

PN-AAA-761
ISN = 28171

5860063/68

**PROYECTO CENTROAMERICANO
DE FERTILIDAD DE SUELOS**

*Consultant's final report to CATIE and ROCAP
on completion of soil analog subproject*

Petter, C. Duisberg

Anexo 17



**CENTRO AGRONÓMICO TROPICAL DE INVESTIGACION Y ENSEÑANZA
Program of Annual Crops**

CATIE

CONSULTANT'S FINAL REPORT TO CATIE AND ROCAP

ON COMPLETION OF SOIL ANALOG SUBPROJECT

SUMMARY

1. Consultant Dr. Peter C. Duisberg, 696 Artist Avenue, Englewood Florida, 33533.
2. Periods of service - Total seven months represented by July 5 to September 5, and October 4 to December 16, 1977 and January 4 to March 23, 1978.
3. My revised Objectives
 - a. To plan and initiate the soil analog component of the Soil Fertility Project.
 - b. To guide it toward results which will be accepted throughout the Central American isthmus and improved in years to come.
 - c. To encourage a continuing coordinating effort within CATIE
4. Results and Outlook

A methodology was developed and used to produce soil analogs in parts of three countries with the collaboration of leading Central American soil scientist and the CATIE personnel. The results were presented at a Regional meeting at which CATIE was requested to provide coordination for a continuing effort in all six countries.

The outlook is excellent if Dr. Rufo Bazán continues to demonstrate high quality regional leadership and if CATIE supports the country soil programs with well planned advisory services through regular staff and consultants in the fields of laboratories, classification, fertility trials and soil management and conservation. There is no reason why much of CATIE's support cannot be built into a carefully conceived work plan related to Systems of Fincas and their Analogs.

PROGRESS TOWARD SOIL ANALOGS FOR CENTRAL AMERICA

Dr. Peter C. DuIsberg
Consultant

A. Preliminary Comments

Two volumes of plans, and trip reports as well as references and maps collected and lists of persons contacted will be left with Dr. Rufo Bazán who should be given an opportunity to continue to carry out the long term objectives and support the national effort in analogs and soil science. Dr. Bazán has already prepared a document outlining the first Regional Soil Analog meeting held in October and will be responsible for the document of the proceedings of the second Regional Meeting in March. This will include six country reports on the status of soil science in each Central American country on which I collaborated.

B. Introduction

The soil analog subproject was programmed as part of the CATIE/ROCAP Soil Fertility project of 1976-78 under Dr. James Walker. Its start was delayed more than a year due to lack of a person to guide it, I was contracted for this purpose, starting July 1977, for three short term contracts covering seven of the final nine months of the Soil Fertility project. Dr. Walker concentrated on the Soil Fertility component of his project and left it up to me to plan and initiate the project. His understanding and support for my rather unique concept of attempting to study national soils projects and capabilities and to evolve plans and methodology with national soils scientists were crucial to the eventual success achieved. This approach necessarily involved a slower start to build a basis for national involvement and

a higher risk of failure. Dr. Harvey Hewton and Ing. Agr. Washington Bejarano were contracted during most of the subproject, Dr. Joseph Tosi was contracted for a short period to carry out technical work on Bioclimates essential to producing the Analogs. Dr. Rufo Bazán of CATIE assumed an increasingly active role beginning in mid-October. During January he fully assumed the coordinating role and carried this out efficiently and effectively through the end of the sub-project in March.

C. Accomplishments of the sub-project

The subproject accomplished considerably more than original objectives to build on work by previous consultants, Simmons and Bacchieciamp, to produce first approximation analogs and to organize, calculate and apply the voluminous data on past fertility trials collected by Dr. Walker. The only unfinished business involves the correlation of this fertility information with soil series and analogs. Accomplishments not originally programmed were reviews of the status of soil science in each country, two regional soils meetings and a regional soils organization eager to carry on the analog effort under CATIE's coordination and cooperate in improving national capabilities in soil science.

The major results were:

1. Development of a methodology for Soil Analogs agreed on by all of the heading soil scientists, of the six Central American countries involved. Although, the basic concept of Simmons and Bocchieciamp was adopted, major modifications and additions were made. The contributions of Ing. Agr. E. Marin of Nicaragua and M. Rico of El Salvador, and Dr. J. Tosi of the office of Tropical Science were by far the most

important but several others made lesser contributions to the methodology finally used.

2. Application of the methodology and computer analysis of about 200 selected soil series in Nicaragua, Honduras and El Salvador by Marín and Rico with coordination and inputs by Dr. Bazán and myself for CATIE, Ing. R. Denys of El Salvador, H. Yuksel of the Catstral project in Honduras, Ing. O. López and J. Ortiz of El Salvador and Dr. Tosi. The Dirección de Recursos Naturales of El Salvador contributed valuable computer and logistic support. Dr. F. Calhoun was very helpful.

3. Organization of the first two regional soils meetings in 15 years, the first primarily coordinated by myself and the second and larger by Dr. Bazán. The first meeting resulted in the three country cooperative project which produced the first approximation soil analogs discussed at the second meeting. Notable results of the second meeting were the decision to reorganize the defunct Soil Science Society of Central America and to continue the cooperative effort to produce more sophisticated soil analogs. The next meeting was scheduled for Nicaragua and Dr. Oscar Hidalgo, Research Director of INTA assured the group it will receive the needed support from Nicaragua.

