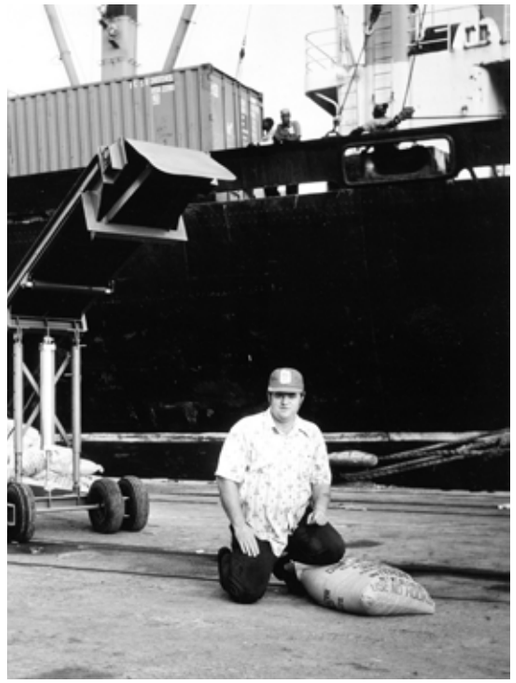
At the end of 1976, IFDC staff started moving into their new office building. Two more buildings – the greenhouse and pilot plant buildings – were still under construction but ahead of schedule. Hiring was in full gear; the staff would reach 50 by year's end.

It was time to get down to work. IFDC's central mission was straightforward: Increase food production in developing countries through efficient use of improved fertilizers. But beneath that simple mission was a complex tangle of economic, technical, political, and cultural considerations. Developing nations urgently needed fertilizer to boost food production. But fertilizer was too expensive for most small farmers in the developing world. It was a first-world commodity. Developing nations, with 70 percent of the world's population, consumed only 23 percent of the world's fertilizer. Two-thirds of that was imported, shipped around the world, often at prohibitive prices. Fertilizers developed for use

IFDC Headquarters in Muscle Shoals, Alabama.

in cooler temperate climates often did not work well in the tropics and subtropics. Local production was hampered by a lack of technical know-how. The economic situation varied from country to country. Some governments subsidized fertilizers, others didn't. Tariffs, taxes, and market structures could be markedly different. The needs of local soils, the locations and amounts of ores that might be used for fertilizers, the ways those ores had to be processed; the methods that worked best for teaching farmers how to use fertilizers – so much was unknown.

IFDC dove in. Some of the first efforts centered on information gathering – a team was sent to identify fertilizer use problems in six nations in West Africa; a world database of fertilizer technology and use was started; statistics were compiled. Other efforts were targeted toward real-world production – engineers were sent to Taiwan and Colombia to assist in plant startups and fine-tuning. Others focused on transportation and distribution – an IFDC chemical engineer helped get



Don Waggoner, IFDC chemical engineer, poses with the first bag of fertilizer from the ship unloading operation at Port Tema near Accra, Ghana. Waggoner assisted with the project, including the training of the people necessary to unload the ship, bag the fertilizer, load the bags onto trucks and transport the bagged fertilizer to storage.

the first shipment of bulk fertilizer unloaded in Ghana, and made sure it was bagged properly for the climate. Training programs were instituted, and students from around the world flew to Muscle Shoals for in-depth instruction in everything from fertilizer plant maintenance to marketing and organization development; a social science research program to improve fertilizer decisionmaking was underway; when the pilot plant got up and running in 1978, research was focused on developing better fertilizers for the tropics and subtropics. The use of phosphate rock for direct application – a potentially cheaper way to get phosphates to developing nations – was evaluated. Regional coordinators for Asia, Africa, and Latin America were established to develop and coordinate IFDC programs.

USAID, impressed, extended basic operational funding for 10 years. Other funding looked promising.

Then came a bombshell. The language was blunt, the source – the U.S. General Accounting Office (predecessor of today's Government Accountability Office) – was unimpeachable, and the effect was that of a death sentence: "We recommend that the Administrator of AID consider terminating support of the International Fertilizer Development Center and that arrangements be made for transferring its programs and activities to existing international organizations."

This was one recommendation among many within a 64-page GAO draft report on fertilizer problems in the developing world, sent out a week before Christmas 1976 to the departments of State, Agriculture, and Treasury – including 35 copies to USAID – with a request for comments within a month. It was unambiguous and unexpected. And it set off a long 30 days in Muscle Shoals. McCune distributed the report to his top staff. Through the early part of January 1977 memos and notes flew back and forth from AID to IFDC to TVA. The GAO had focused on two main problems with IFDC: First, the work it was doing was already being done, for the most part, by an alphabet soup of international food groups like FAO, United Nations Industrial Development Organization (UNIDO), International Fund for Agricultural Development (IFAD), and CGIAR. Second, and more important, IFDC had failed to secure the international support it had promised. Almost all of its funds came from USAID, which by FY 1977 had pumped in almost $15 million for construction and operations. The Canadians had given a small but important amount – a bit more than $50,000 from the IDRC to flesh out IFDC programs (supplemented in later years) – and some contract work was being paid for by foreign countries and other agencies, but most of the contracts were again with USAID.

All other attempts to get significant international support had so far failed. Added to this was CGIAR's continued reluctance to grant full membership.

GAO found that CGIAR was holding back from offering full support in part because IFDC was located in the USA and funded by the USA; it was seen as a "U.S. government project." CGIAR was arguing that if it brought in an American institute, other research centers in other wealthy nations would want to follow – there were such efforts in Great Britain and France, for instance – and this would create a burden for CGIAR's developing-nations mission and already-stretched budget. During the initial setup for IFDC, Congress had been told that U.S. funding would largely be replaced by international monies within three years. That now seemed unlikely. Rather than stretching out perpetual funding from U.S. taxpayers, the draft report concluded, it would be better to cut off funds now and let other groups pick up the slack.

McCune's staff pored over the GAO draft and found numerous small errors. Everyone was wondering where this attack had come from, who had lit a fire under GAO, and if, perhaps, one or another of those other international organizations might be trying to strangle IFDC in its cradle. The most important fact, however, was this: The GAO critics misunderstood the big picture. IFDC was not duplicating the work of other groups, but adding to it in vital ways. No one else in the world was focused on the development of tropical and subtropical fertilizers. No one had the technical infrastructure and history of fertilizer development. "No one," a summary of IFDC's internal comments noted, "will agree that meaningful technical assistance programs can be maintained for the developing countries without having a major R&D program geared to remove the constraints to fertilizer use." That package of research ability and market know-how is what IFDC offered, and what no one else could duplicate. True, international support was slower in coming than everyone had hoped, but IFDC was not only coordinating and cooperating fully with CGIAR and other international groups but was also providing technical support for projects. Contracts to date – just over a half million dollars a year – were only a start. The organization already had so many requests that it had been necessary to turn some down until staffing got to full strength. The Philippines was promising $10,000 in support; Brazil had offered to build a greenhouse; IDRC in Canada had indicated an interest in sponsoring work in South America. IFDC was just finishing its buildings and getting its staff to full strength. It had not yet shown what it could really do. When it was up to full power, the international money would come.

These arguments did not sway the GAO. Despite all of McCune's work, despite memos of support from TVA, USAID, and Treasury, despite complimentary comments from the World Bank, Inter-American Development Bank and UNIDO, the GAO's final report in July 1977 still contained the same recommendation: terminate IFDC.

But by then it didn't seem to matter as much. Hannah, with access to the White House and every Cabinet member, had been working behind the scenes to marshal support. Local supporters in Alabama lobbied their Congressional delegation, and found a strong advocate in Ronnie Flippo, U.S. Representative for Alabama's Fifth District. A new administration was coming in; just as comments on the GAO report were being sent in, a new President, Jimmy Carter, was inaugurated. Liberal politically, humanitarian by nature, and with a personal background in agriculture, Carter was inclined to boost efforts like IFDC, not cut them. In March 1977, Carter signaled his support by signing an executive order that designated IFDC a public international organization (PIO), which provided not only a Presidential imprimatur but an important functional advance for the organization. The PIO designation meant that IFDC staff members recruited from other countries could hold G4 visas, which allowed them to work more easily in the U.S. The new designation helped IFDC cut through a lot of red tape. Recruitment was easier. Travel and relocation arrangements were easier. So was international fundraising. The designation also offered a degree of prestige, giving IFDC a legal status similar in many ways to that of the United Nations.

Carter's signature could not have come at a better time. The GAO's final recommendation to terminate, when delivered in July, was buried deep in a long document with the less-than-scintillating title "Restrictions on Using More Fertilizer for Food Crops in Developing Countries." It is likely that few people in Congress read it. Apart from a single small story in the Birmingham newspaper, nobody in the media paid much attention. No government action resulted.

But the affair did have an effect within the close-knit world of food aid agencies. In the

Jimmy Carter

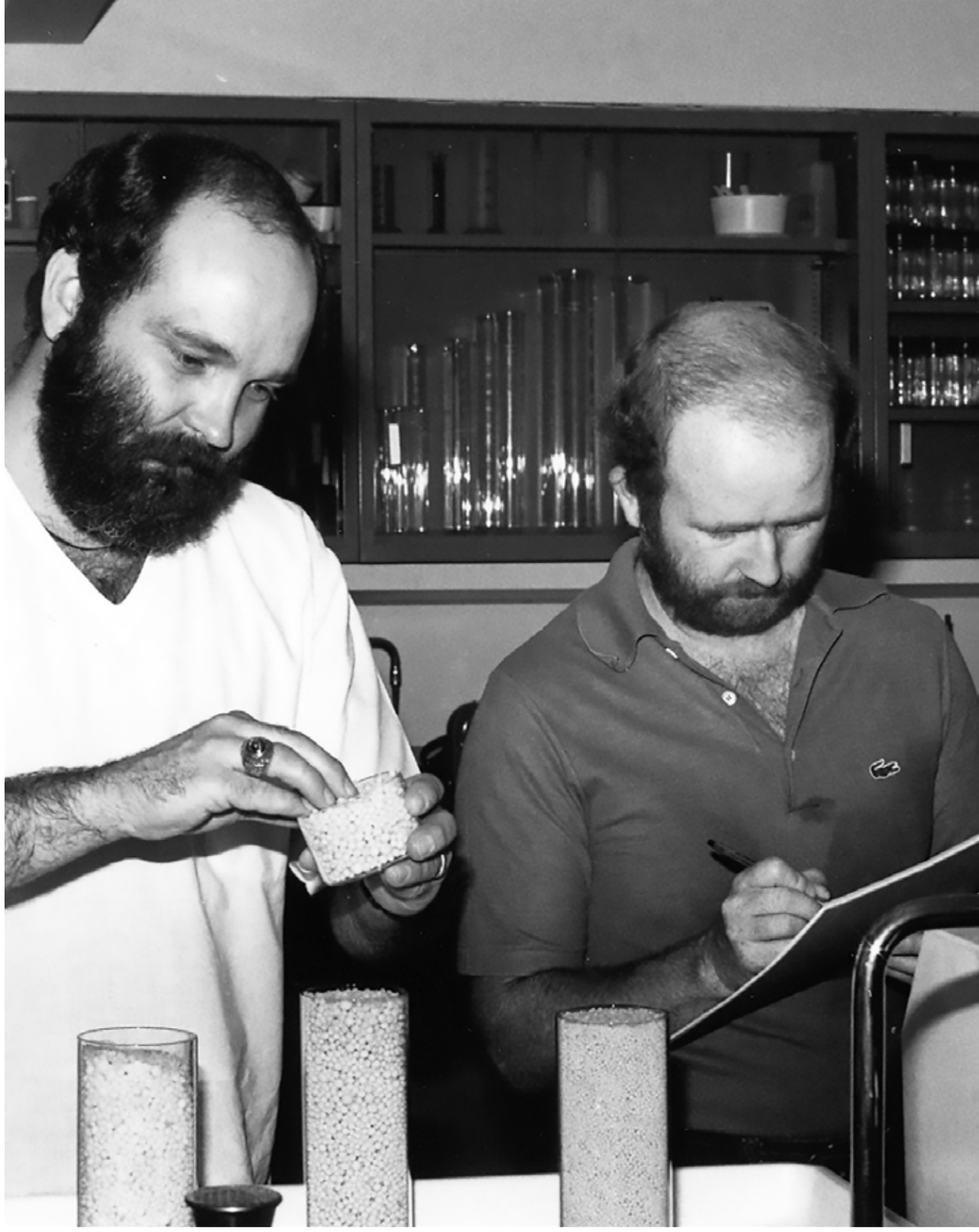
Less than two months after his inauguration as President, Jimmy Carter, on March 14, 1977, signed an executive order that changed the future of IFDC. It was a brief item, a few lines of text. But it made a world of difference. Those few lines officially made IFDC a public international organization (PIO), entitling it "to enjoy the privileges, exemptions, and immunities conferred by the International Immunities Act." IFDC had been seeking the status since its inception. By granting PIO status, President Carter not only made it far easier to hire and arrange travel for international staff, he also demonstrated direct White House support when IFDC desperately needed it.

After returning to private life in 1981, President Carter maintained his interest in world food issues. His Carter Foundation, through its Global 2000 program, joined forces in 1986 with Japan's Ryoichi Sasakawa and Nobelist Norman Borlaug to form the Sasakawa Africa Association (SAA), a joint initiative to bring the benefits of Borlaug's Green Revolution to sub-Saharan Africa, using the best possible approaches to increasing agricultural yields and bettering lives. Among many other projects, SAA was involved in important ways with the Africa Fertilizer Summit.

President Carter's long relationship with IFDC has been important both to the Center, and to the former President. Carter's recognition of the Center's international status provided much-needed support at a critical time. And IFDC's work, especially in Africa, helped President Carter better understand the soil health issues underlying Africa's food challenges. The result was a shared vision, both for the Africa Fertilizer Summit – where, in his recorded opening remarks, President Carter echoed IFDC's findings when he said, "The alarming mining of soil nutrients in Africa makes the use of mineral fertilizer environmentally friendly" – and for the future of agriculture.

late summer of 1977, Robert Nooter, a deputy administrator at USAID, attended a CGIAR meeting. He asked other attendees what they thought about IFDC's chances to become a full-fledged member. "On the whole, it appears that the present Associate status is probably as far as CGIAR will go on this," he wrote one of McCune's assistants. "Several people pointed out that the British, French and others have research institutes in their own country which would like to receive CGIAR support, and the inclusion of IFDC would open up a Pandora's Box." CGIAR seemed intent on making sure that its member institutes were all headquartered in developing nations. It might be possible, Nooter wrote, to set up bilateral contracts with some individual CGIAR institutes, but that was as far as it was likely to go. And, he added, he was hearing some troubling rumors. "I was told that the top people at IFDC are getting nervous about the future of the center," he added, "and some may have already begun to look for other jobs. It is important that we let them know our position in terms of U.S. support as soon as possible so that the situation does not deteriorate." Between 1979 and 1989, two TAC-commissioned teams considered IFDC for CGIAR membership, but it was futile; IFDC remained an associate member.

McCune and Hannah made certain that it did not. They reassured their people, secured promises of support, and convinced everyone to stay. IFDC emerged from the episode in better shape than it had gone in: It had not only buried the GAO report, but also had secured international status. USAID had committed to the next several years' core funding. The new campus was nearing completion. Staff was growing. IFDC's work was not over – it was just beginning.



David Rutland and David Wright testing physical properties of fertilizers.

4

BUILDING A HOME

"The design and building of the office and laboratory building and the pilot plant was a time of hope, excitement, and finally satisfaction," remembered one early IFDC worker. The Center's new main building was modern, clean-lined, low-profile, and sheathed in local white Russellville marble, designed to be open, light-filled, and welcoming, and set on a swath of TVA land that was quiet, green, and beautifully landscaped. Its completion marked the start of a new era for IFDC.

By late 1977, McCune had his new home humming. There were now 70 staff people working on projects in 40 nations. He divided them into three divisions: Technology (which handled new fertilizer development), Agro-Economic (greenhouse trials and market and policy research), and Outreach (field work). Interdisciplinary teams for specific projects were drawn from all three.

The first projects were literally all over the map: Old programs inherited from TVA, new priorities from USAID, and a miscellany of individual contracts with a variety of funding sources as they came in.

But patterns soon emerged. There was an initial focus on Latin America, in part because McCune knew Spanish and had contacts from his years in Chile. India was considered a global hot spot because of its rapid population growth. But it was a former region of India, now independent, that ended up capturing much of IFDC's attention.

First it was called East Bengal, then East Pakistan, and now Bangladesh. Its history had been part glorious and part horror story. Once it had

Bangladeshi farmer broadcasting fertilizer on rice paddy.

been the garden spot of India, its location at the delta of the Ganges, the subcontinent's wealthiest region and home to the greatest rice production. Medieval western geographers had located Paradise in what is today Bangladesh. But the latest chapters in its history were marked by a series of natural disasters – catastrophic storms and floods – and warfare as Bangladesh sought independence from Pakistan. The modern image of the area was set in part by ex-Beatle George Harrison's 1971 "Concert for Bangladesh," designed to raise funds for famine relief, with its bestselling record featuring a photo of a starving Bangladeshi child. In 1974, another deadly combination of bad weather, catastrophic floods, rising food prices, and distribution bottlenecks led to a further million deaths. Its fast-rising population was packed into a very small space, with an average population density in the late 1970s more than twice that of India, and thirty times that of the U.S. Its people were fed by an ancient agricultural system based on individual smallholder farms, very small plots of land handed down from generation to generation and worked by hand. Centuries-old methods of agricultural production could not keep pace with modern population growth.

It was a test case for IFDC. Rice was the most important crop in Bangladesh and throughout Asia. It also had the greatest potential for

Interior of IFDC Pilot Plant.

improvement with the proper use of fertilizers. When farmers in the late 1970s could afford fertilizer, they used mostly prilled urea – popular because it was relatively cheap and packed a lot of nitrogen per pound – which was broadcast over paddies by hand. But tossing urea into flooded rice paddies was wasteful: Only a fraction of the valuable fertilizer's nitrogen made it into the growing plants. More than half – often more than 70 percent – was washed away into waterways or volatilized into the air as pollution.

IFDC focused early on the urea/rice question, testing various schemes for increasing efficiency and lowering pollution. TVA had started a program years earlier to develop a coated urea – fitting various molecular jackets around fertilizer granules to slow the release of nitrogen and increase effectiveness – and IFDC inherited it. Great hopes for the tropics were pinned on sulfur-coated urea, which offered another important nutrient to plants – sulfur – often in short supply in tropical soils. Test after test was done at IFDC. Researchers used radioactively tagged nitrogen to track it through the process, running various forms against variations in soils and schedules and water use, looking for the magic combination that would put the most applied nitrogen into the rice instead of the waterways. There were problems from the start. Sulfur-coated ureas were good in theory but in practice tended to float on the surface of paddies. Adding the coating added around 30 percent to costs, making it unaffordable for many poor smallholder farmers. The sulfur-coated urea patent was eventually bought and developed by Pursell Industries, a Sylacauga, Alabama, based fertilizer company that was investing in slow-release fertilizers for specialty applications. At IFDC, meanwhile, the search continued for something that could inexpensively get needed nutrients closer to the roots of rice plants.

