IFDC

Report

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

Headquarters—

IFDC Assists PHILPHOS in Establishing Complex

Research recently completed at IFDC will contribute to the foundation of a new fertilizer complex being established by the Philippine Phosphate Fertilizer Corporation (PHILPHOS) on the island of Leyte. The complex will be owned and operated by PHILPHOS, a joint venture between the National Development Company (60% interest) and the Republic of Nauru (40%).

The new complex should reverse the downward trend in Philippine fertilizer production. Since 1976 production of fertilizer in the Philippines has declined from 306,200 tonnes to 230,000 tonnes in 1980 while consumption has increased from 643,900 tonnes in 1976 to 819,600 tonnes in 1980. A major factor in improving the Philippines' self-sufficiency in food production is the increase in fertilizer consumption.

Using a polarized-light microscope, Ms. Michelle Cooper, Mineralogist, examines a petrographic thin section of Leyte phosphate rock.

The new complex will use two indigenous resources on Leyte Island: phosphate from the Bantigue deposit and sulfuric acid produced from the copper smelter of the Philippine Associated Smelting and Refining Association (PASAR).

To lay the groundwork for the new fertilizer complex, in late 1981 PHILPHOS requested IFDC to begin providing technical assistance on a wide variety of subjects. Mr. William Brooks, IFDC Engineering Consultant, and Mr. Roy Smaltz, IFDC Engineering Consultant, are outposted in the Philippines, for the purpose of assisting PHILPHOS with the design and development of their new complex.

Dr. Guerry McClellan, IFDC Coordinator of the project, outlined its progress. "During the early stages of the project, IFDC conducted mineralogical and chemical studies on the exploration samples from 10 locations at the deposit site," McClellan said. "Based on these studies, IFDC selected a typical ore from the deposit. We then conducted laboratory-scale studies to develop a beneficiation procedure that would reduce the iron and aluminum contents of the ores to acceptable levels."

The IFDC team chose attrition scrubbing and sizing as the beneficiation procedures

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Headquarters—

PETRONAS Officials Review Project

"From what I have seen at IFDC, I feel that the work should be extended to the next phase so that the laboratory research can be confirmed through pilot-plant testing."

This was the way that Mr. Mohd Shukor Omar, Manager, Project Services Department, PETRONAS, assessed the progress of the collaborative rubber-coated urea project. Shukor, along with Mr. Pierre Cohen, Instrumentation Engineer, and Mr. Abdul Hadi Rahmat, Chemical Engineer, visited IFDC Headquarters on December 14-16, 1983, to review the research work.

The project, being conducted in cooperation with the Petroliam Nasional Berhad (PETRONAS) and the Rubber Research Institute of Malaysia (RRIM), attempts to increase the efficiency of urea fertilizer.

Phase I of the PETRONAS project (laboratory-scale testing) was completed in March 1984. "The progress made at IFDC more or less confirms the findings by RRIM," Shukor said. "But from laboratory-scale data alone one cannot make a meaningful assessment of the technical viability of the product; pilot-plant testing is necessary." This research and development work has tremendous implications for the Malaysian agricultural sector. There are several reasons why it will make a powerful impact on Malaysian agriculture.

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Headquarters—

Review Committee Evaluates Research

The third annual meeting of the Program Review Committee was held at Headquarters, February 28-March 2.

Two new members joined the Committee this year. They are Sir John Crawford, a former IFDC Board member from Australia, and Mr. Hernando Celedon, General Manager of MONOMEROS, Barranquilla, Colombia. Returning members of the Committee were Dr. George Cooke, another former IFDC Board member and now Honorary Scientist, Rothamsted Experimental Station, England, and Dr. Richard Reidinger, Economist, the World Bank, Washington, D.C., U.S.A.

Sir John Crawford, Chairman of the Committee, is a former chairman of the Technical Advisory Committee (TAC), the group that advises the Consultative Group for International Agricultural Research (CGIAR) on research priorities. He is also Chancellor of the Australian National University and a major advisor to the Australian Government on a wide range of policy matters.

The Program Review Committee has as its mandate—to review existing and planned programs of IFDC and to make recommendations of new activities to help IFDC maintain or improve its present level of excellence.

During this meeting, the Committee heard presentations by the field staff on their work in Africa, Asia, and Latin America.

