

Report

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

Albanian Market Reform Aided Through Agricultural Statistical Surveys

"Despite an approximate sixfold increase in the cost of fertilizer at the farm level since 1992, the use of fertilizer has not declined. Furthermore, the country is now producing over 400,000 tonnes of wheat annually compared with about 250,000 tonnes in 1992 (according to the World Bank). New agricultural marketing systems have started evolving with more than 300 private dealers providing services, with imports of nearly 40,000 tonnes of fertilizer from international markets during the past 12 months, and with prospects of increasing national fertilizer production over the next few years. . . ."

The type of information found in a recent IFDC survey report of Albanian agriculture is valuable for decisionmakers in Albania as they progress in their transition to a free-market economy. The privatization reforms and land distribution, the formation of small-scaled family-oriented farm units, and the promotion of agricultural enterprises are requiring updated information on farm production, constraints, and use of resources. The Directorate of Statistics of the Albanian Ministry of

Agriculture and Food (MOAF) is responding to the increased need for accurate, reliable, and timely information by implementing reliable survey systems to provide the necessary statistics. The Albanian Government is increasingly recognizing the need to support farmers, private farmers' organizations, and research and extension workers both by providing them with the information that they need and updating their own technical expertise and knowledge.

To support and assist Albania's development of viable agricultural production strategies and make a contribution that promotes and enhances the free-market agricultural sector, Dr. Julio Henao, IFDC Senior Biometrics Scientist, recently conducted socioeconomic and crop area surveys in Albania using area frame strategies implemented by IFDC in 1993. These national surveys provided

the MOAF with factual information on the socioeconomic characteristics of rural families, farming practices, production, and the use of agricultural inputs during the 1993/94 cropping season. These surveys were carried out in collaboration with officers of the Directorate of Statistics of MOAF. An efficient na-

tional agricultural statistical system is now being developed in the country as a result of the pioneering work by IFDC.

In the socioeconomic study some 649 farm households were surveyed. The information that was collected will contribute to the establishment of a national agricultural information system, one of the Albanian Government's high priorities. As structured the survey system can be easily updated and managed in the future.

"Important outcomes of the surveys include the provision of socioeconomic and agricultural indicators for determining production bottlenecks, evaluating farming conditions, and appraising improvements in agricultural production through the use of fertilizers and other inputs," Henao says. "Another outcome is the development of an area sampling frame to monitor

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(Photo by Dr. Thomas P. Thompson)

Valleys are intensively farmed in Albania.

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IFDC is a public, international, nonprofit organization, governed by an international board of directors with representation from developed and developing countries. The Center is supported by various bilateral and multilateral aid agencies, private foundations, and national governments. IFDC focuses on increasing and sustaining food and agricultural productivity in developing countries through the development and transfer of effective and environmentally sound plant nutrient technology and agribusiness expertise.

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The President of The Fertilizer Institute Joins IFDC Board

One of the newer members of the IFDC Board of Directors leads the top trade association of the plant food industry in the United States. As head of The Fertilizer Institute (TFI), Gary D. Myers impacts all segments of the industry, including fertilizer producers, manufacturers, retailers, brokers/traders, and equipment manufacturers.

TFI's President directs the association's programs to promote and defend the industry whether in the halls of the U.S. Congress, in the administrative agencies, in the court system, or in the news media. Myers' outspoken support of agriculture earned him the Nebraska Rural Radio Association's Agricultural Spokesman of the Year Award for 1993.

A product of the Illinois countryside, Myers earned a degree in education from Bradley University in his native state. Other prominent items on his resume include positions as Executive Vice President of the Illinois Grain and Feed Association and Director of Member Services for the National Fertilizer Solutions Association.

Myers began his 25-year career with TFI in 1969 as Director of Administration and later advanced to the position of Executive Vice President. In 1982 he left TFI for a 1-year stint as President of the National Council for Farmer Cooperatives but returned in 1983 as the Institute's President.

Besides serving on IFDC's Board, Myers serves on the Board of Directors of the International Fertilizer Industry Association's Environmental Committee. He served as a participant in the U.S.-E.U. joint Conference on Agriculture in Brussels and has addressed numerous national and international audiences on the environmental and economic benefits of chemical fertilizer.

