

Report

Headquarters—

Togolese Scientist Studies Ways to Use His Country's Phosphate Rock



During the last half of 1988, Kokoasse Kpomblekou, a Togolese scientist, was stationed at IFDC to conduct research on ways to improve the agronomic and economic effectiveness of Togo phosphate rock for crop production.

This work was part of his graduate program toward an M.S. degree in soil science from Tuskegee University, Tuskegee, Alabama (U.S.A.).

Togo has large deposits of phosphate rock. However, because Togo phosphate rock has a low reactivity, it is not expected to be suitable for direct application in its natural form. Therefore, it is important to seek techniques, such as partial acidulation or dry granulation by the compaction process with soluble phosphate fertilizers, to make it agronomically and economically effective in agricultural production.

"My purpose was to try to find a new form of phosphate fertilizer that could be derived from Togo phosphate rock for use in agriculture so that my country can import less of the expensive conventional phosphate fertilizers such as triple superphosphate (TSP)

and single superphosphate (SSP)," Kpomblekou says.

At IFDC the Togolese scientist worked under the guidance of Dr. S. H. Chien, Soil Chemist. According to Chien, one of the objectives of Kpomblekou's research was to measure the chemical properties influencing the agronomic effectiveness of the fertilizer materials derived from Togo phosphate rock.

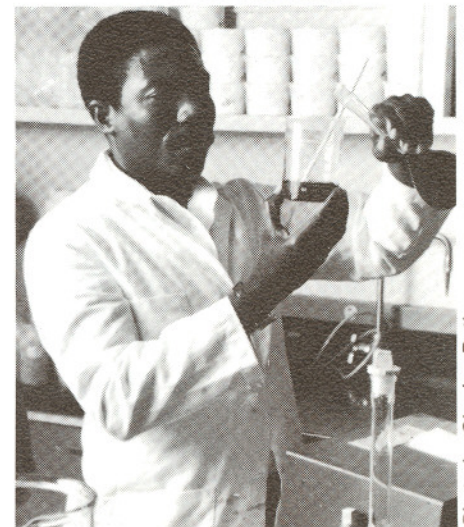
The fertilizer materials used included partially acidulated Togo rock with sulfuric acid (50% acidulation level) or with phosphoric acid (20% acidulation level), Togo phosphate rock compacted with SSP or with TSP (at 1:1 P ratio), and commercial-grade SSP and TSP. The compacted and partially acidulated materials had approximately the same water-soluble phosphorus content (approximately 43% of total phosphorus).

This research work included a laboratory incubation study and greenhouse experiments with maize and cowpea as the test crops. The acid soil that was used had certain properties similar to those of some agricultural soils in Togo.

"The results confirmed that finely ground Togo phosphate rock alone was relatively ineffective in supplying available phosphorus for maize or cowpea due to its low reactivity," Kpomblekou says. "However, when the Togo phosphate rock was modified either by partial acidulation or compaction with TSP or SSP, its effectiveness was significantly increased. In the maize experiment, the fertilizer materials produced by compaction and partial acidulation were equally effective and they were approximately 76% as effective as TSP and SSP in increasing dry-matter yield of maize. In the cowpea experiment, however, the compacted

materials tended to be more effective than the partially acidulated materials in increasing seed yield and phosphorus uptake by seed. For example, compacted phosphate rock plus SSP was as effective as SSP whereas partially acidulated rock (with 50% sulfuric acid) was 87% as effective as SSP in increasing seed yield and 65% as effective as SSP in increasing phosphorus uptake by seed.

Kpomblekou's research thus suggests that compaction with TSP or SSP may be an attractive alternative technology for utilizing the low reactive Togo phosphate rock. Furthermore, compaction technology offers another advantage in that other nutrient fertilizers (e.g., urea, potassium chloride) can also be included as multi-nutrient fertilizers for farmers in Togo. Future field work is needed to evaluate the agronomic effectiveness of these types of compacted fertilizer products under farmers' conditions. ■



Kokoasse Kpomblekou conducts chemical analysis of soil and plant tissue samples as part of his research at IFDC.