Then someone thought of mudballs. This was a simple, proven, and ancient farming technique used by rice farmers in Japan and China. Farmers rolled mud into fist-sized balls, then used their thumbs to push a pocket into the mudball. The indentations were filled with fertilizer (manure or other organic waste in the old days, chemical fertilizers today), sealed with more mud, and left to dry in the sun. Once hard, the nutrient-filled mudballs could be pushed down into the soil between rice plants. It was a great technique because fertilizer was used sparingly and released gradually; less was wasted. But it was also labor-intensive. It took six people working eight hours a day to create and bury the 62,500 mudballs needed to fertilize a single hectare of rice.

IFDC research during the late 1970s showed that placing urea into the soil of rice paddies instead of broadcasting it on top offered clear benefits, both by increasing yields and by cutting pollution. Researchers at IFDC headquarters began experimenting with different forms of urea, testing bigger and bigger "supergranules" that could be pushed into the soil like mudballs. Urea was a natural choice because it was already known by farmers – traditional farmers are notoriously conservative when it comes to trying anything new – and it was cheap. Whatever supergranule system was developed would have to be cheap, too, which meant looking at the whole manufacturing process. The granules in prilled urea were far too small. But that was the form made by most of the world's fertilizer manufacturers; it was unlikely that they would invest in refitting their massive factories to make a new form without the promise of more profit than was possible from smallholder rice farmers in Bangladesh. IFDC began looking for inexpensive

Scientist Paul Vlek in the IFDC greenhouse.

machines that could form the prilled product into supergranules, ideally something cheap enough to be affordable at the village level. One of IFDC's major strengths was becoming clear: Its ability to see the big picture, not just fertilizer formulation alone, but price and marketing and distribution, adoption by farmers and long-term use. Every step was important; it did no good to come up with a dazzling result in an experimental greenhouse if it was not applicable to real-world farming in Asia and Africa.

As testing continued, good relations were established with the Bangladesh government and USAID workers in the country. In 1977, a first project was started by IFDC in partnership with the Bangladesh Rice Research Institute. The purpose was to identify important fertilizer adoption and demand constraints and to develop ways to open any bottlenecks.

Nitrogen was only one part of the research agenda. An equal emphasis in IFDC's early years was placed on another critical soil nutrient: phosphorus. This was an especially big problem in South America and Africa, where many soils were phosphorus-poor. Unlike synthetic nitrogen fertilizers, which required expensive factories and were distributed through a complex international market that rose and fell along with energy prices, phosphorus-containing minerals could often be mined locally and processed in less-expensive ways. The problem was that not all phosphate deposits were the same. Elemental phosphorus could form part of many different minerals. Some forms were easier to use for fertilizer than others. Local ores in some places were so rich in the right kinds of phosphates that the rock could simply be ground up and applied to fields. The next region, however, might have "difficult ores" high in contaminants that might require far more extensive processing. IFDC started systematically mapping types of ores, characterizing the indigenous phosphate-containing rock, profiling chemical and mineralogical properties, and gradually building an enormous database of all the phosphate rock deposits in the world – extent, type, and

IFDC scientist Larry Hammond observing field trials at the CIAT experiment station.

Rice transplanting in preparation for greenhouse gas emission trials at IRRI headquarters, Los Banos, The Philippines.

location. This would prove immensely valuable decades later. Another arm of research investigated the best ways to process the local ores. In some cases "beneficiation" (upgrading or concentrating the phosphate minerals chemically) might be the best choice; in other cases, treating it with high heat and the right kinds of acids could release the right mix of phosphates; in still others, simple grinding and direct application was the answer. The idea was to match indigenous resources with available technology and local soil needs. If everything worked right, it would be possible to bring this important fertilizer to local farmers in greater quantities and lower prices. To boost the program, IFDC included among its early hires a young Ph.D. from Georgia Tech whose dissertation had focused on ways to recover phosphorus from phosphate mine waste. His name was Amitava (Amit) Roy. Roy arrived in January 1978 just as IFDC's pilot plant complex – three granulation plants, two phosphoric acid plants and one phosphate rock beneficiation unit – went into full operation, giving him and other researchers the practical tools they needed to explore new ways of turning phosphorus ores and other raw materials into the most effective possible fertilizers.

As the 1970s turned into the 1980s, IFDC settled into a productive and busy routine. In the greenhouses, round-the-clock experiments tracked the fertilizing effects of various phosphate ores and the amounts of nitrogen pollution in various approaches to rice production. In the pilot plants, variations on processing, coatings, mixtures, and production were reviewed. In the classrooms, a growing stream of students from around the world flew in for intensive coursework in the production, marketing, and use of fertilizers in the tropics and subtropics. The local airport in

Muscle Shoals took on an international flavor as groups of technicians, executives, and trainees from Mexico, Israel, Japan, and dozens of other nations cycled in and out. Florence began to seem surprisingly cosmopolitan, with Alabama locals rubbing shoulders with dashiki-wearing Senegalese and business-suited Brazilians. McCune and his wife Jean made sure that all the foreign visitors to Alabama felt welcome.

People from the Shoals community attend a tasting of international foods prepared by members of the IFDC Wives Club.

Jean McCune was especially important to the arriving international guests. She was a gracious lady, and she understood after spending five years in Chile with her husband what it was like to be a stranger in a foreign nation. International hires at IFDC were most often landing in a new and somewhat alien culture without friends and family, and without a knowledge of the basics: Where to shop, how to communicate, how to

Jean McCune (right) and Edwina Clayton discuss an event for the IFDC Wives Club.

Leila Habib from Syria examines her experiments in an IFDC greenhouse.

cook American foods, the whole range of things needed to make daily life comfortable. The wives of newly hired men often had the greatest difficulty. Jean started a spouse's support group, a wive's club, devoted to making sure that new arrivals had everything they needed to set up a household and were immediately offered the chance to become part of a network of spouses in similar situations. The women held social events, from kaffeeklatsches to cocktail parties, and helped to make sure that the organization's larger staff gatherings went smoothly. Not everyone who came to IFDC from a foreign country adapted well to American life. But many did. And for them IFDC became more than a place to work. It became home.

5

A CHANGING WORLD

By the beginning of the 1980s, IFDC had established its place in the world. Annual funding had almost doubled, to more than $8 million per year. The Board of Directors had been expanded to include twelve members: three from the U.S., three from other developed nations, and six from various parts of the developing world. There were now around 60 professional workers at IFDC headquarters, aided by scores more support staff, plus seven additional salaried employees working in four developing countries. The endlessly detailed nuts-and-bolts side of the organization – everything from contract tracking to bookkeeping involved in sharing resources with TVA to acquiring visas for international visitors – was running smoothly.

As things settled down, Don McCune was able to focus on his core mission. He laid it out in a 1981 speech: "Our *modus operandi* in program planning is to clearly identify fertilizer needs," he wrote, "We look first for solutions by adopting or adapting existing fertilizers, processes, or knowledge from anywhere in the world. If further work is indicated, we assign the involved disciplines to task teams for planning and conducting the work." This was simple and straightforward: Define the problem; use an existing solution if available; if not, invent one.

The devil, however, was in the details. IFDC researchers were finding out just how different tropical and subtropical soils could be from the temperate soils for which most fertilizers were designed. Sulfur, for instance, a minor nutrient in most temperate agriculture, was vital in the tropics. "We are so thoroughly convinced that sulfur is so important in the tropics that, contrary to developed country practice, it must be treated as a major nutrient," McCune wrote. Other "minor" nutrients from calcium to boron were also proving more important in the tropics and subtropics. "This and other similar evidence give a strong indication that the conventional primary nutrient (N, P, and K) approach to fertilizers may not be adequate in tropical agriculture," he said.

Even the terms "tropical" and "subtropical" were problematic. They described climates, not soils and agricultural needs. Asian lowland rice farmers needed approaches that were very different from farmers in the highlands. Africa soils, depleted from slash-and-burn farming, were very different from soils in India that had been farmed and replenished for centuries, and they both differed from newly cleared fields in South America. Farming was all local.

"Our modus operandi in program planning is to clearly identify fertilizer needs. We look first for solutions by adopting or adapting existing fertilizers, processes, or knowledge from anywhere in the world. If further work is indicated, we assign the involved disciplines to task teams for planning and conducting the work."

– Donald McCune

There were so many issues, so much needed research, that IFDC found itself doing a little bit of everything – from studying the recovery of value from gypsum stacks in Asia to the use of urease inhibitors to cut nitrogen pollution, from bacterial nitrogen fixation, fertilizer transport and distribution systems to data analysis methodology, soil compaction profiles, farm-level economics, and fertilizer production optimization; the list seemed endless. And they were doing it everywhere, with studies in Venezuela, Bangladesh, Niger, Jordan and a dozen other nations. Seen one way, the organization's progress was phenomenal through the early 1980s. Seen another, it was spreading itself too thin.

So McCune's team began to concentrate their fire, picking major target areas. One driving factor was demographics: In terms of projected population growth (and therefore projected food needs), the world's greatest challenges were going to be in southeast Asia and Africa. McCune started ramping back on Latin American work.

IFDC also focused its research agenda. Sulfur-coated urea, long under development at TVA – a good idea, but simply too expensive – gradually became less of a priority. Of all the variety of other coatings and time-release strategies studied at IFDC, none offered a clear advantage when the analysis included the price point of the final product. The newest

analyses indicated the best approach, at least for Asian rice paddies, was not coated urea but supergranule urea. The best size was a chunk about as big as the end of a thumb, more of a small briquette than a granule. Hand-placing urea briquettes into the soil between rice plants resulted in yields about as good as sulfur-coated urea, but at a much lower price. The search continued for ways to turn bulk, prilled urea into briquettes.

In Africa, phosphates stayed at the forefront. Here the issue was not how expensive the nutrient was, but how cheap. In the early 1970s, fertilizer companies could buy phosphate rock at the mine for about the same price as washed sand or gravel – raw phosphate ore was, literally, dirt cheap. Even delivered to a foreign port, prices for the raw material were as low as $20 per ton. Users often paid more for shipping than the rock. "Under these conditions," McCune noted, "prospecting for new deposits was hardly worthwhile, and development of new deposits was not attractive." But global price spikes, tied to the oil price surge of the mid-1970s, changed the picture. The hunt was on for indigenous phosphate sources, nearby ores that could be delivered to farmers without long-distance shipping. Much of this work had to be carried out on a country-by-country basis; each project was directed at a unique phosphate deposit in a single region. The goal was, ideally, to find ores that could simply be ground and applied to the soil. But even that was not simple: IFDC researchers were discovering that long-term results with direct-application phosphates could differ from short-term results; in some cases, the direct application of a local ground rock seemed less effective on the first crop but could improve year after year. Soil acidity and the amount of calcium in the soil made a difference, so liming, and the timing of liming became a factor. Roy's research included the study of "thermophosphate," a form fused at high temperatures, which proved far more effective in tropical soils than in temperate areas.

By the early 1980s, the true scope of IFDC's challenges was becoming clear. Energy prices were again rising, from $3 a barrel in 1973 to more than $30 in 1981. The old "major nutrient" NPK approach – so successful in temperate regions – clearly could not be exported wholesale to the tropics and subtropics, where sulfur, calcium, even magnesium were also important. Then there were micronutrients like zinc. "Micronutrient fertilizers may eventually become a fertile undertaking for IFDC," McCune wrote in 1981. "There is little doubt in our minds that as crop yield increases, micronutrient fertilization will be much more important in the tropics and subtropics than it is in temperate agriculture. We wish we had the budgets, facilities, and staff to address these problems."

In 1985, on its tenth birthday, IFDC threw a party. It was hosted by a local Alabama IFDC support group called The Century Club, a network of area business leaders and prominent citizens who had been introduced to IFDC and were enthused about its work. Rooms were rented in the area's best hotel, a Ramada Inn in Sheffield. Speeches were given. Toasts were raised.

There was much to celebrate. McCune was making headway in getting more international funding. In 1982, the United Nations Development Program (UNDP) had given more than $3.5 million for a study of upland nitrogen use. The same year the Australian Development Assistance Bureau gave $1.6 million to find ways to use fertilizers more efficiently in southeast Asia. IFAD, a specialized U.N. agency, also granted IFDC more than $2 million in the mid-1980s. Those were blockbuster grants; apart from these, money was coming in from a number of smaller, short-term grants for specific projects in specific countries, from improving market strategies in Nigeria to introducing granulation to Malaysia, testing phosphates in the Philippines to management studies in Nepal. Interest in the international training programs was also growing year by year – from just over 200 participants in 1980 to more than 400 in 1986 – with sessions held both in Alabama and in an increasing number of foreign countries. UNDP had provided important initial funding for these highly successful study programs, which continue to educate new generations of trained agricultural experts in developing nations.

But beneath the celebration were a few concerns. Ronald Reagan had swept into the U.S. Presidency by promising to cut taxes and federal budgets. With him came a new USAID administrator, Peter McPherson. McPherson would prove to be a vitally important figure in the history of IFDC. He had been a student at Michigan State University (MSU) when John Hannah was its President, and the two men had gone through somewhat similar career arcs. They knew and respected each other. Soon after McPherson took the reins of USAID, Hannah paid him a visit. As McPherson recalls it, Hannah pulled a chair next to him and said "Now Peter you need to take care of a few institutions...one of them being IFDC." Through the Reagan years, McPherson did his best, despite the tax-cutting mood in Washington. As the decade went on it became clear that even with McPherson's support, USAID funding – core recurring monies that supported about half of IFDC's annual budget – was likely to become more limited, shifting from unrestricted monies to more targeted grants, and gradually tapering off.

The budget pinch was felt first in IFDC's basic laboratory and pilot plant studies – its search for ideal fertilizer coatings, improved phosphate processing, and a better understanding of nutrient interactions. Lab-based science studies required stable, long-term funding, which became harder to find as USAID's unrestricted grants began to shrink in the second half of the decade. This, added to the growing realization that

Amit Roy

Amitava Roy was 18 years old when he first came face-to-face with starvation. He had just left home to attend college at the prestigious Indian Institute of Technology. India was in the middle of two years of severe drought, and starving thousands had left their failing farms to desperately seek work and food in the cities. Roy passed by them in the streets, their lives uprooted, their bodies emaciated. It was then that he decided to devote himself to the fight for food. That led to graduate work in fertilizers at the Georgia Institute of Technology, specifically ways to recover phosphates that were being lost as waste.

And that led to an uncomfortable moment. In July 1976, shortly after getting his doctorate, the young man found himself across a desk from a "quite stern looking" Don McCune, being interviewed for a job at IFDC. McCune was typically forceful and to-the-point. "Why do you want to come here?" McCune asked. "Do you think you can live in a small town like this? There's not a lot for a young man to do." Roy held steady, assured him of his motivations, and gradually got the older man to start talking about himself. "He was very passionate about helping people grow food," Roy remembers. "That was the softer side of Don McCune."

And that was the politic side of Amit Roy, always able to talk in human as well as technical terms. Amitava Roy was one of four children born into a banking family in Kolkata in 1947, and was raised there and in Mumbai and Chennai in India. Drawn to engineering as a career, at age 18 he left to attend the Indian Institute of Technology. Initially interested in solar power as much as fertilizers (Roy helped design a heat shield for an experiment that went up in the Space Shuttle), he went on to focus his Ph.D. work at Georgia Tech on phosphates. The supervisor for his studies, who had once supervised Travis Hignett as the head of the chemical division at TVA, knew everybody in the business. He told Roy in 1976 that he should look for work at a new fertilizer development center just being started in Alabama called IFDC. That led to the talk with McCune and the start of a long, productive, and beneficial career.

many developing countries, especially in Africa, could benefit greatly from the imaginative application of existing technologies rather than the development of new ones, prompted a gradual shift in emphasis. Although important studies on nitrogen loss, improved coatings, and phosphorus processing would continue at IFDC, the organization would increasingly move toward technology transfer programs designed to bring developing countries the benefits of what was already known. The aim was to find and put in place the most effective, least costly fertilizer package for specific areas – including everything from production and transportation through market development and use in the field. As a result, technology transfer and training programs remained healthy even as IFDC's overall budget began to tighten.

An internal review conducted by the Board of Directors in 1986 confirmed a changing landscape for food aid and support. Recognizing that IFDC "must refocus its efforts," the Directors asked McCune to draft a new plan for the next decade, a blueprint to reshape the organization's priorities in light of what had been learned in the years since its inception. In the spring of 1987, a committee was formed to prepare the 10-year plan. To head it, McCune chose a rising star within his organization: Amit Roy. The young chemical engineer had done well with his phosphate research. But along the way Roy had demonstrated other abilities. He was interested in the entire fertilizer chain – not just the science, but also the economics and the politics, the importance of training and outreach. As a native of India, he had a special appreciation for work in the developing world. He also had people skills. He was approachable, friendly, and well-liked within the organization. By naming him to head the 10-year planning process, McCune would now see something about his administrative abilities. Roy dove into the project in May 1987. He sought ideas widely, talking to most of the IFDC staff and noting their suggestions. When he delivered his report later in the year, it echoed the Board's sense of a need to shift gears. "The world agricultural and fertilizer situations have drastically changed since 1975," a summary of the report concluded. IFDC had been born in a time of concerns about high energy prices and fertilizer shortages. But with the end of the oil crisis of the 1970s, prices had stabilized at a lower point. The mid-1980s was a time of fertilizer surpluses. Communications had become much more rapid. As a result of balance-of-payment problems in developing countries and the related scarcity of foreign exchange, the development of export crops and import substitutions was becoming increasingly important. Environmental concerns about chemical pollution and sustainability were growing. Increased production without ample attention to the careful use of inputs and soil conservation measures was causing environmental degradation in some areas. One-size-fits-all solutions to food problems were proving difficult to find; country-by-country differences had to be recognized.

In short, IFDC's research program had to change to meet the world's changing needs. The old focus had been on finding the least expensive, most appropriate fertilizer for tropical and subtropical soils. But now, "Recent studies on technology have indicated that environmental issues will be of growing concern in developing countries in the next decade," the report said. "IFDC should maintain and expand its capabilities in pollution measurements as well as control methods and practices to reduce potential hazards. . . . The focus of agronomic research should be expanded to address the issues of the sustainability of crop production, fertilizer management, long-term strategies to improve returns to farmers, resource conservation, and environmental concerns."

IFDC's training program, the report continued, remained important. But its focus should also shift. "The transfer of technology to developing countries involves the transfer of skills, and the most effective means of building the human resource capability of the developing countries is through training. Changes that are taking place in developing-country agriculture necessitate shifts in the focus and technical content of training programs to be offered." It was no longer enough to teach people in developing nations how to run fertilizer production plants and distribution systems most efficiently. Physical, social, economic, and political constraints also had to be recognized, along with "the need for specific and sharply focused programs rather than general programs." Suggested new areas for training were computer-based analysis and simulations, econometric models, environmental and pollution issues, and the effects of government policies.

IFDC's programs would best benefit those parts of the world where inefficient fertilizer use was not just a problem, but a key constraint

to food production. In those nations IFDC should develop a multidisciplinary network of highly trained in-country experts capable of assessing the relevance and relative effectiveness of new or improved fertilizers and fertilizer practices. Supply bottlenecks should be identified and opened. Benefits had to be communicated more effectively to farmers, which meant closer attention to local cultural norms and practices. And IFDC was not in this alone: Cooperative working links with other international aid institutions had to be developed into effective action plans.

