IFDC report

Vol. 2–No. 3
Sept. 1977

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

Recent Grants in Support of IFDC Programs

Two grants totaling $361,000 have recently been awarded IFDC.

The largest of the two grants, $311,000 from **Canada's International Development Research Centre (IDRC)**, was extended in support of a two-year collaborative research project with the Centro Internacional de Agricultura Tropical (CIAT) on the efficient utilization of phosphate fertilizers in acid soils of the tropics and subtropics.

A large proportion of the current and potentially arable land in the tropics is strongly acidic. In such soils, the phosphorus retention capacity is often high and the immediate rate of recovery of fertilizer phosphorus by the plants is usually very low.

Saturation of the phosphorus retention capacity by means of soluble P fertilizers is often uneconomical at present. However, the utilization of lower-cost phosphorus sources, such as phosphate rock, basic slag, fused magnesium phosphate or Rhenania phosphates, offers opportunities for meeting phosphorus requirements at lower costs.

The IFDC-CIAT project consists of coordinated field, greenhouse, and laboratory experiments aimed at evaluating the initial and residual effectiveness of various P sources and application methods. The basic research will be carried out at CIAT and at locations

(continued page 2)

Collaborative Research— Korean Institute of Science and Technology

IFDC and the Korean Institute of Science and Technology (KIST) have entered into a cooperative research project to develop a controlled-release fertilizer based on urea with nutrient release characteristics that more closely match the needs of rice varieties common to Korea and to other Asian countries.

The scope of work outlined includes the study of various methods to form polymer coatings on conditioned and unconditioned granular urea. Tests will be conducted on the factors that affect nutrient release rates (coating weight, degree of polymerization, catalyst-type, etc.). Efforts have been planned on ways to overcome the hydrophobic character of polymer coating (such as on sulfur-coated urea) that tends to cause the particles to float away from the point of application. Researchers will be looking for methods to incorporate hydrophilic material in the polymer coatings to alleviate this problem and for ways to vary the nitrogen release pattern from the granules. Other studies include evaluations of alternative sealants for sulfur-coated urea, as well as an evaluation of the minimum coating thickness necessary to make urea compatible with superphosphate for bulk blends.

Experimental quantities of these improved materials will be produced for testing in greenhouses and farm-level

(continued page 2)

AGRO-ECONOMIC AND OUTREACH—

Administrative Appointments

Acting directors for the Agro-Economic and Outreach Divisions have recently been nominated by Don McCune, IFDC Managing Director.

Dr. William D. Bishop has been named to the Agro-Economic Division post, replacing Dr. Per Pinstrup-Andersen, who accepted a position at the Royal Agricultural University, Copenhagen, Denmark. Dr. Bishop has held positions as Agronomist, Assistant, Associate, and Dean of the Agricultural Extension Service at the University of Tennessee. His responsibilities included field demonstration and practical research activities. He had the assigned responsibility of working directly with the Agricultural Experiment Station staff in research evaluation and implementation. Bishop completed his Ph.D. at Purdue University in 1956 with a major in soil fertility and minors in agricultural economics, statistics, and plant pathology. At IFDC, Dr. Bishop has the responsibility for coordination and execution of Agro-Economic Division research programs.

Dr. Dennis H. Parish, formerly IFDC Regional Coordinator for Asia, now heads the Outreach Division. He is replacing Donald Waggoner, who accepted a senior chemical engineering position with TVA's ammonia-from-coal project. Parish completed his Ph.D. in 1965 at Queens University, Belfast, Northern Ireland. Parish has worked as Chief Chemist at the Sugar Industry Research Institute, Mauritius; Professor and Department Chairman at the University of East Africa, Uganda; and FAO Regional Fertilizer Program Leader, first for Africa and later for Asia and the Far East. As Outreach Division Director, Parish is responsible for coordinating and executing IFDC activities in technical assistance, training, and transfer of technology.

Dr. Bishop

Dr. Parish

Grants–(continued)

outside Colombia in collaboration with national institutions.

ICL Grant

A $50,000 unrestricted grant to core budgets was recently received from **Israel Chemicals Ltd. (ICL)** in support of IFDC technology research to assure that appropriate chemical fertilizers and fertilizer know-how are available to the developing countries in their quest to feed their people.

