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

Headquarters-

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Alex Haley Addresses IFDC Century Club

eport

"Alex Haley is the world's master teacher-he teaches us to understand about our families and our neighbors. More importantly he teaches us to understand our whole world family . . . how we're so much alike in spirit and the things that really matter, such as the love of family and neighbors, how to reach out to people in need, the common bond between all people of the world that is so important. But he goes on beyond that and tells about the cultural differences among the peoples of the world, what is beautiful about those cultures, their meanings, and the richness of them. Through this teaching you begin to untangle some of the problems of the world and understand how we're so much alike . . . He teaches us about the struggle for dignity and the human inspiration that all people have."

These were the words of Bill Willis, General Manager of the Tennessee Val-

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ley Authority (TVA), as he introduced Alex Haley to the IFDC Century Club, during its tenth Annual Banquet on March 22, 1988. After visiting with IFDC staff and touring its Headquarters facilities, Haley served as the keynote speaker for the Century Club banquet, held at the Holiday Inn in Sheffield, Alabama. On the following day, he addressed a public gathering at TVA's National Fertilizer Development Center.

Born in Ithaca, New York, Haley spent much of his youth in Henning, Tennessee, where he first learned of his ancestry from his grandmother. During World War II he was a ship's cook with the U.S. Coast Guard in the Southwest Pacific. Haley fought off boredom by reading and writing. In 1959 when he became eligible for retirement, he left the Coast Guard to embark on a new career as a full-time writer.

During the long, intensive, challenging ordeal of researching the maternal side of his family, Haley eventually traced his genealogy across some 200 years and 6 generations. He determined that his fourth great grandfather was Kunta Kinte, a youth of The Gambia, West Africa, who in 1767 was kidnapped and brought to the United States as a slave. During Haley's 12year odyssey, he traveled more than a half million miles, conducting his study in more than 50 libraries on 3 continents.

Haley's *Roots* became the biggest best seller in U.S. publishing history. Published worldwide, by now in 37 lan-

guage translations, it has sold over 6 million hardcover copies.

According to Who's Who in America, Haley's writing has won him America's two topmost writing awards: The Pulitzer Prize and the National Book Award. Colleges and universities have awarded him 17 honorary academic doctorate degrees, while from other sources he has received over 300 special recognitions. Time Magazine has labeled Haley "a folk hero" and his book Roots a "cultural landmark."

The famous author has not rested on his laurels but



Mr. Alex Haley

has become involved in many humanitarian projects. For example, he and Willis initiated an adult literacy project that is being conducted in the Tennessee Valley. In addition, Haley participates in an African agricultural consortium founded at Tennessee State University.

In his address to the Century Club, Haley compared the world and its people, not to a melting pot, but to a salad bowl. "Although all of the ingredients make up the salad, none of them lose their own special personalities in the process," he said.

In giving his response to the world, Haley said, "All peoples of the world are different. We need to be proud of

India-

who we are and what we are. We need to be energetic in sharing our heritage with other people and equally eager to learn other people's personalities, characteristics, heritages, and cultures."

This gentle, quiet man, described by some who have interviewed him as "unpretentious," "easygoing," and "very likeable" proved to be "electrifying" and "spell-binding" as a speaker. After giving his audience a glimpse of his background and why and how *Roots* originated, Haley praised the work of the IFDC staff.

"I don't know of anything that can better demonstrate the best in us," he said, referring to the work of the Center. "The work of IFDC—helping to make the world a better place—is unsung."

But Haley surmised that there is an explanation for this. "The things that contribute the most seem to get the least credit, publicly anyway," he said. "As a society we respond more, on the surface, to negatives than to the positives. At the same time, if it were not for the quiet, positive things, our society would be corroded and eroded. I think that the work of IFDC is really in the very highest tradition of making a better world, and I don't think there's a better calling that any of us individually or collectively could aspire to."■



Workshop Explores NPK Fertilizer Production Alternatives

The almost exponential growth in

food-grain production of the 1960s and 1970s in Asia has stagnated and again we face a crisis situation as we approach the 21st century, according to Dr. T. S. Manickam, Dean of the Agricultural College and Research Institute, Madurai, India.

