IFDC

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an update on the work & progress at the International Fertilizer Development Center

Mali—

Phosphate Project Yields Good Results

In southern Mali, near the Molabala sector, lives a farmer named Kadda Dembele. On his small farm he raises maize, cotton, and sorghum. Even though he is a small farmer, Dembele likes to learn of new technologies and is eager to try them on his farm.

Several years ago this Malian farmer participated in a set of fertilizer experiments conducted by the N'Tarla Research Station. More recently he participated in similar fertilizer experiments with indigenous phosphate rock from the Tilemsi deposit in northern Mali. These experiments were part of the IFDC Mali Phosphate Project conducted in collaboration with the Institut d'Economie Rurale (IER), Bamako, Mali.

This IFDC research on farmers' fields, sponsored by the World Bank, is an outgrowth of the original Mali Phosphate Project. On the phosphate plots, when different rates of phosphate rock are compared with the recommended rate of complex fertilizer, all complementary nutrients are applied at the same rate as the cotton complex mix. The original project covers 10 experiment stations and has been sponsored by the International Development Research Centre (IDRC) of Canada since 1981. The IFDC experiments in which Dembele participated confirmed the results from the N'Tarla experiments.

During a recent interview with Dembele, Pierre Rosseau, IFDC Tropical Agronomist, and his counterparts on the Mali Phosphate Project learned the results of the phosphate experiments in which the farmer participated.

"The Tilemsi phosphate rock gave me better yields than the complex fertilizer, which I was used to applying after planting," Dembele said. "My maize crop yielded the same number of ears, but they were larger and had more grains than I got with the complex fertilizer."

Dembele discovered other advantages of using the indigenous Tilemsi phosphate product. "Using phosphate rock there was less drought stress than when I used conventional fertilizer," the farmer said. This can be explained by a better developed rooting system when phosphate rock is incorporated more deeply than complex fertilizer applied at first weeding. This enables the root system to penetrate more deeply into the soil, preventing drought stress.

Kadda Dembele, an active participant in IFDC's Mali Phosphate Project, harvests sorghum on his farm in southern Mali.

The Malian farmer did not keep this new-found technology a secret from his neighbors. "Many other farmers from the area came to visit my fields. I showed them the difference in yields from phosphate rock and conventional fertilizer," Dembele said.

Not only does Dembele readily accept the new fertilizer product, but also he is willing to conform to the recommended management practice revealed to him by the extension agent and the IFDC agronomist. Although Dembele is used to hand applying the conventional fertilizer after planting, he learned that phosphate rock must be applied prior to plowing and then incorporated in order to be most efficient.

Rosseau and his Malian counterparts working on the Mali Phosphate Project are seeing good results in the experiments being conducted at 10 experiment stations and on farmers' fields located throughout Mali. "On farmers' fields the average maize yield per hectare using directly applied phosphate rock increases about 50% compared with the yield without phosphate rock and are similar to the yields obtained with the cotton mix. Only in the driest areas does the cotton complex show better yields than the phosphate rock," Rosseau said.

As farmer Dembele discovered, the researchers likewise learned that

(Continued on page 4)

Headquarters—

Australian Aid Official Joins Board of Directors

From the land "down under" comes the latest addition to the IFDC Board of Directors. Dr. Dennis G. Blight, Assistant Secretary, South East Asian Programs Branch of the Australian Development Assistance Bureau (ADAB), Canberra, joined the Board at its annual meeting in October.

Dr. Blight brings to the Board a broad range of experience in the fields of science, diplomacy, and aid. A native of Perth, he received the B.S. and Ph.D. degrees in chemistry from the University of Western Australia.

Initially Blight served his country in the Foreign Affairs Department for a short time. After 2 years in Turkey, where his work concerned general economic analysis, Blight joined ADAB. At this time he was responsible for Australia's aid program to Africa and South Asia. During this 2-year stay at ADAB, he served in Nairobi, Kenya, as the Deputy Head of the Australian High Commission. His responsibilities included aid matters; he was also the Deputy Permanent Representative to the United Nations Environment Program.

Returning to Australia in 1978, he was asked to serve as the Secretary to the Consultative Committee on Research for Development, then under the chairmanship of the late Sir John Crawford. During this period, the basis was laid for the development of the Australian Centre for International Agricultural Research (ACIAR).

"After 3 years had passed, the wanderlust struck me again," Blight said. "At that time I moved on to London, where I worked for 2 years."

"When Australia established the ACIAR, Sir John Crawford asked me to return to Australia to be the Interim Director and Centre Secretary and get it off the ground," Blight said. "The next 2½ years were spent working with Sir John Crawford, Chairman of the ACIAR Board, in developing the Centre."

Blight ascended the next rung in the ladder of his career in July 1984, when he was asked to take charge of Australia's aid program in South East Asia.

"My responsibility covers Australia's aid program in the countries of Burma, Malaysia, Thailand, Singapore, Indonesia, the Philippines, and the People's Republic of China," he said, "I am also responsible for Australia's Economic Cooperation Program with the ASEAN grouping."

