

First Recipient—

Mr. Travis P. Hignett Receives ACS Award

The first recipient of the American Chemical Society (ACS) Fertilizer and Soil Chemistry Division Merit Award is Mr. Travis P. Hignett, Special Consultant to the Managing Director of IFDC. Mr. Hignett received the award at the 180th National Meeting of ACS, August 25-29 in Las Vegas, Nevada.

The award, consisting of an honorarium and a plaque, recognized Mr. Hignett's "outstanding contributions to the improvement and understanding of fertilizer technology as well as his dedication to the dissemination of this technology to assist worldwide food production."

Mr. Hignett, the retired Director of the Division of Chemical Development of the Tennessee Valley Authority, has more than 51 years' experience as a chemist and chemical engineer. Besides editing and contributing to the recent IFDC/UNIDO *Fertilizer Manual*, he has more than 100 technical papers and 15 patents to his credit.



Mr. Travis P. Hignett is the first recipient of the ACS Fertilizer and Soil Chemistry Division Merit Award.

Colombia—

Sardinata Rock Tests for MONOMEROS

In May IFDC scientists completed bench-scale tests to study the production of nitrophosphate using Sardinata rock. The tests were initiated by a contract with MONOMEROS, a major Colombian fertilizer producer. This contract evolved because of the Colombian Government's interest in utilizing local phosphate rock resources to partially supply the nation's phosphate needs.

MONOMEROS has not been able to use more than 5% of Sardinata ore (with 95% Florida rock) in its plant due to problems with gypsum filtration. The objectives of the IFDC tests were to solve these problems and to improve the potential for using Sardinata phosphate rock for making various NP/NPK fertilizers.

Six tests were conducted—one run using 100% Florida rock, four using 100% uncalcined Sardinata, and one with 100% calcined Sardinata. The filtration rate of the gypsum crystals of the run with

100% uncalcined Sardinata was comparable with that of the Florida rock. Overall recovery was 94% for Florida rock, 88% for uncalcined Sardinata, and 74.8% for calcined Sardinata. The lowest recovery rate probably resulted from calcination at too high a temperature and the use of too short a residence time during acidulation of this relatively unreactive feed.

Generally, filtration rate improves as the gypsum crystal size becomes more uniform. Two factors affecting gypsum crystal size are degree of agitation and sulfate level. Three runs were conducted to determine the effects of these factors on filtration rates using Sardinata rock. High sulfate levels and increased agitation resulted in a 5-ton $P_2O_5/m^2/day$ decrease in the filtration rate compared with rates obtained when using the normal operating parameters. When a very low level of SO_4 ($\approx 0.1\%$) was used, filtration improved dramatically, but so did

IFDC-PAU—

Constraints to Expanded Fertilizer Use in the Indian Punjab

In an effort to identify the nature and magnitude of constraints related to adoption and demand for fertilizers, IFDC and the Punjab Agricultural University (PAU) of Ludhiana, India, initiated a 2-year collaborative project in July. Dr. Dalip S. Sidhu, Head of the Department of Economics and Sociology of PAU, and Dr. Surjit S. Sidhu, IFDC Economist, are coordinating the study.

The objectives of the project are: (1) to identify and evaluate quantitatively the principal constraints to the expansion of economically sound fertilizer use among agricultural producers in selected areas of the Punjab and (2) to suggest policy measures that may be used effectively and efficiently to remove such constraints.

The survey will collect data on all major crops and the use of fertilizers and other inputs on approximately 300 farms in the state of Punjab. It will also analyze environmental constraints, particularly those related to soils.

The results obtained from this study will be useful for: (1) public as well as private institutions and agencies in the Punjab and other parts of India and similar institutions in other countries and (2) international institutions with fertilizer-related agricultural development programs. This study is part of the overall research effort in the area of adoption and demand and should benefit institutions outside the study area.

coprecipitation of dicalcium phosphate with gypsum, resulting in low P_2O_5 recovery.

IFDC has submitted a proposal for future work with MONOMEROS recommending that a full-scale plant test using 100% Sardinata rock be conducted at the MONOMEROS plant at Barranquilla, Colombia, during December.

Sri Lanka—

Eppawala Phosphate Rock Study

In April IFDC completed a 1-year study to determine the potential uses of a phosphate rock from Eppawala, Sri Lanka. With cooperative financial support from the Dienst Internationale Technische Hulp (DITH) of the Netherlands, IFDC carried out laboratory and greenhouse studies to evaluate the performance of products made from this ore.

The high-grade ore was treated to reduce the main impurities—chloride, Al_2O_3 , and Fe_2O_3 —to acceptable levels. The usual methods of calcination and attrition scrubbing did not reduce the level of impurities significantly. Conversion of the rock to wet-process phosphoric acid resulted in a filter-grade acid containing 27% P_2O_5 .