KIST–(continued)

demonstrations. Data and methodology for the manufacturing of improved materials will be developed to permit scale-up to larger production facilities.

The initial KIST-IFDC project runs through August 1978 and is financed equally by both institutions. IFDC is providing experimental materials, specialized pieces of equipment, and technical backstopping. Additionally, IFDC will carry out complementary research at headquarters to support the overall project objectives. Dr. Moon at KIST and Mr. Bob Horn at IFDC are coordinating the research at their respective institutions.

BETTER USE OF BYPRODUCT MATERIALS–

Granulation of Soluble Salts

A granulation process to allow better utilization of industrial byproduct ammonium sulfate and potash fines is being developed at IFDC.

Since the tropics and subtropics are characterized by many diverse microenvironments characterized by different soils, rainfall, temperature, and land use, it is agronomically desirable to custom blend the fertilizer formulation to more closely match the nutrient requirements for a given crop and site. In recent years, the fertilizer industry has turned increasingly to physical mixing or bulk blending of plant nutrient sources in order to formulate a wide variety of fertilizer grades.

Most fertilizer materials today can readily be processed into solid granular products. However, no really acceptable method has been developed for salts, such as ammonium sulfate and potash fines although both materials are generated in sizable quantities through manufacturing activities. For example, in the manufacture of caprolactam, a key material for making synthetic fibers, up to 4 tons of poor quality ammonium sulfate is produced for every ton of caprolactam.

In the case of potash, the flotation process produces substantial quantities of byproduct fines which currently have to be compacted to get fertilizer grade product. The current recycling method is capital intensive and produces irregular shaped particles that are less than optimal for bulk blending.

IFDC's new experimental process for the granulation of salts uses process machinery very similar to that used in the steam granulation process. Finely divided salt is premixed with water and a binder, such as ground phosphate rock, carbon black, or limestone. The moist mixture is fed to a pan or rotary drum granulator where it is agglomerated and compacted into granules. The still moist granules are dried and sized. Adequate strength was achieved by using an inert, insoluble binder with high surface area.

The most important process variables affecting the granulation characteristics of the salts were mixing time and intensity, size distribution of the salt, and moisture content of the wet blend. The mechanical strength of the product was mostly affected by the size distribution

MINIGRANULATION TECHNOLOGY–

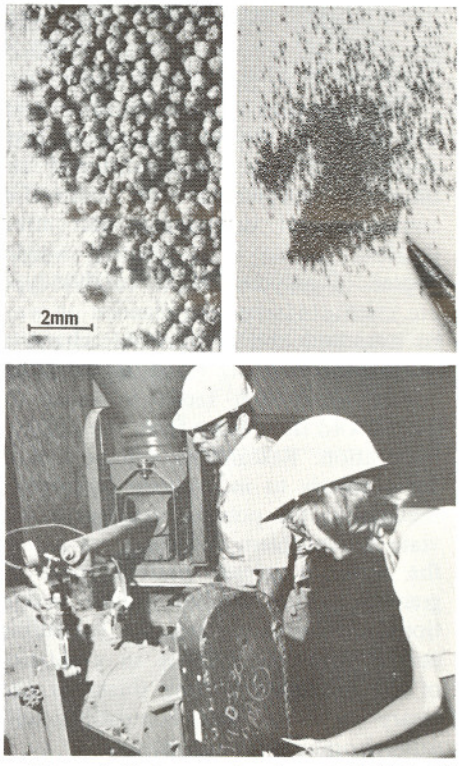
Phosphate Rock for Direct Application

Historically, the use of phosphate rock for direct application has been a subject of controversy and unpredictable value to agriculture. Much of this controversy stemmed from a lack of understanding that phosphate rocks differed widely in their reactivity or suitability for use in direct application. It has now been established that highly reactive, finely ground phosphate rocks approach the effectiveness of soluble P fertilizers, especially if residual crop response is considered.