Regarding the nitrogen program, the Committee concluded that further work at IFDC and in the field is needed on the following topics: physically modified fertilizers, additives, methods of application, factors influencing the effectiveness of deep-placed nitrogen, the timing of applications, and mechanisms of loss. Considering the phosphate program, the group noted that there is much interest in partial acidulation of phosphate rock and more work will be needed both on the process and on field testing of the products. The Committee suggested that greater emphasis on basic chemistry studies designed to identify specific phosphate products and their reactions in soil systems may help in the further development of effective phosphate fertilizers.

Members of the Program Review Committee put the finishing touches on their report. They are: Dr. George W. Cooke (left), Dr. Richard Reidinger, Mr. Hernando Celedon, and Sir John Crawford.

The Committee encouraged the earlier involvement of socioeconomic studies in problem identification, development of solutions, and evaluation and transfer of specific technologies.

The advisory group endorsed the establishment of the proposed Fertilizer Evaluation Data System and Advisory Unit (FEDSAU). This unit would establish a complete database and fertilizer evaluation system to enable the identification of the most efficient and economic fertilizers and use methods for different agroclimatic environments of the tropics and subtropics. Data on climates, crops and cropping systems, soils and their management, and water management would be made available to decisionmakers at all levels of the fertilizer sector.

In conclusion, the Committee recognized IFDC's unique capability to advise on both the production of fertilizer from indigenous materials and the efficient use of all the available fertilizers. IFDC is in a position to give unbiased advice on the solution of a wide range of technical, agronomic, social, and economic problems involved in fertilizer production and use.

"In this respect the Center is unique in the world and has capabilities not possessed by any other research institute,"—quoting from the Committee's report.□

Upper Volta

Feasibility Study Conducted

An IFDC team visited Upper Volta and the Ivory Coast, December 6-20, to begin a feasibility study of a bulk-blending and/or a phosphate acidulation plant in Upper Volta.

The IFDC team members included Dr. W. E. Clayton, Transportation/Distribution Specialist; Mr. N. D. Le, Chemical Engineer; and Mr. A. F. Little, Industrial Project Analyst. With assistance from Upper Volta's Projet Phosphate, the group collected the necessary data. Dr. André Bationo, IFDC Soil Scientist posted in Niger, met the project team in Upper Volta to assist with the data collection.

During the visit, data was collected on fertilizer use, phosphate rock mining and grinding, fertilizer imports, truck and rail transportation, importation of fertilizer raw materials and products, and data concerning plant design and site selection.

The World Bank—funded project is considering three production schemes for the plant. They include (1) a bulk-blending plant, (2) phosphate rock acidulation plant, and (3) phosphate rock acidulation and bulk-blend plants.

The phosphate rock acidulation plant would be on the basis of partial acidulation of Upper Volta Kodjari phosphate rock using sulfuric acid. IFDC has done extensive development work on partial acidulation of Kodjari phosphate rock, mainly under funding by Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) of F.R. Germany. The technical and economic viability of the three production schemes will be assessed.□

Headquarters—

A Conversation With Sir John Crawford

An opportunity to talk with a man who has helped shape the agricultural sectors of developing countries for several decades is a rare occurrence. This writer recently had the pleasure of talking with Sir John Crawford—Agricultural Advisor "Par excellence."

Sir John is one of those unique individuals who makes an indelible impression on people. Though slight of stature, he is tall on wisdom as far as knowledge of the factors necessary to foster the development of resources to feed hungry people.

His silver hair hints to the wisdom of his years, which derives from the breadth of his experience. Besides being a former Chairman of TAC, he is also the former Chancellor of the University of Papua, Papua New Guinea; Chancellor (President) of the Australian National University; and former Senior Advisor on Agricultural Policy to the World Bank.

With a distinctly Australian accent, he emphasizes an important point, "No developing country that has to produce its own food can avoid having a fertilizer policy. That policy has to take into account the foreign exchange implications of importing all of its fertilizer requirement or some of it, and the technological knowledge available."

"This is where IFDC comes in—not only on the technology question but also by helping governments of developing countries to survey national constraints to agricultural production and to determine the best way to handle these constraints. The Center is ideally placed to help a country assess its position—the national advantages and disadvantages in relation to its real fertilizer needs."

Sir John used the following example to illustrate his point. "Some countries have ample supplies of phosphate rock; their need is simply the transfer of technology from experienced countries to them. Other countries must import rock. If this is the case, they need advice on the most efficient means of producing fertilizer from imported material. They need advice on how to save on foreign exchange and develop their industrial capacity. Very often these countries have both options open to them. Whatever the combination, IFDC is highly relevant at all stages."

