IFDC report

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

Nigeria—

Fertilizer Marketing and Distribution Study

A major nitrogenous fertilizer manufacturing project is being planned in Nigeria. The Government of the Federal Republic of Nigeria has engaged IFDC to conduct a fertilizer marketing and distribution study to assess the present distribution system, to make an inventory of transport and storage capacity, and to assess the extent to which these are efficiently utilized. The study will serve to identify present and possible future constraints to the supply and consumption of fertilizers and to develop a comprehensive fertilizer marketing plan. The implementation of such a plan is essential to ensure an adequate internal outlet for the output of the proposed Nigerian fertilizer project.

The marketing plan is presently under study and is scheduled for completion in February 1980. A technical assistance team under the leadership of Mr. L. B. Williams, IFDC Regional Coordinator—Africa, recently completed the in-country field survey for the study. Members of the study team include: Mr. F. J. Klem, IFDC Engineering Coordinator; Mr. G. T. Harris and Dr. M. S. Mudahar, IFDC Economists; and consultants Dr. W. E. Clayton, Transportation Specialist, Imperial Chemical Industries Limited; Dr. A. O. Falusi, Agricultural Economist, University of Ibadan, and Dr. V. L. Sheldon, Professor of Agriculture, Western Illinois University.

Nigerian consultants used for short-term assignments and their specialty were: Dr. B. Abogunrin, Marketing; Mr. Richard Ajala, Communications; Dr. S. O. Olayide, Government Policy and Actions; and Dr. Adeniyi Oshuntogun, Credit.

Dr. M. S. Mudahar, Mr. L. B. Williams, Dr. V. L. Sheldon, Dr. W. E. Clayton, and Mr. G. T. Harris listen to Mr. Richard Ajala explain the practice of intercropping of corn in the rain forest in Oyo State, Nigeria.

Colombia—

IFDC-CIAT Phosphorous Project

The objective of the IFDC Phosphorus Project based at the International Center for Tropical Agriculture (CIAT) is to develop a phosphorus management strategy for the various crops and cropping systems on the acid infertile soils of subtropical and tropical Latin America. The project was initiated in July 1977 with a major share of the funds provided by the International Development Research Center, Canada (IDRC).

Because the majority of the acid Latin American soils are low in both total and available phosphorus and generally have a high phosphorus retention capacity, the phosphorus needs of the soil as well as of the plant must be considered. These phosphorus needs may not be economically accommodated through the use of conventional soluble fertilizers such as triple- or single-superphosphate (TSP, SSP). In certain soils a large percentage of the phosphorus in these soluble fertilizers is retained by the soil and rapidly becomes unavailable to the plant. In addition, TSP and SSP have a high energy and capital requirement per unit of phosphate.

Dr. W. E. Fenster and Dr. L. A. Leon, IFDC Soil Scientists stationed at CIAT, are conducting experiments to determine if more slowly available forms of phosphorus such as finely ground phosphate rock (PR), partially acidulated PR, cogranulated mixtures of sulfur with PR, and cogranulated mixtures of TSP or SSP with PR are reasonable alternatives to TSP and SSP. Because the phosphorus in these experimental forms becomes available at a slower rate, their residual value may prove to be superior to that of TSP or SSP. In addition, the cost per unit of phosphorus as PR is about one-third that for TSP or SSP.

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A series of greenhouse and field experiments have been established in Colombia, Ecuador, and Peru in which many of the South American PRs and their altered products are being tested for agronomic effectiveness using different test crops, such as forage, corn, cassava, rice, and peanut. The experiments are being conducted in collaboration with CIAT, Instituto Colombiano Agropecuario (ICA, Colombia), Instituto Veterinario de Investigaciones Tropicales y de Altura (IVITA, Peru), and Instituto Nacional de Investigaciones Agropecuarias (INIAP, Ecuador). Test results indicate that yields realized from some PRs and some modified phosphorus materials compare favorably with those of TSP at all levels of applied phosphorus when both initial and residual availability is considered.