Myers has a long association with IFDC and is one of its strongest advocates. In discussing the Center and its programs, he had this to say: "In my view, IFDC's projects that have emphasized the estab-



(Photo, Courtesy of TFI)

Gary D. Myers
President
The Fertilizer Institute

lishment of a free market orientation in the Eastern Bloc countries of Europe are some of its most significant successes. By continuing to plant the seeds of democracy and free market economies, IFDC is providing a valuable service to the American public."

"IFDC was recently involved in a venture in Albania where no dealer mechanism existed to sell fertilizers to the farmers. At the project's outset, dealers were not the only cog missing in the fertilizer delivery system though. The country also lacked a transportation system and a business infrastructure. After putting a transportation network in place to deliver fertilizer to the farmers, the Center helped establish an association of some 300 fertilizer dealers."

As for new horizons for IFDC, Myers urges IFDC to "broaden its scope and mission by expanding on its efforts to deliver technological assistance to developing countries. For environmental and economic reasons, computer mapping, soil testing, and total farm management planning should be made accessible to the developing agricultural economies. The export of computer technology should be a priority in any expansion of IFDC's programs."

TFI's President admits that he is pleased with the overall emphasis of IFDC's programs and the important impact that

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IFA Secretary General Adds New Dimension to Board

The Secretary General of the International Fertilizer Industry Association (IFA), Luc M. Maene, is a recent addition to the IFDC Board of Directors. Maene, a native of Belgium, brings to the Board some 25 years of experience in international agricultural development.

After receiving a degree in soil science and agronomy from the University of Ghent, Maene began his career as a Research Associate in the Faculty of Agricultural Sciences, State University of Ghent. After a brief assignment with the Institut National Agronomique de Tunisie in Tunisia, he completed a 10-year tenure with the Belgian Administration for Development Cooperation in Malaysia, where he served as Project Manager of a soil science project dealing with soil fertility and conservation research at the University of Malaya and the University of Pertanian Malaysia. During that period, he was also guest lecturer in soil physics at these Malaysian universities.

After a brief period of service as director of project evaluation for the Belgian Administration for Development Cooperation in Brussels, Maene became Manager of the FAO/ESCAP/UNIDO Fertilizer Advisory, Development and Information Network for Asia and the Pacific (FADINAP).



(Photo, Courtesy of IFA)

Luc M. Maene
Secretary General
International Fertilizer
Industry Association

In 1987 Maene joined IFA as Executive Secretary of its Secretariat in charge of activities of the Agro-Economics Committee, the development of the regional policy of IFA, the supervision of Administrative Services, and aspects of external relations. Two years later he was promoted to Deputy Secretary General with operational responsibility of IFA's Secretariat. Since 1 July 1989, Maene has been Secretary General of IFA.

In a recent interview, Maene discussed the programs and accomplishments of IFDC. "The development and implementation of a free and competitive market system for fertilizers in Bangladesh is one example of an IFDC success story," he says. "The privatization project in Albania to increase agricultural productivity and sustain a free market economy is another. However, I wish

to stress that the key issue facing us today is agricultural intensification to produce enough food to feed the anticipated number of additional people in the world of tomorrow. Taking into consideration environmental constraints and the respect that we owe to the land that supports us, this is a tremendous challenge. Therefore, the importance of long-term research in enhancing plant nutrient efficiency and management aspects of soil and water should be emphasized. These research efforts are the basis of agricultural production technology."

The IFA Secretary General further discussed the challenges faced by development officials today. "We face the challenge of providing access to sufficient food for more than 700 million people in developing countries, who are currently malnourished," he says. "Further, world population continues to grow and food production must increase. Any activity that contributes to the efforts needed to meet these formidable challenges while respecting the natural resource base is a step in the right direction. Mineral fertilizer is recognized as a key input in the agricultural production process. Research on improving the quality and the efficiency of the fertilizer products and on the efficiency of nutrient uptake by the plants is of the highest priority. Improving the efficiency of manufactured fertilizer products, of the infrastructure required to make these products available to the farmer, and of the management practices in applying these products will have a positive effect on the environment while boosting food production."Ⓢ

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they are having on international development, but he looks to the integration of fertilizer and other agri-inputs as an area on which he envisions IFDC will place increasing emphasis in the future.Ⓢ