It is readily apparent that Sir John Crawford greatly influenced Blight's career. "Our association just sort of grew to the point that he was a major advisor to us both institutionally and personally." Blight said. "His example and interest in the international agricultural research system (one of the founders of the Consultative Group on International Agricultural Research) was an inspiration to me and many others. His intellectual thought and influence led to the establishment of ACIAR. Sir John left his mark on a range of institutions and individuals; he had a similar role at IFDC."

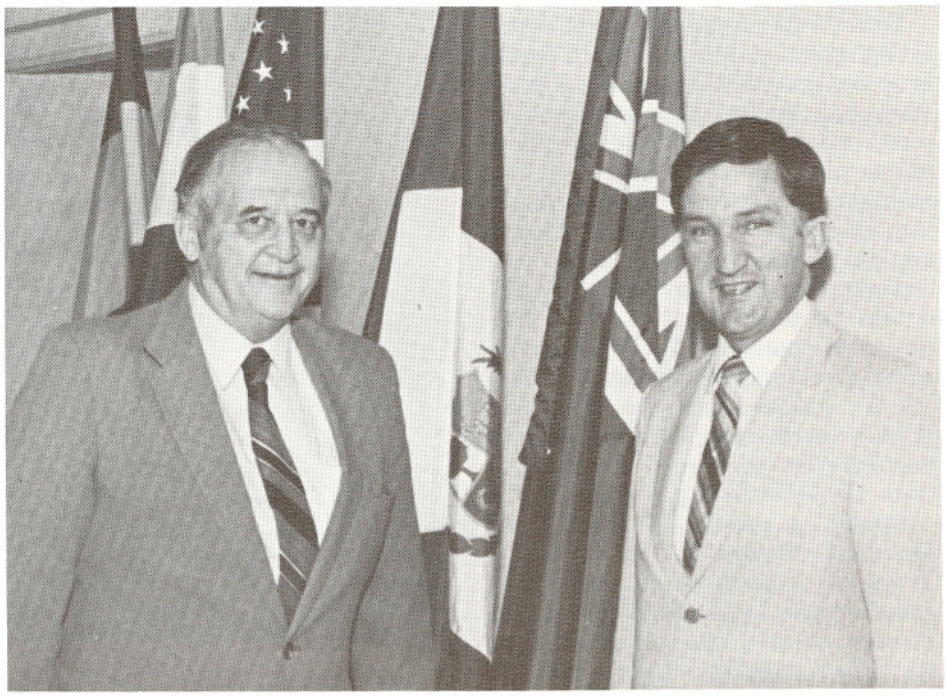
Blight himself is no newcomer to IFDC; his long association with the Center began in 1979. He was involved in establishing a cooperative program between ADAB, IFDC, and the Government of Indonesia; the agreement provided for a fertilizer efficiency research project that IFDC is conducting in Indonesia.

In summarizing his opinion of IFDC's position on the international agricultural research scene, Blight said, "As Sir John Crawford has said, 'IFDC is now established as an institution of quality both in terms of caliber of staff and the standard of its scientific and other publications.' "

Blight further said "IFDC appears now to be tantalizingly close to producing some important technological advances. One of the most encouraging aspects of IFDC's endeavors is the move that the Center is making toward establishing regional fertilizer research centers to develop a presence in Asia and Africa. This, I hope, will lead to the establishment of a family of national, regional, and international fertilizer research and development centers with a broad clientele and a broader range of donor support."

Looking to the future of the Center, Blight said, "The challenge for IFDC is to make the difficult choices between many competing claims for its resources and areas of investment and select those with the highest potential return and to take the necessary risks to see these through to application on farmers' fields."

In giving his impression of his first Board Meeting, Blight said, "As a former chemist, I found the presentations, particularly the one on inhibitors, to be intellectually stimulating."▪



Dr. Donald L. McCune (left), IFDC Managing Director, welcomes Dr. Dennis H. Blight to the Board of Directors.

Headquarters—

MEXICAN FARMER TO GET MORE PRODUCT FOR HIS MONEY

To fertilize their crops, Mexican farmers must apply each fertilizer nutrient separately according to soil and crop requirements. Since many of the fertilizer materials they use are powdered, premixing to obtain the correct nutrient blend is difficult because they lack adequate mixing equipment and encounter problems such as segregation and caking.

Very soon these Mexican farmers will have a new compound fertilizer product available to them—urea-based NPK. In this new granular product, they will be getting a fertilizer with a higher nutrient content at basically the same cost that they have been paying for the separate powdered materials. Another advantage is that with this one product the farmers can apply all three basic nutrients in a single operation. Furthermore, with the new granular product, the problems of segregation and caking should be substantially decreased.