IFDC-ENRC–

Study Program for Egyptian Engineers

As part of IFDC's continuing effort to help solve problems that are of immediate concern to institutions in developing countries, four engineers from the Egyptian National Research Center (ENRC) recently spent 1 to 2 months at IFDC. ENRC is studying selected phosphate deposits in Egypt, currently in laboratory scale, with plans to continue the studies in pilot scale. Funding for the study program was provided by the U.S. Agency for International Development (USAID) with coordination through the National Academy of Sciences.

The program consisted of on-the-job training and visits to beneficiation plants and laboratories in the United States. Dr. A. K. Ismail and Dr. S. I. Moustapha spent 2 months receiving on-the-job training in phosphate beneficiation and chemical processing in IFDC laboratories and pilot plants. Mr. T. R. Boulos and Mr. S.M.R. El-Nozahi spent 1 month studying general research programs of laboratory and pilot scale being carried out at IFDC, TVA, and U.S. industries and universities.

IFDC Staff Update

Arrivals

Mr. Ram S. Giroti–Training Manager–from Fertiliser Association of India–now with Outreach Division–Associate Training Coordinator for 2 years.

Mr. Joseph Lastigzon–Economist–from Israel Chemicals Limited–now with Outreach Division–market research for 2 years.

Dr. El-Esawy M. El-Zahaby–Soil Scientist–from University of Alexandria, Egypt–now with Technology Division–research on use of selected phosphate for calcareous soils for 1 year.

Dr. T. W. Park–Polymer Chemical Engineer–from Busan University of South Korea–now with Technology Division–research on modified forms of urea for 1 year.

Dr. Jacqueline Ashby–Graduate study at Cornell University–now with Agro-Economic Division–Postdoctoral Fellow doing sociological research at IFDC-CIAT phosphate project for 2 years–This position supported by a grant from the Rockefeller Foundation.

Mr. Jose Rolando Pacheco-Salazar–Researcher and lecturer–at the Center of Agricultural Research, University of Costa Rica–now with Agro-Economic Division as an International Atomic Energy Agency Fellow–research in the Upland Nitrogen Program for 1 year.

Departures

Dr. Uzo Mokwunye–Soil Scientist in the Technology Division–1-year sabbatical leave in soils-P studies–returning to Ahmadu Bello University–Zaria, Nigeria.

Annual Meeting–

New Board Members Named

The IFDC Board of Directors named three new board members at their annual meeting at IFDC Headquarters in October.

Dr. Ola Heide (Norway)

Dr. Heide is Rector (President) of the Agricultural University of Norway. He was a W.K. Kellogg Foundation Fellow in 1965-66. Dr. Heide is a Scandinavian delegate to the Federation of European Societies of Plant Physiologists and a member of the Scandinavian Society of Plant Physiology, the Norwegian Academy of Sciences, and the Norwegian Botanical Society. Dr. Heide has contributed numerous articles on plant physiology and ecophysiology to science and agricultural journals.

Mr. Eliseo Restrepo (Colombia)

Mr. Restrepo is General Manager, Monomeros Colombo Venezolanos and Professor of Economics and Finance at the University of Antioquia (Medellin) and Santo Tomas (Bogota). He is a member of the Board of Directors of the Colombian Export Bank, Banco Colombo Americano, Corporacion Financiera Internacional, and Almacenes Generales de Deposito Santa Fe, Almaviva. Mr. Restrepo is a partner of agricultural ventures engaged in cattle raising and in such crops as bananas, rice, and cotton.

