



Intsormil

TRIP REPORT

CENTRAL AND SOUTH AMERICA

BY

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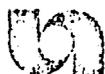
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Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln



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CIMMYT, Mexico - (April 10-16, 1983)

I participated in the "Breeding of Sorghum" workshop sponsored by INTSORMIL, ICRISAT, and INIA and presented a paper entitled "Laboratory screening techniques for aluminum toxicity in sorghum" in a cooperative presentation with Dr. Lynn Gourley (INTSORMIL sorghum breeder at Mississippi State now located at CIAT) and Ronny Duncan (sorghum breeder at the Univ. of Georgia). During my stay at CIMMYT, I visited and consulted with many of the Latin American scientists attending the workshop on subjects of Al toxicity and acid soil tolerance, screening methods, salt tolerance, and mineral element deficiencies in sorghum. Color prints of slides that I had sent Dr. Vartan Guiragossian on mineral element deficiency/excess symptoms on sorghum leaves were displayed and I was asked many questions about these and had requests for copies of slides by a number of scientists. I set out 20 reprints each of two articles on Al toxicity screening and mineral element studies which were taken and additional copies were requested.

I delivered 1 kg HEDTA to Dr. Eva Villegas, CIMMYT scientist, who screens various plants for tolerance to Al toxicity using the hematoxylin method. The last day of the workshop Dr. Villegas gave a demonstration for her screening method for Al toxicity and we (Gourley, Duncan, and Clark) spent about two hours in discussion with Dr. Villegas on similarities and differences of methods used and some of the results obtained. An evening was spent discussing the state-of-the-art methodology for growing sorghum in nutrient solutions with Dr. Jose Ma Villarrems (Ria Bravo, Mexico) who had encountered problems in his system, notably Fe deficiency.

Lolujosa Experiment Station near Choluteca, Honduras - (April 17-20, 1983)

I accompanied Drs. Lynn Gourley and Henry Pitre (entomologist at Mississippi State Univ.) to Honduras to collect insects and to observe sorghum research plots of the sorghum program in southern Honduras. We visited and consulted with Dr. Dan Meckenstock (INTSORMIL sorghum breeder located at Choluteca, Honduras), Mr. Rigoberto Nolasco, and Mr. Juna Benito Gueunra (Honduran sorghum scientists), and saw their sorghum plots with the various lines and hybrids being studied. Three separate trips were made to the plots to observe results. During one trip, army worms were collected to be sent to the U.S. for further study at Mississippi State.

During one day of this visit, three of us accompanied Dr. Kathleen DeWalt and her two assistants (Allyn Wrightsel and Lucinda deOliva) to the villages of Ei Tular, Pedrerito, and Paplon to interview families and to observe the use and culture of sorghum in the Honduran coastal plains area. We saw malcrillo (native sorghum) grown for forage and saw how the people used sorghum in their eating patterns (mixed with maize or used alone in tortillas), and discussed extensively the use of sorghum and the customs of the Honduran people with Dr. DeWalt. Slight Fe deficiencies were noted on some sorghum genotypes.

Discussions were held with National Resource Program officials in Tegucigalpa and with Mr. DeCastro (a banker for the National Resources Program and father of a Honduran graduate student with Dr. Pitre) about the sorghum program in Honduras.

CIAT, Colombia - (April 21-26, 1983)

Accompanied by Drs. Gourley and Pitre, I traveled to CIAT (Cali), Colombia where we toured facilities, saw field plots, and consulted with numerous CIAT scientists. Our first visit with Dr. Douglas Liang, Director of Crops Research (beans, rice, and cassava), who oriented us with research at CIAT, discussed some of the problems of concern, and pointed out the need for sorghum research in Colombia. He made suggestions of several scientists whom we should visit and discuss various concepts about acid soil problems and the adaptation and improvement of crops to these soils.

Extensive discussions were held with Drs. Jose G. Salinas (soil scientist and one of the leaders of the tropical pastures research program), E. Pulver (rice breeder, working on Al toxicity problems), R. Howeler (cassava mineral nutritionist), E. Sieverding (microrrhizae scientist), and Dr. Lynn Gourley (INTSORMIL sorghum breeder). Discussions included screening methods for Al and Mn toxicity tolerance, mineral efficiency uptake and use, acid soil nutritional problems, mineral element analysis methodology, microrrhizae functions and relationships to Al toxicity and nutrient efficiency, sorghum breeding and improvement to acid soils, sorghum culture and cropping systems, and various other topics related to mineral nutrition of plants and plant adaptation to acid soil conditions. I also interviewed and discussed the potential of Ms. Larisa Galvez coming to Nebraska as a graduate student under INTSORMIL to study Al and Mn toxicity problems. Ms. Galvez is presently a biologist at CIAT.