The transfer of this fertilizer production technology to the engineering staff of Fertilizantes Mexicanos, S.A. (FERTIMEX), a state-owned company, occurred at IFDC Headquarters during October and November. Ing. R. Sergio Torres Osorio, Plant Processes Department Head, FERTIMEX Headquarters, and Ing. Agustin Escalante M., NPK Plant Assistant Manager, Minatitlan Complex, came to IFDC to observe the pilot-plant scale production of urea-based NPK.

According to Torres the main objective of their visit to IFDC was to gain experience and acquire the know-how necessary to operate similar plants in Mexico.

Escalante said that his purpose in coming to IFDC was to "find out the main operating parameters to control the plant and to be able to scale up the information gained in the IFDC Pilot Plant and apply this to a large-scale commercial plant."

FERTIMEX has used ammonium nitrate and ammonium sulfate as the primary nitrogen sources for practically all of its NPK products and has had very little experience using urea. However, due to the economic problems that Mexico is currently undergoing, the construction of an ammonium nitrate plant near Pajaritos (the first complex slated to use the new urea-based process) has been delayed. Since urea is already available, it is advantageous for FERTIMEX to use this source of nitrogen in producing NPK products.

"The objectives of our visit here were not only reached," Torres said. "We received more than we expected by acquiring information on compaction, the pipe-cross reactor, and materials handling. In addition, we gathered published information from the IFDC and TVA libraries."

While in the United States, the engineers also visited the International Minerals and Chemical Corporation's operations in Florence, Alabama, and the Agrico Chemical Company in Donaldsonville, Louisiana, to obtain first-hand information on the production of NPK and diammonium phosphate fertilizers.

"When I return to the Pajaritos complex, I will have the necesary information for startup and operation of the process," Escalante said.

The expected capacity of the facility as it is presently designed is 900 tonnes of product per day. If all goes as planned, FERTIMEX will begin producing urea-based NPK products in July 1985. Their plans call for the continued involvement of IFDC engineers during the plant startup.

Torres summed up his impression of IFDC in this way, "IFDC is like an international bank of the best information on fertilizer—the doors to which are very easy to open." ▪

Ing. R. Sergio Torres Osorio (left) and Ing. Agustin Escalante M. of FERTIMEX, with IFDC Special Project Engineer Jose R. Lazo De La Vega, examine urea-based NPK product in the IFDC Pilot Plant.

Headquarters and Indonesia—

Technical and Economic Assessment of USG Conducted

"Urea supergranule (USG) fertilizer that is hand deep-placed has great potential for improving nitrogen efficiency in the developing countries, particularly for Asian rice culture," Dr. Paul J. Stangel, IFDC's Deputy Managing Director, stated recently.

During the past several months IFDC has been conducting a technical and economic assessment of producing and marketing USG in Indonesia. The conclusions from this study were presented during a workshop at the Centre for Soils Research in Bogor, Indonesia, September 27-29.

"USG technology is likely to be one of a family of technologies that will have to be deployed in Indonesia to increase nitrogen efficiency and improve rice yields," Dr. Stangel said. "A consensus of the Bogor Workshop indicates that there is an immediate need to identify soil and agroclimatic conditions under which USG technology is superior to other means of improving nitrogen efficiency. This technology is likely to have the greatest applicability in areas where wage rates are low and problems of increasing population of rural landless will become more acute in the years ahead."

It has been shown that the overall market for USG needs to be better defined, taking into account the natural soil and farming practices where this material will be most effective, the socioeconomic characteristics

(Continued on page 4)

Technical and Economic Assessment *(Con't from page 3)*
that will advance this technology, and the ability of the fertilizer sector to supply this material at competitive prices.

"Three pilot areas have been tentatively suggested—one each in East, Central, and West Java," Stangel revealed.

"To answer the questions that remain concerning USG technology requires a link between IFDC and institutions or companies in the fertilizer sector," Stangel said.

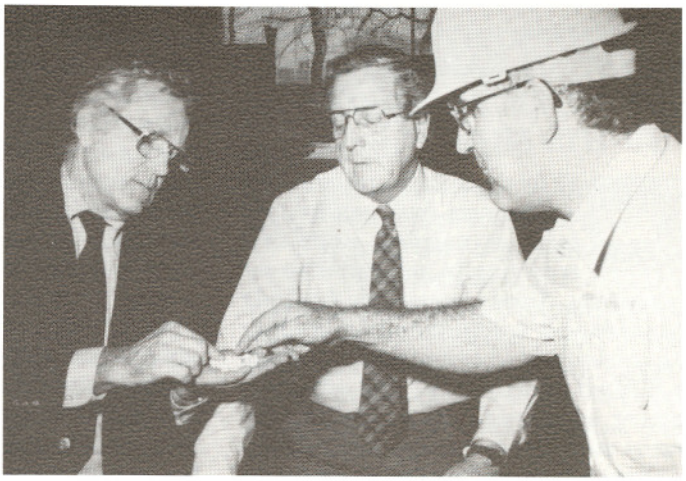
The recent technical assessment study of USG was directed by J. J. Schultz, IFDC Engineering Coordinator. This study highlighted the state-of-the-art of USG production alternatives and defined areas that need additional focus. On the production side, it is clear that the PUSRI I facility in Indonesia will be of great help in carrying out further experimentation on USG production and marketing. In addition, some commercial companies such as Norsk Hydro, NSM, Toyo Engineering, and Koppern GMBH have demonstrated a strong interest in the technology.