Dr. Manickam was the keynote speaker at an international workshop exploring NPK fertilizer production alternatives, which was conducted by IFDC in Madras and Bombay, India, during February 8-13, 1988. The group numbering 70 from 15 countries included delegates and technical resource persons.

Manickam went on to say that we have come to the end of this "seed and fertilizer" formula for increased crop production; yields have leveled off in spite of increased application of nitrogen. What is needed now, according to Dean Manickam, is a stronger focus on balanced nutrition. While nitrogen is clearly the primary fuel for the crop production machine, phosphorus, potassium, magnesium, calcium, sulfur, and a number of micronutrients are needed in increasing amounts not only to maintain but also to increase the fertility of the native soil. We now need to look beyond what has been achieved with seeds and fertilizer and direct more of our attention to the soil characteristics in an effort to supply a more balanced nutrient package.

These observations were quite in keeping with the objectives of the Workshop and the goals of the assembled delegates who sought to discover and examine a number of ways to produce a variety of multinutrient (NPK) fertilizers that will make it possible to achieve another "Green Revolution" during the next century. Such a breakthrough is needed in crop yields if one accepts the prediction that the need for additional food, worldwide, will increase by about 60% during the next 20 years.

"The Workshop was designed to bring together industry leaders, primarily from the developing nations of Asia, to discuss ways of meeting the needs of balanced crop nutrition," says J. J. Schultz, Workshop Manager. This activity was cosponsored by IFDC and the Fertiliser Association of India and the Fertilizer Advisory, Development, and Information Network for Asia and the Pacific (FADINAP), a United Nations Organization. "The 6-day Workshop explored the entire gamut of existing and emerging technologies used for supplying a variety of NPK products," Schultz says. "These technologies include bulk blending, pressure roll compaction, and a number of liquid-phase granulation techniques ranging from the most simple water and steam granulation processes to the more complex family of ammonium phosphate- and nitrophosphate-based processes."

Since urea is the predominant form of nitrogen used in the developing world, a heavy emphasis was given to the examination of methods for its use in the production of NPKs. Incorporation of urea into NPK products causes certain problems that must be overcome through specialized plant design, plant operation, and product storage and handling techniques. Furthermore, the urea-containing grades are quite hygroscopic and must be protected from the humid environment so characteristic of most developing countries.

"Another emerging NPK technology that captured the attention of the delegates is compaction/granulation," Schultz says. "A case study referring to one such unit recently built in Guatemala provided the foundation for the discussions."

Although there are only about six NPK compaction/granulation fertilizer plants in the world today with a total annual production of less than 1 million tons, the future looks bright for the application of this technology in many of the developing regions of Asia, Africa, and Latin America. This technology appears to be especially appropriate in cases where the annual fertilizer requirements are quite low, where a large number of grades are required, and where only solid raw materials are available.

A Proceedings of the Workshop is being prepared and should be available during the latter half of 1988.



Delegates to the NPK Workshop listen intently to a presentation by an industry representative.



Sulfur Fertilizer Experimentation Conducted on Upland Soils

Field trials in West Africa are revealing

that even low application rates (5-10 kg/ha) of sulfur fertilizer can increase grain yields by as much as 64%.

Africa-

IFDC's work on sulfur fertilizers for upland soils is concentrated in West Africa where sulfur deficiency has the potential to become a widespread problem. Its occurrence has long been recognized in cash crops such as groundnuts and cotton which historically are the principal consumers of fertilizers in the region. (This work is conducted in collaboration with the International Crops Research Institute for the Semi-Arid Tropics, Niamey, Niger.)

"Fertilizers destined for these cash crops often have a prescribed sulfur content," says Dr. Dennis K. Friesen, IFDC Soil Scientist. "In contrast, fertilizer use on food crops is low, and the consequent low yields have not placed excessive demands on native soil sulfur which is replenished by inputs from rainwater and dust."

