

Administrative Report 1982-1983

**IBSNAT PROJECT**

**International Benchmark Sites Network  
for Agrotechnology Transfer**

**Department of Agronomy and Soil Science  
College of Tropical Agriculture and Human Resources  
University of Hawaii at Manoa**

936 4054

**A program of the  
U.S. Agency for International Development  
Bureau for Science and Technology  
Office of Agriculture  
Renewable Natural Resources  
Washington, D.C.**

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PDAAAP-946

**ADMINISTRATIVE REPORT**

**International Benchmark Sites Network for  
Agrotechnology Transfer**

**IBSNAT Project/Hawaii**

**Contract No. AID/DAN-4054-C-00-2071-00**

**SEPTEMBER 1, 1982 - SEPTEMBER 30, 1983**

**Goro Uehara  
Principal Investigator  
IBSNAT Project  
Department of Agronomy and Soil Science  
College of Tropical Agriculture and Human Resources  
Honolulu, Hawaii 96822**

## ACRONYMS USED IN THIS REPORT

ARS	Agricultural Research Service
ACSAD	Arab Center for Studies of Arid Zones and Dry Lands
ALMANAC	Agricultural Land Management Alternatives with Numerical Assessment Criteria
AVRDC	Asian Vegetable Research and Development Center
CATIE	Centro Agronomico Tropical De Investigacion Y Ensenanza
CENIAP	Centro Nacional de Investigaciones Agropecuarias
CERES	Crop-Environment Resource Synthesis
CIAT	Centro Internacional de Agricultura Tropical
IP	Centro Internacional de La Papa (International Potato Center)
RSP	Collaborative Research Support Program
CSIRO	Commonwealth Scientific and Industrial Research Organization
DSIR	Department of Scientific and Industrial Research
EEC	European Economic Community
EMBRAPA	Empresa Brasileira de Pesquisas Agropecuaria
EPIC	Erosion Productivity Impact Calculator
ERS	Economic Research Service
FONAIAP	Fondo Nacional de Investigaciones Agropecuarias
IBSNAT	International Benchmark Sites Network for Agrotechnology Transfer
ICAR	Indian Council for Agricultural Research
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICRISAT/FSRP	ICRISAT/Farming Systems Research Program
IDIAP	Instituto de Investigacion Agropecuaria de Panama
IFDC	International Fertilizer Development Center
INRA	Institut National de la Recherche Agronomique
INTSOY	International Soybean
NBSS & LUP	National Bureau of Soil Survey & Land Use Planning
NIFTAL	Nitrogen Fixation by Tropical Agricultural Legumes
NOAA	National Oceanographic and Atmospheric Administration
OBSNAT	Oceania Benchmark Sites Network for Agrotechnology Transfer
ORSTOM	Office de la Recherche Scientifique et Technique d'Outre-Mer
PCARDD	Philippine Council for Agriculture and Resources Research and Development
PRBSP	Pacific Regional Benchmark Soils Project
SCEP	Soil and Crop Evaluation Project
SCS	Soil Conservation Service
SMSS	Soil Management Support Services
SPC	South Pacific Commission
SPEC	South Pacific Bureau for Economic Cooperation
USAID	United States Agency for International Development
USDA	United States Department of Agriculture

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## SUMMARY SHEET

**Project Title and Contract Number:**

International Benchmark Sites Network for Agrotechnology Transfer--IBSNAT  
DAN-4054-C-00-2071-00

**Principal Investigator and Contractor:**

Dr. Goro Uehara, University of Hawaii at Manoa

**Co-Principal Investigator:**

Dr. F. H. Beinroth, University of Puerto Rico at Mayaguez

**Contractor's Address:**

Department of Agronomy and Soil Science  
2500 Dole Street, Krauss Hall 22  
College of Tropical Agriculture and Human Resources  
University of Hawaii at Manoa  
Honolulu, Hawaii 96822

**Contract Period:**

1 September 1982 to 31 August 1987

Total AID Funding to Date:	\$1,500,000
Total Expenditures and Encumbrances through Previous Fiscal Year	0
Total Expenditures and Encumbrances for Current Fiscal Year	291,859
Estimated Expenditures for Next Fiscal Year:	1,032,764

**Project Monitor:**

Dr. T. S. Gill  
Chief, S&T/AGR/RNR  
Agency for International Development  
Washington, D.C. 20523

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## SUMMARY

The acronym, IBSNAT, stands for the International Benchmark Sites Network for Agrotechnology Transfer and refers to the collective group consisting of the contractor (the University of Hawaii) and its collaborators to form a prototype network of national, regional, and international agricultural research centers for the purpose of developing, validating, and utilizing a scientific method for the effective transfer of agrotechnology among and within countries in the tropics and subtropics.

