

Report on Trip to Venezuela
July 29 - August 7, 1998

USAID Grant No. LAG-G-00-97-00002-00

SM-CRSP Project *Decision Aids for Integrated Nutrient Management*

Travel Team:

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Objectives:

Venezuela is characterized by an ecological diversity resulting in many different agroecological systems. Ten of the eleven soil orders are recognized. Ultisols and Oxisols are found in significant areas. The main soil constraints are acidity and low plant nutrient supply resulting in poor yields for the majority of the crops. Specific objectives for the trip were the following:

- Meet with researchers from the National Agricultural Research Foundation (FONAIAP), agri-business companies (PEQUIVEN and PROMIVECA) and university researchers (Technological University Institute - Portuguesa State, IUTEG) to discuss and develop potential collaborative relationships for the evaluation of the SM-CRSP project's Integrated Soil Nutrient Management Decision Support System (IntDSS).
- Evaluate the response on growth and obtain soil and plant samples from two field experiments with different levels of amendments (dolomite, calcite, magnesite and gypsum) for shade- versus sun-grown coffee. This experiment is part of Yamily's dissertation research at Cornell University and is designed to determine if there is a response to these amendments and whether the response is related to the soil Al, soil pH or Ca and Mg deficiencies.

Meetings:

IntDSS project information was presented to various groups in four separate meetings. Three of the meetings were organized by FONAIAP and one by PEQUIVEN. The meetings were held in three Venezuelan States (Aragua, Carabobo and Tachira). The presentations contained the following information and structure:

1. a general description of the IntDSS project;
2. an overview of the three major global soil constraint (acidity, N and P);
3. the project objectives;
4. the strategy to be used for developing globally-applicable integrated decision aids software;
5. description of the intensive testing sites; and
6. the extensive evaluation network.

The importance of the Extensive Evaluation Network was emphasized. The benefits of being a part of the network such as receiving the software as soon as it becomes operational, participating in a global collaborative team effort, exchange of expertise with researchers from other tropical countries, calibrating the software for local use, and training in the use of that software under local agroecological conditions was also discussed. The project limitations such as no financial support for extensive evaluation, the amount of information needed to calibrate the software and the absence of K recommendations were also discussed. A pamphlet (see Appendix) written in Spanish containing an outline of the presentation was given to those in

attendance. Copies of the slides used in the presentation, in Spanish, are available upon request from Shaw Reid.

FONAIAP Meetings:

Prior to our arrival, Dr Leonardo Salazar, Technological Negotiator Manager, organized a national meeting for the presentation of the IntDSS project. Heads of the Analytical Laboratories and Soil Fertility Researchers were invited. We also met Dr Tiburcio Linares, FONAIAP National Manager. Because of another national meeting occurring at the time of our visit and a communication problem, Dr. Linares had no prior knowledge of our visit. After discussing the purpose of our visit, he organized a meeting with Dr. Claudio F. Chicco, Director of CENIAP, and the soil science researchers of the National Agricultural Research Center (CENIAP) in Maracay, Aragua State to discuss the possibility of FONAIAP participating of the IntDSS project.

*Meeting with Heads of Analytical Laboratory and Soil Fertility Research
(FONAIAP Main Office, Maracay Aragua)
July 30, 1998.*

Eleven researchers from five States (Anzoategui, Aragua, Guarico, Tachira and Yaracuy) attended this meeting. This was the first of the four meetings. Ms. Zavala presented the IntDSS information in Spanish. The researchers were very receptive to the idea of an IntDSS project. There was considerable discussion, almost all of a positive nature. Researchers indicated that in Venezuela, there is a lot information, both published and unpublished, on soil nutrient problems for many crops and their management. One of the tools used for making liming and fertilizer recommendations is an expert system for many crops developed in CENIAP. The main concern about IntDSS was the exclusion of a K component, due to project funding constraints, which is an element considered to be potentially limiting crop production in Venezuela.

Dr Ricardo Ramirez, Mineral Nutrition Researcher, suggested that FONAIAP could participate in the development of a K component for IntDSS due to the importance of K in Venezuela. Dr. Julia Brito, Soil Science Researcher and Information Manager, proposed that information from the Liming and Fertilizer Recommendation Expert System could be useful in providing basic information for the IntDSS to be tested and validated in Venezuela. The effects of soil compaction and other limiting factors on the evaluation success were also discussed.