Assessing IFDC's progress to date, Sir John said, "Its progress is phenomenal. IFDC has become not merely a respected international research institute but also a very significant force in the improvement of national agricultural policies of developing countries."□

"No developing country that has to produce its own food can avoid having a fertilizer policy." Crawford

"The Center is ideally placed to help a country assess its position—the national advantages and disadvantages in relation to its real fertilizer needs."—Crawford

PETRONAS Project *(Con't from page 1)*

Shukor expressed it this way—"Presently urea is used mainly for the production of rice. This rubber-coated product increases the potential use of urea; it will now be used on rubber and oil palm."

"Secondly, Malaysia is one of the largest producers of rubber in the world," Shukor said. "Rubber-coated urea will provide another way to increase the use of rubber."

This research and development work has tremendous implications for the Malaysian agricultural sector. There are several reasons why it will make a powerful impact on Malaysian agriculture.

The review team also discussed with IFDC officials the options for Phase II work (pilot-plant testing) and developed plans for the presentation of Phase I results, to be held in Malaysia.□

PETRONAS officials present Dr. Donald L. McCune (far right), IFDC's Managing Director, with a souvenir PETRONAS emblem. Pictured from left, Mr. O. W. Livingston, Director of IFDC's Fertilizer Technology Division; Mr. Mohd Shukor Omar, Mr. Samin Bin Ahmad, and Mr. Abdul Hadi Rahmat.

Headquarters—

Dr. George Cooke Addresses "Constraints to Crop Production"

A frequent and valued advisor to IFDC, Dr. George W. Cooke, presented a seminar entitled "Constraints to Crop Production: Opportunities for the Chemical Industry," at Headquarters on March 9.

Dr. Cooke, a former IFDC Board member and now Honorary Scientist, Rothamsted Experimental Station, England, covered three primary issues. They were (1) the potentials that we now recognize, (2) the constraints that prevent the full realization of these potentials, and (3) the roles that chemistry may have in overcoming these constraints.

"We must first assess our targets," Cooke stated. "It is only when we know what the targets for production are that we can see what the effects of constraints to production are. We must study the constraints and devise inputs that overcome them."

According to Cooke, where research results have been carried into practice fully, we can measure the potential of a given crop on a given site. This potential is governed, of course, by the genetic capacity of a crop, solar radiation, length of the growing season, assuming that nutrients and water are adequate and disease is absent. Great potential exists in tropical regions through its greater amount of solar radiation and favorable temperatures. The secret is to tap that potential through the removal of other constraints.

"Before looking forward to the future, it is always essential to look back a little and see what we have achieved," Cooke said. It has only been during the last 20 years that Britain's wheat yields have increased considerably, now to a national average of 6.5 tonnes per hectare; this is still only one-half of the potential. Potato yields have likewise improved in recent years, but they are still only one-third of the potential. Obviously, there are still considerable constraints to overcome.

"We must first assess our targets. . . . We must study the constraints (to production) and devise inputs that overcome them."—Cooke

These constraints fall into three categories: physical, biological, and chemical. The major physical stresses include mechanical impedance, waterlogging, and temperatures. Among the chemical constraints are poisons and the shortage of nutrients. Biological constraints include pests, diseases, and weeds.

"Fertilizers were the greatest breakthrough in man's ability to control the production of his food," Cooke said.

In Great Britain, for example, fertilizers account for 13% of the total current expenditure by farmers; this is a very sizable input. Use in the United Kingdom is typical of other developed countries. Because of the size of the expenditure, efficiency in fertilizer use must be addressed. When considering phosphorus and potassium in temperate climates where the surplus is retained by the soil, experience indicates that recovery may be complete although it will be over very long periods. For nitrogen the position is much less favorable. As for the world average, no more than 40% of applied fertilizer nitrogen is recovered and used by the crops.

"Fertilizers were the greatest breakthrough in man's ability to control the production of his food."—Cooke

Cooke pointed out that work at Rothamsted has shown that the bigger the crop the better the recovery of nitrogen and how under temperate conditions the rainfall after application influences losses by leaching. Under favorable conditions where timing of nitrogen application is being fitted to weather, 90% of the nitrogen applied has been recovered in the crop and soil. It is thought that in certain temperate climates, with the models now being developed, good soil information, and better weather forecasts, we will make ammonium nitrate fertilizer quite efficient. He predicts a 90% efficiency for ammonium nitrate by the end of the century.