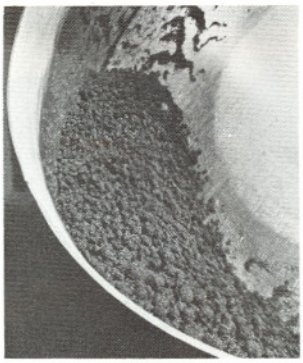
The use of reactive phosphate rock for direct application instead of soluble P fertilizer is attractive for several reasons: capital and operating requirements are relatively small, and the technology is simple and can be labor intensive. The major obstacles to more widespread utilization of reactive phosphate rocks have been the troublesome problems of transporting, handling, and applying the dusty, finely ground material.

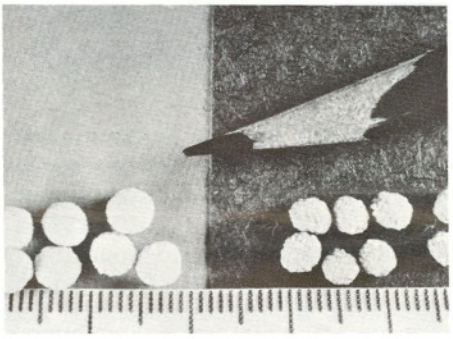
Since agronomic data indicate that phosphate rock should be applied to the soil in a finely ground form to obtain maximum contact between the rock and the soil solution, IFDC is looking at ways to improve the physical characteristics of phosphate rock for direct application without sacrificing agronomic effectiveness. Several approaches are being evaluated, such as treating the rock with a dust suppressant, mixing the rock with water to form a stabilized suspension, and minigranulation to sizes that range between 50- and 200-mesh.

Recent research at IFDC has centered on the production of "minigranules" (minus 50- plus 200-mesh). Water solutions of magnesium sulfate, potassium chloride, and urea were used for binding the finely divided rock particles. The physical properties of the minigranulated material indicate that it can be handled and stored without excessive dust problems. Preliminary laboratory tests indicate that the minigranules are as soluble in the soil as the original finely ground material. IFDC technologists are now looking at the cost and production parameters of producing larger quantities. Agronomic testing is underway in IFDC greenhouses and at CIAT.



The principal researcher in granulation of finely ground phosphate rock is Jorge Polo shown above testing process equipment.





Visiting Scientist S. Carmon (shown above) has been the principal investigator in the research on granulation of soluble salts. IFDC has applied for a patent on this new process. Examples of granulated materials–AS (left) and KCl (right)–are shown in picture on the right.

of the salt, binder content and surface area, and product size. A stronger product was produced when coarse salt powder was used, although a limit was reached when the size of the salt particles exceeded 30-Tyler mesh, beyond which granulation was poor.

On the basis of laboratory data, a short-term, commercial-scale test demonstrated that well-formed granules with acceptable strength can be produced with this process for use in bulk blends. Additional pilot- and commercial-scale testing will be required to optimize the process and to determine the engineering and commercial feasibility.

Uruguay— Technical Assistance to CALFORU

At the request of the Cooperative League of the USA (CLUSA), IFDC Regional Coordinator R. T. Smith and CLUSA Consultant Harold Jordan traveled to Uruguay in June to assist the Cooperativa Agropecuaria Limitada de Sociedades de Fomento Rural (CALFORU) in an assessment of its fertilizer demand and supply alternatives.

Currently, CALFORU has approximately 200 local cooperative association members, half of which handle fertilizer. In 7 years since CALFORU began to sell fertilizers to member co-ops, it has become the fourth largest fertilizer distributor in Uruguay, relying almost entirely on imported materials. Currently, CALFORU only supplies a portion of total member demand (around 50% in 1977). The remaining fertilizer requirements are purchased directly by individual cooperatives, usually from Uruguayan producers.

Recommendations were made to CALFORU regarding the management of their current fertilizer distribution operations, the establishment of long-term contractual arrangements for supply sources, and the possibilities for entering into actual production.

FERTILIZER DISTRIBUTION SEMINAR

A 9-week seminar on fertilizer distribution began in August for 19 participants representing 10 different countries and organizations.

The seminar goal is to increase the participants' knowledge of fertilizer marketing concepts with particular emphasis on physical distribution systems. A "systems approach" is being used to analyze and develop methods of marketing and distribution to fit agricultural conditions in the participants' countries.

