

IFDC-IAS—

Nitrogen Research in Korea

Rice is the main food crop in areas containing two-thirds of the world population and 90% of the world poor. The development and use of modern rice varieties have increased rice yields in these areas. But insufficient or incorrect use of nitrogen fertilizers by farmers is constraining high rice yields.

IFDC scientists are working to solve this problem through research on the nitrogen requirement of the rice plant. During a 2-year period, soil scientists Paul L.G. Vlek and Leif J. Youngdahl of IFDC worked with Dr. Chong-Woon Hong of the Institute of Agricultural Sciences, Suweon, Korea, who conducted five field experiments in Korea to determine the effect of new controlled-release fertilizers and fertilizer management practices on flooded rice. They used two rice varieties on continuous and intermittent flooded fields with regular urea and two sulfur-coated ureas applied at

either four or five different levels of nitrogen.

Experimental results confirmed that variations in yield are determined mainly by panicle density and number of spikelets per panicle. Potential yield is fixed by heading time and is closely related to the amount of nitrogen taken up by the plant before heading. Nitrogen uptake during the period between 2 weeks after transplanting to maximum tillering most critically influenced potential yield.

In the past, the critical periods of N uptake by rice as a function of N availability have not been studied extensively. The methodology used in this project enables the determination of critical periods of N uptake in field experiments. Such information, combined with better knowledge of the fate of applied N, will help set criteria for tailoring fertilizer and fertilizer management for rice.



Dr. Chong-Woon Hong and Paul Vlek inspect experimental rice plots in Korea.

Pilot-Plant Studies—

Research Contract with Behn, Meyer

Behn, Meyer & Company (Pte) Ltd., with headquarters in Singapore, has contracted IFDC for technical services and assistance. IFDC researchers are conducting pilot-plant studies to develop a process for granulating multinutrient-N, P, K-fertilizers from raw materials presently used by or potentially available to Behn, Meyer.

IFDC researchers are determining methods to efficiently produce homogeneous granular NP, NK, and NPK products using prilled urea, phosphate rock, and potassium chloride as the primary nutrient sources. The researchers are testing various fertilizer grades and combinations of raw materials.

Pilot-plant tests are of sufficient duration to demonstrate the feasibility of granulating individual fertilizer grades, to establish process equipment requirements, and to determine operating parameters.

The Technology Division, with James J. Schultz, Engineering Research

Coordinator, and George W. Bolds, Senior Pilot-Plant Technician, serving as project coordinators, is being assisted by the Outreach Division.



S. K. Hoh, Group Manager, Behn, Meyer & Co., (center) examines test fertilizer with Jorge Polo and Atticus Harrison.

IFDC-MSU—

Combining Fertilizer and Bacteria

Biological fixation of nitrogen through a symbiotic relationship of nitrogen-fixing bacteria and leguminous plants is an important source of nitrogen throughout the world. A problem exists, especially in the tropics, in how to inoculate the soil or the leguminous seeds so that the bacteria will have a better chance to live. An alternative to inoculation is applying these bacteria with the fertilizer.

To date this has been unsuccessful because bacteria cannot survive in intimate contact with fertilizers produced in the conventional ways. IFDC and Mississippi State University scientists are attempting to resolve this problem.

Preliminary work has shown that nitrogen-fixing bacteria can live, even at relatively high temperatures, for at least 6 weeks in fertilizer granules containing phosphate and potash if certain biological safe carriers are incorporated into these granules.

Much additional research will be required before this approach can be commercialized. But both Mississippi State University and IFDC scientists are excited about the potential of this cooperative research effort.