Subcontracts with the University of Puerto Rico at Mayaguez and the Agricultural Research Service of the U.S. Department of Agriculture at the Grassland, Soil and Water Research Laboratory at Temple, Texas were endorsed for implementation before the end of the calendar year 1983. The latter group provides IBSNAT direct access to personnel and facilities to support activities related to utilization of the minimum data set necessary to develop and validate crop models for agrotechnology transfer. The University of Puerto Rico will serve as the IBSNAT project contact for Central and South American activities as well as for potential collaborative programs in Africa.

The Soil Management Support Service (SMSS) program of USAID implemented by the Soil Conservation Service (SCS) of the U.S. Department of Agriculture (USDA) and the IBSNAT project reached agreement on collaborating on common activities to the mutual benefit of both programs. The SMSS would assist in identifying and classifying soils at IBSNAT experimental sites and the IBSNAT would assist and participate in training workshops organized by SMSS and provide crop and soil management information available for sites of the prototype network.

Potential collaborators were invited to participate in the first meeting of IBSNAT to determine the minimum data sets for developing and testing crop models

for selected crops. These crops were identified by collaborators as cereals (rice, maize, wheat, sorghum), legumes (soybeans, green beans--Phaseolus var., peanuts or groundnuts) and root crops (cassava, Irish potato, and aroids). This first meeting was organized by the IBSNAT contractor, the University of Hawaii, ICRISAT, and the Soil Management Support Services (SMSS) at ICRISAT in Hyderabad, India.

A technical advisory committee (TAC) was created to assist the Contractor in the development of long range plans for IBSNAT and its collaborators and to provide technical advice on efficient means to achieve stated project objectives. The TAC will be a five member group. Presently, there are three: Dr. Joe Ritchie of ARS/USDA, Temple, Texas; Dr. Juan Comerma of FONAIAP in Caracas, Venezuela; and Dr. Henry Nix of CSIRO, Canberra, Australia.

## OBJECTIVES

The primary thrust of the IBSNAT project is to create a prototype network of national, regional, and international institutions that will enable a systematic flow of relevant land-use technology among tropical countries.

Stated objectives of the project are:

1. accelerate the flow of agrotechnology on a scientific basis from its site of origin to new sites with a similar agroenvironment;
2. increase the success rate of technology transfer from agricultural research centers to farmer's field.

IBSNAT aims to achieve its objectives by the following activities:

- a. establishing a network of collaborating national, regional, and international agricultural research centers to serve as sources and recipients of agrotechnology;
- b. identifying the soil-crop-weather and management data needed to successfully transfer agrotechnology;
- c. using systems analyses and soil-crop-weather models to predict the performance of crops and management systems;
- d. testing and validating soil-crop-weather and management simulation models in a network of experimental sites; and
- e. training collaborators to use systems analyses and soil-crop-weather simulation and management models for agrotechnology transfer.

## ACCOMPLISHMENTS

One of the first action programs involved to achieve stated project activities and objectives was the establishment of linkages with the University of Puerto Rico at Mayaguez, the Agricultural Research Service of USDA at the Grassland, Soil and Water Laboratory in Temple, Texas and the Soil Management Support Services (SMSS) project of USAID implemented by the Soil Conservation Service of USDA. They are envisioned to play key roles in providing the University of Hawaii with assistance and support in planning and implementing activities to establish the prototype network of IBSNAT.

Potential collaborators are likely to be national, regional, and international agricultural research centers. The purpose of this network will be to develop, validate, and utilize a scientific method for the effective transfer of agrotechnology among and within countries in the tropics and subtropics.

Under activity (a), a Memorandum of Agreement between the University of Puerto Rico at Mayaguez and the University of Hawaii through its Research Corporation was approved. F. H. Beinroth has been designated as the key contact for Puerto Rico and will serve as a Co-Principal Investigator. Beinroth was the Principal Investigator of the Benchmark Soils Project (Contract No. AID/ta-C-1158) at the University of Puerto Rico. He will be the responsible liason for Central and South America, the Caribbean area, and parts of Africa. In coordination with the University of Hawaii, Beinroth will be involved in determining the scope and level of research and training activities necessary to achieve project objectives within the budgetary framework of the contract.

Under activity (b) the first annual IBSNAT meeting (Appendix A) was held on the grounds of the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) in Hyderabad, India. As a result of the symposium:

1. A minimum data set for soil, crop, weather, and management input has been circulated to IBSNAT cooperators for comments and suggestions.
2. Ten crops including four cereals (maize, rice, wheat, sorghum), three grain legumes (soybean, groundnut, bean), and three root crops (aroid, cassava, and potato) were recommended for study.
3. Agronomists and crop modelers will jointly design field experiments. The experiments will be crop specific and serve the development needs of the collaborating country.
4. IBSNAT will conduct regional workshops to train scientists from collaborating countries in systems analysis and crop modeling using data from their own experiments.
5. IBSNAT will hold at least one meeting each year to enable the collaborators to report on the progress of their work.

