IFDC report

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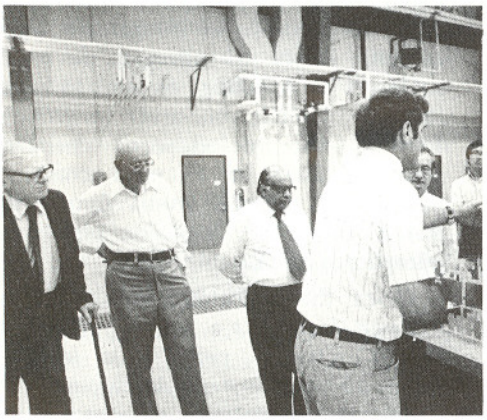
June 1977

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

IFDC BOARD REVIEWS PROGRAMS



The IFDC Board of Directors included 3 days of program review and discussion with staff members during their May Board Meeting held in Muscle Shoals, Alabama. Board members toured the new headquarters complex which is nearing completion. Work is now underway in several laboratories, as well as the headhouse/greenhouse.

John Hannah, IFDC Board Chairman, in closing the review, told the staff, "This excellent research and development and training facility is nearly complete; your next accomplishments will come from progress in your plans of work. The program you have laid out is ambitious. If you achieve your goals, this Center can make a significant contribution to national and international efforts to feed a hungry world."

Eight Bangladesh Chemical Industry Corporation (BCIC) engineers completed a 1-year "fertilizer factory maintenance and instrumentation course" at IFDC in May. In addition to utilizing their new knowledge in their regularly assigned work, they will also carry out training and development programs for other personnel at BCIC fertilizer factories. From left to right are: Rukun Uddin Ahmed, A.H. Md. Serajul Haque, Saifullah Majumder, Taibur Rahman, Md. Abu Hassan, Md. Mozaherul Alam, Md. Abdur Rab, and Mohammad Humayun.

Distribution Seminar Begins In August

The primary thrust of IFDC's Fertilizer Distribution Seminar, to be held at headquarters in Muscle Shoals, Alabama, August 15 to October 14, 1977, is in the development of physical distribution systems. Included under this topic will be product handling, warehousing, transportation, packaging, inventory control, imports and exports, and other key factors essential to the successful operation of distribution systems.

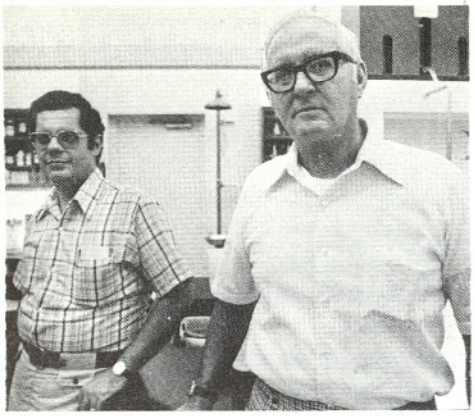
Participants will also receive the latest supply/demand information on world, regional, and country fertilizer situations. In addition, marketing functions will be covered, including management, consumer identification and evaluation, promotion programs, and credit availability and use.

A field trip is planned to Florida to see phosphate mining, beneficiation, manufacturing, and distribution installations. A similar field trip to Louisiana and other southern states will follow nitrogen fertilizers from the factory to the farmer.

Seminar lecturers will come from IFDC, TVA, FAO, the World Bank, U.S. universities, and U.S. and international fertilizer manufacturing and distribution companies.

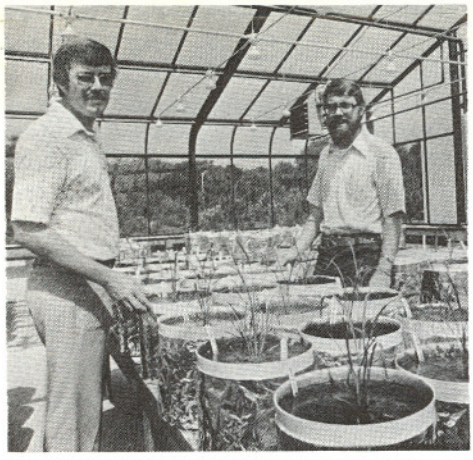
Registrations thus far include middle and upper management people from companies or government institutions in Bangladesh, Afghanistan, Sri Lanka, Hungary, Brazil, Colombia, Morocco, and Venezuela. Although enrollment is limited, a few openings still remain. Those interested in attending should contact Carl Amstrup, IFDC Training Coordinator, immediately for additional details on seminar subjects and costs.