When concentrated, this filter-grade acid produced a very viscous merchant-grade acid at 54% P_2O_5 , but it had a high chloride content. Phosphoric acids having high chloride contents are very corrosive and require special materials of construction. Of the stainless-steel materials tested with this acid, Sanicro 28 and Jessop 700 were the best.

IFDC Staff Update

Arrivals

Mr. Shmuel Carmon—Chemical Engineer—from Israel Chemicals Ltd.—now with the Fertilizer Technology Division for 2 years.

Mr. Ismail Yusuf—Chemical Engineer—from P.T. PUSRI—now with the Fertilizer Technology Division for 2 years.

Dr. Emmanuel E. Opuwaribo—Soil Scientist—on sabbatical leave from the Department of Soil Science, College of Science & Technology, Port Harcourt, Nigeria—now with the Agro-Economic Division for 9 months.

Mr. Agus Ridwan Rahmad—Agronomist—from P.T. PUSRI—now with the Agro-Economic Division for 2 years.

Dr. Johnson A. Ekpere—Visiting Scientist—on sabbatical leave from the University of Ibadan, Ibadan, Nigeria—now with the Agro-Economic Division for 1 year.

Dr. Uzo Mokwunye—Soil Scientist—formerly with the Ahmadu Bello University, Zaria, Nigeria—now with the Agro-Economic Division in the Phosphate Research Program.

Dr. W. E. Clayton—Distribution Specialist—formerly with the Imperial Chemical Industries Limited—now with the Outreach Division.

Departures

Dr. A. O. Falusi—Lecturer (Economist) with the Outreach Division—returning to the University of Ibadan, Ibadan, Nigeria, after completing sabbatical leave.

Dr. W. E. Fenster—Soil Scientist stationed at the International Center of Tropical Agriculture—returning to the University of Minnesota.

Dr. T. W. Park—Visiting Chemical Engineer with the Fertilizer Technology Division—returning to Busan University of South Korea.

Ammoniation of the concentrated acid produced excellent diammonium phosphate (DAP) (18-48-0) and monoammonium phosphate (MAP) (13-51-0). Superphosphates (single [SSP] and triple [TSP]) were also satisfactorily produced for agronomic testing. Rhenania-type phosphate (RHP) (0-26-0) and a fused calcium-magnesium phosphate (FMP) (0-20-0) were also made for agronomic testing.

The agronomic evaluation of some products for phosphate (P) availability showed that TSP, SSP, and RHP were the most effective of the materials tested which were made from Eppawala rock. The finely ground rock is ineffective as a direct application P source. MAP and DAP were made but not tested; however, the effectiveness of these materials would likely be equal to or better than that of the materials tested.

Preliminary cost estimates show that a plant producing SSP offers the lowest P_2O_5 cost, followed by those producing TSP and DAP. RHP was more cost effective than FMP. The results of the studies indicate that except for the corrosive chloride content Eppawala rock is a satisfactory raw material for several fertilizer processes and should be tested on a larger scale to provide the necessary data for a final economic evaluation.

Thailand—

Fertilizer Granulation Seminar

In cooperation with the Ministry of Industry of the Royal Government of Thailand, IFDC conducted its first regional fertilizer granulation seminar in Bangkok, July 21-25. The primary focus of the seminar was on the production problems of multinutrient granular fertilizers in Asia.

Mr. M. T. Frederick, IFDC Chemical Engineer, directed the seminar; other lecturers included Mr. J. J. Schultz, IFDC Engineering Research Coordinator; Mr. A. V. Malone, Engineering and Safety Manager, Agway, Inc., Syracuse, New York; and Mr. Emmanuel Sutarto, P.T. Petrokimia Gresik, East Java, Indonesia.

The seminar papers covered such topics as—"Quality Assurance, Sampling, and Testing for Fertilizer Producers," "Pollution Control and Environmental Protection," "Nonconventional Phosphate Fertilizers: Properties and Use," "Formulation of Compound Granular Fertilizer," and "Techniques for Increasing Nitrogen Efficiency."

Fifty-two participants, representing nine countries and twenty-nine organizations or companies, attended the seminar. They included fertilizer plant managers, production managers, and supervisors. Representatives from the Thai Ministry of Industry, Thai Department of Agriculture, the U.S. Embassy, and UNIDO/UNDP also attended.

A practical highlight of the schedule was a field trip to Thai Central Chemical Company's fertilizer plant near Bangkok.



Mr. M. T. Frederick conducts a session of the fertilizer granulation seminar in Thailand.

FERTIMEX—

Mexican Officials Visit IFDC Headquarters

IFDC hosted Mr. David Gustavo Gutierrez Ruiz, General Manager and Director of Fertilizantes Mexicanos, S.A. (FERTIMEX), Mexico, and seven members of his staff from July 29 through August 2.