At least thirty potential benchmark sites (Appendix B) have been selected in South and Central America, Africa and the Middle East, and the Pacific Islands and Southeast Asia. All collaborators with identified sites have agreed to have each site characterized for soil and climate. Each site has or will be provided with a weather station.

IBSNAT has succeeded in creating a network of collaborating national research centers that matches every AID dollar invested in IBSNAT with two national research center dollars. The amount of this matching is expected to measurably increase as the first experiments are installed. A strong commitment on the part of the part of the collaborators is reflected in their view of IBSNAT as an instrument for accelerating agricultural development by sharing agrotechnology.

Under activities (c), (d), and (e) an agreement between the Research Corporation of the University of Hawaii (RCUH) and the Agricultural Research Service (ARS) of the USDA at the Grassland, Soil and Water Laboratory in Temple, Texas was entered into for the collaborative purpose of developing and testing crop simulation models for assessing and predicting crop performance in any area where soil and climate information are available. The University of Hawaii and its collaborators would collect a pre-determined minimum data set for any of the ten identified IBSNAT crops for use in developing or validating models for each crop.

The ARS group has agreed to provide computer software and make available technical personnel to assist in the research and training program of IBSNAT. The ARS staff would be available to travel on behalf of IBSNAT to participate in meetings with collaborators in host countries and to participate in the annual meetings of IBSNAT collaborators.

Compensation for professional time of ARS staff would be in the form of payment of computer services utilized by ARS at Texas A&M by the RCUH.

In addition, a Technical Advisory Committee (TAC) was established to broaden the knowledge base of IBSNAT with individuals recognized by their peers to be outstanding in their technical disciplines. The TAC would provide IBSNAT with sufficient technical information to allow the contractor to implement operations related to activities (a) to (e) to achieve project objectives. The TAC was formed with the appointment of Juan A. Comerma, Director of Fondo Nacional de Investigaciones Agropecuarias (FONAIAP), Venezuela; Henry A. Nix, Leader, Resource Management Program, Commonwealth Scientific and Industrial Research Organization (CSIRO), Australia; and Joe T. Ritchie, Research Leader, Crop Systems Evaluation Unit, Grassland, Soil and Water Research Laboratory, ARS/USDA.

## Network Establishment

### *Collaboration on Data Generation*

During the current reporting period, communication linkages have been established with several countries to explore common interests in collaborating in the establishment of the prototype network of IBSNAT. The following is a list of countries and agencies of organizations expressing interest in collaboration. Memorandums of agreement have been or are being prepared for transmittal to most of those listed. A copy of the draft agreement is included in the Appendix.

<u>Country</u>	<u>Agency</u>	<u>Agricultural Research Center</u>
Brazil	EMBRAPA	National
Burundi	University of Burundi	National
Cameroon	IRA	National
Colombia	CIAT	International
Costa Rica	CATIE	Regional
Fiji	MAF	Regional
Guam	University of Guam	Regional
India	ICAR	National
	ICRISAT	International
Indonesia	AARD/CSR	National
Pakistan	PARC	National
Panama	IDIAP	National
Philippines	PCARRD	National
	IRRI	International
Syria	ACSAD	Regional
Taiwan	AVRDC	International
	FFTC/ARCPAC	Regional
Thailand	Dept. of Land Development	National
Venezuela	FONAIAP	National

Ecuador, Malaysia, and Zambia have recently expressed interest in participating in IBSNAT activities. Follow-up communications will be implemented by the contractor.

The agreement with collaborators is a commitment from them to implement, in most cases, additional activities in relation to ongoing or new plans for field

experimentation to measure and record the minimum data sets necessary to develop and validate crop simulation models. Each collaborator will be able to contribute and share in the collective pool of data sets and the modeling software necessary to further develop crop models for their particular needs.

### *Collaboration on Modeling and Data Base Management*

Software for computer simulation of crop development and growth are being developed in cooperation with scientists at the Grassland, Soil and Water Research Laboratory of ARS/USDA in Temple, Texas. Through a subcontract with the Research Corporation of the University of Hawaii, the ARS/USDA group has agreed to provide support in the form of not only computer software, but also data analyses, and consulting services to IBSNAT collaborators. To date, the Erosion Productivity Impact Calculator (EPIC) and the Crop Environment Resource Synthesis (CERES) models are the major computer software that have been made available to IBSNAT.