The serious losses from urea are also important because of the increasing world use of urea and the fact that in many developing regions urea is the dominant nitrogen fertilizer. Cooke ranks IFDC's work on inhibitors and slow-release nitrogen fertilizers as very important on a world scale. "If we can double urea nitrogen efficiency from 40% to 80%, the saving in terms of nitrogen saved amounts to $11 billion and in terms of energy saved, $8 billion," Cooke said.□

Headquarters—

IFDC Staff Design Blueprint for the 80s

Nine IFDC outposted scientists met at Headquarters on February 20-27, to assist in designing a research program to further IFDC's goal of "feeding a hungry world."

The IFDC field staff are stationed in six countries around the world. The following staff attended the meeting and made presentations: Dr. Jacqueline Ashby, Rural Sociologist, stationed in Colombia; Dr. André Bationo, Soil Scientist, Niger; Dr. I.R.P. Fillery, Soil Scientist, Philippines; Dr. C. W. Hong, Soil Scientist, India; Dr. Alfredo León, Soil Scientist, Colombia; Dr. Spider Mughogho, Soil Scientist, Nigeria; Dr. Dennis O'Brien, Fertilizer Evaluation Specialist, Indonesia; Dr. Brian Palmer, Soil Fertility Specialist, Indonesia; and Dr. Robbert Wetselaar, Soil Scientist, Indonesia.

The objective of the workshop was to develop a blueprint for the future direction of the Agro-Economic Division's research program. The Agro-Economic Division is research oriented and focuses on the agronomic and socioeconomic evaluation of new fertilizers developed by IFDC's Fertilizer Technology Division or other organizations. Evaluations are conducted in Headquarters' laboratories and greenhouses and in fields of tropical and subtropical countries. The overseas portion of the research is conducted in cooperation with other organizations, such as the International Rice Research Institute (Philippines), the International Center of Tropical Agriculture (Colombia), the International Crops Research Institute for the Semi-Arid Tropics (India and Niger), the International Institute of Tropical Agriculture (Nigeria), and the Indonesian Agency for Agricultural Research and Development.

Dr. Paul L.G. Vlek, Director of the Agro-Economic Division, summed it up this way: "Our intent was to design a blueprint for the Agro-Economic Division so that it can fulfill its mission through the 1980s." He defined that mission as "the conduct of research toward the elimination of constraints to efficient fertilizer use."

According to Vlek, the blueprint will be used as a framework to develop new programs to present to potential donors.

The last such blueprint was developed in 1977. Since that time, IFDC has outposted more people overseas near the actual problems that must be dealt with.

As Vlek said, "We wanted to capitalize on their experience, thus, our decision to bring them in."

"Every research person should have time to do outreach; every outreach person should have time to do research."
—McCune

A large part of the Workshop was devoted to reviews of past activities with presentations by the senior staff members. In addition, a session on project development reviewed the framework of overseas activities required to complete the Agro-Economic mission and the degree to which the ongoing projects fulfill this role.

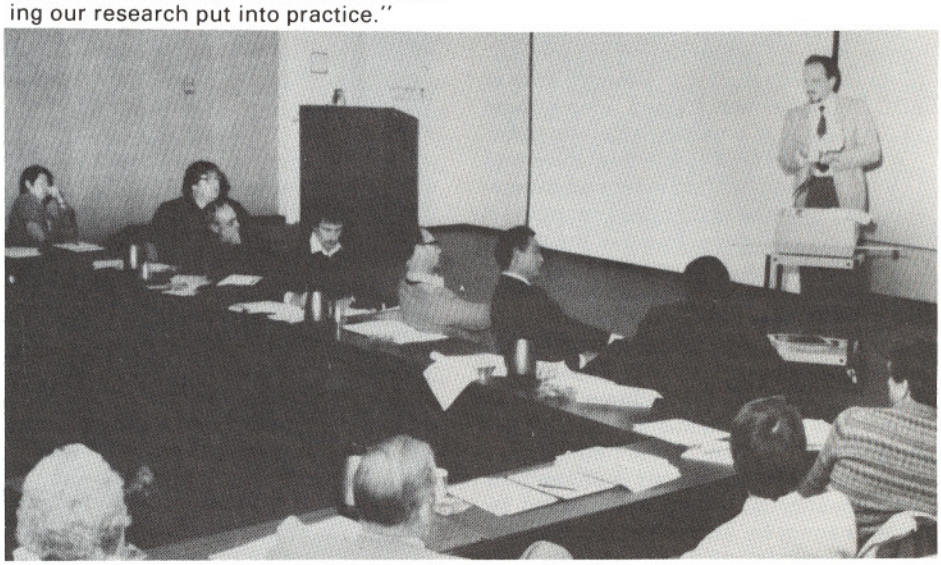
During the workshop, Dr. Donald L. McCune, IFDC's Managing Director, urged the field scientists to challenge the fertilizer technologists to produce specific types of fertilizers to satisfy the particular needs of their host countries as well as those within the regions they serve.