The IFDC study outlined modifications of the process and product, which may be effective in decreasing its cost. An interesting concept that has been proposed—a "coproduct production approach"—allows for a single-production unit to produce USG and granular urea of various sizes (2-5 mm) to accommodate the local market requirements.

Stangel emphasized, "It is important to recognize that USG, because it is a new product, requires additional marketing and promotional techniques, which cost money initially. However, these activities will be essential to communicate the long-term benefits of the product to the farmer."

"Central to the whole study is the assumption that one-half of the amount of urea is required as deep-placed USG to produce the same yield as a farmer now receives when using conventional prills under the current practice of broadcasting fertilizer in floodwater," Stangel said.

"For the technology to be accepted by the farmer, soil scientists and agronomists are challenged to better define the agroclimatic conditions, and the marketing specialists



Dr. P. J. Stangel (left), IFDC Deputy Managing Director; Dr. D. H. Parish, Director, IFDC Outreach Division; and J. J. Schultz, IFDC Engineering Coordinator, examine urea supergranules produced in a joint IFDC/TVA process development project.

are challenged to better predict how a farmer is likely to respond to a very efficient but very different technology," Stangel said. "Economists and social scientists must translate the potential benefits of USG into terms meaningful to the farmer. Hand-placed USG requires 60-80 workhours per hectare to apply, compared with broadcasting conventional urea that requires 12-14 workhours per hectare. This may not be a hindrance in regions where the population of rural landless is growing."

The USG product could be the beginning of a family of materials to increase nitrogen efficiency and farmers' net incomes. An example of another technology that may soon emerge is the deep placement of conventional-size urea using mechanical applicators. These applicators are presently under development by the International Rice Research Institute and others. Successful development and introduction of these machines will enlarge further the group of farmers able to benefit from deep-placement technology.

Togo—

SYMPOSIUM ON "MANAGEMENT OF NITROGEN AND PHOSPHORUS FERTILIZERS IN SUB-SAHARAN AFRICA" SCHEDULED

IFDC, in collaboration with the International Institute of Tropical Agriculture (IITA), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), and the Ministry of Rural Management, Republic of Togo, will hold a symposium on the "Management of Nitrogen and Phosphorus Fertilizers in sub-Saharan Africa," March 25-28, 1985, in Lome, Togo.

In addition to examining various aspects of the fertility and productivity of tropical African soils, the symposium will review 3 years of experimentation in sub-Saharan Africa by IFDC, IITA, and ICRISAT under the fertilizer research program for Africa funded by the International Fund for Agricultural Development (IFAD).

For additional information, please feel free to write or telex Dr. Uzo Mokwunye, Soil Scientist, Agro-Economic Division, IFDC. ▪

Phosphate Project *(Con't from page 1)*
using incorporated phosphate rock produced larger ears of maize than did surface-applied conventional fertilizer. Normally one maize plant will produce 1-2 ears, but those treatments receiving the Malian phosphate rock usually yielded three ears per plant.

The complementary nutrients—nitrogen, potassium, sulfur, and boron, particularly—are very expensive, and economic analyses are needed to ensure that substantial savings can be made by using phosphate rock plus complementary nutrients instead of the imported cotton mix. More studies may be needed to assess the needs for all the complementary nutrients and find the cheapest sources.

At the conclusion of the interview, Dembele humbly shared some products of his farm with his visitors to show his appreciation for having been asked to participate in a research program. ▪

Mali—

First French FERITT Program Conducted

Removing the language barrier, IFDC conducted its first Fertilizer Efficiency Research in the Tropics Training (FERITT) Program in French during October 15-26, in Bamako, Mali.

Sixteen participants from six countries attended the program. The Central African Republic, Mali, Niger, Senegal, Togo, and Burkina Faso were represented.

The program was cosponsored by the Institut d'Economie Rurale (IER) and was directed by Pierre Rosseau, IFDC Tropical Agronomist. IFDC staff involved in the program were Dr. Dennis H. Parish, Director of IFDC's Outreach Division, and Dr. André Bationo, IFDC Soil Scientist, stationed in Niger.

Other speakers came from Senega—Dr. F. Ganry of the Institut Senegalaise Recherche Agricoles (ISRA)/Institut de Recherches Agronomiques Tropicales et des Cultures Vivriére (IRAT) and Dr. A. Ange of IRAT, from Burkina Faso—Dr. P. Matlon of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), and from Mali—Dr. John Scheuring of ICRISAT, and Jean Francois Martine of IRAT.