Photo by Charles Butler

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Togo—

African Fertilizer Trade and Marketing Information Network Holds First Annual Meeting

Five observers and more than 17 participants from 12 countries attended the first workshop of the "African Fertilizer Trade and Marketing Information Network (AFTMIN)." The meeting was held in Lomé during November 22-24, 1988.

Participants came from Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ethiopia, Lesotho, Madagascar, Niger, Nigeria, Senegal, Togo, and Zambia.

The discussions at the meeting centered on privatization of the fertilizer sector operations, marketing and distribution costs, and global and regional fertilizer outlook.

Dr. Tham Truong, U.S. Agency for International Development representative from Cameroon, initiated the discussion by describing privatization of fertilizer sector operations in Cameroon. His presentation was followed by country profiles on privatization of the fertilizer sector presented by representatives from Ghana, Cameroon, Gambia, and Senegal. Mr. Henry Ogola, Managing Director of MEA, Ltd., Kenya, also presented a paper entitled "A Critical Review of Privatization of the Fertilizer Sector in sub-Saharan Africa."

The problems currently facing the fertilizer sector in many countries of sub-Saharan Africa include: (1) the excessive burden of fertilizer subsidies, especially in the context of foreign exchange and the financial crises faced by many sub-Saharan Africa countries, (2) delays in procuring and distributing fertilizers, and (3) excessive costs of marketing and distribution.

All three of these limitations were associated primarily with public-sector agencies. Hence, a move from the public sector to the private sector was perceived to be helpful in removing these problems. On this issue, Dr. Balu L. Bumb, IFDC Economist, mentioned that although there is considerable scope for improving the efficiency of the fertiliz-

er sector in sub-Saharan Africa countries, there is a need to separate the issue of ownership from management and to take into account the benefits of economies of scale in bulk imports, as well as to provide safeguards against uncertainties and risks resulting from the volatility of international fertilizer prices. Furthermore, not all of the countries in sub-Saharan Africa are at the same stage of development. Hence, a pragmatic approach is required in moving from one form of organizational arrangement to the other.

The participants suggested that IFDC develop a framework for analyzing the advantages and disad-

vantages of privatization of the fertilizer sector operations in sub-Saharan Africa countries.

The presentations on marketing and distribution costs by Rein Coster, Market Analyst, IFDC-Africa, and various country representatives clearly revealed that prices paid by sub-Saharan countries are much higher than those paid by the major Asian countries, and higher transportation costs account for a major share of this difference in marketing and distribution costs between the two regions.

This first meeting proved to be quite productive, and plans were made for the next annual meeting. ■

UPDATE ON TRAVIS P. HIGNETT FUND

The IFDC Century Club—a nonprofit group composed of IFDC staff and community leaders from the Muscle Shoals, Alabama, area—established the Travis P. Hignett Fund in March 1987.

The Club felt that this was a fitting tribute to a colleague who has made many outstanding contributions to the fertilizer field during the past 50 years. Often referred to as "Mr. Fertilizer," Mr. Hignett produced many publications including the *Fertilizer Manual*, which is widely considered to be the *Bible* of the fertilizer industry.

Monies contributed toward this Fund are to be used to provide fellowships to aspiring developing-country scientists and engineers who wish to study or conduct research projects at IFDC. The Century Club pledged US \$500 as seed money to help establish the Fund and challenged Mr. Hignett's friends throughout the world to match the Club's contribution either individually or as small groups. To date, the Club has collected US \$5,300 toward the Fund; in order to endow a fellowship program, the Club needs to collect at least US \$10,000 so that the fellowship award program can be initiated.