Within IFDC, there was a call to revitalize the multidisciplinary task team approach to problem solving, taking a holistic approach to problems, bringing together soil scientists, agronomists, engineers, chemists, economists, and sociologists to create a "total fabric of research and development activities." Solutions would come not through R&D alone, but by linking the best technology with needs evaluation, product introduction, attention to marketing and distribution, and making sure that there was a well-trained group of experts from within the country to carry out the program over the long term.

Finally, the report highlighted an important change that would guide IFDC priorities for the next 10 years: A redefined and tightened regional focus. While the food situation in Latin America and Asia, areas of emphasis during IFDC's early years, had "generally improved," the report said, "In contrast the situation in tropical Africa has rapidly deteriorated." From this point on, for the next decade and beyond, IFDC would increasingly concentrate its programs on the continent with the fastest-growing population, the lowest per-capita income, and the greatest need for increased food production: Africa.

Sen H. (Norman) Chien, IFDC Scientist examines a soybean experiment in the IFDC greenhouse.

6

PURE CATASTROPHE

After the release of the new 10-year plan, IFDC began changing rapidly. In late 1989, Don McCune announced his retirement. Another of IFDC's original guiding lights, Travis Hignett, IFDC's fertilizer technology expert, died that December. John Hannah, IFDC's strong advocate and original Chairman of the Board of Directors, would pass away less than two years later.

It was the end of an era. McCune's drive, vision, administrative ability, and powerful personality had created IFDC, turning it from a good idea into an effective international force. During the 15 years of his leadership, IFDC had conducted scores of successful projects; gathered invaluable information on the world's soils, fertilizer needs, and natural resources; and trained more than 3,000 people from 100 different nations. The value of his work was recognized nationally (he was one of only five people given a U.S. Public Service Award in 1986) and internationally (he won the prestigious Francis New Memorial Medal from the Fertiliser Society of London in 1981). If McCune could be considered one of IFDC's Founding Fathers, the other was John Hannah. Hannah's enthusiasm, prestige, thoughtful leadership and high-level connections had made him a perfect Chair of the Board. And Travis Hignett was also a vital figure. No one in the field of fertilizer development was more respected than Hignett. Losing all three in a short space of time was a jolt to the organization.

To replace McCune, the Board chose an Australian, David B. Parbery, who offered a solid academic background in agronomy and development economics, as well as a decade of experience working with the World Bank in Asia and Latin America. He arrived with a great deal of energy, in quick order visiting with USAID officials in Washington, D.C., reviewing programs in Africa, and flying to Rome to meet with FAO officials. During his first four months at IFDC, he traveled as much as he was in the office. But his energy soon faded; soon after starting he was diagnosed with chronic lymphatic leukemia, a disease so severe that he became unable to carry out his duties. Just nine months after he started, in the fall of 1990, the Board put him on medical leave.

David B. Parbery, IFDC Managing Director (February 1990-October 1990)

He was replaced by McCune's long-time deputy, Paul Stangel, who had been at McCune's side since the old days at TVA. The Board took the opportunity to restructure the position, splitting the duties of managing director into two parts and renaming them: Stangel became President and Chief Executive Officer, and Amit Roy was named to the new position of Executive Vice President and Chief Operating Officer. It marked a meteoric rise for Roy, who just a few years earlier had been running phosphate tests in the pilot plant. But his management of the 10-year plan had been impressive; just before retiring McCune had made him acting director of IFDC's technology division. Now, less than two years later, he was the second most powerful man in the organization.

Paul J. Stangel, IFDC President and Chief Executive Officer (1990-1992)

Stangel announced "a new direction" for IFDC, incorporating many of the recent recommendations made in Roy's 10-year plan. The organizing ideas were now *integrated nutrient management* (in which chemical fertilizer was seen as part of a complex along with soil and natural fertilizers like manures and composts); *agricultural delivery systems* (with fertilizer seen as a backbone element in a chain of farming inputs that included seed, water, pesticides, and technical information); and *sustainability* (looking not only at immediate results, but also long-term effects on soil quality). The idea of industrially produced fertilizers as a stand-alone solution was evolving into the theme of fertilizer as a critical part of sustainable, environmentally friendly approaches to food production. It was what

Marjorie Engel Brashier and John Malcolm in the IFDC pilot plant.

Stangel called one of "the building blocks of sustainable agriculture" – not an isolated cure-all, but an important component of a larger complex.

This refinement of IFDC's mission marked an important transition for the organization. But Stangel was not going to be the man to take it forward. After a short time at the helm (but a long career at TVA and IFDC), he announced his retirement in July 1992. At the same time, Marjorie Brashier – McCune's invaluable administrative director and the second person hired at IFDC – also announced her retirement.

It was the third change of leadership in less than three years. To avoid further disruption, the IFDC Board of Directors looked to replace Stangel with someone they trusted, who could take command quickly, and who could commit for the long haul. Instead of combing the world for another seasoned executive, they opted for someone relatively young, very energetic, and already familiar with IFDC. In October 1992, they named 45-year-old Amit Roy the new President of IFDC.

It was a gamble because of Roy's limited executive experience, but it was a risk worth taking. His work on the 10-year plan had both impressed the board and given Roy a broad understanding of the history and mission of IFDC. Roy had laid out his vision of the future, and the Board found it compelling. He was also an IFDC veteran who was well-known and well-liked throughout the organization. He didn't need time to learn the ropes. Roy hit the ground running, quickly laying out a mission statement – "increasing and sustaining food and agricultural productivity in the developing countries through the development and transfer of effective and environmentally sound plant nutrient technology and agribusiness expertise" – and restructuring IFDC's programs into four revamped technical divisions: Research and Development, Outreach, Asia, and Africa. He soon found out how challenging it was to be President. There was the usual slate of program-by-program problems to solve, and some new challenges like the attempt to establish a fully functioning IFDC office in Africa. The loss of most of IFDC's founding figures – McCune, Hannah, Stangel, Hignett, and Brashier all gone within a short time – had thinned the number of people he could turn to for advice. Staff morale, after so many changes, was low.

Most pressing, most ominous, and most urgent, IFDC was running out of money. The recent changes at the top had slowed the flow of new contracts and hindered fundraising, while expenses had stayed steady. Roy inherited a financial deficit. And there was worse to come.

"...increasing and sustaining food and agricultural productivity in the developing countries through the development and transfer of effective and environmentally sound plant nutrient technology and agribusiness expertise."

– Amit H. Roy, 1992

IFDC had depended since its inception on core funding from USAID. During the Reagan years, USAID head Peter McPherson had managed to keep that funding fairly steady. But every new change of administration in Washington, D.C., brought new challenges – and that is exactly what happened when Roy accepted his leadership role. He came in the same year that Bill Clinton became President. And Clinton's agenda did not include fertilizer research. Three months after being officially named President of IFDC, Roy remembers being in a meeting in Washington, D.C., when the bad news was delivered. "USAID said you are going to be zeroed out of the budget," he remembers being told. "You won't have any money."

Luisa De Faria, chemical engineer, in IFDC's pilot plant.

In part, it was because chemical fertilizer was out of fashion, seen either as a potential pollutant, a poisoner of soils, or a solved issue. There was no shortage of affordable fertilizer, or at least that is how it seemed to American politicians concerned with American farmers. In the foreign arena, international non-governmental organizations (NGOs) were increasingly advocating organic methods and wildlife protection. IFDC was in danger of being tarred as an advocate of chemical pollution. Donors and potential partners had grown wary. "Financially, it was very uncertain," Roy says.

IFDC's long-time legal counsel, Vince McAlister, did not mince words: "We had pure catastrophe," he says of the time between the end of McCune's tenure and the start of Roy's presidency. "We were in bad shape financially," he recalls. "Terrible, terrible financial trouble." The threatened USAID cut-off, if it came to pass, would be a mortal blow.

Roy went back to IFDC after getting the bad news from USAID, gathered his staff, and told them the truth. "I was very candid," he says. "I told them, this is our situation. So if you are thinking about buying a new car or new house, hold off." It could have been a rookie mistake – administrators are generally supposed to cheer on their workers, not depress them – but it turned out to be a defining moment. He knew his people, and knew that they would see this as a challenge to meet and overcome. The moment also showed his staff what kind of President he was – someone who would level with his workers, shoot straight, be honest, and let them know what was happening. And there was a side benefit. By telling everyone in the organization the bad news, he made certain that the news would spread quickly. When it got to the local papers, the specter of unemployed workers and the loss of millions in federal funding resulted in attention being paid by Alabama's congressional delegation. Instead of making calls to politicians asking for handouts, Roy started getting calls from Washington with offers of help. One came from Alabama's U.S. Senator Howell Heflin.

Roy and McAlister met Senator Heflin at his office in Birmingham, Alabama. McAlister and Heflin had known each other for years – they fought cases against each other as young lawyers – and Heflin was sympathetic when he was told they needed his help, "He listened and told us to come up to Washington," McAlister remembers. "So Amit and I went up there and spent a couple of days walking the halls. Heflin told us where to go and assigned one of his persons to lead us to those people and get some money for us." Heflin himself went to the White House and lobbied for continued USAID funding. Roy and McAlister found another powerful ally in Alabama's other Senator, Richard Shelby. Shelby switched his affiliation from Democrat to Republican in 1994, giving IFDC a presence on both sides of the aisle. "That was how the game was played," McAlister says. "You could not have a direct requirement to USAID from the Senate or the House of Representatives to send X dollars to IFDC. You couldn't do that. So [the politicians] send off these little letters that say we sure hope you can look after IFDC, and make sure of this." Enough little letters were sent to convince the power-brokers in Washington to ensure USAID's funding for IFDC.

Before it was fully restored, however, IFDC had to tighten its belt. In the first years of Roy's presidency, trips were taken only when absolutely necessary and flights were made with the cheapest tickets possible. There were lots of red-eye trips in coach. Publications were cut back. Staff had to be let go. "That was the most difficult time," Roy says, "because I had to let people go because of a lack of money. That was the most difficult thing I had to do when I took over."

But he did it. He learned important lessons about how to be a leader. And then he started rebuilding.

7

A FAST LEARNER

The low point was 1994, when USAID funding for IFDC plummeted to less than half what it had been through most of the previous decade. "They gave us a little bit," Roy remembers. "Enough to breathe." But only barely.

Roy threw himself into the task of resuscitating the organization. He was determined not only to keep IFDC alive, but to make it stronger, bigger, and better adapted to the changing global food environment. Roy could see how the climate for fundraising had changed since IFDC's birth 20 years earlier. If IFDC was seen as some sort of arm of the chemical industry, intent on ruining soils with badly applied chemical fertilizers, it would fail. To Roy, this was an image issue more than an issue of substance. Soil nutrients were soil nutrients; the phosphorus that reached a plant from a factory was the same atom as the phosphorus that came from rotting compost. What mattered was not where it came from, but how it was used. Used properly, with regard for soil health and sustainability, chemical fertilizers (Roy preferred using the term mineral fertilizers) were essential to long-term increased productivity in any farmer's field. In fact, mineral fertilizers were pro-environment; Roy understood that without their use, farmers faced with declining yields would tear into the remaining wild areas of the world to make more cropland. Fertilizers were a key to a sustainable future.

Soon IFDC publications were putting less stress on chemical studies and more on soil health and agricultural sustainability. Articles on technical subjects gave way to descriptions of how IFDC programs were bettering the lives of farmers in developing countries. This new emphasis was both realistic – Roy's goal was simply to feed the hungry, and personal stories illustrated the end result – and effective for fundraising.

There was another, more subtle shift. In an early report to his Board of Directors in 1993, Roy summarized his "strategies to attain sustainable agricultural development through efficient, environmentally sound fertilizer practices supplemented by economic policies that are conducive to private agribusiness development." The phrase "private agribusiness development" was the key. There was a new world of work opening up for IFDC in parts of the world that were neither tropical nor subtropical. With the dissolution of the Soviet Union in the late 1980s, many former Soviet satellite nations found themselves freed from centralized government control and grappling with the transition to a free market economy. The U.S. had a vested interest in helping them succeed.

IFDC had always worked at many points along the fertilizer supply chain, including work on market development. The organization believed that the best way to get fertilizers to farmers was by establishing efficient links between producers and users, through which fertilizer would flow with as few hindrances as possible. Competition and the ability to participate effectively in the private market were critical in keeping costs down. Government subsidy programs – although attractive to many farmers because they kept prices low – were often scarred by corruption and cronyism, and had in IFDC's experience too often proven inefficient. Private agribusiness development was an attractive idea not only to the U.S. government, but to the commercial fertilizer industry as well. By emphasizing the role IFDC could play, Roy was able to speak with government officials and fertilizer manufacturers in terms that made sense.

Roy was a canny observer and a fast learner. He traveled the world, reviewing IFDC's programs first-hand, and talking with not only his own people, but with national leaders, agricultural scientists, business executives, and smallholder farmers. He learned how to speak to each group in ways that mattered to them. His enthusiasm was contagious, and he began to develop good relations with most of the major players. His message was simple – we must feed the hungry – and he used every tool he could find to achieve it. Soon his efforts began to have an effect.

David Hopper, Chairman of the IFDC Board (1990-1996)

IFDC had been blessed with good leadership for its Board ever since John Hannah took the chair. After Hannah's death, leadership passed to W. David Hopper, another effective leader. As head of Canada's IDRC back in 1974, Hopper had given

IFDC's Board of Directors during 1998.

Back row (from left): Dr. Amit H. Roy (IFDC President and CEO); Dr. Edward C.A. Runge (USA); Mr. Baba Dioum (Senegal); Mr. Luc M. Maene (Belgium); Dr. E. Travis York (USA); Mr. Vincent McAlister (Secretary to the Board); Dr. Bukar Shaib (Nigeria).

Front row (from left): Dr. Norman E. Borlaug (USA); Mr. Pratap Narayan (India); Dr. Ann P. Hamblin (Australia); Dr. Kunio Takase (Japan); Ms. Dawn Thomas (USAID liaison); Dr. Christian Pieri (France); Mr. Gary D. Myers (USA); Mr. Al Giese (USA).

IFDC critical seed money needed to demonstrate international support. His resume included a vice-presidency at the World Bank and a stint as chairman of CGIAR. He knew all the international players. Hopper was in charge when Roy was appointed President, and now he and the Board guided and backed their new President as he fine-tuned IFDC's direction.

Three new members brought into the IFDC Board of Directors in the early years of Roy's presidency also proved particularly important. One was Gary Myers, the President of The Fertilizer Institute (TFI), the leading industry association in the U.S. The second was Luc Maene, Director General of the International Fertilizer Industry Association (IFA), the world's foremost international association for the global fertilizer industry. These two additions reflected the growing respect major fertilizer manufacturers had for IFDC's work.

The third eminent new member of the Board, added in 1994, was Nobel Peace Prize winner Dr. Norman Borlaug. Borlaug, the father of the Green Revolution, was a legendary figure among those trying to improve the global food situation. He believed that peace could not be built on hunger and poverty. He understood the vital role fertilizers had played in the Green Revolution in Asia, and wanted to make sure that their use and benefits were expanded in the developing world. Borlaug not only added public prestige to the IFDC Board, but also offered connections with other international nonprofit efforts to fight hunger. One example was an organization he had co-founded with former President Jimmy Carter and Japanese philanthropist Ryoichi Sasakawa, the Sasakawa Africa Association (SAA). SAA, through a program called Global 2000, was working to increase smallholder farm productivity and profitability in sub-Saharan Africa. It was an important mission: The Green Revolution, after tremendous success in Asia, was faltering in Africa. Borlaug devoted himself to finding out why and fixing the problem. "If we could get the private sector involved in fertilizer import and distribution in Africa, we could solve Africa's food production problems," Borlaug said. And with Myers, Maene, Borlaug and others on his Board, Roy and the fertilizer experts at IFDC were in a position to help make that happen.

Norman Borlaug with President Jimmy Carter and Rosalynn Carter in Ethiopia.

8

AFRICA

IFDC had struggled for years to establish a regional center in Africa. McCune, during his tenure, had founded an IFDC-Africa office in Lomé, Togo, and placed it under the management of a talented Dutch-born IFDC scientist and administrator, Paul Vlek. Vlek and McCune had gotten the program off to a good start, bringing in new donors –The Netherlands, Germany, The World Bank and global phosphate producers – and turning IFDC-Africa into an important outreach office. But shortly after David Parbery took over, Vlek left to become a professor at a German University. Parbery felt it was important to put the center under African leadership. He selected Uzo Mokwunye, who was a well-known Nigerian agricultural scientist at IFDC but less experienced than Vlek in administration and fund-raising. This happened at a time when food programs in Africa were shying away from an emphasis on fertilizer. Then in 1991-92 civil disturbance erupted in Togo, with riots and shootings in the streets of Lomé. Many IFDC staff members were pulled out. By the time Roy was named president, the budget for IFDC-Africa had shrunk from a healthy $6 million per year to less than $2 million.

Roy went to Lomé to see the situation for himself. It was sobering. It was tempting to simply shut the center down. But Roy's trip report – although tempered with phrases like "despite political turmoil," and "despite the formidable challenges" – called not for the end of IFDC-Africa, but for its revival. "We believe Africa's agricultural future is bright," Roy wrote, adding that "We at IFDC realize that results take time." He decided to keep IFDC-Africa alive. He asked for patience from his Board. Then he started making changes.

First, he put IFDC-Africa back on the map by holding an important gathering there, the IFDC-Africa Resource Mobilization Meeting. One goal of the meeting was to inform both African leaders and the donor community of the severity of Africa's agricultural crisis. Another was to generate more support. A third was to demonstrate that Roy and the IFDC Board were committed to supporting the Africa center.

In 1996, Roy brought Mokwunye back to Muscle Shoals to become his Special Adviser on Programs in East and Southern Africa and replaced him as director of IFDC-Africa with someone who reflected Roy's new approach and fresh energy. Hendrick "Henk" Breman was an agricultural development specialist with 25 years experience in sub-Saharan Africa. He was also Dutch, a fact that mattered when it came to securing Dutch government support. And he believed, as Roy did, that the future of fertilizer use was tied to sustainability. He was what Roy calls "a card-carrying environmentalist."

"That was very important at that time because we were getting hammered from every side, particularly in Africa," Roy remembers. "You had the international NGOs saying 'No fertilizers. All farming in Africa should be organic.' And here was Henk, an environmentalist who believed in fertilizer." Breman understood that the proper use of chemical fertilizers was about more than simply growing food. It was also an important way to protect wild areas and preserve wildlife. Soil was a complex system; farming depleted nutrients, and fertilizers if used properly could replace them while still building soil health. Soil health was a key to sustainable productivity; sustainable productivity would allow farmers to prosper; and prosperous farmers would not need to slash-and-burn their way into wildlife areas. Fertilizers, in other words, were good for the environment. "Henk," Roy says simply, "truly is a remarkable person."

Breman believed that the key to restoring the weathered, nutrient-poor soils of Africa was the judicious use of inorganic fertilizers in combination with additional organic matter, appropriate cropping, and proper water use. He had seen it work in some of the most adversely affected parts of the continent, even the famine regions of the Sahel. It was a powerful vision, one that managed to bring together fertilizers and sustainability in a framework that made sense for the developing world. It was an approach that allowed Roy to make his case for Africa effectively to all sorts of audiences, from corporate gatherings to environmentally oriented meetings. He could argue the role of fertilizers not only for feeding the hungry – that remained the driving core message – but also for fighting desertification, helping to protect wildlife, countering climate change, and spurring sustainable economic development.