-Almost all fertilizers used in West Africa are imported and, especially

for the landlocked Sahelien nations, must be transported great distances overland from the coast. This situation has induced these nations to rely increasingly on the use of highanalysis sources of phosphate and/or nitrogen such as urea, triple superphosphate and diammonium phosphate. However, increasing yields brought about by the use of these fertilizers are putting the system in negative balance with respect to sulfur. The addition of fertilizer sulfur is becoming necessary to maintain vields and to derive the full benefit of NPK applications.

"IFDC's sulfur program in West Africa is, therefore, examining actual sulfur fertilizer requirements and appropriate nutrient ratios for major cereal crops of the region," Friesen says. "The results of this research are already being implemented through the inclusion of sulfur in some of the imported fertilizers and will also enable planners to take into account the sulfur requirements of crops as local production facilities are installed. Since transportation costs bear heavily on farmgate fertilizer prices in West Africa, evaluation of the more highly concentrated elemental sulfur sources is also being undertaken."

In collaboration with national institutions, IFDC's sulfur experiments are being conducted at six sites from semiarid Niger to the subhumid zone of south-central Togo. The test crops are millet, grain sorghum, or maize, depending on the agroclimatic zone. Each of these experiments involves a comparison of a sulfatic source and one or two elemental sulfur sources.

Results from these trials have shown large responses to sulfur fertilizers: grain vield increases ranging as high as 64% or more than 1,000 kg per hectare have been recorded. Responses have generally been observed in the first year of the trials at the more humid sites while responses have developed at the more arid northerly sites over a period of 2 or years. Nevertheless, initial 3 responses have usually been to the first rate of application only with no additional response to the higher rates. The data, thus, suggest that very low application rates (5-10 kg/ha) of sulfur fertilizer are adequate and highly economical for these crops and soils.

"The trials have also demonstrated apparently similar agronomic effectiveness of sulfate and elemental sulfur sources," Friesen says. "In contrast to our greenhouse results, granulation of elemental sulfur sources has not reduced sulfur effectiveness under field conditions at the rates of application used."

The residual value of elemental sulfur, however, has proven to be greater than that of phosphogypsum in experiments on millet in Niger and maize in central Togo. The poor residual effectiveness of sulfate sources appears to be related to their strong susceptibility to leaching in the sandy soils of this region.

Fertilizer sulfur recovery by the millet crop amounted to only 10% of that applied while 71% was recovered from the soil profile, mostly in the 30-60 cm zone. If these data are confirmed by similar observations from other experiments and seasons, they will demonstrate that considerable scope exists for improvement of sulfur fer-

Togo-

The annual meeting



Field workers in Niger establish sulfur trials.

tilizer efficiency in these cropping systems. At this time, the better performance of the elemental sulfur sources suggests one means of doing so. The role of crop residues in maintaining sulfur fertility is another means that also needs to be examined.■



WAFMEN Annual Meeting Sets New Directions for Network Research

of the West African Fertilizer Management and Evaluation Network (WAFMEN) was held in Lomé, Togo, during February 10-12, 1988. Twenty-one delegates from fourteen countries attended the Workshop.

The Honorable K. K. Walla, Minister of Rural Development, Government of Togo, delivered the welcoming address. Dr. C. B. Christianson, IFDC Soil Scientist, summarized the results of Network nitrogen trials conducted in 1985 and 1986; Dr. Uzo Mokwunye, Coordinator of IFDC-West Africa's Agronomy Programs, gave the delegates an insight on the Network phosphorus trials of 1985 and 1986.

The second session of the Workshop featured a review of the 1987 results from Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Gambia, Ghana, Guinée, Liberia, Niger, Nigeria, Senegal, Sierra Leone, and Togo. In addition, Dr. André Bationo, IFDC Soil Scientist, presented a synopsis of the IFDC/ ICRISAT trials in Niger. Dr. Mokwunye outlined the programs of IFDC-West Africa with special emphasis on the agronomic program.

WAFMEN participants established new directions for their research in that they decided that emphasis should move away from single nutrient nitrogen, phosphorus, and sulfur— trials towards multinutrient experiments. The objective should be to determine what ratios of nitrogen, phosphorus, potash, and sulfur would be required to obtain good economic yields for the farmer. This information would then be used to develop and test the multinutrient products using phosphate rock or partially acidulated phosphate rock as the basic phosphate source.