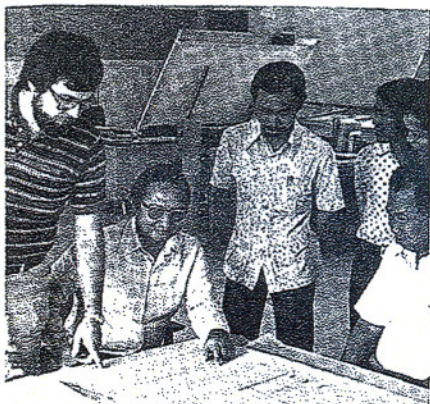
Indonesia—

PUSRI Update

In a continuing effort to provide technical assistance to P.T. PUSRI, M. T. Frederick, Chemical Engineer, James J. Schultz, Engineering Research Coordinator, and George W. Bolds, Senior Pilot-Plant Technician, recently visited the PUSRI ammonia/urea complex at Palembang, Indonesia. They reviewed the design and engineering progress of the PUSRI I urea pan-granulation project.

As part of the overall commitment to the PUSRI I project, IFDC is providing operating and engineering input to the design of the granulation unit. In addition, approximately 10 PUSRI operations foremen will participate in a training program at IFDC Headquarters during August. When the granulation unit is commissioned in early 1980, IFDC will provide onsite startup assistance.

Frederick is the IFDC project coordinator for the PUSRI I project. Schultz and Bolds are helping to provide technical assistance backup for the project.



M. T. Frederick discusses urea pan-granulation design with PUSRI engineers.

IFDC-BADC—

Assistance to the Bangladesh Agricultural Development Corporation

The Bangladesh Agricultural Development Corporation (BADC) has contracted IFDC to assist them in fertilizer distribution and marketing improvement. To fulfill the requirements of the 15-month contract with BADC, IFDC is providing two resident consultants and several short-term consultants.

John M. Hill, IFDC Marketing Specialist, is the chief of the consultant team. Hill supplies technical consulting to BADC on purchasing, sales promotion and advertising, credit arrangements, pricing, organizational planning, field supervision, collection and analysis of

IFDC-TVA—

Assessment of World Fertilizer Situation

An adequate world supply of nitrogen and phosphate fertilizers is expected through 1985. But the potential exists for a tight potash situation in the future. These conclusions were reached in a new assessment of the world fertilizer situation issued in a joint study by the International Fertilizer Development Center and the Tennessee Valley Authority. The study was prepared by Gene Harris, IFDC Economist, and Ed Harre, TVA Agricultural Economist, for the U.S. Agency for International Development.

High fertilizer prices from 1973 to 1975 caused many developing countries to realize the need to produce a major share of their own fertilizer requirements. At the same time, developed countries expanded capacity because of the profitable situation that existed. Between 1973 and 1978, world ammonia capacity

increased 36%; world phosphoric acid capacity increased by 54%; and world potash capacity increased by 16%.

The IFDC-TVA study indicates that potential world fertilizer production will increase from 98 million tons to 141 million tons by 1985. The study points out that in 1969 less than one-tenth of the world's fertilizer was produced in developing countries. By 1985, these countries will produce almost one-fourth of the world's fertilizer.

World fertilizer consumption will increase from 95 million tons of nutrients in 1977 to more than 135 million tons in 1985. IFDC and TVA expect an annual growth rate in fertilizer consumption of 4.6% during the next 8 years compared with a 6.0% growth rate during the past 8 years.

IFDC-IRRI—

INSFFER Training Program

The 1st International Network for Soil Fertility and Fertilizer Evaluation for Rice (INSFFER) Training Program began February 1. This program, a cooperative effort between IFDC and IRRI, is being held at The International Rice Research Institute Headquarters in Los Banos, Philippines.

Twenty-two participants, mostly trained in soil science and agronomy, are attending. The trainees represent 9 different countries. Program topics include scientific and field experimentation, statistical design and analysis, agronomy of rice production, plant nutrition, soils, fertilizers and lime, fertility evaluation,

plant breeding, crop production, and interpretation and reporting. As a major part of the practical work in the program, the trainees are conducting an INSFFER nitrogen experiment.