Breman and Roy made a great team. Instead of shutting down IFDC-Africa, the IFDC Board increased support, strengthening its "Africa Committee" with additional Board members to review progress in Lomé, and renewing the search for funds. IFDC's earlier work had already resulted in the world's best database of information on sub-Saharan Africa's phosphate deposits, soil nutrient deficiencies, and markets. Now that data would be transformed into food production. The Dutch government granted additional money for a market-development project it had started years earlier with IFDC-Africa. This long-term project had begun with the gathering of information about soil and fertilizer needs, moved into strategies to make markets more transparent, and now, using Breman's and Roy's new framework, focused on restoring degraded soils and training local entrepreneurs to supply agricultural inputs to local farmers to develop more sustainable agricultural systems. Other projects for "greening" Africa began to take shape.

By 1996, Roy and the Board had changed IFDC's public face. Sustainability was now a powerful organizing theme. Food security – ensuring populations' reliable access to enough food for an active, healthy life – was another. These were positive themes that resonated well with potential partners. In addition, food security could be seen as a component of national security; there were political and social advantages that came from growing enough to keep populations well fed. "There is an old saying," Roy would sometimes remind listeners: "A hungry man is a dangerous man." A focus on food security would help prevent social unrest.

All these ideas came together in IFDC's 1996 annual report, which was introduced with the title "Creating Fertile Soil for a Food-Secure World." There, in eight words, was a summary of Roy's new direction.

He was righting the ship. Funding from USAID was gradually restored. Productive relationships were established with private industry. New funds for the Africa center were flowing in. IFDC not only had a good message, it had a growing list of real-world successes to point to. Among them, two stood out. One had been building over a long period in Bangladesh, where the privatization of fertilizer procurement and distribution was beginning to make an enormous difference for the country. The other was in a place that no one would have predicted. It was not in the tropics or subtropics. It was not in Africa or Asia. It was not, by some measures, even in the developing world. But success here would prove enormously important for the history of IFDC.

Henk Breman (left) and Mr. Atiye examine a demonstration plot in Togo.

9

THE TIRANA EXPERIMENT

Albania was officially a basket case. In October 1991, when IFDC specialist Edward (Ted) Clayton arrived with a USAID project design team, he found a country veering toward collapse. He was still in Europe – just north of Greece and across the Adriatic from Italy – but he might as well have been in another world. Albania was frozen in time. From the end of World War II until the late 1980s, it had been among the world's most resolute and fervent Communist states. Private enterprise was wiped out. Movement in and out of the country was discouraged. The central government controlled everything. Economic development ground to a halt. Albania held the dubious distinction of being the only European state classified as a "least developed nation." Few outsiders visited Albania and few Western nations traded with Albania. For almost half a century it disappeared from the world stage.

When the Soviet Union fell apart in the late 1980s, Albania found itself propelled into a new and very different world. The Communist government collapsed and centralized control dissolved. When Clayton and his USAID colleagues arrived in the capital, Tirana, to assess Albania's agricultural situation, they found chaos. "The cooperative distribution and service systems had collapsed," an IFDC report stated. "There were no suppliers of inputs, no pricing mechanism, and no credit available." There was no structure for private enterprise. The United Nations gauged that Albania was technologically 20 to 30 years behind the rest of Europe, with "barely functioning institutions, a chaotic and distrusted government . . . and a people suspicious of any attempt to organize and guide them. . . . a land that time and bankers forgot."

Agriculture was particularly hard-hit. There was almost no economic or organizational structure to support farmers. Fertilizer was hard to find and expensive. There was only one nitrogen fertilizer plant in the country, and it operated only part-time during certain months. Food was scarce. "You couldn't get sugar. You couldn't get flour," the wife of one early IFDC member remembers. "If you found meat, you weren't sure what it was." There were queues for bread. If nothing was done, famine was a possibility.

The fall of the Iron Curtain had been, in some ways, a boon for IFDC. In the early 1990s – just before cutting IFDC's funding – USAID had given the Center grants designed to modernize and privatize fertilizer markets in Albania and Romania, ensuring a steady supply of soil nutrients to farmers. After Clayton's initial visit, an IFDC tech team under the direction of long-time veteran Ray Diamond was sent to Albania for more in-depth study and action. The need for fertilizer was so immediate that a freighter loaded with 20 tons of bulk urea was rushed in, and IFDC was given the job of distributing the fertilizer. The only instruction was that it had to be done under the heading of private enterprise.

Ted Clayton, IFDC Transportation/Distribution Specialist, conducting a training program.

And that was a problem. Private enterprise did not exist in Albania. There were no entrepreneurs. Banks were unfamiliar with doing business loans. "We agreed with USAID that we would do it through the private sector," remembers IFDC's Ian Gregory, who spent years in Albania, "But we couldn't find a private sector."

So IFDC took a gamble. In the absence of an established system, Roy and his people decided to create one. When the urea freighter arrived in the Albanian port city of Durres, IFDC staff, aided by USAID veteran John Becker, decided to advertise a fertilizer auction and see if they could attract and work with budding business people. A publicity blitz – or as much of a publicity blitz as was possible in Albania – was mounted, using

state television, radio, and print ads to raise awareness of the event. When the ship docked in early 1992, James (Jim) Kelly, a retired U.S. Navy veteran and IFDC purchasing agent, oversaw the bagging and warehousing of the bulk urea, guarded it from thieves, and waited to see what would happen. The day of the auction came. And men began to show up. Some wore business suits. Some wore sandals without socks. Some did not know what private credit was. Some did not understand what an auction was. But somehow, with enough explaining, it all began to work. Auction rules were outlined. IFDC staff convinced local banks to extend credit. And when the day of the auction came, the fertilizer was sold, bag by bag, ton by ton, to a group of people who had never experienced anything like this in their lives. Some of the Albanians who participated in that first auction became the nation's first private fertilizer distributors in more than a generation and early members of the Albania's new business class.

John Becker (USAID), IFDC Senior Procurement Officer James (Jim) Kelly, President and CEO Amit Roy, and Neil Hilton (Shipping Consultant acting on behalf of Sealift) at the Port of Durres in Albania overseeing the transport of urea.

That was only the first step. Albanian farms were poor and scattered, the result of breaking up the old state landholdings and distributing it to hundreds of thousands of peasant farmers. It was not ideal for modern agriculture: Most Albanian farms were small (around one hectare) and fractured. "Everybody got a little piece of valley land," remembers Gregory, "a little piece halfway up the mountain, and a little piece on top." Soils were often eroded and nutrient depleted. The new distributors had fertilizer to sell, but no way of getting it to the widely spread farms. Automobiles were rare in Albania, and trucks even rarer. So IFDC and

Edwina Clayton and Bobbie Kelly

In March 1992, Edwina Clayton saw something awful on the television. Her husband, Dr. E. W. "Ted" Clayton, was getting ready to go to Albania with IFDC, so she paid attention when CNN ran a story about the economically ravaged country. The scenes of hospitals were horrific. "I was very moved when they showed the conditions of the children in the hospital, the plight of the sick, and the frustration of the doctors who could not, due to the lack of everything, perform the simplest medical procedures," she wrote later. "It tore into me." She felt called to do something about it.

So she made plans to join Ted in Albania, bringing with her as much medical equipment as she could pack in her luggage. Ted made contact with the head of the pediatric institute in Tirana, Albania's capital, and faxed her a list of the most urgent needs. Edwina asked her church if she could put out a donation box, and put another at IFDC headquarters. What followed, she remembers, was "an outpouring of love and giving." She ended up bringing two footlockers full of bandages, feeding bottles, syringes, stethoscopes, and over-the-counter medicines when she flew to join Ted. On a stopover with relatives in England, she collected even more – so much that Swiss Air had to agree to waive excess baggage costs.

On a layover in Zurich she ran into another IFDC spouse, Bobbie Kelly, who was on her way to Albania to join her husband Jim. Bobbie, instantly inspired by Edwina's mission, joined her medical odyssey.

The two women arrived with their welcome supplies at the pediatric clinic in Tirana. It was a sobering experience. The halls were so dark they had to use a flashlight to find their way. The clinic's only incubator sat broken in a hallway. The operating room contained nothing but a steel table. The director's room was bare apart from a desk, an empty cabinet, and a few chairs. "A look at the kitchen was quite shocking," Edwina wrote. "One half-used packet of dried baby food and four jars. Otherwise nothing on the shelves."

The supplies the Americans brought were desperately needed. But there was more to do. The clinic's cardiology director told them that more than anything else the children would benefit from one item: An EKG machine to help diagnose heart problems. Once home in Alabama, the two women again went to their churches, their families, and IFDC staff for funds. And again support flowed. Bobbie returned to Tirana the next year, bringing with her the much-needed equipment.

This was not about food aid or fertilizer. It was about IFDC family members caring about the places they worked, and the people they worked with.

USAID shipped in a fleet of thirty 10-ton capacity trucks to move the urea, trained drivers in the operation of these modern trucks, and sent them off into the mountains.

It was new, it was exhilarating, and it was working. With IFDC's guidance, the veterans of that first auction formed a new trade group, the Albanian Fertilizer and Agribusiness Dealers Association (AFADA), founded officially in the spring of 1993. They set up an office and information systems. After distributing two USAID-funded fertilizer shipments, AFADA members decided to try buying from the global fertilizer market. Because no single person had enough money to bid on the enormous amounts needed, members pooled their resources, buying 2,700 tons of urea from the Ukraine. Even that was miniscule by international shipping standards. Commercial carriers were not interested in hauling such a small load. So IFDC's Jim Kelly came to the rescue.

Kelly – a decorated Vietnam naval vet who had once worked with the CIA – was a do-everything self-starter. He was also credentialed as a ship captain. He found an old naval vessel that had been rusting at anchor in Albania for decades, got it running, hired a crew, and set sail for Odessa, Ukraine. At one point he was delayed for weeks by severe cold and ice. At another Kelly found himself being saluted by the Italian Navy, which confused him for a retired admiral. But the urea got to Albania, and AFADA learned how to deal with the world of international fertilizer. IFDC helped to build a complete agricultural supply network around AFADA, including producers, importers, transporters, and retailers; laid the groundwork for an agricultural statistical system; and began running regional workshops to develop management skills.

It all happened very quickly. In part that was because it was all happening in a vacuum. In Albania, everything started from zero. Systems could be built without dealing with vested interests and established competitors. IFDC was free to do things the right way from the start, and AFADA served as an important partner, a center through which IFDC's business training programs and individual counseling could be offered, production and distribution needs discussed, best practices discussed, trades made. AFADA soon was lobbying and arranging credit. Its meetings – which at first drew attendees as much for food and drink as for business – grew serious (and profitable). Members prospered, and their individual success served as a role model for other areas of the Albanian economy. As one IFDC publication put it, "The financial success of the AFADA dealers made believers of Albanians in market economics."

IFDC made a signature contribution. In the mid-1990s, when an interviewer asked Ray Diamond to list the most important effects of his

Ray Diamond, Chief-of-Party of Albania, with the fleet of trucks donated by USAID for transporting fertilizer in Albania.

work there, he said, "The creation of a network of agribusinesses, composed of importers, distributors, and retailers, to supply agricultural inputs to farmers ranks high on the list" (a network that won accolades as the "most effective business association in Albania" by the International Finance Corporation). "Another milestone," Diamond said, "was the establishment of an association of agribusinessmen to provide support to its member businesses. Third, but equally important, was the work that our team did to encourage state-owned banks to provide commercial loans, which enabled agribusiness people to purchase supplies and sell them to the farmers." IFDC had helped demonstrate that an open, privatized market system could work in Albania.

Within a very short time, the agricultural numbers improved. Inorganic fertilizer use rose dramatically. Albanian agricultural production rose almost 8 percent annually through the first half of the 1990s, triple the rate of the previous decade, and the highest rate of increase in the region. Wheat and maize yields almost doubled. Agriculture was Albania's single most important contributor to gross domestic product (GDP), and within three years of IFDC's arrival, the country's GDP had risen 30 percent. The growth in productivity had a ripple effect: Within a few years of its arrival, IFDC counted 400 new agribusinesses employing 4,000 people, creating effective markets not only for fertilizer, but for improved seed, herbicides, and pesticides. USAID Albanian mission director Dianne Blane summed up IFDC's work in three words: "an enormous success."

The strength of that success was tested in the spring of 1997 when an insurrection toppled the government and Albania fell into near anarchy. "Almost every function, including law and order, collapsed," an IFDC report said. AFADA, however, weathered the storm. Its members held together, obtaining external credit and arranging convoys of agricultural inputs to farmers, helping to prevent a food crisis. In fact, fertilizer sales during the crisis year increased 17 percent over the year before. Despite the political turmoil, harvests were stable and IFDC was able to advise the international community that no additional food aid was needed in Albania.

When order was restored, AFADA emerged stronger than ever. There was now a private agricultural framework in Albania – a structure connecting factories and importers to wholesalers, retailers, and farmers – that not only effectively met the fertilizer needs of the country, but could also be used to communicate new farming techniques, seed varieties, and timing for the best input results. IFDC pushed this communication through the support of publications and media spots, easy-to-use charts and timetables, even helped start the nation's first agricultural business magazine. AFADA expanded, exploring the possibilities of agricultural processing and the addition of high-value export crops. IFDC began fostering additional private-enterprise efforts by assisting other Albanian agricultural trade associations. In late 1997, members of the new Permanent Parliamentary Commission in Albania demonstrated the continuing importance of the relationship by visiting IFDC headquarters in Muscle Shoals.

Albania marked an important step forward for IFDC. Its success demonstrated to major donors that their work could make a very significant difference in a very short time. It showed USAID that IFDC was a reliable, innovative, and effective partner. And it highlighted the importance of a smoothly functioning market in the changing world of food and agricultural aid. What was important was not sticking rigidly to outmoded approaches. What mattered was thinking fast, adapting to local realities, and looking for whatever solution might work to help farmers get what they needed – "continual innovation, flexibility and commitment to client interests," as an IFDC publication on Albania put it.

Roy and his team believed that many of the lessons learned in Albania could be used in other transitional economies, including those in sub-Saharan Africa. These core lessons included:

- Have full confidence in the private sector.
- Concentrate on key efforts with limited set of actors (in this case, AFADA).
- Lead by example.
- Take a holistic approach that coordinates key factors – seed, credit, transport, media – whatever is needed to ensure success. Making part of the system work isn't enough. The whole system has to work.
- Demonstrate tangible results to gain confidence.
- Strengthen and work with appropriate government institutions.
- Expand into new opportunities when possible, as IFDC did in guiding. AFADA dealers into agro-processing and exporting to the EU market.

In the late 1990s, IFDC packaged everything it had learned under the heading "A Holistic Agribusiness Development Model." The organization more than ever was committed to coordinating and working across the entire value chain, anything that touched on increasing productivity, whether it was marketing, banking, shipping, seeds, machinery, communications, or any one of a half-dozen other fields.

IFDC had come a long way from fertilizers.

10

DOWN TO EARTH

Albania was a model for success, not a formula. Things that had worked there did not necessarily translate directly to other countries. IFDC's attempt to take a similar approach in Romania did not achieve the same degree of success, in part because Romania was economically healthier to begin with, with vested interests and existing structures that were more resistant to change. IFDC would remain active in eastern Europe – it conducted an extensive review of the agricultural situation in the Ukraine in 1997, and was asked to help heal the war wounds to agriculture in Kosovo – but after the tremendous success in Albania, Roy shifted most of the organization's focus away from Europe and back to its original mandate areas in the tropics and subtropics, especially south Asia and sub-Saharan Africa. Here, as in 1974, populations were rising fast and predicted to rise faster. Here, agriculture still was done for the most part by smallholder family farmers using centuries-old techniques to cultivate a few hectares of land. They grew enough to feed their families, and hoped for something to sell at local markets.

These millions of smallholder farmers held the key to meeting future food needs. If they could not dramatically increase their productivity, there was little hope of feeding the fast-growing global population. But their needs, their culture, their infrastructure were extraordinarily challenging. The massive tractors and combines common on American farms were nonexistent. Bulk buys of chemical inputs were impossible. Smallholder farmers most often were located in small, isolated communities with poor roads and communications, operating year-by-year with little money and limited credit. Often they could not afford sufficient inputs and productivity suffered.

It was possible, in theory, to modernize the system by destroying it. Large tracts of land were being bought up in Africa by groups eager to do just that – turning what had been regions of smallholder farms into giant agribusiness super-farms where modern technologies and economies-of-scale could be used to increase yields. All they had to do was raze the villages and relocate the farmers.

Roy wanted to find another way. He wanted to boost the success of smallholder farmers, not destroy their way of life. It would require all the skills IFDC had been honing. It seemed like an impossible challenge.

As IFDC neared its 25th anniversary in 1999, Nyle Brady, former USAID official, emeritus professor at Cornell, and former Director General of CGIAR's International Rice Research Institute (IRRI), summarized much of IFDC's progress in a letter to Roy. "It has been my privilege to observe the emerging contributions of IFDC as it has helped farmers and their national and international compatriots gain a better understanding of the critical role of plant nutrients in helping the world feed itself," he wrote. "The international accomplishments of this Center have clearly shown that this is an institution with a global mandate and with truly global impact. One of the strengths of IFDC's programs is the extent to which they have focused on low-income farmers in low-income countries. In collaboration with scientists and educators in developing countries, IFDC has helped discover or develop appropriate systems to effectively utilize and recycle these nutrients, and has created models that helped its cooperators extrapolate their findings from one eco-region to another. IFDC must be congratulated for having helped them blend the best of science with the down-to-earth management abilities of small farmers."

Down-to-earth summarized much of IFDC's approach. It was flexible and pragmatic, built around identifying the most pressing problems, gathering the tools needed to solve them (whatever those tools might be), and getting to work.

There was a lot to celebrate as IFDC turned 25. Since its founding, IFDC had conducted technology transfer activities in more than 120 countries. It had expanded the number of foreign offices to nine. It had contributed to the development of human resources and institutional capacity building through 600 or so training programs delivered to more than 7,500 participants from 150 countries. The funding crisis was over; the organization's total budget was almost double what it had been at its low point in 1994. USAID, impressed by the Albanian work, had come back on board with annual funding even greater than it had been in the 1980s. Now, as IFDC's global stature grew, that core support was supplemented with a growing list of other significant donors from around the world.

But there was still much left to do. More than a billion people around the world lived on less than $1 (U.S.) per day; another 2 billion earned less than $2 per day. Up to 80 percent of that limited income went to food, leaving little for education and advancement. There had been no major famines in recent years. But nearly a sixth of the world's total population of more than 6 billion people still suffered from hunger and malnutrition. "While their counterparts in the developed countries are surfing in cyberspace," then-Chair of the IFDC Board E. Travis York wrote in 1999, "these people are tilling the soils and working hard to feed themselves. . . . It is essential that additional food be produced at lower costs so that these people can feed themselves at satisfactory nutritional levels while spending less than one-half of their incomes." This had to be done in ways that increased productivity enough to feed an astonishing projected population increase (the analyses at the time indicated a global population of around 8.9 billion by 2050). And all of this had to be accomplished while at the same time protecting the environment and, if possible, preserving the cultures of smallholder farmers.

E.Travis York, Chairman of the IFDC Board (1998-2004).

It was a daunting task. But Roy and his team believed it could be done. In fact, they had already helped solve a problem almost as daunting, in a place that most of the world had written off as a lost cause – a nation with stubborn poverty, one of the fastest-growing populations on the globe, and a capital city that was officially the most crowded place on earth. IFDC had shown what could be done in Bangladesh.