Through linkages developed by the ARS group, the Benchmark Soils Projects of the universities of Hawaii and Puerto Rico, and the SMSS program with technical staff and scientists, the IBSNAT project has been able to invite the participation of the following institutions and agencies. These linkages, which to date have not required the necessity of formal written memorandums of agreement, were established through mutually common scientific interest on their part.

<u>Organization</u>	<u>Program</u>
IFDC	soil nitrogen model
CSIRO	various crop models
Univ. of Florida	soybean model
CIAT	cassava model
Cornell Univ./CIP	potato model
INRA	data base management
NOAA	weather data base and models
ICRISAT	groundnut model
FAO	crop and soil management

The IBSNAT project, with headquarters on the campus of the University of Hawaii, will coordinate and facilitate development and strengthening of linkages among collaborators and with groups involved in developing and testing crop simulation models for agrotechnology transfer.

### *Collaboration on Soil Characterization*

The basis for a successful transfer will not only depend on the crop models, but on accurate knowledge of the characteristics of both the donor and recipient sites. Accurate soil and site characterization information are crucial to the success of the IBSNAT approach, not only for model development and its validation, but more importantly for the establishment of network approach to agricultural research and planning as a whole.

In agreement with collaborators, the soils at designated sites of the prototype IBSNAT network will be characterized, analyzed, and classified according to the standards and specifications of the Soil Conservation Service of the USDA. The classification of the soils will be according to Soil Taxonomy--the system of soil classification developed by the USDA.

Soil characterization analyses will be conducted at the SCS laboratory in Lincoln, Nebraska while analyses of transient soil properties will be completed at either or both soil laboratories of the collaborator and the University of Hawaii.

Drs. Richard W. Arnold and Hari Eswaran of SCS and Dr. T. S. Gill of AID/S&T/AGR/RNR have been instrumental in developing a close liaison between the SMSS program and IBSNAT. In response to requests initiated through the local USAID mission by potential collaborating countries, the SCS/USDA through the SMSS program has sent soil scientists to the following countries:

<u>Country</u>	<u>Organization</u>	<u>Status</u>
Panama	IDIAP	sampling completed
Costa Rica	CATIE	sampling completed
Venezuela	FONAIAP	sampling planned
Thailand	Land Dev. Dept.	sampling completed
Guam*	Univ. of Guam	sampling planned
Hawaii*	Univ. of Hawaii	sampling completed
Burundi	Univ. of Burundi	sampling completed
Zambia	Univ. of Zambia	sampling completed

\*Sampling completed by the state of local SCS office.

Several of the locations indicated have been or are sites for workshops organized by the SMSS staff and their hosts. Samples collected from these sites and those that are potential IBSNAT experimental sites were sent to the SCS laboratory in Lincoln, Nebraska for analyses to classify the soils in accordance to Soil Taxonomy.

## **PUBLICATIONS— DISSEMINATION OF INFORMATION**

The proceedings of the first meeting of collaborators is being handled by ICRISAT. An editor, Vrinda Kumble, was assigned the task of meeting with each author before his departure from India. A proposed outline of the presentations are listed in Appendix B. Publication date of the proceedings was targeted for the spring of 1984.

A leaflet containing information on IBSNAT was published in August 1983 and distributed to interested parties. The leaflet also exhibited the IBSNAT logo for the first time.

Information and description of IBSNAT were also published in both the Benchmark Soils News and the Soil Taxonomy News. The mailing list of both newsletters numbers nearly 2000.

Principles and concepts of IBSNAT were also described and discussed in formal and informal presentations by University of Hawaii staff and country collaborators in Cameroon, Venezuela, Thailand, Fiji, and Guam. Discussions on a personal level have been made in Burundi, Zambia, Rwanda, the Philippines, Indonesia, Malaysia, Panama, and Costa Rica.

## STATEMENT OF EXPENDITURES AND OBLIGATIONS

The following are the line item expenditures and encumbrances incurred by the project from 1 September 1982 to 30 September 1983.

<u>Line Item</u>	<u>Expenditures/Encumbrances</u>
<b>Direct Costs</b>	
Salaries and Wages	46,205
Fringe Benefits	6,397
Consultants	5,117
Equipment, Supplies, Services, Others	8,149
Vehicles	0
Freight	29
Travel and Subsistence	125,563
Publications	2,522
<b>Subgrants</b>	
University of Puerto Rico	5,052
Grassland, Soil and Water Research Laboratory, ARS	32,084
<b>Indirect Costs</b>	50,524
<b>Total Cost</b>	291,859

Expenditures for the first year of operation were within the estimated budget. The line item for travel was larger than anticipated due to higher air fares for the conduct of the workshop on "Minimum Data Sets for Agrotechnology Transfer" held at ICRISAT headquarters in Hyderabad, India. Twenty-eight scientists received support for travel to the symposium.