There was interest to participate in the evaluation of IntDSS in Venezuela. The concern of the participants was the designation of a person who could coordinate it for most of the important crops and agroecological systems of the country.

Participants:

CIAE-Guarico, Calabozo - Ing. Nidia Alfonzo

CIAE-Yaracuy - Ing. Isabel Arrieche, Ing. Jorge A. Escalona

CIAE-Yaracuy, Yaritagua - Ing Orlando Mora

CIAE-Anzoategui - Ing. Mariela Navas

CIAE-Tachira - Ing. Nabor Gomez

CENIAP-IIRA- Aragua - Ing Marisol Lopez, Ing Juan Carlos Rey, Ing Ricardo Ramirez

CENIAP-IIRA-UNILAB-Aragua - Ing Luis Nieves

FONAIAP- Information Management - Ing Julia Brito

*National Agricultural Research Center Meeting
(CENAIP- Maracay, Aragua State)
July 30, 1998.*

This meeting was organized by the FONAIAP national manager to discuss a possible cooperative agreement between FONAIAP and the IntDSS project. There was concern about financing the collaborative IntDSS evaluation considering that any kind of evaluation will generate expenses which the institution cannot afford right now. However, an official agreement would help justify a request for financial support among different entities in Venezuela for the developmental research needed. This meeting concluded with the understanding that FONAIAP will develop a proposal to formalize an agreement for participation in the Extensive Evaluation Network, and that this agreement will be used to help generate a project for requesting financial support.

Participants:

Dr. Claudio Chicco (CENIAP-Director), Dr. Ricardo Ramirez, Dr. Luis Avilan, Ing. Marisol Lopez and Ing. Belkis Rodriguez.

*Tachira State Agricultural Research Center Meeting
(CIAE-Tachira, Bramon, Tachira State)
July 31, 1998*

The presentation of the IntDSS project at this Center was more for informative purposes as this is Ms. Zavala's work location and the location of the coffee field trials. Present at the meeting were representatives for the coffee sector and the Extension Department of the Ministry of Agriculture (MAC). There was general interest in extending the information from this project to more people involved in agriculture. Ing. Diogenes O. Mora (Coffee Foundation, FONCAFE) proposed that, considering the importance and relevance of the IntDSS project, it might be included in the XV Venezuelan Agricultural Conference. This conference will be held next year between July 25-30, 1999 at the Experimental National University of Tachira (UNET) in San Cristobal. After the meeting we were invited to visit the private (CONCAFE) and public (FONCAFE) factories for processing coffee beans.

Participants:

Researchers and technicians of the CIAE-Tachira, Ing. Fausto Gory (CONCAFE), Ing. Oscar Sandoval (FONCAFE), Ing. Diogenes Mora (FONCAFE), Ing. Jairo Santander (Agricultural Ministry MAC-UE, Tachira) and Ing. Brito Silverio (Agricultural Ministry MAC-UE, Tachira).

PEQUIVEN Meeting:

*Pequiven, Moron, Carabobo State
July 31, 1998*

This meeting was to inform the fertilizer industry, amendment producer, and other University researchers about the project and obtain their reactions and possible assistance in evaluating IntDSS. There was interest from researchers of the Technological University Institute of Portuguesa (IUTEG) in participating in the evaluation of the IntDSS. Professor Maritza Sanchez stated that the IUTEG research group plans to consolidate the Soil Analytical Laboratory for use in physical and chemical diagnosis and recommendations in the management of the agroecological system in the State of Portuguesa. Farmer and private organizations in Portuguesa support economic and technical programs for the improvement of crop productivity. Based on the

above, there is unconditional interest from the IUTEG researchers in participating in the evaluation, and validation of the IntDSS for diverse crops (sugar cane, rice, maize, coffee and sorghum) in Portuguesa.

Ing. Carlos Maldonado, amendment producer, proposed that his company was interested in the project and could assist by providing some quality amendment materials (dolomite, calcite, gypsum, rock phosphate and magnesite) for the evaluation of the project. He pointed out that there is no quality control for amendments in the country and this could be a limitation for the evaluation of IntDSS. Participation by PEQUIVEN in the evaluation of IntDSS will be proposed to a higher level of management; however, the agronomists present at the meeting were interested.