NITROGEN PRO



The first task in nitrogen technology research assumed by Chemical Engineer Jorge Polo and Chemist Robert Horn involves looking at ways to modify and economically manufacture urea products with nutrient release characteristics that are more closely matched to crop requirements.

Soil Scientist Paul Vlek and Analytical Chemist John Stumpe are engaged in laboratory, growth chamber, and greenhouse experiments on nitrogen loss mechanisms. Research on ammonia volatilization, denitrification, and leaching of fertilizer nitrogen is underway.



Soil Scientist Eric Craswell and Greenhouse Supervisor Bernie Byrnes are involved in greenhouse experiments on nitrogen balances. The initial emphasis in this research is on developing and testing techniques under greenhouse conditions to measure the timing and pathways of nitrogen losses. Later these techniques will be transferred to field experiments.

Adequate supplies of nitrogenous fertilizers are essential to meeting the food requirements of an expanding world population. Food crop demand for nitrogen has long gone beyond the ability of known natural fixation sources of nitrogen to meet needs. Since the majority of the world's major food crops are nonlegumes, sizable yield increases can be gained from the use of fertilizer nitrogen. Unfortunately, substantial losses of fertilizer nitrogen often occur where existing materials are applied to the soil, depending on the type of material applied, crop, agroclimatic conditions, and cultural practices employed.

Research done to date in the tropics and subtropics has not produced a full understanding of the nitrogen/soil/water/plant interactions under various environmental conditions. Gaining such knowledge and relating this to losses incurred through use of present-day fertilizers is basic to IFDC efforts to improve nitrogen efficiency. It is hoped that these studies will help establish criteria for the manufacture of new or modified nitrogen fertilizer materials with greater use efficiency for developing country agriculture, especially among small farmers.

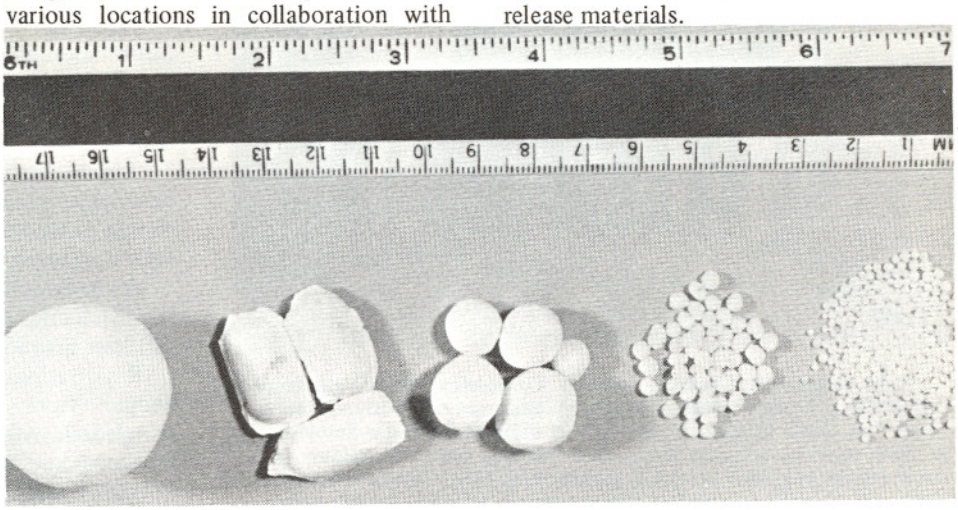
Researchers are working to improve information on the mechanisms of nitrogen losses, particularly the magnitude of losses by pathways. Activities cover the spectrum from laboratory experiments to applied field trials. Research at headquarters will be closely integrated with field experiments at various locations in collaboration with national and international institutions. Although the initial crop focus is on rice, research on other important food crops is also planned.