During the opening ceremony the Directeur de Cabinet of the Ministry of Agriculture thanked IFDC for its efforts not only in solving the fertility problems of African soils but also in training personnel so that the solutions can be transferred to the farmer. "Integrating research, both on the station and in farmers' fields, with socioeconomic data to elaborate the best possible recommendation provides for the most efficient research," he said.

The objective of the program, as with other FERITT programs, was to teach the participants proper techniques for conducting better research on fertilizer efficiency.

During this program a nitrogen experiment on maize was conducted. Prior to the arrival of the participants, the Malian counterparts, who work with IFDC staff on the Mali Phosphate Project, planted the field trials at Sotuba, a suburb of Bamako.

The experiment plays a very important role in each FERITT program. It provides the participants with hands-on experience not only in the field but also in the classroom. Participants learn to design experiments, conduct the experiments in the field, and make statistical and economic evaluation of the fertilizers tested. Technical report preparation and presentation on the experiment follow. The participants were divided into four working groups during the program; at the conclusion of the program each group prepared and presented a report on the maize experiment.

In the closing ceremony the IER Deputy Managing Director, Mr. A. Coulibali, emphasized the importance and impact of such specific and highly focused training programs. ▪

M. Bagayoko (left), Agronomist and a counterpart on the Mali Phosphate Project, explains how to collect information from an experiment to FERITT participants, Kokoasse Kpomblekou-Ademawou and Abdoulaye Traore.

Headquarters—

FIRST MICROCOMPUTER COURSE PROVIDES PRACTICAL TRAINING

The microcomputer is a flexible and powerful tool for effectively handling many of the daily needs of the fertilizer business. Since microcomputers are relatively inexpensive and easily maintained, there are tremendous opportunities for their application in developing countries. They can assist with a number of functions, including statistical analyses, inventory control, accounting, billing, graphics, and word processing. Numerous microcomputer programs that lend themselves to specific applications within the fertilizer industry have already been developed.

To make information and training on microcomputers available to people of developing countries, IFDC offered for the first time a training program—"Use of Microcomputers for Fertilizer Sector Personnel"—during September 20-October 1 at Headquarters.

Nine people from six developing countries attended this program. The participants were from Bangladesh, Colombia, India, Indonesia, Pakistan, and Sri Lanka.

The objective of the program, under the direction of G. T. Harris, IFDC Economist, was to develop participants' skills in computer programming and the use of software programs applicable to the fertilizer industry.

Program topics included: (1) types of microcomputers; (2) microcomputer technology; (3) microcomputer equipment; (4) introduction to BASIC programming; (5) how to operate a microcomputer, including data storage and retrieval; (6) how to use selected fertilizer applications programs; and (7) general microcomputer applications in the fertilizer area.

Several teaching methods were used —lectures, films, demonstrations, and hands-on practice.

(Continued on page 7)

Headquarters—

PROGRAM ON STATISTICS AND ECONOMICS OF FERTILIZER USE MARKS ANOTHER FIRST

Another new training program, "Statistics and Economics of Fertilizer Use," complemented the microcomputer program and was offered subsequently at Headquarters, October 2-19.

Fourteen participants from nine countries increased their knowledge and understanding of the statistical and economic analysis of various types of data related to fertilizer use. They came from Bangladesh, the People's Republic of China, Colombia, Guyana, India, Indonesia, Saudi Arabia, Sri Lanka, and the Philippines.

The program, under the direction of Dr. Adolfo Martinez, IFDC Agricultural Economist, was organized around three components—experimental design and analysis, socioeconomic surveys, and time series analysis.

By participating in practical exercises the members of the group developed their skills in such procedures as analysis of variance, regression analysis, marginal analysis, production functions, and demand forecasting. They learned principles of computer programming for data processing and analysis and had the opportunity of running programs on microcomputers.

One of the participants, Eusebio P. Panganiban, Jr., of the Philippines, expressed his opinion of the program at its conclusion. Panganiban, a Marketing Consultant with the Philippine Phosphate Corporation (PHILPHOS), is in charge of agricultural liaison between PHILPHOS and the Ministry of Agriculture. One activity that he is presently monitoring consists of fertilizer trials on fertilizer use efficiency being conducted in the Philippines.

"All three components of the program are very relevant to my work," Panganiban said. "For example, the information that I gained relative to demand analysis will help my company in terms of corporate planning. If we know what our country's demand for fertilizer is going to be for a particular period, we can adjust fertilizer production accordingly."

The PHILPHOS participant was surprised to learn that this was the first time for this program to be offered by IFDC.

"It was conducted so well we thought it had been held two or three times already," he said.

After completing this program, the participants are better able to assist their countries' agricultural scientists, marketing managers, planners, or policymakers in several areas. These areas include (1) defining fertilizer recommendations, (2) identifying factors affecting fertilizer use, (3) designing sampling procedures, (4) measuring the effect of governmental policies on fertilizer use, and (5) estimating demand projections through time series and structural models. ▪

Mohamad Swielam Amer of the United Arab Emirates (left foreground), Ir. Baharaja P. of Indonesia, and M. S. Chughtai of Pakistan listen to a presentation during the Maintenance and Production Management Training Program.