Mr. Eric Owen (soil scientist located at Villavicencio) and Dr. Fernando Arbolendo-Rivera (Director of the National Maize and Sorghum Research Program located at Palmira) from ICA (Colombian National Agricultural Research Program) met with Dr. Gourley and myself at CIAT and discussed programs of sorghum research. ICA appeared very interested in cooperating in sorghum research with INTSORMIL and Dr. Gourley plans to follow up on this. Mr. Owen would like to test Dr. Gourley's germplasm at his site on the Llanos. Mr. Owen also accompanied Dr. Gourley to his plots at Sandendar de Quilichoa. During the Mexico meetings we visited with Dr. Manuel Torregroza (Head of Agronomy, ICA, Logata) and he expressed interest in cooperative sorghum research programs. Dr. Torregroza intended to meet with us at CIAT, but was unable to do so and sent Dr. Arbolendo-Rivera and Mr. Owen.

One day of our visit was spent seeing field plots of Dr. Gourley and other scientists at Sandendar de Quilichoa on the Al toxic soils, and observing cultural practices and farming systems on hillsides where maize is now grown extensively. Too much lime had been added to Dr. Gourley's low lime plots and it was difficult to distinguish differences among genotypes for tolerance to Al acid soil toxicity. We were unable to see the plots in the Llamas (Carimagoa) because of the distance, time, and expense that would have been involved.

Before we left CIAT, we visited with Drs. J. Nichol (Director General of CIAT) and Douglas Liang about our impressions of research programs and what might be accomplished in cooperative endeavors between CIAT and INTSORMIL.

Instituto Agronomico, Campinas, Brazil - (April 27-30, 1983)

We (Gourley, Clark, Pitre) were hosted by former graduate students from Nebraska (Drs. Pedro and Angela Furlani, plant physiologists) and Mississippi State (Drs. Candida Bastos, sorghum and sugarcane breeder and now Director of Industrial Crops, and Atavio Tesselli, soybean breeder) who introduced us to many scientists and showed us to facilities at the Institute. Each of these scientists are conducting research related to acid soil problems. Extensive time was spent with Drs. Angela and Pedro Furlani since both are mineral nutrition scientists and discussions were held on many aspects of the acid soil problems, nutrition efficiencies, and problems common to mineral nutrition.

We were introduced initially to and met with the Director of the Institute, Dr. Nelson Sabino. Dr. Courley and I spent time consulting with other maize/wheat breeders, plant physiologists, and soil scientists. The maize group consisted of Drs. Luis Eugenio Miranda, Luis Torres de Miranda, and Edvardo Sawazaki; the wheat group of Drs. Carlos Eduardo Camargo, Solano Rodrigues, and Genesco Gervellini; other plant physiologists were Drs. Ondino Cleante Bataglia, Jose Romano Gallo, and Rutter Hiroce; and one of the soil fertility scientists was Dr. Bernardo van Raij. We had two days of continuous discussions and reviewing problems of mutual interest, and tried to assess the major problems of acid soils and the adaptation of plants to these conditions. Throughout, the discussions with most of the Brazillian scientists were along the avenue of high inputs and high production practices. Scientists most active in screening, identifying, and working in the mineral nutritional research were Drs. Angela and Pedro Furlani and Carlos Eduardo Camargo. Some very good research is being conducted by these scientists.

Corn and Sorghum Research Center (CNPMS), Sete Lagoas, Brazil - (May 1-4, 1983)

Mr. Laudellino Carneiro Leite (plant Pathologist) met us and showed us some of the farming systems as we travelled to Sete Lagoas from Belo Horizonte. We met first with Drs. Robert Schaffert and Goncalo E. deFranca and their families. After meeting some of our close scientist friends, we met with Dr. Roland Vencovsky, Director of the Research Center, and discussed the sorghum programs of both Brazil and the U.S. Dr. Vencovsky has been very interested in INTSORMIL for a long time and wondered why cooperative research programs had not been initiated. He indicated that correspondence had been written earlier to invite such, but apparently breakdowns had occurred or the climate was not appropriate. We explained that conditions were changing and cooperative sorghum research now appeared feasible. It was suggested that another letter be written to INTSORMIL inviting them to investigate cooperative research in the sorghum programs of INTSORMIL and EMBRAPA. It was further suggested that Dr. Gourley and I meet with Dr. J. M. Pompeu Memoria, Chief of International Cooperative Associations of EMBRAPA, during our Brasilia visit later in the week.