Institutional and country support was clearly demonstrated by the presence of these individuals for one week-time spent away from their duty stations.

## WORK PLAN AND BUDGET FORECAST

Project work plans are presented as milestone events in Appendix C. Management and coordination of collaborators' activities will be centered at the University of Hawaii's Mānoa campus. All contract funds will be managed through the Research Corporation of the University of Hawaii. Coordination of activities in Central and South America will be handled through a subcontract with the University of Puerto Rico at Mayaguez. Computer crop modeling and growth simulation are being coordinated through an agreement with scientists from ARS, ERS, and SCS at the Grassland, Soil and Water Research Laboratory at Temple, Texas.

The following activities to attain project objectives are anticipated to be completed by 30 September 1984:

- establish collaborative linkages with Venezuela, the Philippines, Fiji, Costa Rica (CATIE), and Panama through memorandums of agreement
- install IBSNAT experiment with maize in Hawaii
- prepare guidelines for experimental design in planning IBSNAT experiments for model development and testing
- develop data base management system format
- conduct first meeting of Advisory Committee
- conduct second meeting of collaborators in Hawaii

The University of Hawaii will continue to pay the salary and benefits of faculty involved in this contract activity.

**BUDGET FORECAST**

Oct. 1, 1983 - Sept. 30, 1984

<u>Line Item</u>	<u>Expenditures/Encumbrances</u>
<b>Direct Costs</b>	
Salaries and Wages	234,409
Fringe Benefits	57,234
Consultants	15,000
Travel/Subsistence	70,000
Equipment	112,254
Supplies/Services	82,050
Freight	20,000
Publications	20,000
Total Direct Costs	610,947
<b>Subgrants</b>	
University of Puerto Rico	168,758
Grassland, Temple, Texas	90,000
Total Subgrants	258,758
<b>Indirect Costs</b>	163,059
<b>Total</b>	<b>1,032,764</b>

## IBSNAT PERSONNEL

Principal Investigator	Goro Uehara
Co-Principal Investigator	Frederick H. Beinroth
Training Coordinator	Bernardino G. Cagauan, Jr.
Data Manager	Clement P. Y. Chan
Assistant Project Manager	Annette E. Chang
Agronomist	Patrick C. Ching
Soil Chemist	Ada E. Chu
Project Coordinator	Hariharan Eswaran
Secretary	Naomi Murabayashi
Publications Specialist	Victoria L. Pecsok
Account Clerk	Suemi Sakumoto
Project Manager	Gordon Y. Tsuji

### Personnel:

The principal investigator receives salary compensation from the University of Hawaii in combination with other scientists in the Department of Agronomy and Soil Science, one full-time-equivalent (FTE) of personnel time is assigned to the contract.

The co-principal investigator receives only a percentage of his compensation from the subcontract with the University of Puerto Rico at Mayaguez. In addition, the project coordinator's post was established through a subcontract received from the Soil Conservation Service of the U.S. Department of Agriculture under the Soil Management Support Services Program of USAID. The latter position is a half time appointment on IBSNAT.

Staff position listed are those of individuals assigned a percentage of their time to IBSNAT and to two other AID-supported programs. All are housed on the campus of the University of Hawaii at Manoa.



Tuesday 22 March

SESSION 2

CROP, WATER BALANCE, NUTRIENT, AND EROSION MODELS

Chairman: L. D. Swindale, ICRISAT

1st Rapporteur: J. A. Comerma, CENIAP-FONIAP

2nd Rapporteur: Sardar Singh, ICRISAT

- 0830 Sorghum model - S. M. Virmani, ICRISAT
- 0900 Cassava model - J. H. Cock, CIAT
- 0930 Soybean model - J. W. Jones, University of Florida
- 1000 Tea/coffee and light snacks
- 1030 Water balance/Nitrogen model - D. Godwin, Grassland Soil and Water Research Lab, Texas
- 1115 Wheat model - C. A. Jones, Grassland Soil and Water Research Lab, Texas
- 1145 Potato model - E. E. Ewing, Cornell University
- 1215 Erosion model - J. R. Williams, Grassland Soil and Water Research Lab, Texas
- 1300 Lunch

SESSION 3

BASE DATA COLLECTION AND ANALYSIS

Chairman: G. Gunasekera, ICRISAT

1st Rapporteur: F. H. Beinroth, University of Puerto Rico

2nd Rapporteur: A. K. S. Huda, ICRISAT

- 1400 Climatological data collection and analysis - C. Sakamoto, Center for Environmental Assessment Services, Missouri
- 1430 Soil data base management - R. W. Arnold, SCS, USDA
- 1500 Crop data base management - D. Wallach, INRA, France
- 1530 Tea/coffee and light snacks
- 1600 Erosion productivity impact calculator - P. T. Dyke, Grassland Soil and Water Research Lab, Texas