The objective of the visit was to receive assistance from IFDC for the FERTIMEX project to establish a national fertilizer institute. The FERTIMEX staff members toured facilities at IFDC and the Tennessee Valley Authority and were briefed on the research and development and training programs of each organization.

India—

Regional Fertilizer Marketing Training Program

IFDC and the Fertiliser Association of India (FAI) are cosponsoring a Regional Fertilizer Marketing Training Program in Bombay and New Delhi, India, November 17-December 3. This program is the first of a series of IFDC regional fertilizer marketing training programs to be conducted in Asia, Africa, and Latin America to assist in developing the manpower requirements of the fertilizer sector of the tropics and subtropics.

The program in India is designed for middle- or promotable junior-level marketing executives from fertilizer companies, cooperatives, and governmental agencies.

The program's objectives are to: (1) raise the participant's level of knowledge of fertilizer marketing covering the stages from production/importation to the farm; (2) expose the participants to the latest marketing techniques; (3) demonstrate how to analyze, develop, adapt, or modify marketing systems to fit conditions in participants' countries to meet the needs of farmers; and (4) develop plans for specific marketing improvements in the participants' work responsibility areas.

The program is a blend of theory and practice (November 20-December 3 in New Delhi) and includes field trips to ports, fertilizer plants, and other fertilizer-related facilities (November 17-19 in Bombay). The timing of this program allows the participants to attend the FAI seminar on "Fertilisers in India in the Eighties" scheduled for December 4-6 in New Delhi.



Dr. Robert T. Smith (right) discusses greenhouse research projects with Mr. David Gustavo Gutierrez Ruiz (left).

Thirty-nine Participants—

Fertilizer Marketing and Distribution Program

Representing 16 countries, 39 participants attended the fourth annual 6-week Fertilizer Marketing and Distribution Program from August 11 to September 19 at IFDC Headquarters. Most of the participants had managerial backgrounds with responsibility for fertilizer marketing in their countries. Eight participants were from Indonesia; six from Bangladesh; five from India; three from Brazil; two each from Egypt, Pakistan, Sri Lanka, Tanzania, and Venezuela; and one each from Zaire, Philippines, Nigeria, Peru, Israel, Japan, and Malaysia.

The program included lectures, discussions, and multimedia presentations on: (1) the world fertilizer situation; (2) fertilizer production, industry, and economics; (3) marketing and distribution planning strategies; (4) factors affecting marketing planning; and (5) analysis and development of appropriate marketing systems. A computerized fertilizer marketing simulation and leadership effectiveness training were also included. Each participant presented a country profile on his country with detailed information on fertilizer consumption and marketing. Field trips to the U.S. corn belt and a tour of Florida phosphate operations provided a practical look at fertilizer production, marketing, and use.

Venezuela—

Fertilizer Sector Study

Petroleos de Venezuela, S. A., a state-owned company established to plan, coordinate, and supervise the activities of Venezuela's oil industry, recently requested IFDC to conduct a study of the Venezuela fertilizer sector to develop strategies for its efficient development during the next decade. IFDC staff members, Dr. Edwin C. Kapusta, Dr. Yao H. Chuang, Mr. Fred J. Klem, Mr. A. Frank Little, Dr. Adolfo Martinez, and Dr. Hernan R. Tejeda, visited Venezuela in June to gather the necessary data.

The purpose of this study is to find ways to alleviate the economic burden created by Venezuela's importation of 75% of its current fertilizer consumption—triple the consumption of 10 years ago. An additional drain on the economy is that caused by the large government subsidies of fertilizer. The ratio of the government's share of the real cost of fertilizer compared to that of the farmer is greater than 2:1.

Specific objectives of the project are: (1) to delineate the types and quantities of fertilizers required by Venezuelan agriculture, (2) to evaluate possible least cost fertilizer supply alternatives, and (3) to recommend changes required in the marketing and distribution system.

Nitrogen—

Australian Development Assistance Bureau Support to IFDC

The Australian Development Assistance Bureau (ADAB) recently initiated an annual grant to fund the Headquarters' research of IFDC soil scientist, Dr. Eric T. Craswell. This research concerns the mode and magnitude of N losses and methods for curbing these losses from rice grown under wetland conditions. ADAB is considering similar support for an IFDC soil scientist based at the International Rice Research Institute.

In addition to this support, ADAB partially sponsored the Indonesian Fertilizer Efficiency Workshop and the ¹⁵N workshop—both held at IFDC Headquarters in September 1979. Australia's interest in supporting fertilizer research in Asian countries provided the incentive for ADAB's support of these IFDC activities.