Mr. Richard M. Freeman (United States)

Mr. Freeman is a member of the Tennessee Valley Authority (TVA) Board of Directors. He was first employed by TVA in 1948 following his graduation from Columbia University School of Law. From 1958 to 1968, Mr. Freeman was a partner in the Chicago law firm of Belnap, Spencer, Hardy and Freeman. In 1968 he became Vice President-Law for the Chicago and Northwestern Railway Company. In 1969 he and the then President of the Railway Company formed a corporation which bought the assets of the Railway Company and in 1972 successfully offered stock to the Railway's employees–making it the largest employee-owned corporation in the Nation.

Deep Placement– A Method Compatible with Algal Nitrogen Fixation

For centuries, Asian rice farmers have practiced a unique system of rice production that maintains a degree of soil nitrogen fertility and ensures modest but stable yields without the use of chemical fertilizers. Blue-green algae play an important role in this system by providing a steady input of nitrogen fixed from the atmosphere. Pressure to improve rice yields has led to widespread use of nitrogen fertilizers. Unfortunately, broadcasting nitrogen fertilizers to the surface of the paddy field, the most common method of applying fertilizer, inhibits the algae thus reducing the supply of this free nitrogen. Surface application also is probably the most inefficient method of fertilizer application because the nitrogen fertilizer is subject to extensive losses through ammonia volatilization, nitrification-denitrification, runoff, and leaching.

Deep placement of urea is known to dramatically improve the efficiency of nitrogen fertilizer use and has been demonstrated through the labor intensive mudball technique. Practical means of deep placement in puddled rice soils, however, were not available until the recent development by IFDC of urea supergranules and briquettes. Experiments in 11 Asian countries have shown that deep placement of urea supergranules and the use of a slow-release fertilizer increases rice yields compared with conventional split application of urea.

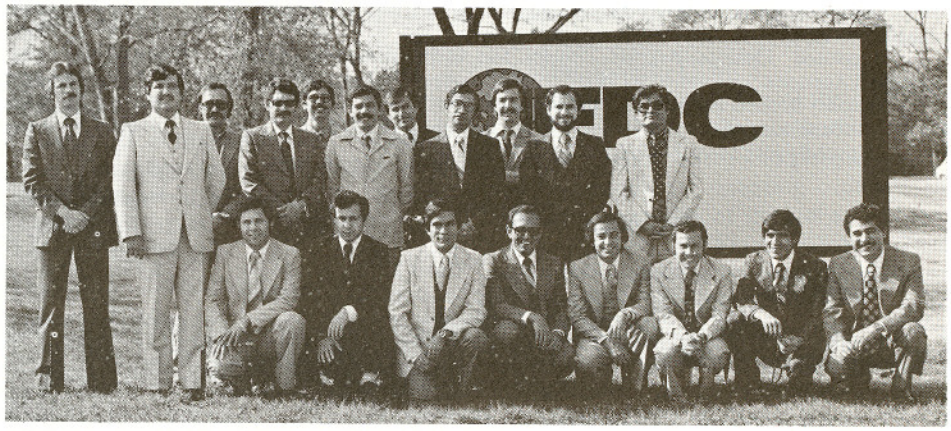
Dr. E. T. Craswell, IFDC Soil Scientist; Dr. P. A. Roger, Soil Microbiologist, Office de la Recherche Scientifique et Technique Outre-Mer; and Dr. S. A. Kulasooriya and Ms. A. Tirol, Soil Microbiologists at the International Rice Research Institute (IRRI) conducted experiments at IRRI to determine the effect of deep placement of urea on algal nitrogen fixation.

Results of these experiments indicate that surface broadcast application of nitrogen fertilizer not only inhibits nitrogen fixation but also encourages the growth of green algae which immobilize the fertilizer nitrogen, making it temporarily unavailable to the rice plant. Green algae also increase the pH of the floodwater, encouraging fertilizer nitrogen loss by ammonia volatilization. In contrast, deep placement of urea supergranules did not disturb the natural algal N_2-fixing system and permitted N_2 fixation to continue at 70% of the rate in control plots which did not receive nitrogen. Thus, deep placement provides a bonus of nitrogen to the ecosystem.