McCune stressed the importance of having field and Headquarters' scientists to exchange roles from time to time. "Every research person should have time to do outreach; every outreach person should have time to do research," McCune said.

As a result of the Workshop, objectives for the Agro-Economic Division's work for 1984-90 were established.

In summary Vlek said, "The Agro-Economic Division will continue to operate as a research division with its primary responsibility in the areas of soil chemistry, plant nutrition, soil fertility, agronomy, economics, and sociology. We will, however, also be interested in seeing our research put into practice."

The research emphasis for the remainder of the decade will be placed on four primary topics. These include (1) efficiency of fertilizers in various agro-ecological zones of the developing world, (2) integrated fertilizer management, (3) farm-level economic constraints to fertilizer usage, and (4) research on fertilizer impact, supply, and international trade.□



Dr. C. A. Baanante, IFDC Economist, makes a presentation during the Internal Review of IFDC field research.

PHILPHOS *(Con't from page 1)*

to separate fine particles of iron and aluminum oxides from the coarser phosphate particles.

The next phase of work consisted of preparing the IFDC Pilot Plant equipment in which a few hundred kilograms of concentrate would be prepared for a phosphoric acid test. These tests successfully produced concentrates low in iron and aluminum and high in phosphate using a simple treatment process that is compatible with the limited water resources available at the Bantigue site. Some flexibility exists in the beneficiation treatment because present plans are to blend the Bantigue ore with imported rock.

"The main result of the beneficiation and characterization studies was that IFDC assisted PHILPHOS in identifying portions of the Leyte deposit that would represent the ore in a commercial mine," McClellan said. "IFDC also developed and demonstrated a simple but viable beneficiation procedure that could be used to upgrade the ore to nearly normal commercial standards."

The next major phase of the project consisted of the production of wet-process phosphoric acid and was primarily carried out in IFDC's laboratory-scale pilot plant.

"First, we evaluated concentrates available from several companies interested in selling phosphate rock to PHILPHOS," McClellan said. "These rocks were from Nauru, Jordan, Senegal, Israel, Morocco, and Florida (U.S.A.)."

IFDC also tested a manually selected high-grade Bantigue concentrate and the Bantigue concentrate prepared in the IFDC Pilot Plant. A limited number of tests were conducted using blends of the Bantigue concentrate and the imported ores. The purpose of the latter tests was to determine how much Leyte rock could be blended with the imported phosphate concentrates while maintaining high production rates and acid quality.

The tests were conducted under standard conditions to determine variables, such as sulfuric acid consumption, reaction efficiency, and filtration rates for various ores. PHILPHOS officials are using these data to evaluate the advantages of each ore during processing.

"As a supplementary part of the project, we assisted PHILPHOS in analyzing the data collected during the tests," McClellan said. "An IFDC computer program, known as BALANCE, was updated to incorporate various process costs; thus, a new program, known as COST, was developed. This program has been used to compare the economic benefits of the various ores."

This part of the project proved especially valuable since the COST program was written in a very condensed form for a hand-held computer that PHILPHOS officials used during negotiations with commercial rock producers.

Another important part of the technical assistance project consisted of a 6-week training program for two PHILPHOS employees, Mr. R. S. Solidum, Senior Manager, and Mr. R. L. dela Peña, Senior Chemist, during 1983. The PHILPHOS personnel were introduced to the methods that IFDC uses in characterization and beneficiation. They were also trained in the use of a bench-scale wet-process acid unit, which PHILPHOS had also purchased to install in Manila. During the training program, the Filipino scientists tested commercial and Bantigue rock concentrates and learned how to interpret and report the data collected. They received specific training in corrosion testing and the operation of and data collection from a laboratory-scale phosphoric acid concentrator.