Emphasis on Urea

In the developing countries urea is the major source of fertilizer nitrogen. Although urea is an inexpensive high-analysis source of nitrogen, it poses problems in handling, storage, and use in hot, humid, or arid conditions. Further, due to undesired chemical reactions, urea in its most common prilled and granular forms cannot be mixed with TSP, a major source of phosphorus for rice cultivation.

Given the importance of urea as a nitrogen fertilizer, a major portion of IFDC's nitrogen program is initially being directed toward developing and transferring technology to improve its use efficiency and handling properties. Two general approaches are being pursued: controlling nutrient release and development of materials for deep placement, either by hand or through the use of simple equipment.

Granulation of urea, an existing technology, offers several advantages over the prilling of urea: pollution control is easier and more effective than with the prilled urea process; the particle size can be adjusted to produce bulk-blend grades; supergranules (very large particles) can be prepared in the same equipment with minor process changes; and it is an excellent substrate for coating with sulfur or other materials to obtain controlled-release materials.



Pictured here are some of the various urea materials being evaluated for use efficiency. Different sizes, shapes, treatments, and coatings are being tested to compare the performance of these modified materials.

OGRAM

Controlling Nutrient Release

The best-known controlled-release type fertilizer currently available for transfer is TVA's sulfur-coated urea (SCU). This material, which is a free flowing, nonhygroscopic material, goes a considerable way toward meeting the needs for a single application material for rice and various long-season crops. For rice, it is applied in one broadcast treatment at the time of the final harrowing of the paddy and is particularly apt for the typical Asian farmer who has problems of water and fertilizer management. Additionally, SCU, unlike urea, can be mixed with TSP; thus, it could be used as a basis for the development of balanced fertilizers for rice production.

Although the technology of coating granular urea with sulfur is relatively simple, the coating represents a substantial additional cost (at least 30%) over basic urea nitrogen. Thus, its value at the farm level depends upon the economics of its use when compared with conventional urea. IFDC researchers are looking at ways of reducing SCU's cost and improving its performance. Variations in granule size, surface characteristics, and surface coatings are being studied.

Materials for Deep Placement

Researchers are looking for economical ways to produce urea in forms adaptable to deep-placement application. The production of supergranules is one approach. Because the cost of treating or coating the surface area of a larger urea granule is less per unit of weight than a smaller granule, detailed studies on methods to produce "supergranules" with surface treatments and coatings that retard the release (and loss) of nutrients are underway.

Researchers are also experimenting with urea "briquettes." Briquettes are prepared by compacting almost any form of urea, including offsize material. The size and shape of briquettes can be varied with good uniformity in both characteristics. Briquettes are not good substrate material for coating because of their surface properties, but their weight can be more accurately controlled than can the weights of supergranules.

Three Indonesian engineers from P. T. PUSRI spent 5 weeks with IFDC/TVA engineers working on detailed drawings and equipment specifications for the conversion of an old prilled urea plant to granular urea.

DOMINICAN REPUBLIC

Small Farm Stores

During the last 2 years, IFDC has provided technical assistance to the Government of the Dominican Republic (GODR) in the development of fertilizer-related action programs designed to expand food production on small- to medium-size farms. Reaching the small farmer with new farm input technology was a formidable task within the existing farm input marketing system. This situation prompted GODR to initiate the pilot "small farm store" program. Recently, R. T. Smith, Regional Coordinator for Latin America, prepared an evaluation of the program through 1976.

In 1975, GODR and USAID entered into an agreement and loan program to develop a public sector agricultural input distribution system (Centros de Venta de Materiales Agropecuarios). By the end of 1976, 18 stores with warehouses were in operation serving over 28,000 farmers. The 1976 income or sales from all stores amounted to $1.2 million with an average value of $39 per transaction. A government subsidy equaling roughly $4.85 per farmer served was required for store operations.