11

UREA DEEP PLACEMENT

In Bangladesh, fertilizer was not just desirable – it was essential. Since the country's independence from Pakistan in 1971, food had been at the forefront of the government's concerns. But Bangladeshi agriculture, much of it based on rice farming in the delta of the Ganges River, was intermittently devastated by floods and droughts. Shortages were filled with imports. In the 1970s, it seemed like self-sufficiency in rice production was a dream; the nation's farmers were for the most part smallholders using age-old agricultural methods on a few acres of land. Fertilizer was a luxury. What little they could afford was often lost through inefficient methods of application. The government ended up paying large sums to subsidize fertilizer for its agricultural sector.

IFDC had been working in Bangladesh since the late 1970s, stationing two staff members in the capital, Dhaka, in 1979. The program was expanded in 1982 when USAID provided contract funds to help further improve the fertilizer distribution system and increase farmer education on soil fertility management. In the late 1980s, realizing that the private sector could improve efficiency at all levels in ensuring farmers timely access to fertilizers at competitive prices, USAID funded IFDC to work in close collaboration with the Ministry of Agriculture to achieve complete privatization of the fertilizer marketing system – an amazing feat because the privatization of sectors still did not have widespread acceptance in developing countries.

In the early 1990s, that effort bore fruit. "Fertilizer subsidies are no longer required," an IFDC publication announced in 1993. Thanks in great part to the work of IFDC, the Bangladeshi government had now found that

IFDC economists Carlos Baanante and Surjit Sidhu visit with farmers in Bangladesh as a part of a research program on ways to improve the productivity of small farms.

the evolution of the private sector meant that it was no longer required to provide public support for fertilizers. IFDC ran a study to assess the impact of the subsidy removal, and found that while in the short term fertilizer prices had gone up slightly, price increases were generally offset as the private market matured and efficient use practices spread. The task now was to spur competition in the private sector, clear remaining bottlenecks, and ensure the availability of credit for both farmers and dealers. Work in the banking sector proved especially important in Bangladesh, where the concept of lending to the private sector for fertilizer trading was unknown. IFDC helped bankers understand the credit needs of fertilizer traders and dealers, made sure that credit was available when needed, and spurred the growth of the private sector. Freed of the burden of fertilizer subsidies, the government was able to redirect tens of millions of dollars per year toward other pressing needs.

Through the 1990s, the situation in Bangladesh continued to improve. Fertilizer use was rising. Credit was easing. IFDC's encouragement of what one staff member called "a community of entrepreneurs" was creating jobs – more than 100,000 new jobs to date – and hundreds of new businesses related to the distribution and sale of fertilizer. Fertilizers were available in every part of the country when the farmers needed them and at lower prices than in the past. Rice production increased significantly and Bangladesh was on its way to feeding its expanding population. IFDC was becoming a trusted partner in the region, with strong ties to both the government and USAID. IFDC counsel was sought by the Bangladeshi Ministry of Agriculture (it did not hurt that Roy, raised in India's West Bengal region, spoke Bangla). It became a go-to source for program development by the U.S. government. "This work," said the U.S. Ambassador to Bangladesh, "is unprecedented."

As always during Roy's presidency, IFDC did more than enjoy the accolades. The organization always tried to learn from its experiences, assessing what worked and what did not in order to ensure maximum efficiency in the future. The four most important lessons from Bangladesh were put into print in 1994. First: Government policy changes – a "strong political will," as the publication put it – were clearly able to affect the

U.S. President Barack Obama and USAID Administrator Rajiv Shah discuss fertilizer deep placement technology with Dr. Bidjokazo Fofana, agronomist and coordinator of IFDC's fertilizer deep placement initiative in Africa. Fofana (right) shows President Obama and Administrator Shah a mechanical applicator that facilitates deep-placement of fertilizer briquettes. Photo courtesy of USAID.

economic direction of the agricultural sector. Second: Privatization worked, and competitive market forces played a major role in keeping prices down so that use could grow. Third: Nothing happens until donors, consultants, and the government work in concert. And fourth: Technology transfer and skill building are essential for privatization. It wasn't enough to say that privatization was a good thing. Business skills had to be developed. Methods had to be demonstrated. Associations had to be formed. Government officials had to be shown results.

Once government subsidies were gone and the private market was revving up, IFDC took another major step. It was named prime contractor for the enormous Agro-Based Industries and Technology Development Project (ATDP), an all-encompassing joint project between USAID and the Bangladesh government designed to expand competitive markets for agriculture and agribusiness inputs, outputs and technologies, covering everything from seed and farm machinery to poultry and livestock, processing plants to fiscal policy. IFDC would be bringing everything it had learned in the past 15 years to bear on agriculture across the country. Its responsibilities included management of an agribusiness credit fund that in its first year provided $43 million in loans to farmers and agricultural entrepreneurs, and the creation of public-private market monitoring information systems to speed the flow of ideas between donors, government, manufacturers, distributors, and end-users.
While privatization activities were in full swing, IFDC began to work in earnest to improve use efficiency of urea, themost commonly used fertilizers in rice production. With the common application technique of spreading urea by hand, nearly two bags out of three were lost to air and water. This was both an economic loss and pollution problem. Early IFDC work in the region was demonstrating the potential value of using their urea deep placement (UDP) technique, pushing small briquettes of urea down into the soil between rice plants. Local farmers called this "Guti" urea.

But it was not without problems. Urea arrived in Bangladesh in the prilled form, granules about the size of rice grains. UDP required larger briquettes; a way had to be found to form prilled urea into the larger Guti form. Another limitation was found in the field. It was relatively easy for a smallholder farmer to toss prilled urea over a rice paddy; it required more work to push Guti briquettes into the soil at a certain depth, in a certain pattern.

IFDC worked to solve the problems. In 1987, it announced that a device had been found that might solve the briquetting issue: A relatively simple machine that pressed prilled urea together to form the larger Guti size. It was small enough and inexpensive enough to be set up by local people in a small village setting. The basic idea had been developed first in China, used in Indonesia, and now IFDC was refining it for Bangladesh. By 1989, IFDC was demonstrating its UDP approach in 25 Bangladeshi villages in five regions of the country, and had proven that it did the things it was supposed to, lowering the amount of fertilizer needed and cutting pollution while at the same time increasing rice yields. But farmers were still slow to adopt it. It was new, for one thing, and traditional farmers were risk averse, unwilling to try something new until it had been proven to them beyond any doubt. The village infrastructure for producing the briquettes was still not in place. There was resistance to placing the Guti by hand; there was a need for some sort of applicator, a machine that a farmer could use in a small paddy to automatically push the briquettes into the soil at just the right depth. No applicator existed. So IFDC went to work to invent one. At the same time, it was working with the government to rationalize and streamline the private system needed for efficient distribution of fertilizers at market prices.

By the late 1990s, field tests in Bangladesh were providing hard numbers to support the UDP approach. It was clear that done properly, UDP represented an almost perfect technology for smallholder farmers, increasing crop production while at the same time lowering the amount of fertilizer required, cutting pollution, and boosting net income for farmers by more than 30 percent. This was an unprecedented win-win-win-win. In order to expand its use, IFDC built strong ties with the Bangladesh government and spent a great deal of time in farming communities. IFDC's

Usha Rani Goswami (left) receives the Bangabandhu National Agriculture Award Gold Medal from Bangladesh Prime Minister Sheikh Hasina. Also present is Minister of Agriculture Begum Matia Chowdhury.

Usha Rani Goswami

Usha Rani Goswami threads her way down a narrow path, then cuts across her neighbors' gardens, her sari a flash of orange and gold in a deep green landscape. Her bare feet sink in the earth; the hem of her sari darkens with irrigation water and streaks of mud. The villagers she passes pause their work and shoot glances. A group of women on the road stare, then go back to their talk. She looks straight ahead, her attention focused on a small rectangle of land bounded by low earthen dikes. When she reaches the tiny field of emerald rice she wades into it, her feet ankle-deep in the soft earth, and starts working. This is her rice. Her land.

She is the only woman in her village who dares to farm. After her husband's death she had inherited his bit of farmland in the Ganges delta region of Bangladesh, but in her culture men were in charge of the rice. She was expected to quietly fade away into the role of traditional Hindu widows, moving into a room in the house of a relative and helping with chores. But Sreemoti did not do the expected. She loved her home, a patchwork of tiny fields stitched together by low dikes, each tended by a different farmer. She loved the way the fields shone silver when they were flooded to make paddies, then turned into a shimmering sea of emerald as the rice ripened.

(Continued on page 85)

Asia Division headquarters in Dhaka, Bangladesh, was expanded until it matched the Africa Division in importance.

By the middle of the first decade of the 21st century, the UDP approach for traditional rice farming was perfected: Just the right sized briquettes of urea, placed at just the right depth, at the right time in the planting cycle, could benefit farmers, consumers, and the environment at the same time. The system even created a new group of village-level UDP entrepreneurs who made a bit of money by using the machines IFDC had helped design for pressing prilled urea into briquettes. By 2004, more than 500 of these machines had been sold and were in use, making urea briquettes for more than a quarter million Bangladeshi farmers. Those using UDP saw their yields rise more than 20 percent, the amount of nitrogen applied to fields cut by a third, pollution cut by half, and rising profits. This was great news

Mr. Sayedul Alom (second from right), assistant manager of Mark Industries, demonstrates a briquette machine to (from left) Mofizul Islam, senior agricultural specialist; Ishrat Jahan, IFDC resident representative in Bangladesh; and John Allgood, then-director of IFDC's EurAsia Division.

for the government, which announced in 2007/2008 that it planned to expand the use of UDP to 1.6 million farm families on almost a million hectares of land. Ms. Ishrat Jahan, Resident Representative in Bangladesh for IFDC, led the charge. In 2008, when fertilizer, food, and energy prices increased dramatically, the Government of Bangladesh threw in its support behind UDP, and directed the Department of Extension to work closely with Jahan and her team. The results were remarkable – an estimated 1,000 machines were in use, and UDP adoption was spreading to the point where it was expected that its effects would provide food security for an additional 4.2 million Bangladeshi citizens.

UDP was a simple idea with multiple benefits. It did the basic things that fertilizer technology is supposed to do – gave farmers bigger crops and bigger profits – but also did the things that agriculture needed to do for the new century: lowered pollution and increased efficiency. There was an additional, less tangible benefit as well. UDP was an inexpensive, low-tech solution geared to the scale of traditional smallholder farmers – requiring nothing more than a local briquette maker, a few hours of training, and perhaps access to a simple applicator. It did not require huge mega-farms to be practicable; it could be used on very small plots. It did not require expensive new machinery; it could be used by hand (although work continued to find the perfect small applicator for hand-use in small paddies). It put more money in farmers' pockets. It did not destroy traditional smallholder communities; it strengthened them.

And it proved effective for more than rice grown in paddies. IFDC started working to expand UDP to rice systems irrigated in different ways, to different countries – India, Afghanistan, Nepal, Guyana, Cambodia, and Vietnam – and to different crops. By 2009, UDP was being used by an estimated 2 million farmers in Asia alone. But Africa, where rice is a fast-growing staple, was also a target; UDP has now been introduced into eight countries in sub-Saharan Africa. And why stop with urea alone? Experiments have now started on developing all-in-one briquettes that include the right amounts of potassium and phosphorus in addition to nitrogen – turning UDP into FDP (fertilizer deep placement).

Along the way the impossible happened: Bangladesh became self-sufficient in rice production. The nation that was once a global symbol for famine is now feeding its own fast-growing population through its own efforts.

To the surprise of her village, she announced after her husband's death that she was going to stay where she was. She was going to live in her house and farm what land remained to her. She was 55 years old, slight, but still strong. Her 16-year-old daughter Sema lived with her, and she was not about to uproot both their lives. She intended to care for her daughter and her land. Usha Rani planted her feet. Then she started planting rice.

Somehow she had to make a living off of little more than an acre of land and a small house. Her neighbors watched as she strode into the fields, a tiny, barefoot figure. The men scoffed. Most of the village believed Usha Rani would fail.

But she did not. Instead, she learned when representatives of IFDC and local farming agents told her village about a new method that would help her grow more rice on her land. It was called urea deep placement (UDP). It took more work at the start – Usha Rani had to individually hand-place each briquette of fertilizer into her field – but the results were amazing. She worked hard, and was soon growing more rice than even the most experienced village farmers. There was enough rice to feed her and Sema, and more left over to sell. She began to make a little money, enough to buy a few needed items for her home, even enough to think about sending Sema to school.

The men in her village watched. Then they, too, started using UDP.

Bangladesh Prime Minister, Sheikh Hasina recognized her achievement with the "Bangabandhu National Agriculture Award."

A SUMMIT IN AFRICA

IFDC's star was rising. Its showcase projects in Albania and Bangladesh, along with good results from a number of smaller contracts, generated further requests for partnerships. Its emphasis on sustainability, soil fertility, privatization, and smallholder success proved a winning combination; so did IFDC's reputation as a reliable partner able to deal successfully with colleagues in many nations, and its proven ability to work effectively with local populations. IFDC did what it said it would do.

As the new century dawned, IFDC took everything it had learned and applied it increasingly in Africa. This was the great challenge: the most food-insecure, population-pressured, poverty-stricken, politically unstable place on earth. IFDC-Africa, under Henk Breman's direction, emphasized an approach it called Integrated Soil Fertility Management (ISFM), in which mineral fertilizers were used as part of a strategy to build Africa's poor soils along with the addition of other organic matter, proper irrigation, and proper livestock and crop choices. The healthier the soil, the better able it was to "unlock" the power of added fertilizers, lowering the amounts needed, and saving farmers money. As Roy put it, "Organic matter is not used as an alternative to fertilizer, but as a soil amendment that leads to a higher response to fertilizer use."

The overarching central problem seemed straightforward: African farmers were not using enough fertilizer. The amounts applied per hectare per year on the continent were a fraction of the global average: about 8 kilograms per hectare compared to more than ten times that amount in Asia. Some observers thought that one of the most important reasons the Green Revolution had succeeded in Asia but sputtered in Africa was fertilizer use.

Eminent Persons Advisory Group for the Africa Fertilizer Summit. From left: Ambassador Ibrahim Ali Hassan, Representative of the President of Egypt to NEPAD; H.E. Joaquim Chissano, Former President of Mozambique; Dr. Rudy Rabbinge, Dean of Agriculture, Wageningen University and IFDC Board of Directors; Dr. Jacques Diouf, Director-General of FAO; Dr. Norman Borlaug, President Sasakawa Africa Association; H.E. Alpha Oumar Konaré, Chairperson of the African Union; Dr. Judith Rodin, President of the Rockefeller Foundation; Dr. Cyril Enweze, Vice President of IFAD; H.E. Olusegun Obasanjo, President of the Federal Republic of Nigeria; Dr. Donald Kaberuka, President of the African Development Bank; Mr. Peter McPherson, Chair of the IFDC Board of Directors; Dr. Abdoulie Janneh, Executive Secretary of the Economic Commission for Africa; Prof. Firmino G. Mucavele, Chief Executive Director, NEPAD Secretariat; and Mr. Luc Maene, Director-General of IFA. Not pictured: Dr. Jeffrey Sachs, Director of the Earth Institute, Columbia University.

But this was not universally accepted. A good deal of work in Africa was being done by groups convinced that the continent could solve its food problems with organic agriculture, eschewing entirely the use of chemical inputs and genetically modified crop strains. Although the scientific evidence was clear that organic methods were incapable of producing yields high enough to feed Africa's mushrooming population, the political and social appeal of the organic approach was undeniable.

Roy and IFDC were convinced that if Africa wanted to lessen the threat of famine and political unrest while at the same time easing pressure on its shrinking wildlife refuges, agricultural productivity had to rise fast. Two decades of real-world experience in Africa had demonstrated to IFDC that the way to do that was through agricultural intensification based on better accessibility and use of inputs, improved roads, credit for farmers, more transparent markets, and the growth of dealer's networks and agricultural associations to get the word out about best practices.

This package was not as easy to talk about in sound bites as organic gardening. It simply worked better.

Roy began pushing on a number of fronts at once. He thought in terms of an "upstream and downstream" approach, with farmers and their fields in the middle. Efforts had to be made upstream to build soil quality and get farmers the inputs they needed in a timely, efficient, and affordable manner. Downstream, crops needed to be stored efficiently, sold at the right time for the best price, then moved quickly to market. Based on this philosophy, Arnoldus (Arno) Maatman, an IFDC economist in Africa, developed the Competitive Agricultural Systems and Enterprises (CASE) initiative incorporating the "upstream and downstream" approach. If the entire system worked, farmers grew bigger crops and profited more, while food production increased and hunger eased. IFDC worked with local governments to weed corruption out of the fertilizer supply chain. It tested a voucher system in Malawi, in which farmers got credits they could use to buy fertilizer if they first put in time working on local road projects. In Burkina Faso, a joint project with the Dutch aimed at reforming the agricultural input market. In West Africa, IFDC worked on a huge effort designed to provide farmers and private entrepreneurs with the accurate, real-time market information they needed for good decision-making. In Ghana a Memorandum of Understanding (MOU) was signed with the government formalizing the goal of increasing ISFM and private market development. Roy found that in Africa it worked well to officially seal a deal with governments agreeing on a set of goals, and he signed MOUs with several other groups. They were useful. The process established IFDC as a partner with a government rather than a contractor, and formalized both its

CASE Components: (1) Agribusiness cluster formation – strengthening of local capacity for innovation and entrepreneurship involving a diversified array of stakeholders. (2) Agricultural value chain development – linking farmers to others in the chain emphasizes integration of all stakeholders and strengthens the agribusiness cluster. (3) Enabling institutional environment – capacity building that involves both public and private stakeholders and fosters improvements in the institutional environment for agribusiness development.

Akin Adesina, Minister of Agriculture, Nigeria (formerly with the Rockefeller Foundation).

commitment and the government's. MOUs put aspirations into words and set hard numbers to goals.

Roy was not thinking about MOUs when he attended the 2005 FAO agriculture ministers' meeting in Johannesburg, South Africa. He was thinking about how FAO was not putting enough stress on mineral fertilizers. The organization seemed to be tilting hard away from anything that seemed chemical in nature, instead focusing on irrigation and water management. It was hard to get them to even recognize that mineral fertilizers played an important role. That, Roy thought, was short-sighted, especially at such a critical moment in Africa's history. He knew an FAO staff member from Europe who was sympathetic with his views, and together they worked to convince FAO head Jacques Diouf to put fertilizer on the group's agenda – specifically, a ministerial resolution calling for improved fertilizer production. A debate over the resolution was opened, views on both sides were aired, and Roy, backed by Dr. Bukar Shaib, a former IFDC Board member and a leading member of the Nigerian delegation to the meeting, reminded everyone that former U.S. President Jimmy Carter had said that "the most limiting factor in creating a 'Green Revolution' in Africa is the poor fertility of African soils." Integrated soil fertility management was discussed. In the end, the resolution passed.