Anyone wishing to make a donation to assist the Century Club in this worthy effort should make his/her contribution payable to the "IFDC Century Club," designating that it should be applied to the "Travis P. Hignett Fund." Donations should be sent to: IFDC Century Club, P.O. Box 2040, Muscle Shoals, Alabama 35662.



Malawi—

IFDC Team Completes Smallholder Fertilizer Marketing Study

Commissioned by the Republic of Malawi, two IFDC staff members recently participated in a smallholder fertilizer marketing study in that country. The members of the team included Lewis B. Williams, IFDC Agricultural Economist and Team Leader; John H. Allgood, IFDC Market Analyst; Julie Mphande and Bashir Sacranie, accountants with Peat Marwick, Blantyre; and Tony Chindime, Extension Specialist representing the Ministry of Agriculture. They conducted the study during October 7-November 25, 1988.

The study assessed the present distribution system, identified constraints that limit the availability of fertilizers and that force costs to higher levels than is necessary. It also recommended a system that will make fertilizers more readily available to farmers in the most cost-effective manner while taking into account the possible involvement of the private sector.

The team spent 4 weeks in the field determining the constraints and performance of the existing fertilizer marketing system. The marketing

specialists visited the facilities of the Smallholders Fertilizer Revolving Fund, Agricultural Development and Marketing Corporation, and OPTICHEM Ltd. They traced the marketing channels to all levels, including warehouses, primary depots, primary markets, temporary markets, private traders, retailers, and farmers—the ultimate consumers.

Before leaving the country, the team members prepared and reviewed a draft report with the Ministry of Agriculture and confirmed the data collected.

In discussing the results of the study, Williams points out that “fertilizers are essential to sustain and increase agricultural production in Malawi. Research shows that fertilizer will increase yields by two to three times present production levels.”

The Annual Survey of Agriculture indicates that only approximately 25% of the local maize, primarily grown by the smallholders, is fertilized; whereas, 85% of the hybrid maize, primarily grown by the larger farmer, is fertilized. The survey also revealed that the average fertilizer application is only about 50% of the



Agricultural training of Malawi's young farmers will help that country increase food production.



Photos by J. H. Allgood

recommended rate. The full potential for increasing agricultural production through fertilizer is tremendously underutilized in Malawi.

According to Williams, the recommended fertilizer marketing system would require the reorganization of the facilities of the Smallholders Fertilizer Revolving Fund into a commercial-type marketing organization. Social obligations of the new system would be met by making fertilizer available on a timely basis and providing an educational program to farmers to increase crop yields more efficiently. The new system will decrease the subsidy to the Government on a per-ton basis.

In addition, Allgood says that "the

recommended system will have a significant impact on food production in Malawi." In fact, yields are presently being suppressed because fertilizers are neither "timely available to farmers nor in ample quantities." At the time of the study the team found that many farmers were planting maize without fertilizer because it was not available in their markets.

"The fertilizer marketing system that we are recommending can change this use pattern through educational programs," Williams says. "The new system can easily increase output by 610,000 tons of maize. At current maize market prices of MK 0.24/kg, a total revenue increase of MK 146 mil-

lion (US \$58,400,000) can be obtained for the farmers."

Williams and Allgood estimate that the new recommended fertilizer marketing system by 1995 will increase fertilizer consumption in the smallholder sector to 107,000 tons of product or 26,000 additional tons of nutrients. If applied properly, this increase in fertilizer use should produce an increase of 300,000-350,000 tons of grain. At 1988 prices it would cost MK 274 million (US \$109,600,000) to import this quantity of grain to Malawi. The economic returns due to improved performance under the recommended system would amount to MK 229 million (US \$91,600,000). ■

Burkina Faso—



Second WAFMEN Symposium Breaks New Ground

IFDC's oldest research network in Africa celebrated its sixth year with a 5-day symposium held in Ouagadougou from February 7-11, 1989. It was the second in the series of symposia organized by IFDC as part of the West African Fertilizer Management and Evaluation Network (WAFMEN).