FERTIMEX– Mexican Engineers Receive Training at IFDC

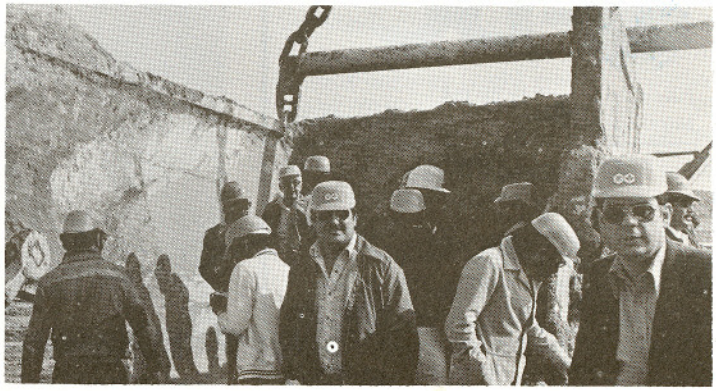
Nineteen production and maintenance engineers from FERTIMEX of Mexico attended a fertilizer production training program at IFDC Headquarters from October 15 to December 5. The program covered all phases of fertilizer production, with major emphasis on process technology, equipment design and selection, and maintenance management. Course faculty included professionals from IFDC staff plus 30 high-level managers from 20 industries and TVA's National Fertilizer Development Center.

Field trips to fertilizer companies in northern Alabama, Tennessee, Kansas, Louisiana, and Florida made it possible for the participants to see the fertilizer industry in action and to discuss problems and opportunities with local plant managers.



FERTIMEX Training Participants: (front row, left to right) Jose Karam Spencer, Rigoberto Robles Cabrera, Jose Luis Deloya Jimenez, Antonio Aguirre Pinales, Gonzalo Guillermo Almada Verdugo, Octavio R. Carrion Chavez, Noe Mora Escobedo, and Pablo Hernandez Aceves; (back row) Jose Ramon Lazo de la Vega, Ignacio Velarde Lopez, Felix Pizarro, Marco Antonio Perez Arce, Carlos Angeles, Rodolfo Castro Cardenas, Rodolfo Gonzalez Baez, Jose Israel Sastre Blanco, Luis Fernandez Posada, Manuel Muzquiz, and Juan Antonio Vazquez.

Mr. J. J. Schultz explains the roles of plant design, process, and production factors in a fertilizer quality control program.



As part of the Fertilizer Technology Phase of the FERTIMEX Training Course, the participants visited the IMC phosphate rock mine in New Wales, Florida.

PUBLICATIONS AND REPRINTS AVAILABLE FROM IFDC

Reports

"Mexico: the Fertilizer Industry," published by IFDC.

"Bolivia Fertilizer Situation and Recommendations," published by IFDC.

"Organic Nitrogen Compounds for Use as Fertilizers," published by IFDC.

"Sulfur in the Tropics," published by IFDC.

"World Fertilizer Situation and Outlook–1978-85," published by IFDC and TVA.

"Granular Urea–Advantages and Processes," published by IFDC.

"The Potential for Regional Cooperation in Fertilizer–A Methodology Study of the ASEAN Group," published by IFDC.

"Supplying Fertilizers for Zaire's Agricultural Development," published by TVA.

"West Africa Fertilizer Study (Volumes I-VII)," published by IFDC.

Volume I–Regional Overview
Volume II–Senegal
Volume III–Mali
Volume IV–Upper Volta
Volume V–Niger
Volume VI–Chad
Volume VII–Mauritania

"Economic and Technical Aspects of Fertilizer Production and Use in West Africa," T. Zalla, R. B. Diamond, and M. S. Mudahar, IFDC/MSU Working Paper No. 22, 1977.

"Ghana–Progress in Fertilizer Production, Marketing, Education," published by TVA.