But that turned out to be only the start. Roy was intent on reversing the image of fertilizer in Africa, changing it from being seen as a chemical pollutant to being a replacement for lost soil nutrients, a necessary component of ISFM, an important part of sustainable agriculture. Roy knew that progress would be slowed if IFDC had to fight the same battles over and over. So after Johannesburg he worked "day and night," he remembers, with a like-minded Rockefeller Foundation colleague (agricultural economist Dr. Akinwumi Adesina, now Nigeria's Minister of Agriculture), brainstorming ways to change fertilizer's image across the continent, raise its importance and place it officially on Africa's development agenda. They took their case to the Rockefeller Foundation, seeking funding for a public meeting devoted to fertilizer use in Africa. The Rockefeller people suggested doing a workshop. But Roy and Adesina convinced them that something at a higher level was needed. "If you want to really make a difference," Roy said, "let's go all the way to the top. Why don't we call it a Fertilizer Summit?" The Rockefeller Foundation agreed. Roy and Adesina got their money.

Secretariats were set up for the Africa Fertilizer Summit, managed by IFDC economists Maria Wanzala at NEPAD in South Africa and Oumou Camara at IFDC headquarters.

Now they needed to get someone big on board to head the proposed Summit. If they wanted to make this work, they needed someone who was powerful, well known, and persuasive. It took several weeks of negotiations, but eventually they arranged a meeting with one of the continent's most important leaders, Nigerian President Olusegun Obasanjo. "So here we go into this cabinet room with all the ministers and the President, and we start making a pitch about fertilizers," Roy remembers. "And the President stopped us. He said, 'Don't waste your time. I am a farmer. I know the value of fertilizers. We will have the Summit.'"

IFDC was charged to implement the meeting on behalf of the African Union and NEPAD (The New Partnership for Africa's Development, an integrated program of the African Union, developed by Africans to promote sustainable development across the spectrum of African activities). A date was set: June 2006. A site was set: Abuja, the capital of Nigeria. And through the remainder of 2005 and into the next year, feverish planning took place. This was to be a signature moment for IFDC, a public endorsement at the highest levels of its African strategy for fighting hunger.

Roy used his organization's decades of experience to craft a seamless, effective meeting with a real outcome. Two secretariats were set up – at IFDC headquarters, managed by IFDC economist Oumou Camara, and at NEPAD in South Africa, managed by Maria Wanzala, also an IFDC economist. The Nigerian Government set up a local organizing committee to coordinate all the local arrangements headed by Ms. Ama Pepple, Permanent Secretary of Agriculture and Rural Development in Nigeria. Roy personally managed the technical committee (17 members drawn from nine African nations plus experts from outside of the continent), which began meeting in the fall of 2005 to handle the logistics. This had to be a meeting by Africans, for Africa. NEPAD was prominently involved. To raise the international visibility of the event, an "Eminent Persons Advisory Group" was constituted and it met in New York at the headquarters of the Rockefeller Foundation in March 2006. The distinguished attendees included the President of Nigeria, the head of FAO, the President of the Rockefeller Foundation, and Nobel Peace Prize winner Norman Borlaug. "We have been particularly delighted by the positive reaction of the international press to the Summit and its preparations," an IFDC publication reported after the Eminent Person's meeting was covered by Reuters, BBC, and *The New York Times*. President Obasanjo was an effective spokesperson, telling reporters, "To feed our people, we must feed our soils." But despite that need, "African farmers apply almost no fertilizer," he said, which "locks Africa into a low-level productivity trap." "Fertilizer use must increase," he said, but in "a judicious and environmentally sound manner," with proper attention to efficient use, pollution control, and safe storage and transport.

The five-day Summit, June 9-13, 2006, drew some 1,100 participants from dozens of nations. Attendees included African heads of state, ministers of agriculture, corporate leaders, chairs of international organizations and representatives from agricultural research centers. They all heard in-depth presentations about fertilizer needs and strategies. But Roy made certain that it ended with something more than talk. The group crafted a capstone document, a set of resolutions that put on paper all the aspirations the participants had expressed about fertilizer use in Africa. They called it "*The Abuja Declaration on Fertilizer for an African Green Revolution*." Among the ambitious goals it set were increasing average fertilizer applications sixfold within a decade; lowering the cost of procurement; taking "concrete action" to increase farmers' access to fertilizers; and making larger investments in needed infrastructure. It declared fertilizers "strategic commodities without borders," a step toward eliminating cross-border tariffs and taxes. As a final note of confidence, President Obasanjo committed $10 million to start a fund for regional fertilizer procurement and distribution.

The Summit accomplished everything IFDC had hoped. "Today," Roy says, "fertilizer is at the top of the agenda for Africa."

Abuja Declaration on Fertilizer for an African Green Revolution

The New Partnership for Africa's Development has declared that the vision of economic development in Africa must be based on raising and sustaining higher rates of economic growth (7 percent per year). To realize this vision, the African Heads of State and Government adopted the Comprehensive Africa Agricultural Development Programme, which calls for a 6% annual growth in agricultural production, as a framework for the restoration of agricultural growth, food security and rural development in Africa.

Africa's farmers face a variety of constraints including low productivity, limited access to new agricultural technologies and weak markets. Without adequate inputs, farmers often cannot meet the food needs of their own families, much less those of a rapidly growing population. To feed themselves and their countries, farmers will need to shift from low-yielding, extensive land practices to more intensive, higher-yielding practices, with increased use of improved seeds, fertilizers and irrigation.

A move toward reducing hunger on the continent must begin by addressing its severely depleted soils. Due to decades of soil nutrient mining, Africa's soils have become the poorest in the world. It is estimated that the continent loses the equivalent of over $4 billion worth of soil nutrients per year, severely eroding its ability to feed itself. Yet farmers have neither access to nor can they afford the fertilizers needed to add life to their soils. And no region of the world has been able to expand agricultural growth rates, and thus tackle hunger, without increasing fertilizer use.

In Africa, use of fertilizer averages only eight kilograms per hectare; this is only 10% of the world average. In short, Africa is trapped in a fertilizer crisis. Addressing Africa's fertilizer crisis therefore requires urgent and bold actions. Africa is ready for the Green Revolution. Today, African leaders have convened to show their strong and unanimous commitment to achieving the African Green Revolution by taking immediate actions to solve Africa's fertilizer crisis.

The African Union Ministers of Agriculture convened in Abuja on 12 June 2006 for the Africa Fertilizer Summit:

Recognizing that Africa needs a Green Revolution which is long overdue and yet constitutes the way of getting African farmers out of the poverty trap by achieving food security and other relevant the Millennium Development Goals;

Recognizing that fertilizer is crucial for achieving an African Green Revolution in the face of rapidly rising population and declining soil fertility;

Realizing that most farmers in Africa are poor, have virtually no access to fertilizer and that the poorest of them urgently need special attention;

Recognizing the urgent need for a strategic investment program to increase the availability and use of fertilizer alongside with other inputs to usher in the Green Revolution on the African continent;

Declare fertilizer, from both inorganic and organic sources, a strategic commodity without borders; and

Resolve that the African Union Member States will accelerate the timely access of farmers to fertilizers:

1. Given the strategic importance of fertilizer in achieving the African Green Revolution to end hunger, the African Union Member States resolve to increase the level of use of fertilizer from the current average of 8 kilograms per hectare to an average of at least 50 kilograms per hectare by 2015.
2. By mid-2007, the African Union Member States and the Regional Economic Communities should take appropriate measures to reduce the cost of fertilizer procurement at national and regional levels especially through the harmonization of policies and regulations to ensure duty- and tax-free movement across regions, and the development of capacity for quality control. As an immediate measure, we recommend the elimination of taxes and tariffs on fertilizer and on fertilizer raw materials.
3. By mid-2007, the African Governments must take concrete measures to improve farmers' access to fertilizers, by developing and scaling up input dealers' and community-based networks across rural areas. The Private Sector and Development Partners are hereby requested to support such actions.
4. By 2007, the African Union Member States must take concrete measures to specially address the fertilizer needs of farmers, especially women, and to develop and strengthen the capacity of youth, farmers' associations, civil society organizations, and the private sector.
5. With immediate effect, the African Union Member States must improve farmers' access to fertilizer, by granting, with the support of Africa's Development Partners, targeted subsidies in favor of the fertilizer sector, with special attention to poor farmers.
6. The African Union Member States should take immediate steps to accelerate investment in infrastructure, particularly transport, fiscal incentives, strengthening farmers' organizations, and other measures to improve output market incentives.
7. The African Union Member States should establish national financing facilities for input suppliers to accelerate access to credit at the local and national level, with specific attention to women.
8. The African Union Member States, hereby request the establishment of Regional Fertilizer Procurement and Distribution Facilities with the support of the African Development Bank, the Economic Commission for Africa, the Regional Economic Communities and the Regional Development Banks, through strategic public-private partnerships by the end of 2007.
9. Given the extensive fertilizer raw material resources in Africa and the fact that they are underutilized in many parts of the continent, the African Union Member States undertake to promote national/regional fertilizer production and intra-regional fertilizer trade to capture a bigger market and take advantage of economies of scale through appropriate measures such as tax incentives and infrastructure development. This should be supported by the African Development Bank, the Economic Commission for Africa, the Regional Development Banks, the Regional Economic Communities, other Development Partners, and the Private Sector.
10. The African Union Member States should take specific action to improve farmer access to quality seeds, irrigation facilities, extension services, market information, and soil nutrient testing and mapping to facilitate effective and efficient use of inorganic and organic fertilizers, while paying attention to the environment.
11. The African Development Bank, with the support of the Economic Commission for Africa and the African Union Commission, is called to establish, by 2007, an Africa Fertilizer Development Financing Mechanism that will meet the financing requirements of the various actions agreed upon by the Summit. We, the African Union Member States, undertake to support the establishment of this facility and will pledge resources for its immediate operation.
12. The African Union Member States request the African Union Commission and the New Partnership for Africa's Development to set up a mechanism to monitor and evaluate the implementation of this resolution. This should be done in collaboration with the Economic Commission for Africa and the African Development Bank. The African Union Commission should give progress report to the African Heads of State at every sixth-monthly African Union Summit, starting in January 2007.

13

GROWTH AND CRISIS

The Africa Fertilizer Summit was a signature event for IFDC. Its success established the importance of fertilizer for agricultural growth and drew global attention to the work IFDC had been doing in the continent for decades. Demand quickly grew for the organization's help.

And IFDC was ready. The early years of the new century were a time of change for the organization's public image, as well as a time of growth for its programs. Publications changed, with more color, less stress on technical and administrative news, and more stories about real people benefiting from programs. Links between IFDC's work and larger global issues like climate change were given larger play. The importance of the internet was recognized with a redesigned and restructured IFDC website, and the introduction of IFDC's first online course in 2003.

A farm store operated by the Association of Agribusinessmen of Kyrgyzstan.

The organization's sense of itself was changing, too. For years after its founding, IFDC had sought to become one of the international agricultural research centers (IARCs) within the CGIAR structure. But now it had grown beyond that. As Board Chair Travis York wrote in 2002, IFDC was not like other IARCs; it was more "broad-based, holistic," and "unique in that its activities are not limited to research. Indeed, it has a much broader development mission that enables it to engage in meaningful programs and activities in which IARCs normally are not involved." At the time York wrote, IFDC was overseeing work in eight program areas: institutional development; economic and policy development; fertilizer materials; soil and nutrition dynamics; integrated intensification; input accessibility; policy and market; and human capacity building. It had grown so far beyond fertilizers that even the name IFDC was becoming limiting. For a few years after 2001, the organization tried giving itself a more comprehensive name: "IFDC: An International Center for Soil Fertility and Agricultural Development." This accurately recognized IFDC's changing role, but the disconnect between acronym and title was also somewhat confusing. The name quietly reverted to a simple IFDC before the end of the decade.

Its expanded mission and stature made it possible for IFDC to seek partnerships with a growing list of funding agencies and governments. Income grew enormously between 2000 and 2010. An infusion of funds for the Africa Fertilizer Summit helped boost total annual funding from $18.7 million in 2002 to $40.5 million in 2005. As expected, when the Summit was over, funding dropped – but not much, and never fell back to where it had been earlier. Too many new proposals were in play; too many new partners were eager to tap IFDC's expertise. By the end of the decade, total annual funding topped $50 million, more than quadrupling levels in 2000.

The number of new projects was dizzying. The success of privatization in Albania had led to

M. Peter McPherson

M. Peter McPherson's Midwest roots run deep. Raised on a family farm near Lowell, Michigan, he attended and later served as President of Michigan State University, one of the region's (and the nation's) leading land-grant colleges. Like his mentor, John Hannah, McPherson went to Washington, D.C., where he served three Presidents and earned wide respect across the political spectrum. He first came to the White House as Special Assistant and Deputy Director of the Presidential Personnel Office for Gerald Ford in the mid-1970s, then after working a stint at the Overseas Private Investment Corporation as Chairman of the Board, was Ronald Reagan's head of USAID from 1981 to 1987. When George H.W. Bush came in as President, McPherson served as his Deputy Secretary of the Treasury from 1987 to 1989.

Through his years in government and as a senior banking executive, McPherson retained a lively interest in world food issues. It started during a short period between getting his B.A. in political science at Michigan State and going back for his law degree, when he helped establish a school food program in Peru with the Peace Corps. McPherson's approach is based in a keen understanding of agricultural economics. Growing food, he realizes, is about more than feeding the hungry. It is also about raising living standards and boosting overall economic development. "Whenever a prosperous agriculture sector generates a dollar of income in developing countries, three dollars of rural non-farm income are generated," he said when he first took his position as Chairman of the IFDC Board in 2004.

McPherson and IFDC President Amit Roy have made a good team for a decade, with Roy's wide-ranging approach buttressed by McPherson's deep administrative experience and long list of contacts. IFDC, McPherson says, has evolved from what was "a very good little organization" into "a significant organization – in my view, largely because Amit has been so effective." And Roy says of McPherson, "Peter has been an incredibly effective Board Chair. IFDC would not be where it is today without him."

Dr. Raymond Fort and Feisal Beig discuss fertilizer needs with Afghan farmers.

efforts in more post-Soviet countries in Asia. In Kyrgyzstan, IFDC teams found that 90 percent of what fertilizer there was – and there wasn't much – reached farmers through the black market, often at wildly inflated prices. This was in 2001. Four years later, IFDC had helped reform the country's markets and distribution, increasing sixty-fold the amount of fertilizer available to farmers, and stabilizing the price.

In Afghanistan, IFDC was called in after the war with the U.S. in 2002 and charged with helping to rebuild that nation's farming system. By then Afghanistan had been at war more or less continuously for 23 years. Agriculture was "in desperate straits," Roy said. "Farmers had very little seed, virtually no fertilizer, and no credit was available. The entire agricultural infrastructure was gone." Productivity was only a fraction of what it had once been.

Rather than dumping shiploads of donated fertilizer and seed on the fragile economy, throwing off the ability to build a solid long-term system for distribution, Mirza Feisal Beig, an IFDC marketing specialist, arranged a system in which almost 200,000 farmers could obtain vouchers and exchange them at local shops for the fertilizers they needed for planting. The shop owners redeemed the vouchers for cash. It was a form of targeted, immediate credit that served the farmers' needs while keeping the existing private sector alive. IFDC made sure that the shops got the fertilizers they needed by keeping distribution channels open and flowing. They provided dealer development training. The money generated by the voucher system was used for village improvements, wells, and irrigation systems.

By the middle of the decade, IFDC annual reports were so full of active programs and partners that it had to start running a "cast of characters" – a play list of full organizational names tied to their acronyms – that often topped 100. The number of foreign offices was growing, too. By 2005, IFDC had major regional offices in Africa (Lomé, Togo) and Asia (Dhaka, Bangladesh), smaller offices in eight other African nations, and seven more in Europe and Asia, from Afghanistan and Albania to Belgium and Tajikistan. In 2004, a strong, well-connected, and eminently qualified new Chairman of the Board, M. Peter McPherson (see sidebar on page 97) was elected.

Everything seemed to be coming together in the mid-2000s. The use of urea deep placement (UDP) for rice was expanding. A slew of major new projects in Africa were underway, notable among them CASE, developed to boost the agriculture market by linking Africa's highly diverse farming systems with specialty commodity chains; 1000s+ (From Thousands to Millions), designed to boost agricultural production and economic growth for 1 million farm families in West Africa, in part by using CASE to more efficiently link them to markets; and CATALIST (Catalyze Accelerated Agricultural Intensification for Social and Environmental Stability), a five-year project in the Great Lakes Region of Central Africa. In the meantime, J.J. Robert Groot, another Dutch man, succeeded Henk

Rob Groot, Director, East and Southern Africa Division, visits a tea farm in Rwanda.

Breman, who took on a new assignment within IFDC. Groot expanded IFDC's activities in West Africa, building on Breman's solid foundation.

Much of IFDC's work in Africa continued to be done in partnership with the government of the Netherlands. The Dutch had worked with IFDC for years, often contributing funding through their Directorate-General for International Cooperation (DGIS), and the partnership had continued growing in trust, size, and scope. By 2007, the Dutch were contributing more to IFDC's annual funding than USAID, marking a turning point in IFDC's international budgetary support. "There were many reasons for this blossoming relationship, but at the core was a shared vision," said Roelof (Rudy) Rabbinge, an eminent Dutch scientist and a member of the IFDC Board. The Dutch had long been farmers and traders, building prosperity out of a tiny country with daunting limitations – difficult soils, strong, aggressive neighbors on every side, fields wrested from the sea – through an emphasis on peaceful international relations and trade. As one recent Dutch government summary put it, "The Netherlands wants to move forward *in* the world, and move forward *with* the world. . . . We depend on other nations' development for our own well-being and prosperity. Sustainable, inclusive growth is in our own interests and in the interests of others." Growth came out of a healthy private sector; peace was born from plenty. In agricultural programs, the Dutch encouraged entrepreneurism, market development, and infrastructure improvement.

"The budget of IFDC has grown exponentially through relentless and sustained efforts from Amit. He never gives up and keeps pushing, once he is convinced of the value of a project."

–Luc Maene, IFDC Board Member and head of IFA

Plus, they were among the world's best agriculturalists. Dutch farms were marvels of water management, soil care, and maximal productivity. They knew the importance of fertilizers.

In other words, they thought very much like Roy and IFDC.

CATALIST was a good example of the benefits that could flow from a Dutch-IFDC partnership. The original project grew out of Henk Breman's ideas for using ISFM to intensify agriculture in a test area in Central Africa's Great Lakes region. This was a region of "perpetual crises of poverty, social instability, war and environmental degradation," an IFDC publication noted in 2006. "The situation is rapidly worsening as deforestation intensifies and its soils are starved of nutrients." Near it were threatened wild areas, including some of the last refuges of the mountain gorilla. The Dutch funded the CATALIST project with more than $30 million over five years to help maintain biodiversity, improve environmental management, intensify agricultural productivity, and develop markets for both agricultural inputs and the crops that poor farmers produced in the region. It was a test case of IFDC's holistic approach.

Just as CATALIST was getting underway in late 2008, fertilizer prices started spiking. There were always fluctuations in the market, but this was something different. The prices of urea, diammonium phosphate (DAP) and potash, three very common fertilizers, went through the roof, tripling within a space of months. It was a potential disaster for farmers. Observers linked the increase to other international issues, which included dramatic rises in the prices of energy. Whatever the cause, the sudden price hikes forced smallholder farmers to cut back on fertilizer purchases, disrupted food production chains, spurred increases in the price of food, and ended up triggering food riots in a number of countries. It was reminiscent of the energy crisis in 1974 that had helped give birth to IFDC. Then, too, a spike in oil prices had triggered a rise in fertilizer costs, with urea shooting up within a few months from $59 to $333 per metric ton. Both then and now, the fast-rising prices spurred buying – everybody wanted in before the fertilizer went up or ran out. In both cases, prices sank as suddenly as they had risen. Both occasions seemed to demonstrate, with frightening clarity, the interplay between fuel economics and food economics: When the price of energy goes up, so does the price of fertilizer and food.