Wednesday 23 March

SESSION 4

- 0830 ICRISAT field tour
- 1200-1230 Meteorological data acquisition system - B. Tanner, Campbell Scientific
- 1300 Lunch

SESSION 5

MINIMUM SET OF BENCHMARK SITES

Chairman: P. T. Dyke, Grassland Soil and Water Research Lab, Texas

1st Rapporteur: D. M. Leslie, Koronivia Research Station, Fiji

2nd Rapporteur: J. R. Burford, ICRISAT

- 1400 Synthesis of cooperator's data sets - G. Uehara, University of Hawaii
- 1430 Discussions
- 1530 Tea/coffee and light snacks
- 1600 Minimum network of Benchmark sites - H. Eswaran, University of Hawaii
- 1930 Dinner at ICRISAT Center (Hosted by L. D. Swindale)

Thursday 24 March

SESSION 6

MINIMUM SET OF CROPS

Chairman: P. vander Zaag, CIP

1st Rapporteur: S. B. Deshpande, National Bureau of Soil Survey & Land Use Planning, India

2nd Rapporteur: C. Mathieu, Universite du Burundi

- 0830 Group discussions on crops selection
- 1030 Tea/coffee and light snacks

SESSION 7

## MINIMUM DATA SETS

Chairman: S. M. Virmani, ICRISAT

1st Rapporteur: C. Mathieu, Universite du Burundi

2nd Rapporteur: S. B. Deshpande, National Bureau of Soil Survey & Land Use Planning

- 1100 Minimum data sets - H. Nix, CSIRO  
Discussions
- 1300 Lunch
- 1430 Discussion groups: Soils, Crops, Climate, Operations
- 1600 Tea/coffee and light snacks
- 1630 Presentation of group recommendations

SESSION 8

## FORMULATING THE EXPERIMENTAL DESIGN

Chairman: E. E. Ewing, Cornell University

Rapporteur: J. R. Williams, Grassland Soil and Water Research Lab, Texas

- 0830 Rationale for experimental design - F. B. Cady, Cornell University
- 1000 Tea/coffee and light snacks
- 1030 Group meetings: design and minimum set of crops on cereals, pulses, and root crops
- 1130 Group reports  
Discussion
- 1300 Lunch

SESSION 9

## ASSIGNMENT OF RESPONSIBILITIES

Chairman: R. Muniappan, University of Guam

Rapporteur: J. W. Jones, University of Florida

1400 Summary - F. H. Beinroth, University of Puerto Rico  
1430 a. Recommendations  
b. Expression of interest - Participants

1630 Closing remarks - R. Muniappan, University of Guam

Early departure

Saturday 26 March

Early departure

Open Individual discussions with ICRISAT Scientists/shopping/  
sight seeing

Departure

**APPENDIX B. MEMORANDUM OF AGREEMENT**

MEMORANDUM OF AGREEMENT

BETWEEN

\_\_\_\_\_  
\_\_\_\_\_  
and

THE RESEARCH CORPORATION OF THE UNIVERSITY OF HAWAII  
Honolulu, Hawaii, USA

For conducting collaborative research under the International Benchmark  
Sites Network for Agrotechnology Transfer project in \_\_\_\_\_

This Memorandum of Agreement between the \_\_\_\_\_, hereinafter referred to as \_\_\_\_\_, of the \_\_\_\_\_, hereinafter referred to as \_\_\_\_\_, and the Research Corporation of the University of Hawaii at Manoa, referred to hereinafter as RCUH, is to provide an arrangement to implement a collaborative research program on agrotechnology transfer using systems analyses and soil-crop-weather models, hereinafter referred to as the IBSNAT project. The RCUH is a body corporate and public instrumentality which is part of the University of Hawaii at Manoa, hereinafter referred to as UHM, for administrative purposes as provided for in S.26-35, Chapter 307, HRS 1969

## I. Definitions

IBSNAT: International Benchmark Sites Network for Agrotechnology Transfer project (Contract No. DAN-4054-C-00-2071-00) between the University of Hawaii at Manoa and the United States Agency for International Development and which has been service ordered to RCUH (S.O. number 1043).

SMSS: Soil Management Support Services project (Contract No. PASA No. BST-1229-P-AG-2178) managed by the Soil Conservation Service of the U.S. Department of Agriculture.

## II. Objectives

An international network of collaborators representing international, regional, and national agricultural research programs is planned to (1) accelerate the flow of agrotechnology on a scientific basis from its site of origin to new sites with a similar agroenvironment and to (2) increase the success rate of technology transfer from agricultural research centers to farmers' field.