Dr. Mokwunye made a short presentation outlining the potential of such products in West Africa and the response of the delegates was generally favorable.

Next year's meeting will be held in Burkina Faso; at that time, a synopsis of the results for the past 7 years' work will be presented on a countryby-country basis.

In planning next year's meeting, the WAFMEN members decided to invite representatives of the national extension services since they are a vital link between the scientist working at the experimental station and the farmer working in the field. The Workshop participants recognize that it is necessary to involve the extension personnel in experiment planning and to acquaint them with the results of past trials. By including extension representatives from each WAFMEN country in the meeting, it is hoped that a more rapid transfer of fertilizer technology can be achieved between the scientists, the extension service, and the farmers. It is expected that practical approaches will be found to solve the problem of providing the farmer with the recommendations required to achieve maximum economic benefit from his fertilizer inputs.





Specifications Developed for the Egyptian Fertilizer Development Centre

The United Nations Industrial

Development Organization (UNIDO) recently contracted for the services of an IFDC engineer to design the facilities of the Egyptian Fertilizer Development Centre.

The overall purpose of the Centre is to guide fertilizer industries in making the proper investments necessary to produce fertilizers in Egypt.

During the last three months of 1987, J. R. Polo, Engineering Coordinator, visited Egypt on a fact-finding mission. While in Egypt he visited the sites where the facilities of EFDC will be located to gather the necessary in-country information for performing the design work.

Upon his return to IFDC Headquarters, Polo developed detailed plans for a granulation pilot plant; phosphate, nitrogen, and physical properties laboratories; and a library. In addition, he suggested potential international suppliers, advised on civil works and other inputs to complete the construction, and identified technical information on fertilizer production technology that will be needed in the library.

"The Centre's pilot plant, nitrogen laboratory, library, and training facilities will be located in El Mansoura, Talkha," Polo says. "The phosphate research laboratory will be established in Abu Zaabal."

As for the activities to be conducted in the facilities, the nitrogen research laboratory will be equipped to perform small-scale batch tests to evaluate various indigenous materials as conditioners for urea and calcium ammonium nitrate. In the phosphate research laboratory studies will be conducted regarding the properties of phosphoric acid and methods of using the acid for production of fertilizers or fertilizer intermediates. In the physical properties laboratory the entire gamut of physical analyses will be performed on fertilizer materials.

"The granulation pilot plant will be used primarily to perform engineering research on the preparation of different granular fertilizers; devise new formulations, including addition of micronutrients, pesticides, and herbicides; and prepare noncommercial amounts of granular fertilizers for agronomic testing in Egypt," Polo says.

The personnel who will be directly involved in the operation of the pilot plant and laboratories will be thoroughly trained in these activities. The supervisors of the pilot plant and the directors of the different laboratories will travel abroad to receive training in facilities similar to the ones that EFDC will operate.

Togo-



Research priorities

regarding fertilizer supply- and demand-related issues were established during a Workshop on Fertilizer Policy in Tropical Africa, conducted in Lomé, Togo, during April 5-7, 1988.

The Workshop, cosponsored by IFDC and the International Food Policy Research Institute, was attended by 34 delegates, representing 12 countries and 7 organizations. The delegates came from Benin, Cameroon, Côte d'Ivoire, Ghana, Kenva, Malawi, Nigeria, Senegal, Togo, Zaire, Zambia, and Zimbabwe. Organizations represented at the Workshop included the Centro Internacional de Mejoramiento de Maiz y Trigo (CIM-MYT), the Comite Permanent Interetats de Lutte Contre la Secheresse dans le Sahel (CILSS), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Institute of Tropical Agriculture (IITA), and the U.S. Agency for International Development (USAID).

Priorities for Fertilizer Policy Research in Tropical Africa Established During Workshop

> The main objective of the workshop was to collect views and recommendations of policymakers and researchers on what they perceive as the major constraints to increased fertilizer use in their individual countries. In addition, scholars, researchers, and policy analysts from a number of international institutions and donor agencies also shared their experiences and interacted with African delegates on the broad problems confronting the development of the fertilizer sector in the Sub-Saharan region.

