

CIAT PROJECT UNDERWAY—

Utilization of Phosphate Fertilizers in Latin American Soils

As part of a collaborative research project between IFDC and the International Center for Tropical Agriculture (CIAT) on phosphate fertilization of tropical soils in Latin America, IFDC Soil Scientists, Dr. William Fenster and Dr. Alfredo Leon have been stationed at CIAT in Cali, Colombia.

The Project, financed for its first 2 years of operation through a grant from Canada's International Development Research Centre (IDRC), is a continuation of IFDC research on the mechanisms affecting the rate of dissolution and residual availability of P from a variety of phosphorus sources used on acid soils of Latin America, initiated at CIAT in 1975.

In the IDRC-financed research phase, IFDC soil scientists, in collaboration with CIAT Soil Scientist, Dr. James Spain, are expanding past research efforts to determine the effect of P placement, granule size, addition of acid-forming materials to phosphate rock, and soil variations on phosphorus availability to the plant.



IFDC staff viewing field experiments at CIAT are (from left to right): Dr. William Fenster, Dr. William Bishop (Director, Agro-Economic Division), Dr. Robert Smith (Regional Coordinator—Latin America), and Dr. Alfredo Leon.

The IFDC-CIAT team members on the Phosphorus Project will evaluate a number of potential phosphorus sources on a variety of different crops, such as cassava, beans, rice, grass, and leguminous forages. In addition to research in Colombia, regional projects with national

institutes in several other Latin American countries are planned. Project activities at CIAT are coordinated with pilot-plant, laboratory, greenhouse, and economic research activities carried out by IFDC's phosphorus research staff at Headquarters.

AUGUST 14 TO SEPTEMBER 22, 1978

IFDC Marketing and Distribution Course Scheduled

The second IFDC Fertilizer Marketing and Distribution Course is scheduled for August 14 to September 22, 1978, at the Headquarters in Muscle Shoals. The course is designed primarily for managers and planners responsible for the distribution of fertilizers from the factory or receiving location to farmers or segments of that distribution system.

"The main thrust of the course," according to Mr. Carl Amstrup, IFDC Training Coordinator, "will be in integrated marketing concepts with concentration on transportation and distribution systems." In addition, participants will receive a brief update on the world fertilizer situation, instruction on organizational development, and field trips to selected distribution facilities in the United States.

To receive a special brochure on the course and other information, contact Mr. Carl Amstrup, Training Coordinator,

Outreach Division, via mail, telephone or telex. Register early as enrollment is limited.

MARKET DEVELOPMENT IN MEXICO—

Technical Assistance to World Bank

Fertilizantes de Mexico (FERTIMEX), formerly known as GUANOMEX, has asked the World Bank to finance a major portion of the foreign exchange cost for the construction of a fertilizer facility at Lazaro Cardenas, Mexico, to produce diammonium phosphate, compound NPK fertilizers, ammonium nitrate, and phosphoric acid.

The World Bank, as part of its evaluation of the FERTIMEX loan application, requested IFDC's assistance in evaluating the domestic marketing prospects for the

output of this facility in relation to Mexican demand for the above products.

Mr. John M. Hill, IFDC Marketing Specialist, spent several weeks evaluating the marketing potential of products from the Lazaro Cardenas project. His report, which concluded that the products from the proposed facility, tentatively scheduled to come on stream in 1981, are needed to meet the demand within Mexico, will help the World Bank determine its position regarding the loan request.

Improving Effectiveness of Phosphate Fertilizers in Tropical Soils

The key to the development of more efficient phosphate fertilizers for acidic tropical soils is the understanding of basic phosphate reactions in the soil and the factors which control them. Such information is essential for establishing criteria for the development of more effective phosphorus fertilizers and more efficient utilization of existing fertilizers in developing countries.

IFDC Soil Scientists, L. L. Hammond and S. H. Chien, are conducting laboratory and greenhouse studies to develop information needed for the rational design of improved phosphate fertilizers for P-deficient soils in the tropics.

Dr. Hammond of the Agro-Economic Division was involved in the previous field research in Colombia which led to the development of the collaborative IFDC-CIAT phosphorus project. His present activities include laboratory and greenhouse research to determine the agronomic effectiveness of fertilizer materials as influenced by soil properties, crop type, and levels of management. Experiments are now underway to



Dr. Larry Hammond (far left) explains his research program during recent IFDC Board meeting. Also pictured (from left to right) are: Dr. George Cooke, Dr. John Malcolm, Mr. Owen Livingston, Dr. Webster Pendergrass, and Dr. Robert Wagner.

evaluate the initial and residual phosphorus availability of phosphate materials with a range of acidulation and granulation treatments.

Dr. Chien of the Fertilizer Technology Division is focusing his research on the development of an improved understanding of the chemical properties of

phosphate fertilizer materials as related to their potential to provide available phosphorus to the plant. Substantial information has already been collected on the factors controlling dissolution of phosphate rocks, the solubility of granulated phosphates, and the properties of modified phosphates.