Participants:

PROMIVECA - Ing Carlos Maldonado

PEQUIVEN - Ing Luis Mogollon, Ing Andres Monroy

IUTEG-Portuguesa - Prof. Luz Maria Sanchez, Prof. Maritza Sanchez and Ing. Ledy Benitez Puig (Soil Physics-Soil Management Sugar Cane Consultant)

Coffee Field Experiment Evaluation:

Two field experiments were established on an acid soil in August 1997 to investigate the effect of different levels of amendment materials (dolomite, calcite, magnesite and gypsum) on coffee plant growth response in two systems: coffee grown either with shade or under full-sun. The experimental design used is a completely randomized block design with 14 treatments and four replicates at each site (shade and full-sun).

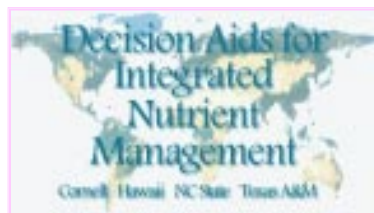
Evaluation of plant growth response during the first year was based on plant height, number of primary and secondary branches, length of central branches, leaf area index, and initiation of flowering and fruit development. Initial observations suggest that coffee growth response was greater for the full-sun site than the shade site. After one year, however, the growth differential for the various treatments was small.

Composite soil samples were taken for each treatment and replication from 0-2 cm, 2-5 cm, 5-10 cm, 10-25 cm and 25-45 cm depth at each experimental site to evaluate the movement of the nutrients through the soil profile.

Plant growth will be measured and soil samples taken again next year. Also, nutrient culture and greenhouse experiments with Al are being conducted on coffee at Cornell University during 1998-1999 to determine the effects of excess Al on the nutrition of coffee.

Appendix
Pamphlet Outlining the IntDSS Project
Distributed to Participants of Venezuelan Meetings

Sistemas de Apoyo para el Manejo Integrado de Nutrientes (SAMIN)



The Soil Management Collaborative Research Support Program
Cornell University, University of Hawaii, North Carolina State University and Texas A&M University
Colaboración:

Equipos en áreas de Pruebas Intensivas y Extensivas

El Exceso de acidez o las deficiencias de nutrientes limita el rendimiento en la mayoría de los suelos tropicales. La acidez puede reducir la producción agrícola en más de un 50%.

El nitrógeno limita la producción en más del 50% de los suelos arables y en la mayoría de los suelos cultivados con granos. Además, cuando es limitante es requerido en grandes cantidades, es muy costoso y difícil de manejar.

La deficiencia de fósforo existe en un 92% en los suelos del trópico los cuales tienen un alto poder de fijación requiriendo una aplicación alta. Además, en muchas regiones su importación es muy costosa, limitando así en muchas áreas la producción agrícola.

Por lo antes expuesto un Sistema Experto que integre los conocimientos y experiencias de profesionales del agro contribuirá a diagnosticar y recomendar las alternativas más apropiadas de manejo para mejorar la productividad agrícola en la región tropical.

META DEL PROYECTO:

La meta principal de este proyecto es integrar y difundir herramientas de apoyo a través de un diagnóstico y selección de las prácticas de manejo más adecuadas según las condiciones específicas de cada región para reducir los problemas de nutrientes en el suelo.

OBJETIVOS:

- Identificar y llevar a cabo los estudios necesarios para diagnosticar y corregir los problemas de acidez y nutrientes del suelo.
- Desarrollar una base de datos para diagnosticar y ofrecer soluciones a los problemas de acidez y nutrientes del suelo en cada región.
- Desarrollar herramientas auxiliares que permitan diagnosticar y resolver los problemas de acidez y nutrientes en cada localidad.

ESTRATEGIA:

Desarrollar un Sistema Experto que integre acidez y nutrientes del suelo, el cual diagnostique los problemas de nutrición mineral en el suelo y recomiende las alternativas apropiadas para aumentar la calidad y producción agrícola a nivel global. Evaluar la aplicabilidad del Sistema Experto (SAMIN) en diferentes áreas agroecológicas de evaluación intensiva y extensiva a través de equipos multi-disciplinarios.