> During the Workshop, the delegates presented papers outlining their countries' fertilizer policies and

the problems confronting the fertilizer sectors in these countries. After these presentations, they engaged in an informal discussion to bring out more forcefully the major issues that are relevant to a large number of the participating countries.

As a result of the Workshop, the delegates delineated some key recommendations regarding fertilizer supply- and demand-related issues. The delegates supported IFDC's current efforts toward the creation and management of a regional data base on fertilizer-related issues to encourage the flow of information on areas of fertilizer marketing, research, manpower training, and expertise within institutions in countries as well as within the region.

As for promoting fertilizer supplies, the group concentrated on the problems related to domestic production

and imports. On the production front, the group recommended the appraisal of the existing production facilities of the region, an assessment of the potential to produce fertilizers in the region, and an appraisal of the potential for small-scale production of fertilizer at the village level. On the import side, the delegates recommended the examination of the possibility of regional cooperation among countries in importing high-grade fertilizers in bulk, the analysis of all aspects of fertilizer cost reductions, and the training of experts in international markets.

Regarding privatization, the delegates recommended the assessment of different institutional arrangements in order to select one that can best manage fertilizer import, distribution, and marketing.

Concerning fertilizer demandrelated issues, the group concluded that the major problem is the lack of detailed data on the physical response to fertilizer, the economic environment, the decisionmaking process of farmers, the current status of extension, and soil fertility maintenance.

The Workshop's recommendations supported IFDC's work already underway in this area and are expected to form the core of IFDC-IFPRI research that will lead to a further refinement of fertilizer policies in sub-Saharan Africa.

6-IFDC Report



Workshop Investigates West African Agrominerals

A geology network for the research and

development of West African agrominerals was established at a workshop held in Lomé, Togo, during April 19-21, 1988. This network will study regional agromineral deposits including agricultural limestone and dolomite, phosphate, potash, and sulfur. Objectives of the network are to (1) identify and document occurrences of agromineral raw materials within countries of the region, (2) develop the special geological skills required to locate and evaluate these resources, (3) distribute information and encourage cooperation between regional scientists and participating organizations, and (4) ascertain the potential for using local raw materials in the production of fertilizers to increase food production in the region.

Eighteen geologists from nine West African countries participated in this workshop presented by IFDC and the Bundesanstalt für Geowissen-

schaften und Rohstoffe (BGR), Hannover, Federal Republic of Germany. This workshop was an activity of an ongoing agrominerals research program in West Africa coordinated by IFDC and funded by Der Bundesminister für Wirtschaftliche Zusammenarbeit (BMZ), Bonn, Federal Republic of Germany.

Some of the topics discussed were: (1) general geology of West Africa, (2) nonmetallic minerals in West Africa, (3) overview of phosphate deposits and development in West Africa, and (4) the use of indigenous agrominerals for direct application and fertilizer production. The participants presented reports on the agromineral situation in their respective countries.

IFDC staff members conducting the workshop were Dr. Guerry H. McClellan, IFDC Research Coordinator; Steven J. Van Kauwenbergh. IFDC Mineralogist/Petrographer: Dr. Ampah Kodjo Johnson, IFDC-West Africa Division Geologist, Lomé, Togo; M. Terry Frederick, **IFDC-West Africa Division Training** Coordinator, Lomé; and Dr. Paul L.G. Vlek, IFDC-West Africa Division Director, Lomé. The BGR was represented by Dr. W. Heimbach. Observers' were from the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) in Eschborn, Federal Republic of Germany, and the Office de la Recherche Scientifique et Technique de Outre-Mer (ORSTOM). Lomé, Togo.

A practical viewpoint was gained through field tours to the Office Togolais des Phosphates Mine at Kpogame and the beneficiation facility at Kpeme.



al situation in their respec- phosphate mine at Kpogame.

India-Singapore-Indonesia-



Fertilizer Distribution and Handling Training Program Conducted

In cosponsorship with the Fer-

tiliser Association of India and Assosiasi Produsen Pupuk Indonesia, IFDC conducted its biennial Fertilizer Distribution and Handling Training Program during February 15-March 4, 1988.