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agricultural land use and forecast crop production. The area sampling frame is composed of permanent identifiable agricultural regions and sampling units composed of farms. The surveys also provided the basis for supporting information management systems by designing and establishing attribute and geographical databases linking information on

crop area, production, and socioeconomic information to facilitate monitoring and development of agricultural programs. In addition, national capacity is being developed by training government officers on the fundamentals of structuring information and using sampling techniques to carry out surveys, data collection, analysis, and reporting."Ⓢ

IFDC's Training Programs Further Reform Process in Central and Eastern Europe

Two training programs recently conducted by IFDC in Albania and Romania represent one means that the Center is using to further the market reform process in these countries. The training programs focused on providing agricultural professionals in these countries access to the latest information technology tools.

"Recognizing that agricultural decisionmakers in the newly emerging democracies of Central and Eastern Europe must have access to accurate, relevant, and timely information if they are to perform efficiently, IFDC recently conducted training programs to introduce them to computer-based tools," says Dr. Philip K. Thornton, IFDC Senior Systems Modeling Scientist. "The tools that were introduced included crop growth simulation models, models of social and economic systems, Geographic Information Systems (GIS), and database management systems. These computer-based tools can be used to process, evaluate, and use information ranging from improved production technologies that are economically and environmentally sound to reliable reports on market conditions."

When integrated into a system used to aid decisionmakers in analyzing complex issues, these information tools are often labeled Decision Support Systems (DSS). IFDC scientists have contributed significantly to the development and application of crop growth simulation models and a prototype DSS referred to as the Decision Support System for Agrotechnology Transfer (DSSAT). (See the article on the recent release of version 3 of the DSSAT elsewhere in this issue).

"Using lectures and hands-on computing activities, we taught professionals from these countries how to use the DSSAT and crop models during the training programs in

Albania and Romania," says Dr. Walter T. Bowen, IFDC Systems Modeling Scientist. "After presenting a basic introduction to computers, we taught the participants how to input, organize, and store data on crops, soils and weather; retrieve, analyze, and display data; validate and calibrate crop growth models; evaluate different management practices and genotypes at a given site; and evaluate risk associated with weather variability."

To make the training more effective, participants used crop, soil, and weather data from their own countries. Participants in each training program plan to form a network of collaborators to support the application and continued development of decision support systems to be used in policymaking, research, extension, and agribusiness activities in their respective countries.

Bowen and Thornton conducted a 2-week training program in Albania at the Agricultural University in Tirana, where 23 agriculturalists participated. The participants represented the Agricultural University of Tirana, the Agricultural University of Korca, the Agricultural Research Institute in Tirana, the Institute for Soil Studies, the Hydrometeorology Institute, the Albanian Fertilizer and Agricultural Inputs Dealers Association and IFDC-Albania.

The two IFDC systems scientists directed the 2-week training program in Romania at the Research Institute for Cereals and Industrial Crops (ICCP) in Fundulea. The 20 participating scientists were from ICCP and other agricultural research stations in Romania. 🌐

The participants in a training program in Albania obtain hands-on experience with computer-based tools in processing, evaluating, and using agricultural information.



The participants in the training program in Romania.



(Photos by Dr. Walter T. Bowen)

New Computer Software Released by Crop Modeling Consortium

A new crop modeling consortium, which is composed of the former members of the International Benchmark Sites Network for Agrotechnology Transfer (IBSNAT) and the International Consortium for Agricultural Systems Applications (ICASA), recently released a new computer software, called Decision Support System for Agrotechnology Transfer (DSSAT)-Version 3.0.

This computer software is designed to enable a user to match the biological requirements of crops to the physical characteristics of land to attain objectives specified by the user. IFDC's crop modelers—Dr. Philip K. Thornton, Dr. Walter T. Bowen, Dr. Upendra Singh, and Dr. Paul W. Wilkens—participated in the design and development of the software.

The decision support software consists of a Data Base Management System to enter, store, and

retrieve the 'minimum data set' needed to validate, list, and use crop models to provide predicted outcomes to alternative management input such as weather, soil, and crop data. The software package also includes a set of validated crop models (CERES and CROPGRO) for simulating processes and outcomes of genotype by environment interactions and an applications program for analyzing and displaying outcomes of long-term simulated agronomic experiments.