The importance in the developing countries of improving efficiency in the distribution of fertilizer (and other agricultural inputs) is underscored by the significant portion of the farmer's cost of fertilizer that is related to distribution–sometimes exceeding 50% of the total cost of fertilizer. Seminar participants hope to identify more effective ways to ensure that the right kind of fertilizer is on hand at the right time and place and to convince the farmer that he should buy and use such materials.

Included in the seminar program are presentations by IFDC staff members, as well as guest lectures by staff from TVA, World Bank, U.S. universities, fertilizer industries, and agricultural finance organizations. Numerous field trips to see fertilizer distribution in the United States in action are included in the program.

Attending the Seminar are Nils Stalbrand, FAO; Zsolt Banyai, Hungary; Asmatullah Yakuby, Afghanistan; Ahmed Ali, Afghanistan; Cheong Kai Yong, Malaysia; Shaul Fogel, Israel; Joseph Lastigzon, Israel; Baladeva Mediwake, Sri Lanka; Smag Perera, Sri Lanka; Lineu C. Cruz, Brazil; Amin Uzzaman Choudhury, Bangladesh; A. Anwarul Haque, Bangladesh; Abdul Quader, Bangladesh; Mozammel Hossain, Bangladesh; Khurshidur Rahman, Bangladesh; Rafique Uddin Ahmed, Bangladesh; Shamsul Alam, Bangladesh; Amir Perez, Mexico; and Jose Gomez, Dominican Republic.

Brazil— Technical Assistance to CRA

During July and August, three Brazilian engineers, Mr. Jorge Soirefmann, Mr. J. Leonel Costa, and Mr. Eduardo Anselmo, from the Companhia Riograndense de Adubos (CRA) underwent a training program at IFDC and TVA to help prepare the engineers for the startup and operation of a new MAP granulation plant being constructed in the port city of Rio Grande.

As part of the program, the engineers visited phosphate complexes in North Carolina and Florida which produce phosphoric acid, MAP, DAP, and TSP and NPK granular fertilizer plants in Missouri, Alabama, and Mississippi.

In the final phase of this assistance, IFDC will arrange for qualified engineers to assist CRA in developing training programs for the personnel working in the new MAP facility.

Word Processing Center

IFDC's Word Processing Center (WPC), equipped with magnetic card memory typewriters, serves the entire staff in the typing of correspondence, memoranda, and reports. Material is channeled into WPC from administrative secretaries in the different divisions and administrative offices.

Through the use of specialized typewriting equipment, secretaries are able to perform their jobs more efficiently. As information is typed, it is stored in memory. Once entered into memory, typed information can be recorded on magnetic cards. Drafts are returned to authors for changes and/or approval. Where necessary, changes are made without the need for extensive retyping, as only the changes need to be typed. All other copy is automatically played out from memory.

The center is able to handle the letters, memoranda, and reports which require quality work and quick turnaround. WPC also has a centralized dictation system. Two types of dictation flow into this system. Originators can dictate via telephone in their office or home or while traveling at any hour of the day or night. Additional dictation arrives from portable dictation recorders that are compatible with the central system.

Much of the editing, layout, and preparation of written materials for publication is also handled in the WPC. Newsletters, reports, brochures, booklets, and manuals are prepared and sent "camera ready" to the printers. WPC also maintains, classifies, and updates IFDC mailing lists and takes care of the distribution of IFDC publications.

By centralizing much of the typing activities of IFDC in WPC and through the use of the specialized office equipment, IFDC is better able to efficiently handle the demand, as well as maintain consistent standards in preparation of written materials. The WPC results in greater economy than do traditional methods used to handle typing requirements within scientific organizations.

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

"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.

New Publication–Fertilizer Policies

IFDC has recently published a report, "Suggested Fertilizer-Related Policies for Governments and International Agencies," which discusses policies related to raw materials; production, marketing, and distribution; measures to increase use; manpower utilization and training; and investment and financing. The report was edited by T. P. Hignett and includes the contributions of numerous individuals.

IFDC

Published Quarterly by the
International Fertilizer Development Center

Christopher Dowswell, Editor

P.O. Box 2040
Muscle Shoals, AL 35660, USA
Phone No. (205) 381-6600
TWX-810-731-3970 IFDEC MCHL

PRINTED MATTER

BULK RATE
U.S. POSTAGE
PAID
FLORENCE, ALA.
PERMIT #525