IFDC PILOT-PLANT RESEARCH UNITS—

Engineering Research Program Gaining Momentum

Engineering pilot-plant facilities provide the backbone to many IFDC programs. Through these small- and intermediate-scale research units, engineers are able to improve process operations, produce materials for agronomic testing, and provide training under safe operating conditions.

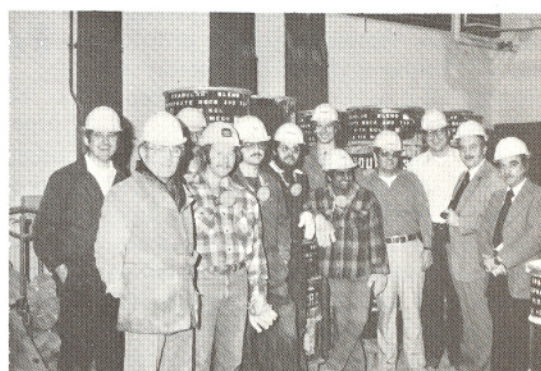
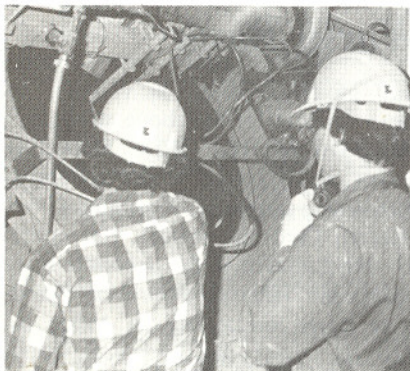
The first of a battery of pilot plants began operation in January. Its first assignment involved the granulation of phosphate rock. This intermediate-scale unit is capable of producing a variety of granule sizes from the minigranule (minus 50- plus 200-mesh) to the conventional bulk-blend material (minus 6- plus 16-

mesh). This plant can granulate a number of materials such as phosphate rock or soluble salts--ammonium sulfate and potassium chloride--into materials suitable for bulk blending.

IFDC researchers and engineers have demonstrated that the granulation of finely divided phosphate rock (less than 200-mesh) with small quantities of soluble salts in an intensive mixer can produce minigranules with good handling and application characteristics. Greenhouse tests of minigranules have shown agronomic effectiveness similar to finely ground material.

Preliminary tests have been made using acids as binders to promote granulation and, at the same time, produce some portion of the phosphate product in an available form. This approach may prove helpful in increasing the agronomic suitability of less-reactive phosphate rocks found in many developing countries.

Perhaps equally important, the use of an acid binder produces heat that has the potential of eliminating the need for the drying and cooling steps in minigranulation. This could be very significant in fuel-short countries, especially if by-product acid is available.



IFDC recently completed its first production run of granular phosphate rock for testing. Appearing in the picture on the right are (from left to right): Mr. James Schultz, Dr. Paul Stangel, Mr. Jerry Clemmons, Mr. Dwight Cline, Mr. Alan Nix, Mr. Joao Cardoso, Mr. Russell Dittrich, Mr. Prakash Acharya, Mr. Jorge Polo, Mr. George Bolds, Dr. Donald McCune, and Mr. Owen Livingston.

Economics of Phosphate Rock for Direct Application

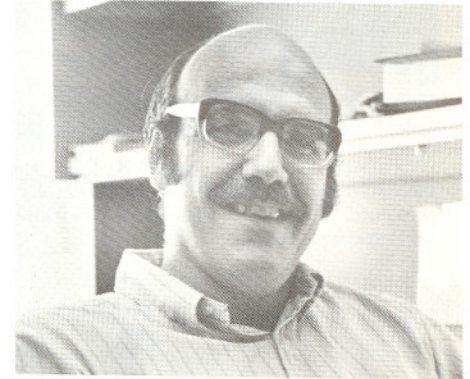
Increasing costs associated with the extraction, processing, and distribution of P_2O_5 and the problems of “phosphorus fixation” associated with the use of soluble-P fertilizers on certain tropical soils will likely deprive large tropical farming areas of adequate fertilization for productive agriculture. These situations underlie the interest in using lower-cost forms of P in tropical soils. One such material under economic evaluation is finely divided phosphate rock (PR) for direct application.

Recently, an IFDC Economist, Dr. Surjit S. Sidhu, developed a framework to evaluate various sources of P. His model captures the “residual effects” of P_2O_5 from the different materials, which are discounted and expressed in present values.

The initial cost advantage that a unit of P_2O_5 has as PR over the more highly manufactured TSP can be eroded away in cases where marketing costs represent a large part of actual farm-gate prices. Since PR involves more weight per unit of P_2O_5 than TSP, the most promising market for at least reactive forms of this material appears to be in areas where intended markets are in relative close proximity to PR deposits. It also appears, based on Dr. Sidhu’s preliminary research, that the higher the cost of a unit of P_2O_5 , the greater the initial cost advantage of PR over TSP. Thus, the attractiveness of PR for direct application in certain situations will grow in the years ahead.

The importance of in-depth research on the economics of phosphate rock

for direct application has been emphasized through the recent appointment of Dr. A. John De Boer, Production Economist. One of Dr. De Boer’s research assignments is to provide additional emphasis in this area.



