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9. ABSTRACT A report on a three-week training course conducted by Mississippi State University at the Pan American School of Agriculture, Zamorano, Honduras, in October and November, 1976. Mississippi State provided three instructors; the Pan American School provided facilities and training equipment. Students included 28 participants from seven countries, plus 17 third-year students at the Pan American School. The course included five and one-half days of instruction and two weeks of related practical work training. Topics included program development, seed production, harvesting, processing, analysis, drying, storage, marketing, and management. A comprehensive final examination was used to evaluate the success of the course. The results indicated that most of the participants had grasped and retained the more important concepts presented in the course. All participants expressed sincere interest in the course, and many useful discussions pertaining to specific country situations and problems were held.		
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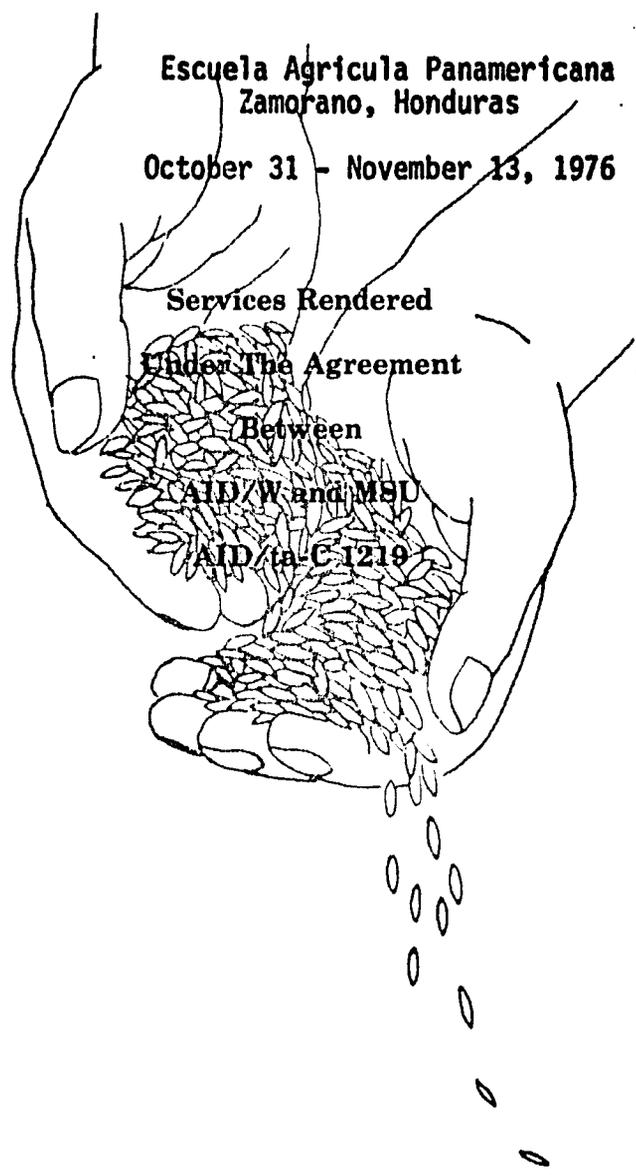
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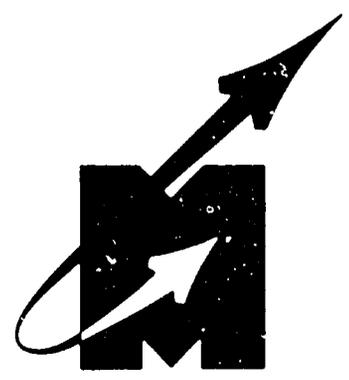
REPORT TO:

AID/W and EAP/HONDURAS

IV INTERNATIONAL SEED TECHNOLOGY TRAINING COURSE
FOR CENTRAL AMERICA, PANAMA, AND THE CARIBBEAN



SEED TECHNOLOGY LABORATORY
MISSISSIPPI STATE UNIVERSITY
MISSISSIPPI STATE, MISSISSIPPI



REPORT TO
AID/W and EAP/HONDURAS
ON THE
IV INTERNATIONAL SEED TECHNOLOGY TRAINING COURSE
FOR CENTRAL AMERICA, PANAMA, AND THE CARIBBEAN

Escuela Agricola Panamericana
Zamorano, Honduras

October 31 November 13, 1976

Services Rendered
Under The Contract Between
AID/W and MSU
AID/W-C-1219

SEED TECHNOLOGY LABORATORY
MISSISSIPPI STATE UNIVERSITY

November, 1976



Instructors and participants of the IV Pan American
Seed Technology Training Course

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REPORT SUMMARY

TITLE: IV International Seed Technology Training Course for Central America, Panama and the Caribbean.