The first one, which attempted to identify the constraints to increased fertilizer use and increased food production in sub-Saharan Africa, was held in Lomé in 1985. The 1989 symposium was organized to review the regional activities and accomplishments of the network since its establishment in 1983 and to identify and plan for the fertilizer research needs of participating countries in the coming year.

The symposium was officially opened on behalf of the Minister of Higher Education and Scientific Research, Burkina Faso by Camarade Gnisse Konate, Director General of the Centre National de Recherche Scientifique et Technologique (CNRST) and by Professor A. Amberger, member of the IFDC Board of Directors. The national agricultural research institute cosponsored the symposium with the International Development Research Centre (IDRC) of Canada and IFDC. The theme of the 1989 symposium was

"Alleviating Soil Fertility Constraints to Increased Crop Production in West Africa." In addition to enumerating constraints, the symposium also reviewed recent contributions by IFDC, its collaborators, and other organizations toward alleviating the constraints caused by such factors as the West African environment, the fertilizer supply and demand situation, fertilizer policy, technology transfer, and the management of fertilizer research data. Twelve of the 14 WAFMEN member countries were represented at the symposium, which attracted 44 participants from a total of 16 countries.

A special feature of the symposium was the inclusion of a session that dealt with constraints to fertilizer use in nonagronomic areas such as policy, fertilizer supply and demand, and technology transfer. Three papers were presented on the above areas and provided insights for participants on the economic, social, and institutional factors that impede increased use of fertilizers in the region. For the first time, extension personnel from three countries—Burkina Faso, Nigeria, and Togo—attended a WAFMEN meeting. This broadening of participation in the workshop is a recognition of the need for greater linkages and understanding between research and extension personnel in the region in order to more effective-

ly bring the benefits of fertilizer research to farmers.

Dr. Uzo Mokwunye, Coordinator of Agronomic Research at IFDC-Africa, says that the decision to involve national extension personnel from West African countries is a timely and logical development of WAFMEN's role and activities in the region:

"This means that researchers are interacting directly with national extension personnel who have frontline responsibilities in getting the fertilizer message over to farmers. WAFMEN is moving in a tangible and practical way to improve regional research and extension linkages for fertilizer technology development and transfer to West Africa's farmers." ■



Bangladesh—

Policy Study Completed Regarding Chittagong TSP Complex

Under contract with the U.S. Agency for International Development (USAID), IFDC recently conducted an evaluation of the technical and economic performance of the triple superphosphate complex at Chittagong for the past 5 years. Alternative production options that could turn the complex into an asset or at least remove it as a liability were considered.

Dr. Paul J. Stangel, IFDC Deputy Managing Director, and Dr. Amit H. Roy, Special Project Engineer, visited Bangladesh to acquire the necessary information for this evaluation. Mukhlesur Rahman served as a local consultant on the project while N.D. Le, IFDC Chemical Engineer, served as a financial analyst.

The TSP complex at Chittagong represents Bangladesh's only capacity to produce phosphate fertilizer. Established in the early 1970s by the Bangladesh Chemical Industries Corporation (BCIC), this plant until recently has not been particularly competitive with imported TSP. As a result, the Government of Bangladesh (GOB) proposed to assess specific factors affecting the cost of producing TSP, identify possible technical constraints, and based on economic and financial analysis develop policy options for the GOB to consider.

According to Stangel, four central issues were addressed in this study. They were: the ability of the complex to compete with imported phosphates without government assistance or protection, the most appropriate product mix for the complex, its potential for privatization, and social and economic consequences of possibly closing the facility or significantly reducing the work force at the complex.

The study concluded that over the past 5 years, domestic production of TSP has not been competitive because of relatively low imported TSP prices relative to phosphate rock and

sulfur. Based on the projected prices of TSP, phosphate rock, sulfur, and phosphoric acid, the team concluded that domestic production of TSP would be attractive if the complex can be operated at 80% of rated capacity. The team felt that this could be achieved provided the raw materials are available on time and improvements are made in the physical properties of product.