IFDC Research Chemist, Robert C. Horn, Fertilizer Technology Division, participated in the training program by presenting lectures on N, P, K and micro-nutrient fertilizers. IFDC Agronomist and Statistician, Hernan R. Tejada, Agro-Economic Division, presented lectures on fertilizer evaluation methods. IFDC Soil Scientist, Eric T. Craswell, IFDC/IRRI Project, also participated in the training program.

marketing and cost information, and sales forecasting.

R. D. Benton, serving as distribution consultant, supplies technical consulting on warehousing, stock levels and inventory control, transportation, field supervision, and the collection and analysis of warehouse and movement cost information. Benton joined IFDC specifically for this project. He has 20 years' experience in the U. S. domestic agriculture chemical handling business and 3 years' experience working on a similar project in Afghanistan.

Short-term consultants, for up to

24 work-months during the first year of the contract, will be available as backup resources. Areas of knowledge needed are in credit, financial accounting, training, socioeconomic surveys, agronomy, agricultural economics, product handling, transportation, statistical design, computer programming and data processing, communications for the dissemination of information, and organizational planning.

The general objective of the IFDC consultant services team is to assist BADC in removing or minimizing constraints to increase equitable and proper use of fertilizer in Bangladesh.

IFDC-PHOSVALOR—

Using Phosphate Slime As Fertilizer

Under a contract with PHOSVALOR, IFDC scientists are completing the first phase of laboratory tests to produce a marketable phosphate fertilizer from the direct acidulation of Taiba phosphate slimes. Data analysis is being made.

Three PHOSVALOR representatives—Bernard Bechon, Rene Bloise, and Guy Delubac—recently visited IFDC Headquarters to review the project with I. T. Rusli, W. R. Clayton, P. H. Peng, and G. H. McClellan of IFDC and to participate in laboratory tests.



Rene Bloise and W. R. Clayton discuss a phosphate recovery method.

IFDC-BSP—

Phosphate Research on BSP Soils Network

IFDC and the University of Hawaii's Benchmark Soils Project (BSP) have initiated a collaborative research project on the "Evaluation of Phosphorus Fertilizer Materials and Placement Effects in a Network of Benchmark Soils in the Tropics."

In this project, the effectiveness of alternative phosphate fertilizer materials, including ground phosphate rock and phosphate rock modified by partial acidulation and minigranulation, will be evaluated along with conventional high solubility fertilizers.

The relative efficiency of these sources will depend on such factors as source properties, soil properties, and the crop management system. Each factor will be closely monitored to determine interaction. This type of basic agronomic information is essential for planning phosphorus fertilizer strategies to benefit farmers with limited capital.

The principal objective of the Benchmark Soils Project is to determine scientifically the transferability of agro-production technology among tropical countries. The five benchmark sites which will be used are located at Luzon and Mindanao, The Philippines; Java and Sumatra, Indonesia; and Hawaii, U.S.A. The field activities are under the supervision of David Harris, doctoral candidate at the University of Hawaii. Seven of the ten project experiments will be installed by May.

Third Annual—

Marketing and Distribution Course

IFDC's third annual Fertilizer Marketing and Distribution Course is scheduled for August 13 to September 21, 1979. The course is designed primarily for managers and planners in developing countries who are responsible for the distribution of fertilizers from factory or receiving location to farmers.

The course will emphasize integrated marketing concepts with concentration on transportation and distribution systems. Participants will receive a brief update of the world fertilizer situation, fertilizer production, and fertilizer product knowledge. Organization development and field trips will complete the course.

Individuals interested in registering for the course may complete the form below.



Guy Delubac, P. H. Peng, and I. T. Rusli discuss a product recovered from the phosphate recovery method.

Mail Registration to: Carl Amstrup, Training Coordinator, Outreach Division
International Fertilizer Development Center, P.O. Box 2040, Muscle Shoals, Alabama 35660, U.S.A.

Name of participant _____

Address of participant _____

Name of organization _____

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Participant's position _____

If you wish to continue receiving *IFDC Report*, please complete and return this form to IFDC, P.O. Box 2040, Muscle Shoals, Alabama 35660, U.S.A.

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"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.

"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.

"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.

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

"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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