Headquarters—

FIFTH MAINTENANCE AND PRODUCTION MANAGEMENT PROGRAM HELD

Twenty-seven participants from nine countries benefited from the Fifth Annual IFDC Maintenance and Production Management Training Program held at Headquarters, October 9-26. These participants were from Brazil, Egypt, India, Indonesia, Israel, Jordan, Pakistan, United Arab Emirates, and Venezuela.

IFDC Chemical Engineer M. T. Frederick was the manager of this program. He was assisted by R. S. Giroti, IFDC Associate Training Coordinator. Outside speakers came from several U.S. and international fertilizer-related companies.

The program covered maintenance and production management methods in both theory and practice. It included an overview of process technology with emphasis on new developments.

The first portion of the program provided the participants an overview of fertilizer sector highlights including fertilizer supply and demand, production economics, and fertilizer production technology and research activities. An indepth treatment through lecture and discussion sessions was provided on topics such as basic management principles, planning and scheduling, and organizing and staffing.

A typical participant, Avinash Malhotra, Senior Process Engineer, Ruwais Fertilizer Industries, United Arab Emirates, found the presentation on "Program Evaluation and Review Technique (PERT) and "Critical Path Method" to be especially interesting. During these two presentations the participants were divided into five groups. Each group was given a problem to solve. Malhotra's group had a problem dealing with the development of a process for manufacturing liquid fuel from wood. Each group developed a plan for solving their problem by applying the planning concepts that had been presented and discussed. Each group made a presentation of its plan for solving their problem.

During the last half of the program, the participants traveled to Baton Rouge, Louisiana, U.S.A., where they visited the Industrial Technical

Corporation and the Agrico-Faustina Plant. In addition, the program in Baton Rouge included an intensive 3-day Maintenance Management Shortcourse. The key elements of the Shortcourse were organization and staffing, recordkeeping and control, planning and scheduling, appraisal of performance, budgeting, and training.

In New Orleans, Louisiana, U.S.A., the group attended a "Workshop on Ammonia/Urea Plant Operation and Maintenance Problems." The workshop featured a panel of international industry experts to discuss selected topics related to problems of operation and maintenance of ammonia and urea plants.▪

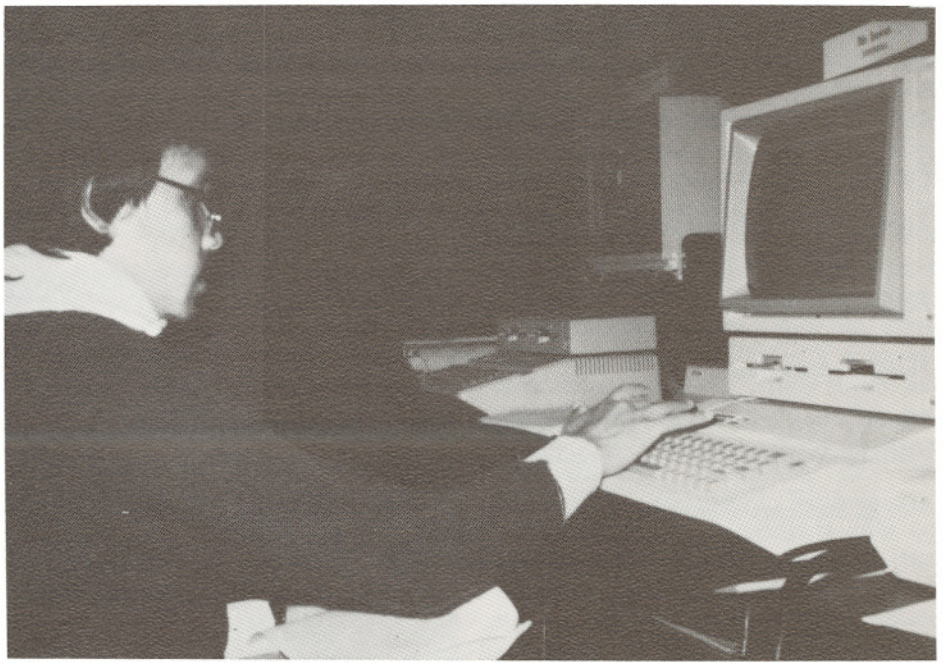
First Microcomputer Course *(Con't from page 5)*

At the beginning of the program, most participants were unaware of the potential applications of microcomputers in their fertilizer organizations. At the program's conclusion, each of the participants made a presentation illustrating specific applications of microcomputers in his/her work situation. All participants were favorably impressed with the large number of possible applications of microcomputers to the various functions of their organizations.

Mr. Irawan, a computer programmer from the Centre for Soils Research, Bogor, Indonesia, was one such participant who expanded his knowledge of computer programming during this training activity.