The eleven crop models included in this computer software cover the cereals: maize, wheat, rice, barley, sorghum, and millet; legumes: soybean, peanut, and *Phaseolus* bean; and rootcrops: cassava and potato. These crop models can be run in a number of ways in the DSSAT. For example, in the validation/calibration mode, they can be used to compare model simulations with real-world field trial results to assess the performance of the model at a given site. In the sensitivity analysis mode, they can be used to answer "what if" questions, such as, what would happen to yield response if a farmer grew another variety of wheat or applied more fertilizer or reduced irrigation. In the strategy analysis mode, replicated seasonal or rotation experiments can be simulated, weather

and economic risk assessed, and options assessed.

IFDC's crop modelers point out that the DSSAT is proving valuable in four different areas. For example, it serves as a teaching and training tool. As a research tool, it is used to derive recommendations concerning crop management and to investigate environmental and sustainability issues. As a business tool, it can enhance profitability and improve input marketing. As a policy tool, it can be used in yield and area forecasting and in land use planning.

The software is written in FORTRAN, C, and Turbo Pascal. It runs under DOS and performs best with a 486DX or Pentium processor. The complete system requires about 15 Mb of hard disk space and 570 Kb of RAM. The package costs \$495 and comes with extensive documentation.

To order this software, please contact:

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Research on Cost-Effective Alternative Phosphate Fertilizers

Although direct application of phosphate rock may be a cost-effective means to supply phosphorus nutrient for plant growth, low- and medium-reactive phosphate rocks often do not perform as well as soluble phosphate fertilizers such

as triple superphosphate (TSP). One practice that has been reported to increase the use of low- and medium-reactive phosphate rocks is to supply the early requirement of the crop with water-soluble phosphorus. By doing so, the crop would have a better development of roots that, in turn, would be able to use phosphate rock more effectively than could a plant initially treated with phosphate rock only. This can be done by compacting water-soluble phosphate fertilizers such as TSP with phosphate rock or by partially acidulating phosphate rock. Quantitative estimation of phosphorus availability from phosphate rock as enhanced by water-

soluble phosphorus has not been reported.

In a collaborative research program with the Joint Division of Nuclear Techniques in Food and Agriculture of the Food and Agriculture Organization (FAO) of the United Nations and the International Atomic Energy Agency (IAEA), Dr. S. H. Chien, IFDC Senior Soil Chemist, and Dr. R. G. Menon, IFDC Senior Soil Fertility Scientist, conducted a greenhouse experiment to study this enhancement effect quantitatively. They tagged water-soluble phosphorus fertilizer (TSP) with radioactive phosphorus-32 as a tracer to distinguish phosphorus uptake

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International Workshop in Sri Lanka Focuses on Phosphate Rock

The Institute of Fundamental Studies (IFS) of Kandy, Sri Lanka, was the site of an international workshop on the direct application of phosphate rock and other appropriate fertilizers for Asia, conducted by IFDC and IFS during February 20-24, 1995. The German Agency for Technical Cooperation (GTZ) was the sponsor of this workshop.

The workshop attracted some 50 delegates from 17 countries including Bangladesh, Cambodia, China, India, Indonesia, Kenya, Laos, Malaysia, Mali, Morocco, Norway, Pakistan, Philippines, Sri Lanka, Thailand, Tunisia, United States, and Vietnam. Nineteen speakers representing 12 organizations made presentations during the workshop.

"This workshop focused on the development of indigenous agromineral resources in Asia to provide nutrients to ultimately increase food production to feed the additional 1 billion people estimated to be added to the region's population

within the next 15 years," says Steven J. Van Kauwenbergh, IFDC Mineralogist/Petrographer and the workshop manager. "In order to feed Asia's growing population, food production must be increased using land that is already under cultivation."

Low-cost phosphate rock that is directly applied and other products manufactured by relatively unsophisticated methods are used successfully in several Asian countries. Appropriate fertilizer products such as single superphosphate and underacidulated products are also used in the region.

"The workshop examined and assessed the factors, constraints, and options to be considered in the development of phosphate rock resources and the use of other fertilizers," Van Kauwenbergh says. "Delegates also considered the environmental factors associated with resource development, fertilizer production, direct application of phosphate rock, and the use of other fertilizers. Guidelines were developed for formulating government policies to facilitate the establishment of fertilizer production and use based on indigenous resources in developing countries."