The sessions and field trips of this popular program were held in India, Indonesia, and Singapore with the active assistance of manufacturers and cosponsors. Twenty partipants from nine countries attended the program. The countries represented were Egypt, India, Indonesia, Madagascar, Nigeria, Philippines, Saudi Arabia, Sri Lanka, and Venezuela. Participants were particularly appreciative of the opportunity to see a wide range of activities at first hand.

Dr. W. E. Clayton, Transportation/ Distribution Specialist, served as program manager. IFDC staff members who assisted Clayton were R. S. Giroti, Training Administrator, and N. D. Le, Chemical Engineer.

During the program participants



Some of the fertilizer handling facilities at P.T. Petrokimia Gresik in East Java,, visited by the training participants.

were exposed to a wide variety of views on the program topics; twenty-one speakers from India, Indonesia, and Singapore provided interesting insights from their own experience in the field. Several speakers gave presentations on the features of the fertilizer

distribution systems that are unique to their particular countries and companies.

At the conclusion of the program, the participants outlined distribution systems that are in effect in their countries.

Recent IFDC Publications

Recent Elsevier Publication Contains Three Chapters by IFDC Authors

Elsevier Science Publishers of the Netherlands recently announced the publication of Energy in World Agriculture, Volume 2—Energy in Plant Nutrition and Pest Control. This volume is edited by Z. Helsel, University of Missouri-Columbia (U.S.A.).

The publication concentrates on the energy involved in plant nutrition and pest control for crop production. Fossil fuel energy used to produce fertilizers and pesticides is evaluated along with the amount, distribution, and use of these fertilizers and pesticides throughout the world.

Three chapters were written by Dr. Mohinder S. Mudahar, formerly with IFDC and now Senior Economist with the World Bank, and Travis P. Hignett, IFDC Special Consultant to the Managing Director. The IFDCauthored chapters are as follows: Chapter 1: "Fertilizer and Energy Use"; Chapter 2: "Energy Requirements, Technology, and Resources in the Fertilizer Sector"; and Chapter 6: "Energy Efficiency, Economics, and Policy in the Fertilizer Sector."

The publication, which contains 322 pages, can be ordered from Elsevier, P.O. Box 211, 1000 AE Amsterdam, The Netherlands, at a price of US \$136.50.

If you are interested in the IFDCauthored chapters only, you may obtain these by writing to the IFDC Purchasing Department and requesting IFDC-Reprint D-68, D-70, or D-71 for Chapter 1, 2, and 6, respectively. Each reprint costs US \$3 for U. S. addresses and \$5 for non-U.S. addresses.

Practical Handbook Prepared on "How to Use the IFDC Dispenser Method for Hand Deep Placement of Urea Supergranules in Transplanted Rice"

Inefficient and inadequate use of fertilizer nitrogen is one of the major constraints to rice yields on fields of millions of small-scale rice farmers in developing countries. The IFDC dispenser method of deep placing urea supergranules (USG) in transplanted rice is a small but significant step toward helping these economically handicapped small-scale rice farmers.

The method combines hand deep placement with line transplanting. It

is a practical translation of the technically and environmentally sound principle of deep placement of fertilizer nitrogen in an otherwise loss-prone environment of submerged rice fields to minimize nitrogen losses and improve nitrogen availability to rice plants. It is anticipated that this technology will enable small farmers to efficiently use small affordable doses of nitrogen as USG for increasing paddy yields and additionally prepare them for intensive rice cultivation-a need of the future.

Dr. N. K. Savant, IFDC Soil Scientist, has prepared a practical manual that explains the IFDC dispenser method, how to use it, how to ensure agronomic efficiency of fertilizer nitrogen, and why the technology is appropriate for small farmers.

This manual is targeted to the "grassroots" level—it is designed to help agricultural field workers to adequately understand the rationale and scope of this technology and to effectively use it under varying field conditions.

IFDC encourages national rice improvement programs and publishers in developing countries to print this pocket-sized booklet in non-English languages for local use. IFDC does not want royalties or payment for non-English editions of its publication in developing nations. For more details and technical assistance, please contact Dr. Savant or the Editor of this newsletter.



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