That, at least, was the common explanation. In fact, IFDC was discovering that the situation was not quite that simple. When the crisis had eased, IFDC went to work studying the causes in more depth and came up with a more nuanced, and surprising, set of findings. First, the rise in energy prices before the fertilizer and food spikes had been slow and steady, not sudden. Energy costs did have an effect on fertilizer prices – it takes energy in four barrels of oil to make one metric ton of urea – but they also have an even more direct affect on food prices because of the energy required to run farm machinery and food transportation systems. At the same time and just as important, demand for food was going up, too, because of population growth and a surging demand for richer diets in fast-developing nations like China. New biofuel regulations played a role as well; U.S. and European corn and rape seed growers respectively in 2008 started devoting about a third of their crops to biofuel production, cutting into the amounts available for food. The 2008 crisis was also exacerbated by droughts in Australia and floods in parts of Asia. It was classic supply and demand: With less food available for more people, food prices went up. And that, it turns out, helped push up fertilizer prices. Farmers, realizing that they could

From left to right: Hon. Agnes Kalibata, Rwandan Minister of Agriculture and Animal Resources, and Dutch Secretary of State Ben Knapen, during a visit with CATALIST assisted farmers.

get more money for their crops, could buy more fertilizer to increase production. Demand for fertilizers increased. So prices started rising.

But the single most important factor in the fertilizer price spike was not energy costs or food costs, but fear – "a sudden fear," as one IFDC publication put it, that fertilizer production would not be able to meet demand. Panicking in the face of rising prices and surging demand, countries began imposing protective tariffs and quotas. China, the world's biggest nitrogen fertilizer producer, slapped a 165 percent tariff on fertilizer exports. India and Brazil, among others, started buying whatever they could find at any cost. Worried about shortages, countries began hoarding food and fertilizer. The market went crazy. The problem was never tied to a shortage of fertilizer, IFDC discovered, as much as it was to "psychological factors."

Regardless of cause, the effects were disastrous. FAO estimated that the spiraling cost of food and fertilizer added more than 100 million people around the world to the 800 million already suffering from chronic poverty, hunger, and malnutrition. Food riots and demonstrations led to deaths in several nations, and toppled the government in Haiti.

To prevent it from happening again, IFDC made a list of recommendations for governments: Do not panic and "buy at any price"; avoid distorting the market by imposing protective quotas or price controls; support farmers by using a voucher system to allow them to get the fertilizer they need in a targeted and flexible manner; improve access to financing; focus on better nutrient management and the development of indigenous resources; and finally, monitor markets more carefully.

As it turned out, the crisis had an energizing effect on IFDC. Externally, it served as a wake-up call for the world community, raising fertilizer to the level of an international priority issue.

And internally, it helped crystallize Roy's thinking about a major challenge for the future. One way or another, rising energy costs were a threat to food production. As long as fertilizer production (along with the rest of modern agriculture) was heavily dependent on fossil fuels, it would be subject to the ups and downs of the oil market; the vagaries of energy supply and demand would determine in part who went hungry. That was unacceptable. To help avoid new shocks and crises, Roy thought, IFDC should be looking at ways to develop more energy-efficient fertilizer products, ones that could be made with fewer fossil fuels, and applied in lower quantities. This was something of a return to IFDC's original mission of developing new fertilizer formulations. But instead of tailoring research for use in the tropics and subtropics, the new agenda would have an energy focus and a fundamental shift in the way nutrients are delivered to the plants. He started thinking about ways to make that research happen.

In July 2009, the G8 economic summit leaders discussed food and agriculture in a serious way for the first time, and increased the sum its members devoted to fighting world hunger from $15 billion to $20 billion. Other agencies showed a heightened interest in fertilizer as a component of food security strategies. IFDC's position as the world's expert in fertilizer production, development, use, and marketing made it a go-to source for information and program development, and new contracts began coming in, boosting IFDC's annual income from $25 million in 2007 to $36 million in 2008, $44 million in 2009, and $57 million by the end of the decade.

The reasons were simple. First, IFDC's programs worked. When the Dutch State Secretary of Foreign Affairs and a delegation from the Hague made a site visit to Rwanda in 2012, they visited farmers who had participated in the Dutch-IFDC CATALIST project. They found a region in which lives were getting better. Farmers who had adopted ISFM techniques had seen productivity more than double. Maize production in one village had risen fivefold. Potato yields were nearing the levels of the best farms in the world. Incomes were rising for a quarter-million farmers in the Great Lakes region, making it possible for them to build better houses, bring in electricity, pay for health insurance, enlarge their farms, and pay for their children's education. The first five-year CATALIST program met its stated purpose – "to improve the livelihoods of smallholder farmers and others in the agricultural value chain and to promote regional trade and business linkages"– so well that it was extended for another five years. Soon, IFDC began launching so many new projects involving multiple nations that two regional divisions in Africa were created to manage the organization's meteoric growth.

And second, as IFDC Board member and former head of IFA Luc Maene put it, "The budget of IFDC has grown exponentially through relentless and sustained efforts from Amit. He never gives up and keeps pushing, once he is convinced of the value of a project."

14

VFRC

IFDC was growing fast. In 2009, Roy reorganized the offices in Asia and Africa. The number of new programs in Africa required splitting the original Africa Division into two pieces: One for countries in the North and West of the continent (centered in Lomé, Togo), and a second centered in Nairobi, Kenya, overseeing activities in the South and East of Africa. IFDC's Asia Division became the Eurasia Division, under the general direction of long-time IFDC veteran John Allgood and the day-to-day management of an extraordinarily energetic and committed young woman, Ishrat Jahan. New personnel were being added, management refined, and organizational systems updated. Roy in 2009, working with the IFDC Board of Directors, began implementing a new five-year strategy, with a focus on "achieving sustainable food production and reducing environmental impact while still fulfilling its original mandate of creating more effective fertilizers." The five-year plan emphasized new initiatives for African productivity, nitrogen efficiency, and phosphate efficiency.

After a decade of success, Roy was thinking not only about the near-term but the long-term future – how to feed the expanding world population that the experts now were predicting would reach nearly 10 billion by 2050. He was guided by some thoughts from one of his heroes, Norman Borlaug. Roy received a letter from Borlaug a year before the Nobel laureate passed away in 2009 that said in part: "The work of the Green Revolution is not yet finished and I believe it will take a new round of technological advancement, political commitment, commercial development and a lot of hard work to complete the job. We need to develop new products that will deliver just the nutrients that the

VFRC BoA members Professor Ruth Oniang'o, Ajay Vashee and Assétou Kanouté.

growing plants require and to diminish environmental externalities. We need to invest in this sort of advanced fertilizer research and we need to coordinate it with advanced plant genetic research so that we can achieve synergy between more efficient use of available nutrients by plants and more efficient delivery of nutrients by fertilizer products."

It echoed Roy's own views, and called IFDC back to its roots: The search for new fertilizers. All of the many parts of the agricultural value chain were important and IFDC worked at all those points, but the central issue remained the same: Humanity needed to dramatically boost agricultural productivity on every acre of farmland. This could not be done without mineral fertilizers, which provided the nutrients that accounted for about half of all increased food productivity. But the current roster of common fertilizers – most of them developed at TVA during the previous century – was no longer doing the job. As Borlaug put it, "Farmers are paying way too much for fertilizer products because we are transporting millions of tons of material that is not nutrient and because much of the nutrients in applied fertilizers are never used by the crop. Nutrient losses to the environment are high, with consequences for global warming and water pollution." The answer, Borlaug and Roy both thought, would be

the development of a new generation of "smart" fertilizers, substances designed to release nutrients only at the time and in the amounts needed by the crop.

In 2009, Roy announced that IFDC was going to launch a global research initiative focused on creating these next-generation fertilizers. "New and improved fertilizers are critical to help feed the world's growing population and ultimately provide food security, while protecting the environment and ensuring the sustainable use of the earth's non-renewable resources," IFDC's 2009 Annual Report stated. At this time it was also becoming evident that it is not merely enough to produce more food but they should be nutritious. Fertilizer has a role as a possible carrier of micronutrients that are vital for human growth and development.

It was a noble goal, but difficult to implement. IFDC had not been doing much in the way of new formulations for years, and TVA was out of the fertilizer business entirely. The fertilizer industry spent relatively little on research and development. There were small, specialized fertilizer research projects scattered here and there around the world, some in universities, some at government labs, some at small private firms. But there was no centralized effort to organize their efforts or track their progress. Despite the importance of the issue, there was little chance of getting the funds needed to start a potentially expensive, bricks-and-mortar, full-blown, next-generation fertilizer research center.

So Roy came up with another solution. He proposed creating a global network of experts in the field tied together by new communications technologies. It would be relatively cheap but potentially powerful, a think tank in cyberspace – a Virtual Fertilizer Research Center (VFRC). Roy built enthusiasm for the idea, and just as USAID saw the need for an organization like IFDC in 1974, it recognized the value of initiating the VFRC to facilitate the next generation of fertilizer products. "The field is frankly begging for innovation," said USAID Administrator Rajiv Shah. "The Facility [VFRC] will coordinate long-term research projects to unlock new products, and reward companies that commit to introducing new fertilizers to developing countries. That's the kind of innovation that can change the world's crop-yield trajectory while cutting our own reliance on foreign oil and protecting our climate."

Roy gathered a board of advisers from around the world. And the effort was officially launched in 2011. High on the list of goals was the development of easy-to-use "intelligent" N and P fertilizers with reduced environmental impact, improved efficiency and yield, and lessened risk of crop failure in adverse conditions.

Advisors discuss VFRC research during a VFRC Board of Advisors Meeting.

But VFRC was designed to do more than create gee-whiz products. It was also an attempt to meet one of food production's most intractable challenges: the issue of traditional smallholder farmers. Half the world's population lived on smallholder farms, working hard but making less than $2 per day. They were technologically and economically poor, bystanders in a fast-changing agricultural landscape where food production increasingly depended on computerized commodities trades, complex import-export markets, and freighter-loads of inputs.

IFDC had always appreciated the realities faced by smallholder farmers and geared its programs appropriately. The organization's focus had long been on moving smallholder farmers from subsistence farming to income-generating farming, a process that required careful provision of what IFDC called "prosperity enablers" like access to credit, markets, skills, and inputs. These had to be made available in ways that made sense for the local culture, that recognized the realities of the area's geography, economy, traditions, and government. And they had to be provided over a sustained period of time. In the end, lifting smallholder farmers would create more food while fighting poverty and preserving local communities. If all this could be done sustainably, ensuring good soil health and low pollution, IFDC would be meeting its mission.

The success of Urea Deep Placement (UDP) pointed the way. Here was proof that even a small advance in fertilizer technology – pressing prilled urea into briquettes – could lead to massive benefits, lowering input costs for farmers, cutting pollution, boosting yields, and raising farmers' profits. Next-generation smart fertilizers would expand that success. IFDC was already looking at putting different types of nutrient mixes into supergranule form; other likely areas for research included the development of controlled release fertilizers (a harkening back to TVA's work with sulfur coatings); finding ways to optimally balance the interactions of fertilizer, soil, water,

and crop; and building into fertilizers the micronutrients needed for plant and human health. On the production side, there was a need for improved mining and production techniques. There was work to be done on waste and runoff recovery to decrease pollution; improvements in the application of fertilizers; better ways to mine and process phosphates; the development of more targeted fertilizers matched to the needs of specific areas; integration with commercial production; finding ways to make fertilizers less dependent on fossil fuels; perhaps even revolutionizing the old Haber-Bosch system, still the source of most of the world's nitrogen fertilizer and burner of almost 5 percent of the world's natural gas. The possibilities were rich.

Advancement on any one of these fronts would help smallholder farmers by reducing their risk of crop failure in bad years and ensuring higher productivity in all years. This was especially important as the effects of climate change became clearer. More extreme weather meant dealing with more droughts, hurricanes, and torrential rains. Rising sea levels threatened increased flooding and soil salinity for lowland farmers. Better fertilizers were needed to better handle these changing conditions, as well as matching the needs of new drought-resistant and salt-resistant crop varieties. Smallholder farmers, IFDC knew from experience, were averse to risk. This sometimes slowed the adoption of new techniques. On the other hand, it made more attractive any next-generation fertilizers that promised to reduce the risk of crop failure.

VFRC was a grand vision. It took time to set up – there were a host of concerns over intellectual property rights, management, oversight, commercial applications – but Roy pushed it through. He succeeded in attracting an expert board of advisers that spanned government, academia, the nonprofit world, and the private sector, including representatives from the Gates Foundation, the World Bank, USAID, the director of the International Fertilizer Industry Association, the chancellor of the University of Tennessee, and the head of the Fertiliser Association of India, a medical doctor, a nutrition specialist from Africa and representatives of farmer's organizations.

As IFDC nears its 40th anniversary, it has never been healthier. With VFRC in place, a new world of possibilities is opening up. So much now seems within reach: The ability to bring smallholder farmers out of poverty and make them into powerful allies in the global fight against hunger; the chance to dramatically cut pollution while boosting productivity; the development of ways to make and use fertilizers that are cheaper, cleaner, and more widely available. The chance to feed the world. All it requires is imagination, commitment, and hard work. Why not capture the methane accumulating in an African lake and use it to make fertilizer? IFDC is studying the possibility. Hand-held analyzers that will allow farmers to assess the chemical quality of fertilizers before they buy them? IFDC is designing them. A system where fertilizers are precisely matched to the needs of the local soil and crop, released at just the right time in the right amounts, boosting productivity to maximum levels with minimum waste? Fertilizers that help grow super foods fortified with the nutrients humans need? These, too, are under study.

The challenges are still daunting. Food production is keeping pace with humanity's explosive population growth, even in Africa – but only barely. Agricultural productivity needs to keep increasing fast if we want to cut more significantly into the number of malnourished people on earth. But over its first 40 years, IFDC has seen enormous progress. When the organization was born in the mid-1970s, the world hot spots for food shortages were places like India, China, and some South American nations. Now all these areas have graduated, moved from requiring direct development assistance into becoming trading partners, their economies more stable, their people better fed. The focus has moved to Africa and other areas of South Asia. And here, too, progress has been steady, and in some cases extraordinary. The keys to a food-secure world are here. The work yet to be done is enormous. But, thanks in great part to IFDC's ongoing efforts, there are proven programs that work. There are paths to a sustainable future. There is a growing sense of hope.

We can feed the world.

ACKNOWLEDGMENTS

Feeding a Hungry World was inspired by my friend, Dr. Amit Roy. He knew documenting the history – and the evolution – of the International Fertilizer Development Center will help guide future generations of agricultural scientists, humanitarian workers and policymakers to continue their important work. As Amit often says, the need for a nutrition-secure world has not changed since IFDC's inception in 1974, but solutions have evolved over time.

Traveling with IFDC staff through Vietnam and Bangladesh I witnessed the organization's operations first-hand, seeing important advances emerge from IFDC's ability to integrate cutting-edge ideas with local realities. The result: practical, cost-effective ways to feed the world. Food and nutrition security is more than just crop production. It's about the entire agricultural value chain, from communicating market information to building better roads and storage facilities. It's everything from training and government policy to infrastructure and supply systems. IFDC is working on every front to ensure this system works effectively.

Many thanks go to Amit for sharing his account of IFDC's history and his knowledge of agricultural development. Our countless conversations make up the core of the book. Debra Rutland spent endless hours gathering historical records, correspondence and background material. Debra began working at IFDC in 1975 as administrative assistant to Don McCune; her memories of the organization's early years were critical to making the book a reality. And to John Allgood, Edwina Clayton, Ian Gregory, Bobbie Kelly, Vince McAlister, Peter McPherson, Taylor Pursell and John Shields – thank you for discussing your recollections of IFDC. The members of IFDC Communications also were an invaluable help, from compiling historical documents and research material to editorial support, photography selection and design.

There are several IFDC employees, past and present, who – though not mentioned in this book – played a critical role in shaping the institution. From the beginning, Debra Rutland has been a constant support to IFDC leadership. Owen Livingston designed the institution's early technology. Donna Venable has ensured the accuracy of IFDC's facts and figures, not only in this book, but publications throughout the years. And IFDC's integrity remains intact due to precise and transparent financial management led by Debbie Shedd and Kaye Barker.

Finally, a heartfelt thank you to all IFDC staff. Your work is strengthening food and nutrition security around the world.

Thomas Hager
Eugene, Oregon
July 2014

The IFDC Historical Timeline

1974

IFDC is created. In 1974, at least 500 million people experienced extreme hunger In April 1974, U.S. Secretary of State Henry Kissinger proposed to the United Nations General Assembly an international effort to improve agricultural production for developing countries through access to and the proper use of improved fertilizer technologies. A few months later, IFDC was created to do just that.

Dr. Donald McCune (1925-2011) is appointed as the organization's first managing director. McCune, then Director of International Development at TVA, along with Dr. John Hannah, the first chairman of the IFDC board of directors, planned and organized the establishment of IFDC in November 1974. During his tenure at IFDC (1974-1990), McCune guided the Center as it grew from a research and extension organization to an agricultural market development center.

1975

IFDC provides its first technical assistance to Latin America. In 1975, IFDC scientists provided assistance in developing a preliminary strategy for the expansion of a fertilizer manufacturing facility in Baranquilla, Colombia. The IFDC scientists gave production facility operators recommendations on improving operating efficiency, which led to an increase in the facility's output that was much nearer to its design capacity.

IFDC posts staff at IRRI to undertake nitrogen efficiency research in Asia. In combination with research to identify losses of applied urea in rice, IFDC outposts staff at the International Rice Research Institute (IRRI), at Los Banos, The Philippines a CGIAR center, to evaluate improved products and management practices developed by IFDC.

Study of the effectiveness of phosphate rock in Latin America. IFDC posts staff at CIAT. IFDC outposts 5 staff at the International Center for Tropical Agriculture (CIAT), a CGIAR center, to evaluate the effectiveness of direct application of indigenous phosphate rock as part of IFDC Headquarters research to identify and characterize phosphate rocks from developing countries.

1976

IFDC's first intervention in Africa takes place in Ghana. Don Waggoner, a chemical engineer and later director of IFDC's Outreach Division, trained the Ghana Fertilizer Company and helped it prepare for and receive the first shipment of bulk fertilizer at the Port of Tema, near Accra. The shipment demonstrated the technical and economic benefits of shipping fertilizer to that port.

IFDC initiates six country sector assessments in West Africa. IFDC undertakes an indepth assessment of the fertilizer sector in Chad, Mali, Mauritania, Niger, Senegal, and Burkina Faso (formerly Upper Volta).

1977

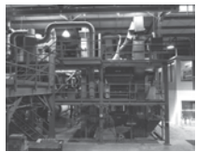
U.S. President Jimmy Carter designates IFDC a PIO. As a public international organization, IFDC became truly international in composition, financing and operation. The designation allows IFDC to receive widespread support, cooperation and backing from the world community it was created to serve. As a PIO, IFDC is entitled to the privileges, exemptions and immunities conferred by the International Organizations Immunities Act.