SISTEMA INTEGRADO DE TOMA DE DECISIONES (IntDSS):

- Integrar los sistemas de toma de decisiones individuales (acidez: ADSS, nitrógeno: NDSS y fósforo PDSS) para el diagnóstico y recomendaciones de manejo integrado de nutrientes.
- Sintetizar, analizar e incorporar los conocimientos requeridos para que cubran los vacíos detectados en los sistemas individuales.
- Probar y validar el IntDSS:
 - Áreas Intensivas:
 - Trópico Húmedo: Costa Rica,
 - Condiciones Invierno-Verano: Filipinas
 - Áreas Semi-áridas: Mali
 - Áreas Extensivas: Net-Work Colaboradores
- Desarrollar herramientas auxiliares para facilitar el uso del IntDSS base por una gran variedad de usuarios incluyendo agrónomos, planificadores y/o agentes gubernamentales.

COMPONENTES DEL SISTEMA:

SISTEMA DE TOMA DE DECISIONES EN ACIDEZ (ADSS):

- Diagnostica problemas de acidez, diversos cultivos
- Ajusta cantidad de enmiendas,
- Conduce un análisis Financiero

SISTEMA DE TOMA DE DECISIONES EN FOSFORO (PDSS):

- Diagnostica fósforo en el suelo, diversos cultivos
- Recomienda fertilización del P,
- Conduce un análisis Financiero.

SISTEMA DE TOMA DE DECISIONES EN NITROGENO (NDSS):

- Estima la cantidad de N para un determinado rendimiento.

RED DE EVALUACION EXTENSIVA:

Personas/organizaciones con:

- conocimientos que deberían ser incluidos en el Sistema Experto,
- información de campo y laboratorio para la evaluación de un lugar específico,
- redes establecidas que se beneficiarían al usar el Sistema Experto.

Instituciones:

- CIMMYT, IBSRAM, ICRISAT, IFDC, IRRI
- ONGs, Compañías Agrícolas
- Rodale Institute, Programas regionales del INPOFOS
- Servicios Nacionales: Profesionales en Africa, Asia y Latino América

EXTENSIÓN: UN ESFUERZO COOPERATIVO

• Propósito:

- Cooperación intensiva a nivel global para evaluar y validar el sistema integrado de toma de decisiones (IntDSS);
 - Intercambio de conocimientos a nivel local para mejorar el IntDSS,
 - Intercambio de experiencias con Investigadores de otras áreas,
 - Distribución del software y herramientas auxiliares,
 - Dar instrucciones en el uso del programa,
 - Evaluar el IntDSS en diferentes condiciones usando datos locales,
 - Exponer las debilidades y fortalezas de las investigaciones locales, lo cual contribuirá a planificar futuras investigaciones

• Logros Esperados:

- Integrar y distribuir las herramientas para las tomas de decisiones;
- Diagnosticar las limitantes del suelo y seleccionar practicas de manejos apropiadas para condiciones locales.
 - Reducir la acidez y nutrientes que limiten la producción y calidad de alimentos en el trópico.
 - Aumentar la productividad, las ganancias netas y la sustentabilidad de la producción de alimentos.

• CONCIENTIZACION!!!!

- No se dispone de apoyo financiero para la evaluación extensiva,

- Participantes serán miembros del proyecto en la medida que se incorporen a la evaluación Extensiva del Sistema Experto.
- Ser parte del equipo de colaboración a nivel internacional. Lo cual permite intercambio de experiencias y conocimientos referente al manejo nutricional de suelos.
- Adquisición y entrenamiento en el uso del programa en condiciones agroecológicas locales.

CULTIVOS A CONSIDERAR:

- Yuca
- Café
- Frijol
 - *Vigna unguiculata*
- Maíz
- Mijo
 - *Pennisetum typhoides*
- Palma
 - *Bactris gasipaes*
- Maní
- Caraotas
- Papas
- Sorgo
- Caña de Azúcar
- Arroz de secano
- Trigo

Dirección del Proyecto en Internet
<http://intdss.soil.ncsu.edu/sm-crsp/>



A Project of the Soil Management Collaborative
Research Support Program (SM-CRSP)
Funded by the U.S. Agency for International
Development

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