The Indonesian participant is responsible for analyzing all of the data collected in the joint IFDC/ Agency for Agricultural Research and Development research project in Indonesia designed to increase the nitrogen efficiency of urea. Working with Dr. Dennis O'Brien, IFDC Fertilizer Evaluation Specialist, stationed at the Centre for Soils Research, Irawan is helping conduct urea efficiency experiments in West Java.

Irawan is quick to point out the important role that microcomputers play in his work. "If we analyze the data by hand, we may be able to do so accurately the first time," he said. "But we cannot guarantee that our analyses will be correct the second or third time. Using a microcomputer we can design the format for entering the data and use this design repeatedly for analyses with consistent accuracy."▪



Mr. Irawan of the Centre for Soils Research, Bogor, Indonesia, keys in information on a microcomputer during a recent training program at IFDC.

Upcoming Training Programs

Program	Location	Dates
IFDC Headquarters		
Fertilizer Marketing		
Data Collection, Analysis, and Projections for National Fertilizer Sector Studies	IFDC	April 8-28, 1985
Fertilizer Marketing Training Program for African Region	Kenya	March 10-22, 1985
Fertilizer Production and Technology		
Fluid Fertilizer Training Program for Latin American Region	Mexico	March 1985
Fertilizer Production Training Program	India, Thailand Malaysia, Indonesia	February 18-March 6, 1985
Development of Indigenous Phosphate Deposits Training Program	IFDC	May 20-June 4, 1985
Fertilizer Sector		
Advances in Fertilizer Technology, Marketing, and Use in the United States	IFDC/Other Locations, U.S.A.	May 3-24, 1985
Regional Programs		
Fertilizer Marketing		
Regional Fertilizer Marketing Training Program for the Asian Region	Thailand	November 26-December 8, 1984
Fertilizer Marketing Training Program for Latin American Region (Spanish)	Colombia	May 1985

NOTE: Dates are subject to change.

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An IFDC Personality
'Mr. Fertilizer': A Profile of Travis P. Hignett

Travis P. Hignett may walk at a slow pace, but those who know him well are aware of his quick wit and "photographic" memory.

Hignett, Special Consultant to IFDC's Managing Director, is a product of the Iowa countryside. The son of a Christian Church minister, he grew up in several Iowa towns.

Perhaps the first person to help mold Hignett's future was his father. "I decided that I wanted to go to college, or more accurately, my father decided that I should and greatly encouraged me to," Hignett said with a chuckle.

Primarily because it was near his home and cost of attendance was minimal, Hignett chose to attend Drake University where he received an A.B. degree in chemistry in 1929.

Travis P. Hignett, Special Consultant to IFDC's Managing Director.

For a down-to-earth approach to a problem or project, younger scientists at IFDC and visitors to the Center from around the world come to Hignett and benefit from his sage advice.

"I had a vague idea of becoming a doctor so I took a lot of chemistry," Hignett said. "Seeing that getting to be a doctor would be a long, expensive process, I decided to look for a job as a chemist."

After 9 years in Washington, D.C., where he worked for the U.S. Department of Agriculture (USDA) and a group called Research Associates, Hignett was offered a job with the Tennessee Valley Authority (TVA) in 1938.

His coworkers, past and present, know that Travis Hignett always enjoys a challenge. Along his career route, he has tackled several challenging jobs.

"Perhaps my most challenging one was directing research and development programs at TVA, first as Chief of the Development Branch," Hignett remembered. "When I was a younger man, I worked mainly on projects selected for me by others; even though they were interesting, they were not always economical. However, when I was given responsibility for directing the work and deciding what others would work on, I tried to select projects that could be used by the fertilizer industry. At this time, there was a change in the policy and attitude at TVA that enabled us to do more work on projects of benefit to the industry and thus to farmers. During the first part of my stay at TVA most projects were aimed at something new and entirely different, which industry could seldom use."

During his 35-year tenure at TVA, which culminated in the position of Director of the Division of Chemical Development, Hignett participated in and led a variety of projects. One of the most unusual was not related to fertilizer. During World War II, he was the leader of a project to produce aluminum from clay.

"At that time most high-grade ores of aluminum came from overseas, and the war production board thought the imports might be cut off by submarine warfare," he said. "They wanted to have a practical process to make alumina and aluminum metal from domestic ores if necessary for things like airplanes."

Another unusual project in Hignett's repertoire involved the hydrolysis of wood to make molasses, used in feed for cattle. This project led to a patent, one of 15 that Hignett has to his credit.

Besides conducting and directing developments that led to the evolution of the chemical fertilizer industry, Hignett has devoted much time to putting his ideas and results into writing. With approximately 150 publications to his credit, Hignett can take pride in being a master craftsman and effective communicator when it comes to writing.

Perhaps his most famous publication is the *Fertilizer Manual.* This IFDC publication is written in a language that, as Hignett says, "you don't have to be an engineer to understand." The 400-page manual describing all of the major processes for manufacturing fertilizer is used by fertilizer technologists throughout the world.