The workshop and ensuing deliberations focused on such topics as mining, production, and consumption of phosphate rock, particularly

in Asia; technical considerations in determining the potential of exploiting indigenous mineral resources; and the determination of the economic viability of using a country's raw material resources. Other topics included the mineralogy of phosphate rock, selection of phosphate rocks for direct application, various processes for beneficiating phosphate rock, evaluating the processing characteristics of raw materials, and the environmental impact of mining and processing fertilizers.

Delegates from Bangladesh, Cambodia, China, India, Indonesia, Laos, Malaysia, Pakistan, Philippines, Thailand, and Vietnam presented reports on their respective countries. These reports covered each country's agricultural situation, use of fertilizer, and the use and demand for direct application of phosphate rock or other appropriate fertilizers.

Individual working groups discussed the topics of governmental policy concerning direct application of phosphate rock and other appropriate fertilizers, technology and production economics, agronomic effectiveness and agro-economics, and transportation and marketing.

The proceedings of this workshop will be published in late 1995 and will be announced in this newsletter.Ⓢ

IFDC-Africa Seminar Highlights Use of Local Mineral Resources

Two IFDC-Africa networks—the African Fertilizer Trade and Marketing Information Network (AFTMIN) and the West African Fertilizer Management Evaluation Network (WAFMEN)—conducted a

seminar on the use of local mineral resources for sustainable agriculture in West Africa during November 21-23, 1994, in Lomé, Togo.

Ninety-two participants from 14 countries in sub-Saharan Africa, two countries in Europe (France and Netherlands), and the United States discussed the use of local mineral resources to reverse the decline in soil fertility and to increase farm production and income. The seminar was funded by the Netherlands Development Cooperation (DGIS), and the WAFMEN participants were sponsored by the Agence de Coopération Culturelle et Technique (ACCT).

"The use of phosphate rock for sustainable agriculture in West Africa became a crucial issue following the devaluation of the FCFA in January 1994," says Henny Gerner, IFDC-Africa Economist/Data Base Manager and one of the organizers of the seminar. "Suddenly farmers in francophone West Africa were confronted with much higher prices for imported fertilizers. Ghanaian farmers have similarly faced higher fertilizer prices (relative to crop prices) following the series of currency devaluations in the past three years. Failure of food-crop farmers to apply soil fertility enhancing inputs because of higher prices will

prices will lead to the adoption of extensive agricultural practices that bring marginal lands under cultivation. Such practices are destructive to the environment because they stimulate soil erosion and aggravate soil degradation."

Increasing farmers' motivation to invest time and resources in soil fertility management is a prerequisite for promoting sustainable agriculture. Farmers' motivation in terms of increased profits can be heightened if fertilizers are used in conjunction with improved crop varieties and if cultivation is carried out on soils whose physical and chemical properties have been modified, e.g., with phosphate. The most productive and environmentally sound soil management system is one that supplies nutrients through the combined use of organic and mineral fertilizers and modifies the crop environment with soil amendments. Phosphate rock, which is relatively abundant in sub-Saharan Africa, can be used as an amendment in the highly phosphorus deficient soils.

"The use of phosphate rock as a capital investment in agriculture is a current theme on the international development agenda, which is being led by the World Bank," Gerner says. "Phosphate rock could be used to add phosphorus to the pool of slowly available phosphorus fraction in the soil. This pool is analogous in economic terminology to fixed capital. Although the phosphorus is not readily available to short-season agricultural crops, ecosystem soundness depends on the maintenance (or restoration) of this base pool. There is a paucity of this capital pool of phosphorus in many sub-Saharan African soils, and applications of phosphate fertilizers to supply the 'liquid' capital or the more readily available pool of phosphorus often fail to yield the desired response because phosphorus is made insoluble and unavail-

able as it forms iron and aluminum complexes or is trapped by soil particles. The addition of phosphate rock to increase the phosphate capital in the soil should not discourage the use of water-soluble fertilizers to improve the plant-available pool of phosphorus (liquid capital)."