"We evaluated seven options for producing fertilizer at the Chittagong TSP complex," Roy says. "The underlying considerations in the selection of options was to produce fertilizers

that contain sulfur—sulfur is now becoming a limiting nutrient in Bangladesh agriculture."

Of the products evaluated, double superphosphate, partially acidulated phosphate rock, and NPK containing sulfur looked promising; however, each of these options would require closure of some existing facilities or the addition of new facilities. In any case there could be an impact on the total number of employees required by the complex. The economic and social impacts of these options were evaluated and detailed in the team's report. ■



Photo by Dr. Paul J. Stangel

Officials from IFDC and the Chittagong TSP Complex (TSPC) observe the unloading of phosphate rock at the Chittagong complex. They are (from left): Dr. Amit H. Roy, IFDC Special Project Engineer; S. N. Alam, Addl. Chief Chemist, TSPC; A.T.M. Khaled, Addl. Chief Technical Manager, TSPC; Mukhlesur Rahman, Consultant, TSPC; Dr. Shafiqur Rahman, Managing Director, TSPC; and S. M. Deb, Addl. Chief Mechanical Engineer, TSPC.

Board's French Participation is Enhanced

With the recent appointment of Dr. Christian Pieri, Deputy Director, Institut de Recherches Agronomiques Tropicales (IRAT), the IFDC Board of Directors has acquired additional French participation.

The French soil scientist has 23 years' experience in soil fertility management and fertilizer use for tropical environments. This ex-



Dr. Christian Pieri

perience has been logged in several developing countries including Morocco, Senegal, Mali, and Mexico.

IRAT, which is based in Montpellier, France, comes under the larger umbrella of the Centre de Cooperation Internationale en Recherche Agronomique pour le Developpement (CIRAD). CIRAD is a scientific organization specializing in arid, tropical, and subtropical agriculture. The Center participates in research programs, rural and agricultural development operations, and training activities in more than 50 countries in Africa, Asia, the Pacific region, and Latin America. The organization is composed of 11 research departments, including IRAT, which focuses on food crops.

At IRAT Pieri coordinates the scientific work of the resources management group. The four primary programs that are dealt with by his group include soil survey and remote sensing, the soil/climate/crops relationship, soil fertility, and irrigation.

To prepare for this important work, Pieri received his primary training at the Institut National Agronomique in Paris, where he obtained a Ph.D.

degree in tropical soil science. His career in tropical soil science has taken him to Senegal for 6 years, Mali for another 6 years, and Mexico, where he served for 1 year as a professor/researcher at the Colegio Superior de Agricultura Tropical.

During a tenure as a visiting scientist at the College of Tropical Agriculture in Hawaii, he earned a degree in physical chemistry and soil physics. His work there, under the guidance of J. Silva and G. Uehara, focused on the physical and chemical properties of tropical soils.

At the Senegalese Agronomic Research Institute (ISRA), Pieri served as team leader of the research group, which concentrated on "Improvement and Management of Soil Productivity."

As a result of the IRAT/IFDC connection, two IRAT scientists are now posted at the IFDC-Africa Center in Togo, West Africa. Dr. Pieri believes that IFDC and IRAT are on a "track of long-term collaboration (in close connection with national agricultural research centers) first oriented to Africa, with the intention of being extended to the other continents of Asia and Latin America." ■

Thailand—

Fertilizer Marketing Training Program Conducted



In cosponsorship with the Ministry of Agriculture and Cooperatives, the Royal Government of Thailand, IFDC conducted a Fertilizer Marketing Training Program in Bangkok during November 28-December 9, 1988. This program focused on integrated marketing concepts, marketing planning, and market development.