The truly great people realize that their lives and characters are molded by others who influence them along the way. Hignett credits three of his supervisors with having this kind of influence on him.

Percy Royster, Hignett's first supervisor and then a section head in

the Fertilizer Investigations Laboratory of the USDA, left an indelible mark on the scientist.

"He was such an interesting conversationalist who liked to talk to and educate his employees," Hignett said. "He lectured to us on such subjects as how to design processes. He encouraged me to take up the study of chemical engineering, which I did."

Hignett also found his second supervisor, Dr. Frederick Cottrell, Head of Research Associates, to be a very interesting person.

"He went about finding out what people of several disciplines were doing and combined their findings into a useful program," Hignett said.

The third of the influential characters in Hignett's life was his first supervisor at TVA, Jack Walthall.

"More particularly, the atmosphere at TVA affected me greatly; it was different from that at the Department of Agriculture," he said. "At TVA there was a sense of urgency to do something useful. Also, there was a feeling that if you did a good job, you would be promoted."

Even though Hignett earned only one formal degree, he has since reaped far greater honors.

In 1969 The Fertiliser Society of London awarded him the Francis New Memorial Medal. In 1972 he received the Honorary Member Award from the National Fertilizer Solutions Association. In 1980 Hignett received the first Merit Award of the American Chemical Society's Division of Fertilizer and Soil Chemistry.

Hignett also holds memberships in the most prestigious fertilizer associa tions in the world, including the Fertiliser Society (London), American Chemical Society, American Institute of Chemical Engineers, and Board of Directors of the Fertilizer Round Table.

For a down-to-earth approach to a problem or project, younger scientists at IFDC and visitors to the Center from around the world come to Hignett and benefit from his sage advice.

"I know that young scientists would like to work on some project that would revolutionize the fertilizer industry," he said. "But it's not very likely that any project is going to develop that would have the impact of, say, the Haber process (a process for fixing nitrogen from the air in the form of ammonia, which is the basis for all modern nitrogen fertilizer). I would advise young scientists to concentrate on some process that will fit into the industry and not require a complete revision of it. If the scientist cannot select a project, my advice is to do the assigned job as well as possible, read about the state-of-the-art (what fertilizer is used for, who uses it, etc.) and be prepared to advance to a point that he/she can select a project."

"No world-shattering advances are likely to be made. There are only a limited number of plant nutrients needed and a limited number of raw materials to make them. Most of the ways of putting nutrient elements into a form that can be applied by the farmer have already been thought of. I see so many young engineers reinventing processes that have been worked on for many years before. This is a good reason to first study the history of what has already been done."

Predicting the future of an industry requires a thorough understanding of its past. For this glance into the future, it is well to go to the man who has done much to shape the world's fertilizer industry.

"We are entering a period in which we will have to be more selective of the kinds of fertilizers we use and how we use them," Hignett said. "When fertilizers were cheap there was little interest in using them efficiently; now that they are increasingly expensive we need to identify and provide the most cost-effective products and tell farmers how to use them efficiently. The industry can no longer concern itself solely with the three "primary" nutrients—N, P, and K. There are ten other mineral nutrients that are essential to plant growth and when anyone of them is seriously deficient, the so-called primary nutrients cannot be used efficiently. There are many cases in developing countries where deficiencies of one or more of the "other ten" elements are limiting crop yields and probably many more cases will be found by further study. Agronomists must identify these needs, and industry must find ways to supply them in the most cost-effective way. We cannot solve a soil fertility problem by throwing nitrogen at it, and we can no longer afford to try, especially in poor countries. Nitrogen is an essential nutrient, but it is also a tool that enables the farmer to mine the mineral nutrients from the soil. Sooner or later the mine will be exhausted, and the tool will be useless, unless we replace those nutrients that are deficient."

At IFDC Hignett is consulted frequently for advice on new directions for the Center.

"I think we need to go into multinutrient fertilizers more," he advises. "The Fertilizer Technology Division is already doing that to some extent in special projects. TVA's most successful developments were in multinutrient fertilizers, such as diammonium phosphate, liquid fertilizer, and granulation of NPK fertilizer."

"Another direction that I would like to see IFDC take is to work more on fertilizers of known economic capability. I think much could be done through new combinations, better physical quality, and more efficient use of fertilizers that we already have. Little good will come from working on products that are considered too expensive. I realize that organizations like IFDC must have a certain amount of basic research, in which there is no apparent economic application of results; this is an administrative problem of how to balance basic research and applied research on present materials."

"Thirdly, I think there will be room for some useful work on micronutrients, their application, and manufacture—more particularly, the manufacture of fertilizers containing micronutrients and their application in the field."

Hignett leaves us with this final note of wisdom from the father of the fertilizer industry, Justus von Liebig: "It's not the land itself that constitutes the farmer's wealth but the mineral nutrients in the soil, which nourish his crops."