## III. Scope of Work

In order to achieve the IBSNAT network objectives, IBSNAT agrees to:

advise \_\_\_\_\_ in the procurement and assist in the installation of appropriate weather stations, if required;

provide information on design of agronomic experiments and on minimum data sets to collect for selected crops to be used in developing and testing simulation crop models;

process field data supplied by \_\_\_\_\_ for storage in computerized data files for use in the development and validation of agricultural management models;

provide \_\_\_\_\_ with information on and results of field testing and experimentation of models at other IBSNAT sites as they become available

invite participation of \_\_\_\_\_ in Annual IBSNAT Collaborators' Meeting

provide \_\_\_\_\_ with computerized software of crop simulation models and appropriate data files;

train \_\_\_\_\_ staff in the use of the models and files, if required;

acknowledge \_\_\_\_\_'s collaboration in and contributions to IBSNAT in appropriate manner.

\_\_\_\_\_ agrees to:

enlist the assistance of SMSS to characterize and classify soils of the major sites used for IBSNAT experiments;

install agronomic experiments with (name crops)

\_\_\_\_\_ on sites in \_\_\_\_\_;

collect a specified minimum set of soil, weather, crop, and management data from these experiments and transmit to IBSNAT offices at UHM as they become available;

assist in the planning, coordination, and implementation of regional meetings related to IBSNAT in the region, if necessary.

#### IV. Publications

Both \_\_\_\_\_ and IBSNAT agree to share data files for publication in reports and technical journals to the mutual benefit of both parties and of network collaborators. Both \_\_\_\_\_ and IBSNAT agree to advise each other of publication plans as early as possible.

#### V. Duration

This agreement shall officially commence on the date of completion of signing of the Memorandum of Agreement and shall remain in force until September 1, 1987 or as long as funding of the contract with USAID is continued.

#### VI. Termination

Either collaborator, \_\_\_\_\_ or RCUH shall have the right to terminate its participation herein at any time upon sixty (60) days notice in writing to the other participating collaborator.

In witness thereof:

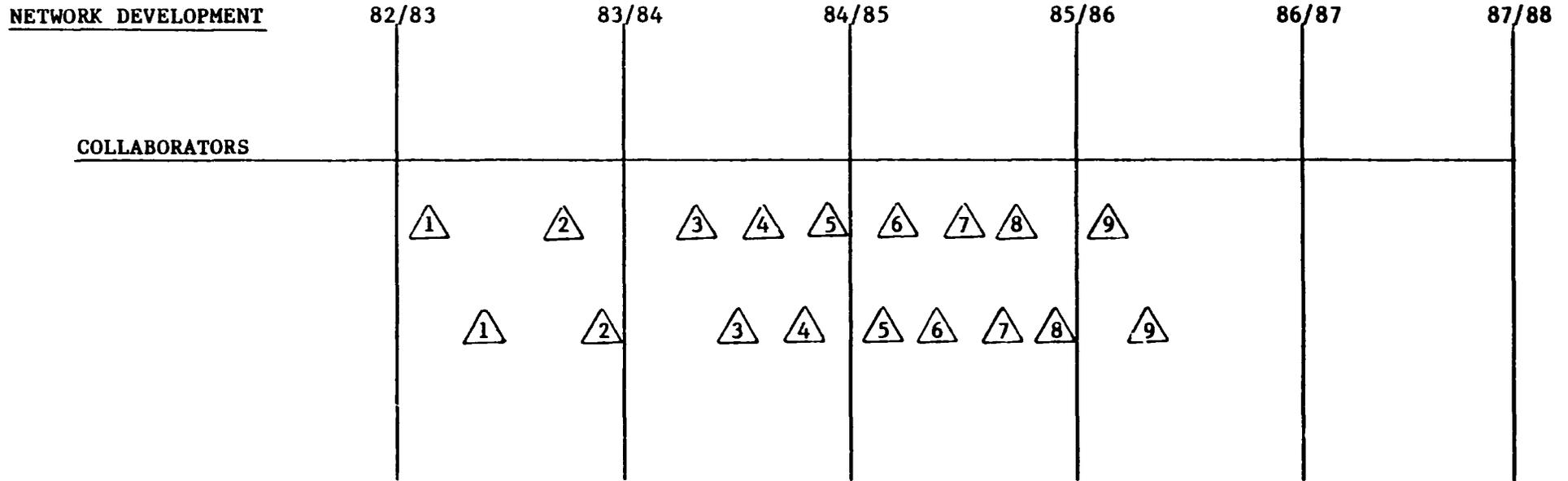
\_\_\_\_\_ /  
for \_\_\_\_\_ date

\_\_\_\_\_ /  
for IBSNAT date

\_\_\_\_\_ /  
for \_\_\_\_\_ date

\_\_\_\_\_ /  
for RCUH date

## APPENDIX C. MILESTONE EVENTS



- 1 - Collaborators Identified
- 2 - Sites recommended
- 3 - Memorandum of agreements completed
- 4 - Sites characterized
- 5 - Sites selected and identified
- 6 - Experiments planted
- 7 - Regional communication linkages developed
- 8 - Global communication linkage developed
- 9 - Model testing and development continues