Economist John De Boer

UTILIZATION OF INDIGENOUS RESOURCES—

Wet-Process Phosphoric Acid Research Program

The production of phosphoric acid for fertilizer via the wet-process “gypsum” method has been practiced commercially for over a century. The basic production scheme involves acidulating phosphate rock with sulfuric acid and filtering off the resulting calcium sulfate (gypsum) and other insoluble impurities.

A variety of processes with basic similarities but with different degrees of sophistication are used to produce phosphoric acid with concentrations ranging from 30 to over 50% P_2O_5 . The quality of wet-process phosphoric acid production is heavily reliant on the quality of the phosphate rock used as a feedstock.

Most existing wet-process acid technology is designed to use calcium-type phosphate ores. Considerable interest exists in countries which have so-called problem ores (high in silica, iron and aluminum, or carbonate) for the development of process modifications and/or operating techniques to permit satisfac-

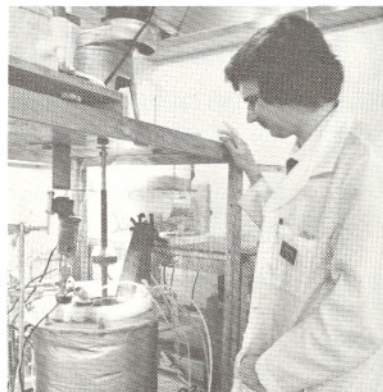
tory and economical use of these ores.

IFDC’s wet-process phosphoric acid research program, under the leadership of Mr. Andre Varsanyi, has the facilities and staff to evaluate a wide range of phosphate ores and make recommendations regarding their use as a production feedstock. Two research production units—a laboratory-scale unit (400 g/hr) and an intermediate-scale pilot plant (10 kg/hr)—are capable of performing the functions encountered in a commercial-scale acid plant. These units permit engineers to obtain detailed parameters which can be reliably extrapolated to larger plants.

In addition to serving as an impartial, and economical source for technical evaluations of developing country ore deposits for use in phosphoric acid production, IFDC has launched a study program to determine the feasibility of developing an economically viable and technically simple small-scale phosphoric

acid production unit (10 tpd) which can be constructed at a fraction of the cost of conventional-scale units (600 tpd). Such small-scale units may represent an appropriate alternative for countries where phosphate rock deposits are small and scattered, where international trade is difficult, and where market and foreign exchange conditions do not permit large-scale units to use materials that are common to developing countries.

The wet-process acid research group is also looking at ways to recover P_2O_5 from byproduct waste materials such as from slimes produced during conventional mining and beneficiation methods of phosphate ores. Researchers have already developed a method to recover most of the P_2O_5 found in certain slimes generated when ores are upgraded. Such recycling of industrial waste materials would improve environmental conditions as well as stretch the life of nonrenewal resources.



IFDC staff members of many nationalities are carrying out wet-process phosphoric acid research. Pictured in left photo (from left to right) are: Mr. Prakash Acharya, Mr. Barrie Winn, Miss Barbara Jamieson, Mr. Andre Varsanyi, and Dr. Peter Peng. Center photo, Mr. Bill Lawton. Right photo, Miss Teresa Boswell.

NEW DELHI, INDIA—

1977 FAI-IFDC Fertilizer Seminar



Seminar keynote speakers—Dr. John Hannah, IFDC Board Chairman, and Hon. H. N. Bahuguna, Minister of Chemicals, Fertilisers, and Petroleum, India.



NITROPHOSPHATES AND BULK BLENDS— Technical Assistance to MONOMEROS

At the request of Monomeros Colombo-Venezolanos (MCV), IFDC Chemical Engineer, Mr. M. T. Frederick, traveled to Colombia to provide technical support for improving operational efficiency in the MCV nitrophosphate plant and bulk-blending facility.

The nitrophosphate facility, located at Barranquilla, is part of an industrial complex initially constructed for the production of caprolactam. The fertilizer plant was installed to utilize the byproduct ammonium sulfate from the caprolactam production. IFDC provided technical assistance in ways to improve process operations, maintenance procedures, and quality control.

The MCV bulk-blending facility, also at Barranquilla, is using some refurbished equipment purchased from Colombia's Caja Agraria. Although the equipment is quite old, it is generally in good condition and should enable MCV to produce high-quality bulk blends. Recommendations

Under the direction of Mr. Satya Nand, Executive Director of The Fertiliser Association of India, IFDC cosponsored the 1977 annual FAI Seminar with the theme "Trends in Consumption and Production." IFDC coordinated the preparation of 17 papers for the seminar authored by IFDC staff members as well as by fertilizer experts from a number of public and private national and international organizations.

were made to assure that MCV bulk blends were of the highest possible quality to counteract previous consumer

resistance associated with powdered products of low analysis and poor physical quality.

PUBLICATIONS AVAILABLE FROM IFDC

"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 VI—Chad

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

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

"Progress Report, 1975-1976," published by IFDC.



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