In 1977, the number of stores is to be expanded from 18 to 35 and the number of farmer customers is expected to grow to 55,000 requiring a government subsidy for store operation equaling $4.40 per farmer served. By 1978, it is projected that 60,000 farmers will be served and that no further subsidy from the government will be needed.

Four Fertilizer Corporation of India engineers are working with IFDC/TVA engineers on detailed drawings and equipment specifications for a 20-ton per day demonstration-scale urea ammonium phosphate plant using the TVA-developed pipe-cross reactor.

The stores' interior installations are standardized and simple with adequate storage and dispensing facilities. The display of agricultural inputs was good and focused on the agricultural market diversity.

The location of input stores in relation to other GODR agricultural development activities is good. There is evidence of growing contact, cooperation, and confidence between agricultural extension workers and input store supervisors.

West African Fertilizer And Soil Fertility Workshop

Ways to step up research on problems related to soil fertility in west Africa were discussed at a recent IFDC Fertilizer and Soil Fertility Workshop held in Accra, Ghana, May 31 through June 2, 1977.

The workshop, hosted by the Council for Scientific and Industrial Research (CSIR) of Ghana, brought together 29 soil and fertilizer specialists representing various national governments and international institutions. The main objectives of the workshop were to identify major soil fertility problems in west Africa, to appraise results by IFDC cooperators in agronomic testing of sulfur-coated urea (SCU) and phosphate sources, and to explore the potential role of IFDC in assisting west African research efforts.

A key conclusion of the workshop was that problems of soil acidity in areas where agriculture is being intensified need further research attention. In particular, the effects on soil acidity of fertilizer type, liming, manure, crop systems, and nutrient losses were identified as key research areas.

In view of the favorable crop response to phosphate rocks of medium and high reactivity, workshop participants encouraged the continuation of phosphate rock evaluation studies in countries where such rocks can be delivered to the farm more cheaply than soluble phosphate fertilizers. Particular research interest was identified in the residual effects of different phosphorus sources. Results of SCU trials, however, revealed no consistent benefits over urea or ammonium sulfate.

Additional recommendations were made to step up research activities on fertilizer requirements in different cropping systems as affected by fertilizer types and nutrient uptake patterns.

Most participants agreed that there was a pressing need to more fully understand the constraints affecting efforts to expand food production in west Africa. Public policy studies on the impact of alternative price, subsidy, and support programs as well as fertilizer market development research were identified as high priority areas for economic research.

Arab States Regional Fertilizer Study

An IFDC team has recently participated in a mission to Tunisia, Algeria, Morocco, Jordan, Syria, Iraq, Kuwait, and Egypt.

The mission, which was sponsored by the United Nations Development Programme (UNDP) at the request of the Industrial Development Center of the Arab States (IDCAS) with the cooperation of the United Nations Industrial Development Organization (UNIDO) and the Arab Federation of Chemical Fertilizer Producers has an IFDC consultant, Harvey Stangel, as its chief of party.

The mission was supported in the field by the Regional Coordinator for Africa, R. B. Diamond, the Regional Coordinator for Asia; D. H. Parish; K. S. Chari, Technical Director of Fertiliser Association of India; Wahib D. Kelada, Technical Manager of Arab Federation of Chemical Fertilizer Producers; and Adly Fakhry from IDCAS.

The study to be released by UNDP provides a comprehensive survey of existing and proposed fertilizer production capacity in those Arab States listed. Constraints leading to low operating efficiency were identified and recommendations were made for future action, particularly for regional and national training programs.

An assessment was made of the current and projected use of fertilizers by the different countries, as well as the constraints affecting agricultural development and fertilizer use. Recommendations were made for stimulating the use of fertilizers by the small farmers of the region, bearing in mind the complex and integrated nature of agricultural development.

Based on this study, revised estimates on Arab States' production, use, and potential supplies of material for export were made.

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.

IFDC

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