PUBLICATIONS AND PAPERS AVAILABLE FROM IFDC

Publications and papers are available at no cost except that a shipping and handling charge is required—**Continental United States**, \$3.00 for first publication or paper, \$1.00 for each copy thereafter; **Other Countries**, \$5.00 for first publication or paper, \$2.00 for each copy thereafter.

IFDC Publications

- "Granular Urea—Advantages and Processes," T-1.
- "The Potential for Regional Cooperation in Fertilizer—A Methodology Study of the ASEAN Group," T-2.
- "West Africa Fertilizer Study (Volumes I-VII)."
- Volume I—Regional Overview, T-3
- Volume II—Senegal, T-4
- Volume III—Mali, T-5
- Volume IV—Upper Volta, T-6
- Volume V—Niger, T-7
- Volume VI—Chad, T-8
- Volume VII—Mauritania, T-9
- "Suggested Fertilizer-Related Policies for Governments & International Agencies," T-10.
- "The Bangladesh Fertilizer Sector, 1978," T-11.
- "Sulfur in the Tropics," T-12.
- "World Fertilizer Situation and Outlook—1978-85," T-13.
- "Organic Nitrogen Compounds for Use as Fertilizers," T-14.
- "Bolivia Fertilizer Situation and Recommendations," T-15.
- "Mexico: The Fertilizer Industry," T-16.
- "Fertilizer Manual," R-1, Price—US \$15.00.
- "Progress Report, 1976-1977."
- "Annual Report 1978."
- "Annual Report 1979."
- "Seminar on Phosphate Rock for Direct Application," S-1.

Papers

- "Kinetics of Dissolution of Phosphate Rocks in Soils," S. H. Chien, W. R. Clayton, and G. H. McClellan, *Soil Science Society of America Journal*, Vol. 44, No. 2, March-April 1980.
- "Application of Elovich Equation to the Kinetics of Phosphate Release and Sorption in Soils," S. H. Chien and W. R. Clayton, *Soil Science Society of America Journal*, Vol. 44, No. 2, March-April 1980.
- "Reactions of Partially Acidulated Phosphate Rock With Soils from the Tropics," U. Mokwunye and S. H. Chien, *Soil Science Society of America Journal*, Vol. 44, No. 3, May-June 1980.
- "Phosphorus Availability from Partial Acidulation of Two Phosphate Rocks," L. L. Hammond, S. H. Chien, and J. R. Polo, *Fertilizer Research*, Vol. 1, No. 1, January-March 1980.
- "Effect of Urea Placement on Leaching Losses of Nitrogen from Flooded Rice Soils," P.L.G. Vlek, B. H. Byrnes, and E. T. Craswell, *Plant and Soil*, Vol. 54, 441-449 (1980).
- "Greenhouse Evaluation of Nitrogen Fertilizers for Rice," E. T. Craswell and P.L.G. Vlek, *Soil Science Society of America Journal*, Vol. 43, No. 6, November-December 1979.
- "Transportation and Storage of Ammonia," Travis P. Hignett, to be published in the proceedings of the Fertilizer Industry Round Table, Washington, D.C., October 30-November 1, 1979.

"Technology of Production of Fertilizers Containing Ca, Mg, and S," Travis P. Hignett, to be published in the proceedings of the Colombian Soil Science Society, Colloquium on Saline Soils and Secondary Elements in Colombian Agriculture, Palmira, Colombia, September 19-21, 1979.

"An Analysis of N Nutrition on Yield and Yield Components for the Improvement of Rice Fertilization in Korea," P.L.G. Vlek, C. W. Hong, and L. J. Youngdahl, *Agronomy Journal*, Vol. 71, September-October 1979.

"Impact of a Training Program on Participant's Mastery of Fertilizer-Related Subject Matter: An Evaluation of a Fertilizer Marketing and Distribution Course," K. J. Byrnes, presented at the Annual Meeting of the Rural Sociological Society, Burlington, Vermont, August 24-25, 1979.

"Dissolution of Phosphate Rock in Acid Soils as Influenced by Nitrogen and Potassium Fertilizers," S. H. Chien, *Soil Science*, Vol. 127, No. 6, 1979.

"Effect of Nitrogen Source and Management on Ammonia Volatilization Losses from Flooded Rice-Soil Systems," P.L.G. Vlek and E. T. Craswell, *Soil Science Society of America Journal*, Vol. 43, No. 2, March-April 1979.

"Possibilities for the Improvement of Nitrogen Fertilizer Efficiency and Rice Production," D. H. Parish, Proceedings of Division of Chemical Marketing and Economics of American Chemical Society Conference, pp. 99-115, Honolulu, Hawaii, April 2, 1979.

"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.

"Nitrogen Requirement and Adequacy of Supply for Rice Production," P. J. Stangel, In Proceedings of Nitrogen Symposium on Rice, International Rice Research Institute, Los Banos, Philippines, September 1978.

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



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