The PHILPHOS fertilizer complex is currently in the procurement stage. Tenders for the equipment and construction of a phosphate mine on Leyte Island have also been invited.

The PHILPHOS project is one example of how IFDC can help fertilizer companies from developing countries find ways to incorporate the use of indigenous resources of phosphate rock into an efficient phosphate complex. □

Headquarters—

More Accurate Soil Testing Technique Studied

If research work being conducted at IFDC proves successful, developing countries may have a more accurate method of testing their soils.

Dr. Raman Gopinath Menon, a Soil Scientist with the Food and Agriculture Organization of the United Nations (FAO), Rome, Italy, is collaborating on this ongoing research during a 3-month stay at IFDC Headquarters. Menon, who arrived on January 9, is a native of Kerala, India.

A graduate of Michigan State University (U.S.A.), Menon has had extensive experience establishing soil testing services in developing countries. Some of the countries where he has worked include Afghanistan, Ghana, Grenada, Indonesia, Laos, Syria, Tanzania, and Vietnam,

"The technique that we are working on determines the amount of phosphorus in the soil that is available to plants," Menon said. "One way to do this is to extract the phosphorus by water, but in tropical soils the amount of phosphorus is so low that the phosphorus, which is dissolved by water, cannot be estimated accurately."

The scientist and his IFDC collaborators are taking a different approach, originally conceived in Holland, that they feel may prove to be more accurate and possibly cheaper.

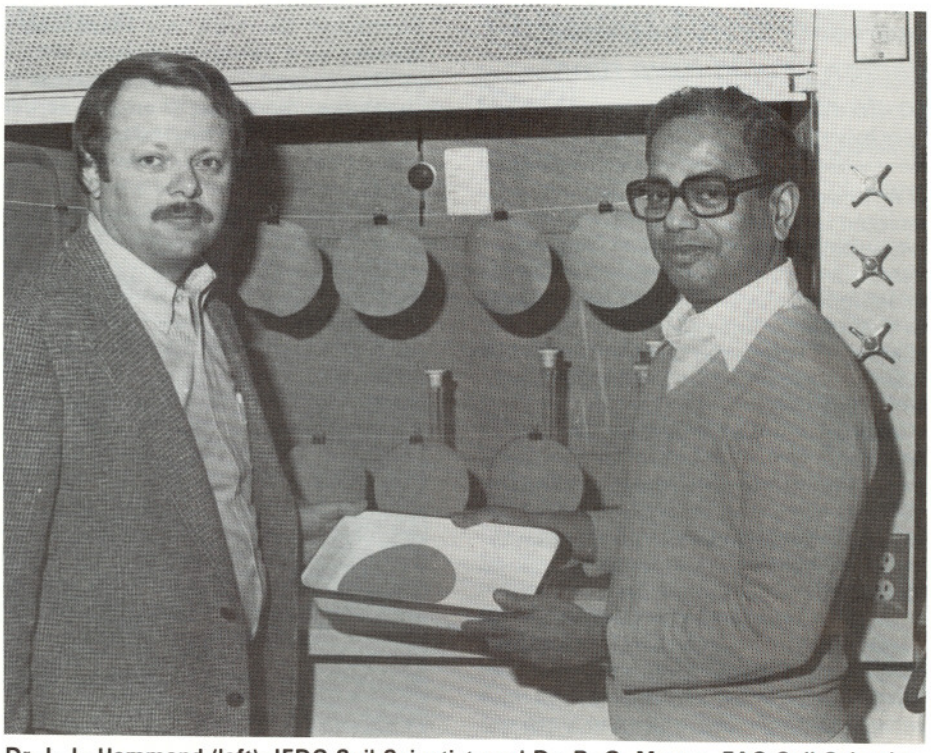
"We are testing a new method in which we use a strip of paper that is treated in such a way that it will draw phosphorus from the soil in much the same way that a plant does," Menon said. "If this procedure proves successful, it still must be tested in a wide variety of soils. We expect this method to work with all kinds of soils and regardless of the type of fertilizer applied."

"The technique that we are working on determines the amount of phosphorus in the soil that is available to plants."
—Menon

The filter paper can be prepared in any laboratory. Thus, developing countries can easily use this technique.