1980

Technical Assistance to CEFER. As a part of researching with indigenous fertilizer raw materials, IFDC helps Brazil to set up Centro de Estudos de Fertilizantes (CEFER) in SAO Paulo. IFDC engineers also help Brazilian fertilizer companies to transition from imported to indigenous raw materials.

1981

IFDC designs and helps in the construction and startup of a plant in Malaysia. IFDC undertakes extensive tests in its pilot plant to develop a process to produce specialized fertilizer for oil palm in Malaysia.



1986

IFDC evaluates UDP in Bangladesh. Urea deep placement was under development by IFDC for several years prior to its official dissemination into the Bangladeshi agricultural system. Use of UDP reduces the amount of urea fertilizer used per crop by 33 percent and increases crop yields by 15-18 percent. Today, more than 1.5 million Bangladeshi farmers are using UDP, and the technology is quickly spreading across sub-Saharan Africa.

1987

IFDC establishes permanent office in Africa. IFDC's Africa operations had grown significantly since its first mission in 1976. Therefore, IFDC established a permanent office in the West African nation of Togo. Dr. Paul L.G. Vlek, former director of the IFDC Agro-Economics Division, was appointed the first director of IFDC-Africa. From this office, IFDC continued to expand its range of activities tailored to serve the special needs of African agricultural development.

1990

Dr. David B. Parbery (1931-1992) is appointed as the second managing director of IFDC. On February 1, 1990, Dr. David B. Parbery began his tenure as IFDC's second Managing Director. Eight months later, Dr. Parbery' steps down due to health reasons. Parbery's 37-year career spanned work as a research scientist to senior position at the World Bank.

Dr. Paul Stangel (1929-2012) is appointed IFDC's first president and CEO. A founding member of the team that created IFDC, Stangel previously served as director of the Outreach Division and then as the deputy managing director of programs. He remained president and CEO until his retirement in 1992. Stangel had previously served as acting director of TVA's international staff and as an assistant professor at the University of Wisconson, among other positions.

1991

IFDC helps to build Albania's agriculture. The People's Socialist Republic of Albania's near dissolution in late 1991 led to the election of the national Democratic Party the following year. With no experience in building a free market economy, Albanians were stuggling. In response, IFDC, tasked by USAID, first evaluated the fertilizer market situation, then helped to build Albania's agriculture sector to stabilize the nation's economy and grow its gross domestic product (GDP).

1992

IFDC establishes its Asia Division with a permanent office in Dhaka, Bangladesh. Following nearly 15 years of successful activities in the country, IFDC established its Asia Division in Dhaka, Bangladesh. The new division allowed IFDC not only to serve Bangladesh more efficiently but to operate in other parts of Asia and Eurasia more effectively.

Dr. Amit H. Roy is appointed as second president and CEO of IFDC. Following the retirement of Dr. Paul Stangel, Dr. Amit Roy was appointed as the second president and CEO of IFDC. Roy joined IFDC in 1978 as a chemical and special projects engineer. Among other efforts, he contributed to IFDC's phosphate research and was instrumental in organizing the Africa Fertilizer Summit in Abuja, Nigeria, in June 2006.

1994

Nobel Laureate Dr. Norman Borlaug is appointed to the IFDC Board of Directors. Often credited with saving over 1 billion people worldwide from starvation, Dr. Norman Borlaug (1914-2009) spent most of his life leading the introduction of high-yielding wheat varieties to impoverished nations in order to relieve hunger and stave off famine. Borlaug served on the IFDC Board of Directors from 1994 to 2003.

1996

ISFM introduced in West Africa. After nearly six years of technology deployment in other regions of the world, Integrated Soil Fertility Management was introduced in West Africa through the 'Combating Soil Fertility Decline to Implement Smallholder Agricultural Intensification in Sub-Saharan Africa' project. The two-phase project ultimately benefited over 2,500 smallholder farm families, with crop productivity and profits two to six times higher than the averages in these regions.

IFDC helps Venezuela privatize its fertilizer sector. IFDC created a multi-level improvement plan increase plant efficiency and a marketing plan to professionalize and privatize the nation's distribution system. Through 1999 IFDC aided Petroquimica de Venezuela S.A.'s overhaul of its facilities, increasing production and efficiency through extensive training of its staff. Fertilizer production capacity increased by at least 30 percent, producing a savings of about $1,000/day.

1999

IFDC celebrates its 25th anniversary. Summarizing IFDC's impact over its first 25 years, Dr. Nyle Brady, Emeritus Professor at Cornell University and former director general of IRRI noted, "IFDC... has helped farmers and their national and international compatriots gain a better understanding of the critical role of plant nutrients in helping the world feed itself… the international accomplishments of this Center have clearly shown that this is an institution with a global mandate and with a truly global impact."

2000

IFDC provides emergency relief in Kosovo. IFDC's success in Albania proved the credibility of the Center's holistic approach to market building. Therefore, USAID granted IFDC emergency funds to assess and aid in the import and distribution of agro-inputs for Kosovo's upcoming 2000 cropping season. IFDC also organized a private-sector distribution and dealer network.

IFDC recognized by the Farm Chemicals International as one of the institutions that helped the world. In the Special Millennium Issue of Farm Chemicals International, IFDC was recognized as "one of the top ten organizations that shaped the world during the past century." The special issue noted that IFDC had become "a global center of excellence, with expertise in fertilizers to service the needs of developing countries."

2002

Afghanistan Intervention. After the cessation of hostilities, IFDC assists returning refugees from neighboring countries to plant wheat through a voucher program that allowed them to get fertilizer and seeds from private dealers who get paid from IFDC against the redeemed vouchers.

2004

IFDC introduces the CASE solution to market development. The Competitive Agricultural Systems and Enterprises (CASE) solution, developed over a few years prior to its official launch, strengthens capacities at every level of the value chain. By mid-2005, more than 100,000 farmers in West Africa had adopted the CASE approach, increasing their incomes by 20-50 percent.

2005

MARKETS project begins in Nigeria. The five-year MARKETS project sought to transform Nigerian agriculture in selected areas from subsistence farming to commercially competitive agriculture by targeting consumer demand for locally produced food commodities and by creating specific produce markets. The USAID-funded project focused on expanding economic opportunities by increasing agricultural productivity, enhancing value-added processing and increasing commercialization.

2006

IFDC organizes the Africa Fertilizer Summit. The Summit was one of the largest meetings in history to focus on Africa's agricultural issues. Heads of state and governments called for the elimination of all taxes and tariffs on fertilizer in the historic Abuja Declaration on Fertilizer for an African Green Revolution . The Summit was attended by 1,100 participants.

CATALIST Project starts. IFDC initiates a project in the Great Lakes area of Africa (Rwanda, Burundi and the Democratic Republic of Congo) to improve crop production through ISFM and development of markets.

2008

IFDC helps rebuild Bangladesh's agriculture sector after Cyclone Sidr. In late 2007, Cyclone Sidr ravaged Bangladesh, killing thousands and destroying almost 660,000 hectares of crops in the nation's southwestern region. In Sidr's wake, IFDC and the Bangladesh Department of Agricultural Extension initiated the Improved Livelihood for Sidr-Affected Rice Farmers (ILSAFARM) project to help restore rice production by bringing fertilizer deep placement to 280,000 farm families.

2009

IFDC establishes the East and Southern Africa Division in Kenya. To manage its expanding project portfolio in Africa, IFDC creates two regional divisions: the North and West Africa Division and the East and Southern Africa Division.

More than 1 million trained in a single year. In 2009, IFDC field training programs reached 1,012,186 participants. While women often do not have the opportunity for training in agricultural technologies, the number of women enrolled in IFDC training programs more than tripled in 2009 – increasing from 92,843 in 2008 to 325,450, or 32 percent of the total number trained.

2010

IFDC creates the Virtual Fertilizer Research Center. The Virtual Fertilizer Research Center (VFRC), a research initiative of IFDC, aims to transform fertilizer research so that development of novel fertilizers can be fast-tracked from the lab to the field. The initiative seeks and supports novel research in fertilizer science through a virtual network and aims to develop new, efficient and environmentally sustainable fertilizers.

IFDC releases *World Phosphate Rock Reserves and Resources*. World Phosphate Rock Reserves and Resources estimated the world's supply of phosphate rock at 60 billion metric tons. By this estimate, phosphate-based products will be available for several hundred years, overshadowing (by 44 billion tons) previous estimates of the U.S. Geological Survey, which subsequently revised its to more closely reflect those stated in the report.

Start of AAPI project. IFDC launches the Accelerating Agriculture Productivity Improvement project to upscale UDP in rice production covering about 20% of rice growing area in Bangladesh.

2011

Professionalizing South Sudan's agricultural market. In light of a looming food crisis in the newly created country, IFDC and AGRA began implementing the USAID Seeds for Development (S4D) project, which harnessed the entrepreneurial spirit of agro-dealers, seed companies, farmers, food processors and bankers to commercialize and transform agriculture in the new nation from subsistence farming to a market-oriented, competitive and profitable system.

2012

2SCALE project starts. IFDC launches an ambitious public-private partnership project cover eight countries in Africa to connect farmers to national, regional and/or international agribusinesses to create a sustainable demand for crops.

WAFP project starts. IFDC launches the West Africa Fertilizer Program (WAFP) to improve marketing of the inputs, particularly fertilizer markets in Ghana, Liberia, Mali and Senegal.

2013

U.S. President Barack Obama reviews FDP. During a USAID Feed the Future agriculture fair in Senegal, U.S. President Barack Obama reviewes various agricultural technologies, including FDP. "I know that…fertilizer doesn't always make for sexy copy," remarked Obama, standing in front of IFDC's FDP-themed booth. He insisted that while technical details of nourishing the hungry do not make headlines, these things are helping small farmers rise out of poverty.

Improving vegetable production. IFDC launches a project to improve vegetable production using fertilizer deep placement technology in plots managed by women.

Helping farmers access fertilizers. IFDC assists Nigeria to implement targeted fertilizer subsidy to more than 8 million smallholder farmers using mobile telephone system.

2014

Fertilizer Sector Improvement project begins in Myanmar. With funding from USAID, IFDC and a consortium of partners are helping 80,000 targeted farmers in Myanmar successfully use fertilizer deep placement and other modern farming techniques. A key component of the project is strengthening the country's fertilizer supply chain.

IFDC's Presence
(1974-2014)

SOURCES CONSULTED

Initial history of Muscle Shoals, Alabama and the Tennessee Valley Authority was gathered from Lewis B. Nelson's History of the U.S. Fertilizer Industry and articles from The Florence Times as well as local histories kindly provided by the Florence-Lauderdale Public Library. Manuscripts of speeches and conversations from Secretary of State Henry Kissinger were acquired from the archives of the Office of the Historian at the U.S. Department of State.

The IFDC library and archives proved particularly useful in piecing together the story of IFDC. Unpublished historical reminiscences written by T.P. Hignett, John Malcolm and others gave a beneficial behind-the-scenes look at early IFDC years. Quarterly and annual reports from 1974 to the present, along with manuscripts of speeches, reports, personal conversations with current and previous staff and various other documents compiled by James Thigpen from the IFDC archives added greatly to the stories told in this book.

INDEX

Adesina, Akinwumi, 91, 92

Afghanistan, 85, 98

Africa Division, 62, 84, 99, 104

Africa Fertilizer Summit, 88-95, 96, 97

agriculture

- development, 55, 68, 76, 82, 97, 102, 105
- tropical and subtropical, 19, 21, 45

Agro-Based Industries and Technology Development Project (ATDP), 82

Albania, 68-75, 88, 97

Albanian Fertilizer and Agribusiness Dealers Association (AFADA), 72-75

Allgood, John, 29, 84, 104

Anniversary

- 10th, 46
- 25th, 77

Asia Division, 84, 99

Bangladesh, 37-40, 64, 80-87, 88

Becker, John, 69

Beig, Mirza Feisal, 98

Bernstein, Joel, 19, 23

Blane, Dianne, 73

Borlaug, Norman, 60-61, 89, 93, 104

Brady, Nyle, 77

Brashier, Marjorie Engel, 17, 54, 55

Breman, Hendrik (Henk), 63-65, 88, 99

Camara, Oumou, 92, 93

Carter, Jimmy, 33, 61, 91

Catalyze Accelerated Agricultural Intensification for Social and Environmental Stability (CATALIST), 99-103

Clayton, Edwina, 42, 71

Clayton, Edward (Ted), 68, 69

climate change, 58, 63, 96, 108

Clinton, Bill, 55

Competitive Agricultural Systems and Enterprises (CASE), 90, 99
Consultative Group on International Agricultural Research (CGIAR), 20-21, 24, 26-28, 31-34

Diamond, Ray, 69, 72, 73
Diouf, Jacques, 89, 91
Directorate-General for International Cooperation (DGIS), 100

economy, 7, 59, 72, 98, 107
Edison, Thomas Alva, 11, 12
environment, 49, 58, 63, 78, 104-106
Eurasia Division, 104

farmers, 18, 29, 58, 76, 80, 90, 98
fertilizer
    inorganic, 21, 39, 58, 63, 73, 105
    organic, 39, 63
    prices, 18, 20, 81, 101
    production, 12, 16, 25, 45, 91, 102
    research, 16, 19, 39, 44, 55, 105
    supply, 20, 23, 49, 59, 90
    tropics and subtropics, 19, 30, 32, 49, 103
    use, 15, 17, 29, 32, 62, 81, 88, 93
Flippo, Ronnie, 33
food
    production, 29, 61, 90, 104, 107, 109
    security, 23, 64, 85, 102, 106, 109
Food and Agriculture Organization (FAO), 16, 17, 20, 31, 53, 91, 102
Ford, Gerald, 21
Ford, Henry, 11-13

Gates Foundation, 108
General Accounting Office (GAO), 31-34
Green Revolution, 17, 60, 61, 89, 91, 104
Gregory, Ian, 69, 70
Groot, Rob, 99, 100

Hannah, John – IFDC Board Chairman (1974-1990), 21-25, 28, 52, 55, 59
Heflin, Howell, 57
Hignett, Travis, 14-16, 26, 27, 52, 55
Hopper, David – IFDC Board Chairman (1990-1996), 59
hunger
    alleviating, 8, 16, 23, 25, 61, 103, 108
    assessment of, 8, 18, 78, 102

IFDC Mission, 8, 21, 29, 54, 96-97, 103
Integrated Soil Fertility Management (ISFM), 88-91, 100
Inter-American Development Bank (IADB), 32
International Development Research Centre (IDRC), 28, 31, 32
International Fertilizer Industry Association (IFA), 60
International Fund for Agricultural Development (IFAD), 31, 47
International Plant Nutrition Institute (IPNI), 20
International Rice Research Institute (IRRI), 77

Jahan, Ishrat, 84, 104

Kelly, Bobbie, 71
Kelly, Jim, 70, 72
Kenya, 104
Kissinger, Henry, 6-8, 18-25
Kosovo, 76
Kyrgyzstan, 96, 98

Latin America, 36, 45
Livingston, Owen, 17

Maatman, Arnoldus (Arno), 90
Maene, Luc, 60, 89, 100, 103
Malawi, 90
Malcolm, John, 24, 28, 54
McAlister, Vince, 56-57, 60
McCune, Don – IFDC Managing Director (1974-1990), 15, 17, 20, 23, 26-34, 44-48, 52

McCune, Jean, 42
McPherson, Peter – IFDC Board Chairman (2004-Present), 47, 55, 89, 97, 99, 105
Mokwunye, Uzo, 62, 63
Myers, Gary, 60, 61

New Partnership for Africa's Development (NEPAD), 92, 93
nitrogen fertilizer, 14, 20, 40, 102, 108
Nixon, Richard, 7
Nooter, Rob, 34
Norris, George, 13, 14

Obasanjo, Olusegun, 89, 92, 93
Organization of Petroleum Exporting Countries (OPEC), 7, 19, 22

Parbery, David – IFDC Managing Director (1990), 52-53, 62
Parker, Frank, 16
Pendergrass, Webster, 24
Pepple, Ama, 93
phosphate fertilizer, 14, 20, 47, 48, 101, 108
phosphate rock, 26, 31, 41, 46
Pilot Plant, 31, 36, 41, 47
pollution, 38, 49, 83, 84, 107, 108
poverty, 15, 60, 100, 102, 107, 108
privatization, 64, 80-83, 88, 97
Public International Organization (PIO), 33

Rabbinge, Roelof (Rudy), 89, 100
Reagan, Ronald, 47
Rockefeller Foundation, 26, 92, 93
Roosevelt, Franklin Delano, 13, 14
Roy, Amit – IFDC President & CEO (1992-Present), 41, 48, 53, 54, 89, 93, 104-108

Seeber, Lynn, 24, 28
Shaib, Bukar, 60, 91
Shelby, Richard, 57
Shields, John, 17, 28, 29
soil
    conservation, 14, 49, 100
    fertility, 80, 88, 91
    health, 58, 63, 108
    needs, 30, 41, 64, 93, 109
Stangel, Paul – IFDC President & CEO (1990-1992), 17, 53-55
sulfur, 38, 44, 108
sustainability, 49, 53, 58, 63-64, 88

Technical Advisory Committee (TAC), 21
Tennessee Valley Authority (TVA), 14-18, 20, 32
Ten-year plan, 48, 52, 53, 55
The Fertilizer Institute (TFI), 60
training, 31, 47-49, 64, 72, 77, 85

United Nations (UN),
    General Assembly (Fall 1973), 7
    Special Assembly (April 1974), 18
    UNDP, 47
    UNIDO, 31, 32
    World Food Conference (November 1974), 8
United States Agency for International Development (USAID), 16-17, 19-21, 58, 64, 80
urea briquettes, 46, 82-85, 107
urea deep placement (UDP), 80-87, 99, 107
urea fertilizer, 38, 46, 83, 108

Virtual Fertilizer Research Center (VFRC), 104-109
Vlek, Paul, 39, 62

Wanzala, Maria, 92, 93
World Bank, 26, 32, 52

York, E. Travis – IFDC Board Chairman (1997-2004), 60, 78, 97

About *Feeding a Hungry World*

Feeding a Hungry World chronicles the history and accomplishments of the International Fertilizer Development Center's (IFDC) first 40 years. Through first-hand accounts and IFDC archives, author Thomas Hager (The Alchemy of Air) sows the story of the Center's long-time dedication to increasing agricultural productivity. Behind-closed-doors conversations about U.S. Secretary of State Henry Kissinger's "fertilizer idea" and hand-written documents by IFDC's first managing director, along with historical photos from the Center's archives, illuminate a rich and enjoyable historical account of IFDC's dedication to feeding a hungry world.

About Thomas Hager

Author Thomas Hager has written six books describing the impact of research and technology on our society. His two most recent are "The Alchemy of Air: A Jewish Genius, a Doomed Tycoon, and the Discovery that Fed the World but Fueled the Rise of Hitler," critically acclaimed finalist for the National Academies Communications Award, Borders "Original Voices" selection, and one of Kirkus Reviews' Best Books of the year; and "The Demon Under the Microscope: From Battlefield Hospitals to Nazi Labs, One Doctor's Heroic Search for the World's First Miracle Drug," called "fascinating" (Los Angeles Times) and "a grand story" (Wall St. Journal).

About the International Fertilizer Development Center

IFDC is a public international organization addressing critical issues such as international food security, the alleviation of global hunger and poverty, environmental protection and the promotion of economic development and self-sufficiency. IFDC focuses on increasing productivity across the agricultural value chain in developing countries.

IFDC