We visited and discussed results of laboratory and field plots of Drs. Schaffert, Franca, and Ricardo Magnavaca (maize breeder). We saw various sorghum materials being developed for growth on the Cerrado soils and some of the problems involved with these soils. We saw severe N, Zn, and Mg deficiencies on sorghum plants. On the second day Mr. Renato Borgonovic (sorghum breeder) and Dr. Antonio Bahia (soil scientist) met with us and discussions were held on sorghum adaptation and improvement research and strategy for production on the acid soils. The afternoon of the second day, each of us (Gourley, Pitre, and Clark) presented a 20-30 minute seminar on our research programs and about problems common to both countries. The seminar was prefaced by Dr. Gourley showing slides on the INTSORMIL program, its objectives, and the various projects.

We concluded our visit to CNPMS with another meeting with Dr. Vencovsky and cooperative research was further reemphasized between INTSORMIL and EMBRAPA. A letter inviting Dr. Leng to Brazil to discuss cooperative research programs was mentioned as having been written.

Cerrado Research Center (CPAC), Planaltina, Brazil - (May 5-8, 1983)

Dr. Pitre departed for the U.S. and Dr. Gourley and I continued to Brasilia where we were met by Dr. Derrick Thomas (CIAT scientist stationed at the Cerrado Center for tropical pasture research) and taken to the center for discussions with Drs. Thomas, Water Couto and K. Dale Ritchey (soil scientists). These scientists have been actively engaged in acid soil adaptation of plants to Brazilian acid soils. Dr. Ritchey's research has been concerned particularly with Ca as a nutrient and in getting deeper root growth, since Ca appears to be more limiting than Al toxicity in many subsoils. Extensive discussions were held with Dr. Timothy Warner, Mr. Luiz J. Castelo Branco Carvalho (plant physiologists), and Mr. Carlos R. Spehar (soybean breeder) concerned with Ca nutrition, Al toxicity, deep root penetration, and water relations of plants. We made a special trip to the field to see the effects of added P on the extensive root system of Andropogon gavanus var. bisquamulatus (a tropical pasture grass). Two-year-old established plants on acid soils plots with added P and lime (8 years previous) had a continuous mat of roots that did not stop even at the 2-meter depth. Plants grown on sites without added P were not as extensive as with added P, but more extensive than most other plants grown on this soil. The extensive roots could partially explain why this plant had not responded to many element applications and had such good drought tolerance.

Dr. Gourley and I met with Dr. J. M. Pompeu Memoria, Chief of International Cooperative Associations of EMBRAPA, in his Brasilia office. He was anxious for a cooperative research program between INTSORMIL and EMBRAPA to be coordinated through the Corn and Sorghum Research Center (CNPMS) at Sete Lagoas. Many fruitful areas of research could be conducted in various areas of Brazil, especially in the dryer northeast (Bahia) region.

Breeding and selection of acid soil tolerant legumes have been goals of Dr. Mark Hutton (recently employed at the CPAC center and previously with CIAT for 5 years) and considerable time was spent with him discussing his research. Dr. Cilas P. Camargo (seed technologist for EMBRAPA seed foundation) tried to show us the seed facilities at the Germplasm Resource Center,

but was unable to do so because of it being Saturday and no one was available to show the facilities. Various aspects of seed technology problems, concerns, and successes were discussed.

Dr. Gourley and I parted at Manaus; he returned to CIAT, and me to Nebraska.

Summary

Considerable interest was noted by research organizations for sorghum research on adaptation, and improvement, and for a better understanding of the constraints and problems for plant growth on acid soils. CIAT already has a cooperative sorghum program underway with INTSORMIL, and EMBRAPA (Brazil) and ICA (Colombia) appeared anxious for participation. CIAT appeared pleased with the efforts made in this area and were very cooperative in Dr. Gourley's program. Dr. Gourley's program was making good progress and could progress even better and more effectively if someone could perform the screening research so Dr. Gourley could spend his time at plant breeding instead of having to retrain himself in mineral nutrition, and having to conduct both of these phases of the sorghum improvement program. Scientists in both Colombia and Brazil have expertise so that good progress should be made if cooperative INTSORMIL research programs are initiated. Many EMBRAPA and ICA scientists have had considerable experience with sorghum, but the expertise that could be provided by INTSORMIL would be invaluable to the progress and development of sorghum research in these countries. Good research capabilities existed at each of the Colombian and Brazil locations we visited, and these could provide strong bases for good programs to enhance sorghum production on many of the acid soils of South America and other parts of the world.

During our discussions, many scientists requested reprints or articles on research being conducted. Several requests for copies of color slides on mineral elements deficiency/excess symptoms on sorghum leaves were made. Visual and/or written materials for better understanding problems and techniques were requested at each location indicating a need for these materials being available to scientists. Oral presentations and discussions were good, but documentation or written materials for scientists to follow were particularly needed.