This 2-week program was presented in English by a corps of IFDC experts with support from selected specialists from the Thai Ministry of Agriculture and Cooperatives, the International Potash and Phosphate In-

stitute, Stoller Chemical Co., Fertilizer Advisory Development and Information Network for Asia and the Pacific (FADINAP), the Bank for Agriculture and Agricultural Cooperatives of Thailand, and Thai Central Chemical Company.

Forty-two participants from 12 countries participated in this program. The countries represented included Bangladesh, India, Indonesia, Korea, Madagascar, Malaysia, Nigeria, Philippines, Saudi Arabia, Sri Lanka, Thailand, and Western Samoa.

Dr. L. E. Ahlrichs, IFDC Marketing Specialist (and the program

manager), and R. S. Giroti, Training Administrator, gave the participants of this program high marks. In fact, in assessing the program and its participants, they had this to say: "The keen interest shown by the marketing managers through their active participation in the deliberations convinced us that their knowledge base of fertilizer marketing operations had been expanded and their job skills upgraded. Equipped with the knowledge and skills gained during the 2-week program, they will undoubtedly be instrumental in bringing about improvements in the marketing systems of their respective countries." ■

Recent IFDC Publications

International Workshop on NPK Fertilizer Production Alternatives, Proceedings

IFDC recently released a publication of the Proceedings of an International Workshop on NPK Fertilizer Production Alternatives, which was held in Madras and Bombay, India, in February 1988.

The workshop examined the alternatives for producing NPK fertilizers. The examination included the presentation of 24 technical papers, followed by an in-depth critique by the workshop delegates.

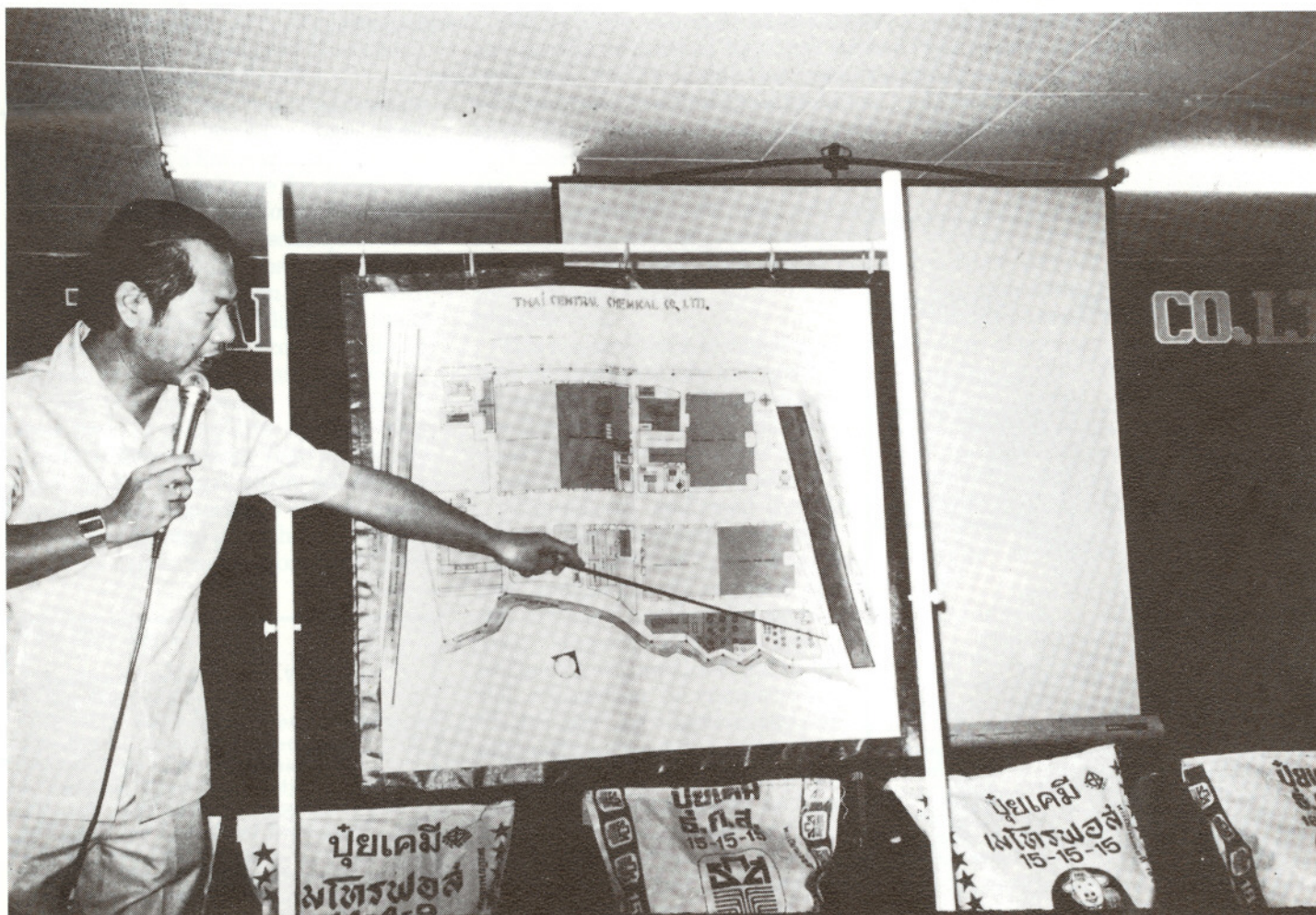
These proceedings represent a very comprehensive coverage of the current status of worldwide NPK fertilizer production technology and therefore provide a useful reference on a complex range of technologies. These proceedings may be useful in many ways including:

1. A technical resource for engineers and fertilizer plant technical and operations staff.
2. Training of fertilizer sector personnel.
3. A practical industrial reference for university students studying

in the fields of chemical processing and material handling.

4. A point of reference for engineering firms and equipment suppliers who engage in the design and supply of NPK fertilizer plants.

To obtain a copy of this publication, please place your order with the IFDC Purchasing Department, P.O. Box 2040, Muscle Shoals, Alabama 35662. The cost of the publication is US \$50 for U.S. addresses and US \$60 for non-U.S. addresses.



Mr. Gumthorn, Plant Manager, Thai Central Chemical Co., discusses the fertilizer sector of Thailand.

Photo by R. S. Girofi

1989 Calendar of Training Programs

Program	Location	Date
Fertilizer Marketing		
FADINAP/IFDC Regional Training Course on Port Handling of Mineral Fertilizer in the Asian-Pacific Region	Singapore and Bangkok, Thailand	April 10-28
Data Collection, Analysis, and Projections for Fertilizer Sector Studies	IFDC Headquarters and other U.S. locations	April 17-May 5
Modern Trends in Fertilizer Distribution and Handling	United Kingdom, Ireland, Netherlands, Belgium, West Germany	June 12-30
Fertilizer Marketing Management Training Program	IFDC Headquarters and other U.S. locations	August 14-September 22
Fertilizer Marketing Training Program	Singapore	December 4-15
Fertilizer Production and Technology		
Technical Management of Fertilizer Production Units	IFDC Headquarters and other U.S. locations	October 16-November 3
Relevant Fertilizer Supply Strategies (French and English)	Lomé, Togo	November 6-10
Fertilizer Use Efficiency		
Computer Simulation for Crop Growth and Fertilizer Responses	IFDC Headquarters	May 15-26
Statistical and Economic Analysis of Fertilizer Experimental Data (French and English)	Lomé, Togo	April 17-28
Fertilizer Sector		
IFDC/Purdue University Training Program in Fertilizer Sector Development in Tropical and Subtropical Countries	IFDC Headquarters	July 24-August 4
Finance for Non-Finance Managers in Fertilizer Sector	Singapore	November 20-December 1

Dates and locations are subject to change.



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