4. The Soil Scientists wish CATIE to serve as regional coordinator for climate-soil analogs. The consensus was that Dr. Bazán would make an outstanding coordinator. This should provide an excellent opportunity for CATIE to carry out the objective of the Soil Fertility project, to provide continuing leadership to the national soil efforts and to obtain valuable assistance in developing the climate-soil analogs

needed as a base for the transfer of results of its cropping systems project and proposed Analogs of Fincas project.

Dr. Newton & I offered preliminary documents analysing the status of soil classification, fertility and conservation in each of the six Central American countries. These are to be refined and should be used to develop a regional proposal for improving the state of soil science and soil analogs.

7. Diagram 1 shows the final work plan, I prepared following the first Regional meeting. The work was carried out on schedule with the exception of part of the line on soil fertility correlation. In this line, Dr. Walker and Ing. Agr. Dejarano calculated several thousand previous fertilizer trial results by the discontinuous method of North Carolina State and made computer printouts. They were not however able to relate these to soil series so that they could be used in testing analogs. Completion of this work should be given priority by CATIE before the first approximation analogs are published.

8. There are now two main methods being developed for Soil Analogs. Our method and the theory that soil families under the new Taxonomy in themselves constitute analogs. This theory is being tested for tropical soils by the University of Hawaii in the Pacific area and the Latin America area by the University of Puerto Rico. By comparing computer results from this project on series previously identified to the family level I have been able to obtain preliminary evidence that the family does not indicate similarity of series as well as our method. This is shown in Table 1. However, it also should be pointed out that our method is only the first approximation and that if sufficient support

is given, to continue its development it may yield increasingly practical results.

SUGGESTIONS FOR CATIE

There would seem to be three principal reasons why continuation of ^{the} subproject should be an integral part of CATIE's future planning. It would not seem necessary, however, and even might be undesirable to maintain the separate identity of soil fertility as a separate project.

The reasons are:

1. Climate-soil analogs seem to be the logical foundation for and could be an integral part of any systems of fincas analogs. By supporting and coordinating the national soil scientists, CATIE is therefore, benefitting its own program objectives. Diagram 2 shows this relationship.

2. The request of the national group for assistance and coordination permits CATIE to build on the work of North Carolina State as contemplated in the ROCAP project.

3. CATIE stands to gain status with the soils group in each country and these people should be helpful in persuading their governments of the importance of supporting CATIE as a regional institution.

Of course, CATIE would have to decide soon on the degree of technical assistance it can or ought to offer.

The following steps might be considered as a start:

1. Prepare a specific work plan relating the CATIE soils staff to both the national needs and the systems of fincas project.
2. This should specifically outline the job descriptions and work

program for Dr. Bazán, and Ing. Agr. Roberto Díaz-Romeu and any possible role for Dr. C. Burgos.

3. CATIE should plan to obtain shortterm consultants qualified to help the countries improve fertilizer trials and the field of soil management and conservation. This work can be related to soil analogs and support the concept of systems of fincas. I prepared diagram 3 in December. It should now be revised and coordinated with CATIE's new plans. However, the lines of action required in soils remain the same.

Among the consultants who ought to be considered are Dr. Walker and F. Calhoun in Soil Fertility, Ing. E. Marín, M. Rico and A. Alvarado/in classification and Dr. J. Tosi and G. Hargreaves in climate, Dr. W. Forsythe in Conservation and Dr. Aldo Norero in Soil Management and also irrigation. Dr. Aldo Norero is now with CIDIAT, Apartado 219, Merida, Venezuela and might be interested in a full time position with CATIE.

PD/mdem

TABLE 1.

COMPARACION PRELIMINAR ENTRE ANALOGOS POR FAMILIAS
Y DE MUESTRA PRIMER APROXIMACION ANALOGOS*

ORDEN	FAMILIA	SERIES	Nº de los Parám. iguales								
			Los Ced.	Guanac.	Granad.	Sn. Marc.	Montelm.	Masat.	Masaya	Pacaya	
Inceptisoles	Durandep ^t as ^h ey	Los Cedros	-	7	5	7	8	5	5	7	
		El Guanacaste	7	-	6	7	7	6	8	7	
		La Granadilla	5	6	-	7	6	6	8	7	
		San Marcos	7	7	7	-	7	10	7	7	
		Montelimar	7	8	6	7	-	8	7	7	
		Masatepe	6	6	6	6	8	-	8	8	
		Masaya	5	8	8	7	7	8	-	7	
		Pacayo	7	7	7	8	8	8	7	-	
		Typic Etrandep ^t medial.		Argelia	-	6					
				Manzanillo	6	-					
Mollisoles	Padric Argiustoll Fine Monmorillonitic.	La Paz Centro	-	9	8						
		San Gabriel	8	-	8						
		San Felipe	8	8	-						
	Typic Durustoll fine monmorillonitic	Diriamba	-	5							
		Zambrano	5	-							
	Typic Haplustoll Fine Monmorillonitic	Buena Vista	-	6	8						
		Larreynaga	6	-	7						
		Padre Ramos	8	7							
DIVERSAS ORDENES	Inceptisol	Durandep ^t ashy	Los Cedros	-	5	5					
		Haplic arguistall monmorillonitic	La Paz Centro	5	-	6					
	Alfisol	Typic haplostalf fine loamy monmorillonitic	Rivas	5	6	-					

* NOTA - En estos 3 casos hay 5 o 6 puntos de analogía entre diferentes ordenes.