In addition to country-specific recommendations, seminar participants also ratified the following recommendations for agro-ecological regions in West Africa, for the international donor community, and for IFDC. In view of the diversity of the agroecological regions in West Africa, the seminar makes the following recommendations to the countries:

- Structures should be created to harmonize integrated soil fertility management activities, where such structures do not already exist, and in countries that already have them, work toward their enhancement. The soil fertility management structure must be consulted on all issues of agricultural policy. It must first summarize all relevant research results and development experience to facilitate the formulation of a strategy for the restoration and maintenance of soil fertility.
- A quantitative and qualitative inventory and a technical and economic evaluation should be completed, covering all local resources (mineral and organic) for direct application and/or use after industrial processing.
- Regions should be identified for the possible use of local resources based on the degree of fertility deterioration, the farming systems, and the types of soil.
- The establishment of small plants should be promoted for the exploitation of local resources by using sources of financing at concessionary interest rates with the view of making the products acceptable to farmers.

- A conducive economic environment should be created for farmers to promote the adoption of appropriate/adequate technologies based on the use of local mineral resources.

For the international community the seminar recommends that it consider with careful attention the following:

- The restoration and maintenance of West Africa's soil fertility as a global environmental challenge and an investment in natural capital. The cost of the operation should be borne by the entire society with the understanding that it is the responsibility of each government to take the initiative with the support of the donor community.
- Soil fertility restoration in West Africa through the application of local mineral resources should be regarded as one possible way of implementing activities mentioned in our common environmental Agenda 21, Chapter 14, "Promoting Sustainable Agriculture and Rural Development," and Chapter 10, "An Integrated Approach to the Planning and Management of Land Resources."

For IFDC the seminar recommends the following:

- In-depth technical and economic studies on the various lines of phosphate fertilizer production should be undertaken.
- Similar annual seminars should be organized with the participation of the policymakers, decision-makers, and donors.
- An information exchange network should be established between the states to promote intra-African trade in mineral resources.

Seminar proceedings entitled "Use of Phosphate Rock for Sustainable Agriculture in West Africa" will be published in French and English.⊕

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between TSP and a medium-reactive phosphate rock. Maize and cowpea were used as test crops. The relative agronomic effectiveness of phosphate rock was only 37% for maize and 50% for cowpea as compared with TSP. The relative agronomic effectiveness was increased to 86% for maize and 92% for cowpea when phosphate rock was mixed with TSP at a 50:50 phosphorus nutrient ratio. Based on the isotopic dilution technique, the enhancement effect was calculated. For maize, phosphorus uptake from phosphate rock was increased by 165% in the presence of TSP. For cowpea, the increase was 72%.

"The results that we obtained in this study reconfirm that phosphorus availability from phosphate rock can be significantly increased by supplementing some water-soluble phosphorus with those low- and medium-reactive phosphate rocks, which may not be suitable for direct application under certain soil and crop conditions," Chien says.Ⓢ

RECENT IFDC PUBLICATIONS

Proceedings of Workshop on Fertilizers and the Environment

IFDC recently published a proceedings of an international workshop on nitric acid-based fertilizers and the environment, which the Center conducted in Brussels in June 1993. IFDC organized and conducted the workshop in cooperation with the European Fertilizer Manufacturers' Association and the International Fertilizer Industry Association. Some financial support for the workshop was also provided by the United Nations Development Programme. Because of the importance of nitric acid-based fertilizers in the developed and developing countries, their potential for having a relatively benign environmental impact at the production site, and their role in international trade for meeting the fertilizer needs of many developed and developing countries, this workshop was organized. This technology has been widely adopted

in Europe and the former Soviet Union and to a lesser extent in Asia and Latin America.

Some sixty-seven delegates from about 30 countries discussed the implications of a number of environmentally driven initiatives directed at the producers and users of these fertilizers. Technological and management innovations were discussed that can be used to help mitigate any negative impact caused by the production and use of nitric acid-based fertilizers. These proceedings should help to sharpen the focus on the technical, economic, and regulatory issues and initiatives that may be required to ensure the availability of cost-effective fertilizer supplies and sustainable agricultural productivity.

To order a copy of this proceedings (IFDC-SP-21), please place your order with the IFDC Purchasing Department. The cost of the 443-page publication is US \$60 (including shipping).Ⓢ