"Suggested Fertilizer-Related Policies for Governments & International Agencies," published by IFDC.

"Progress Report, 1976-1977," published by IFDC.

"The Bangladesh Fertilizer Sector, 1978," published by IFDC.

"Annual Report 1978," published by IFDC.

Papers and Reprints

"Transportation and Storage of Ammonia," Travis P. Hignett, to be published in the proceedings of the Fertilizer Industry Round Table, Washington, D.C., October 30-November 1, 1979.

"Technology of Production of Fertilizers Containing Ca, Mg, and S," Travis P. Hignett, to be published in the proceedings of the Colombian Soil Science Society, Colloquium on Saline Soils and Secondary Elements in Colombian Agriculture, Palmira, Colombia, September 19-21, 1979.

"An Analysis of N Nutrition on Yield and Yield Components for the Improvement of Rice Fertilization in Korea," P.L.G. Vlek, C. W. Hong, and L. J. Youngdahl, *Agronomy Journal*, Vol. 71, September-October 1979.

"Dissolution of Phosphate Rock in Acid Soils as Influenced by Nitrogen and Potassium Fertilizers," S. H. Chien, *Soil Science*, Vol. 127, No. 6, 1979.

"Effect of Nitrogen Source and Management on Ammonia Volatilization Losses from Flooded Rice-Soil Systems," P.L.G. Vlek and E. T. Craswell, *Soil Science Society of America Journal*, Vol. 43, No. 2, March-April 1979.

"A Comparison of Various Laboratory Methods for Predicting the Agronomic Potential of Phosphate Rocks for Direct Application," S. H. Chien and L. L. Hammond, *Soil Science Society of America Journal*, Vol. 42, No. 6, November-December 1978.

"Bench-Scale Studies of Utilization of Problem Rocks in Wet-Process Phosphoric Acid Production," A. Varsanyi, E. B. Winn, and P. H. Peng, Proceedings of ISMA Technical/Economic Conference, pp. 133-149, Orlando, Florida, October 23-27, 1978.

"Reactions of Phosphate Rocks, Rhenania Phosphate, and Superphosphate with an Acid Soil," S. H. Chien, *Soil Science Society of America Journal*, Vol. 42, No. 5, September-October 1978.

"Interpretation of Bray I Extractable P from Acid Soil Treated with Phosphate Rocks," S. H. Chien, *Soil Science*, Vol. 126, No. 2, Aug. 1978.

"Effects of Solution Chemistry and Environmental Conditions on Ammonia Volatilization Losses from Aqueous Systems," P.L.G. Vlek and J. M. Stumpe, *Soil Science Society of America Journal*, Vol. 42, No. 3, May-June 1978.

"Fate of Fertilizer Nitrogen Applied to Wetland Rice," E. T. Craswell and P.L.G. Vlek, *Nitrogen and Rice*, Symposium proceedings, International Rice Research Institute, Manila, Philippines, 1978.

"Needed Information and Economic Analysis for Fertilizer Policy Formulation," M. S. Mudahar, Presented at FAO/FIAC Seminar on Fertilizer Pricing Policies and Subsidies, Bangkok, Thailand, 1978.

"A Simple Chemical Method for Evaluating the Agronomic Potential of Granulated Phosphate Rock," S. H. Chien and L. L. Hammond, *Soil Science Society of America Journal*, Vol. 42, No. 3, May-June 1978.

"Dissolution of Phosphate Rocks in Flooded Acid Soil," S. H. Chien, *Soil Science Society of America Journal*, Vol. 41, No. 6, Nov.-Dec. 1977.

"Thermodynamic Considerations of the Solubility of Phosphate Rock," S. H. Chien, *Soil Science*, Vol. 123, No. 2, 1977.

"Dissolution Rates of Phosphate Rocks," S. H. Chien, *Soil Science Society of America Journal*, Vol. 41, No. 3, May-June 1977.

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