When asked what attracted him to IFDC, he responded, "This Center is recognized worldwide as a premier research institute in fertilizer development."

Menon praised the IFDC staff and rated the Center's facilities among the best in the world.□



Dr. L. L. Hammond (left), IFDC Soil Scientist, and Dr. R. G. Menon, FAO Soil Scientist, prepare materials used in a new soil testing procedure being developed at IFDC.

Upcoming Training Programs

Program	Location	Dates
IFDC HEADQUARTERS		
Fertilizer Marketing		
Fertilizer Marketing Management Training Program	IFDC	August 13-September 21
Use of Microcomputers for Fertilizer Sector Personnel	IFDC	September 20-29
Statistics and Economics of Fertilizer Use	IFDC	October 2-19
Fertilizer Production and Technology		
Maintenance and Production Management Training Program	IFDC	October 8-26
Ammonia/Urea Plant Operations Workshop	New Orleans, Louisiana U.S.A.	October 27-31
REGIONAL PROGRAMS		
Fertilizer Marketing		
Regional Fertilizer Marketing Training Program for the Asian Region	Thailand	November 5-16
Fertilizer Efficiency Research in the Tropics		
Fertilizer Efficiency Research in the Tropics—Latin America (in Spanish)	Colombia	May 7-25
Fertilizer Efficiency Research in the Tropics—Africa (in French)	Mali	October 8-26

NOTE: Dates are subject to change.

Training Program Activities

Philippines—

Twenty-Nine Asian Marketing Managers Receive Training

Dateline—Manila—On a balmy December day, a team of IFDC senior staff arrives in the Philippines to begin 2 weeks of intensive marketing training. The marketing team proposes to train a group of Asian fertilizer marketing managers by imparting to them the latest integrated marketing concepts, marketing planning, and marketing systems development.

Furthering its goal of extending the regional component of training program activities, IFDC presented its fourth annual regional marketing training program for 29 marketing executives, December 5-16, 1983. Cosponsor of the program was the Philippine Fertilizer and Pesticide Authority (FPA).

The fertilizer marketing systems of Bangladesh, India, Indonesia, Jordan, Republic of Korea, Malaysia, Nepal, the Philippines, Sri Lanka, and Thailand should eventually receive the beneficial effects of this training program.

Dr. Y. H. Chuang, IFDC Market Development Economist, was the manager of this program. Other IFDC staff making presentations included Dr. D. H. Parish, Director of the Outreach Division; Mr. M. T. Frederick, Chemical Engineer; and Mr. R. S. Giroti, Associate Training Coordinator. Dr. G. L. Crawford, Professor of Marketing, University of North Alabama, Florence, Alabama, U.S.A., conducted the computer-assisted fertilizer marketing simulation exercise—Alpha. This simulation provides actual "hands-on" experience in analyzing a fertilizer marketing system and developing improvements in that system.

Besides IFDC staff, the program faculty also included specialists from FPA, the Philippine Ministry of Agriculture, the International Rice Research Institute (IRRI), and the fertilizer industry in Asia.

During the opening ceremony, the FPA Program Coordinator, Ms. Bernadette L. Abad, introduced the program. Giving the welcoming address was Mr. Miguel M. Zosa, FPA Administrator and IFDC Board member.

Topics included on the program were the marketing function and its elements, marketing planning and control, promotion, fundamentals of plant nutrition, distribution systems and management, government policies, economics of fertilizer use, etc.

Besides lectures and simulation exercises, the activities also included case studies, role playing, discussions, and field trips. A field trip to IRRI provided an opportunity to observe and study fertilizer use research in progress. In a fertilizer-producing area, the group saw fertilizer factories, warehouses, and transportation systems. At Planters Products, Inc., the largest fertilizer producer in the Philippines, the group observed the production of compound fertilizers. They also learned about Planters' materials handling system for imported and domestically produced fertilizer materials.

More countries participated in the program this year compared with the past three. As Dr. Chuang puts it, "This program had a more balanced regional input."□

Dr. Yao Chuang, Program Manager, addresses the participants of the Fertilizer Marketing Training Program for the Asian Region.

Participants in the Fertilizer Marketing Training Program for the Asian Region listen intently to a presentation by one of their leaders.

IFDC Report

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IFDC is a public, nonprofit organization dedicated to increasing food production through the development of new and improved fertilizers and fertilizer know-how for developing countries.

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