SYSTEMS RESEARCH

82/83

83/84

84/85

85/86

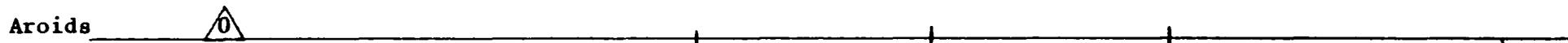
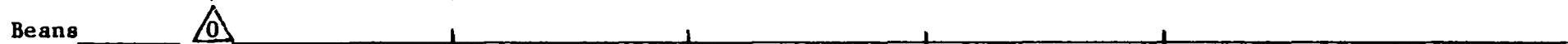
86/87

87/88

MODELING: Crop



Model Development



Model Testing



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SYSTEMS RESEARCH

## Crop Modeling

- Advisory: 1. First IBSNAT Meeting  
 2. Design for collection of minimum data sets  
 3. Second IBSNAT Meeting  
 4. Third IBSNAT Meeting  
 5. Fourth IBSNAT Meeting

- Training: 1. First workshop on modeling  
 2. Regional workshop  
 3. Regional workshop

## Model Development:

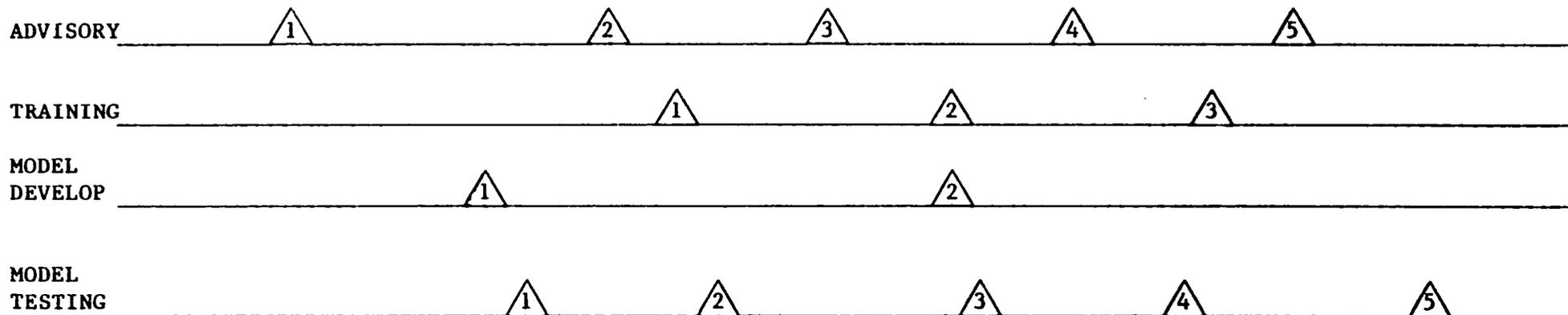
0. Crop identified
1. Minimum data sets determined
2. Experimental design planned
3. Experiments planted
4. Experiments harvested
5. Data sets analyzed
6. First approximation completed
7. Second data set analyzed
8. Second approximation completed
9. Third data set analyzed
10. Third approximation completed

## Model Testing:

0. Crop identified
1. Minimum data sets identified
2. Experimental designed planned
3. Available data sets collected
4. Data sets analyzed/first approximation completed
- 5, 9, 13. Experiments planted
- 6, 10, 14. Experiments harvested
7. First designed data set analyzed
8. Second approximation completed
11. Second designed data set analyzed
12. Third approximation completed
15. Third designed data set analyzed
16. Third approximation completed
17. Actual and predicted crop performance at "new" sites compared

**SYSTEMS RESEARCH (cont'd)**

**MODELING: Economic**      82/83                      83/84                      84/85                      85/86                      86/87                      87/88



**Advisory:**

1. First IBSNAT Meeting
2. Second IBSNAT Meeting
3. Third IBSNAT Meeting
4. Fourth IBSNAT Meeting
5. Fifth IBSNAT Meeting

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**Training:**

1. First regional workshop
2. Second regional workshop
3. Third regional workshop

**Model Development:**

1. ALMANAC model developed
2. ALMANAC model tested

**Model Testing:**

1. Minimum data sets established
2. Data sets collected
3. First series of tests completed
4. Additional data sets completed
5. Second series tests completed