INSTRUCTORS: C. Hunter Andrews, Agronomist, and A. H. Boyd, Associate Agronomist, Seed Technology Laboratory.
G. B. Welch, Agricultural Engineer, Dept. of Agricultural Engineering.

PERIOD OF REPORT: October 27 - November 13, 1976

PROJECT TITLE: AID/ta-C-1219 "Seed Program and Industry Development"

CONTRACTOR: Mississippi State University

SUMMARY

AID/W requested services available under Contract AID/ta-C-1219 with MSU to provide assistance to the Pan American School of Agriculture at Zamorano, Honduras in conducting a regional Seed Technology Training Course. Mississippi State provided three instructors and various references in Spanish, while the Pan American School provided facilities and equipment for training. C. H. Andrews and A. H. Boyd participated in the first week, while G. B. Welch and C. H. Andrews conducted the second week.

Twenty-eight international participants representing seven countries were enrolled in the complete program, (see Appendix II), while seventeen third-year students at the Pan American School attended (see Appendix III). The course included five and one-half days' instruction and practical work for a two-week period (see Appendix I) with classes beginning at 7:00 a.m. and ending at 5:30 p.m.

A comprehensive final examination was used to evaluate the success of the course. The examination results indicated that most of the participants were able to grasp and retain the more important concepts of the program. All of the participants expressed sincere interest in the course, and many useful discussions pertaining to specific country situations and problems were discussed.

The course was concluded with presentation of certificates to each participant.

FOREWORD

This report is submitted as a result of services performed in response to a request from AID/Washington to the Mississippi State University Seed Technology Laboratory AID/ta-C-1219 contract. These services were performed by the authors and were supported according to the provisions of Contract AID/ta-C-1219.

The authors are grateful for the support and assistance provided by the Pan American School of Agriculture (EAP), Zamorano, Honduras. Especially, sincere appreciation is extended to Mr. Joseph Courand, Director, EAP, for his generous reception and to Agr. Victor Muncz for his cooperation and assistance. The authors extend appreciation to all of the instructors at EAP who provided valuable assistance in conducting this course.

C. Hunter Andrews

A. H. Boyd

G. B. Welch

IV INTERNATIONAL SEED TECHNOLOGY
TRAINING COURSE
for
Central America, Panama and The Caribbean

27 October - 13 November, 1976

Services rendered under
MSU Contract AID/ta-C-1219

Cooperators:
Seed Technology Laboratory
Mississippi State University
(MSU)

USAID

Pan American School of Agriculture
(EAP)

INSTRUCTORS

Dr. C. H. Andrews, Agronomist, MSU
Dr. A. H. Boyd, Associate Agronomist, MSU
Dr. G. Burns Welch, Agricultural Engineer, MSU
Agr. Victor Munoz, Profesor Asociado, Agronomia, EAP
Agr. Roberto Garcia, Professor, Agronomia, EAP
Ing. Harry Howell, Profesor Asociado, Agronomia, EAP
Ing. Daniel E. Meyer, Profesor Asistente, Agronomia, EAP
Ing. Jose Torres, Ministerio de Recursos Naturales
Ing. Mary Howell, Profesor Asociado, Agronomia, EAP

SEED TECHNOLOGY TRAINING COURSE

FOR

CENTRAL AMERICA, PANAMA, AND THE CARIBBEAN

I. INTRODUCTION

A. GENERAL: The Fourth International Seed Technology Training Course for Central America and Panama was held at the Pan American School of Agriculture in Zamorano, Honduras. This course was designed to provide intensive specialized training in Seed Technology to technicians and administrators in the Central America region. Broad aspects of Seed Technology were covered in this course; however, the major emphasis of the course was in seed processing, drying, storage, and production. Twenty-eight participants representing seven countries attended:

1. Panama -----	5
2. Costa Rica -----	1
3. Nicaragua -----	6
4. Honduras -----	8
5. Guatemala -----	2
6. Dominican Republic -----	5
7. Bolivia -----	1

See appendix for list of participants.

B. OBJECTIVE: The objective of this course was to develop within each participant an understanding of the fundamentals of Seed Technology and to increase his skills in seed processing, analysis, drying and storage, and management of a complete system in seed production, harvesting and distribution. To implement this objective, specialized instruction in the following areas was presented:

- (1) Implementation of the seed program with special emphasis on operational competence in seed processing and production.
- (2) The technological aspects of seed technology, emphasizing production, harvesting, analysis, processing and storage with special emphasis on their relevance to the development and marketing system.

- (3) Specialized instructions in the process of management and marketing systems were incorporated.

C. PLAN OF STUDY: The course consisted of two weeks of instruction with ninety hours of lectures, practical exercises and assigned work. The students received intensive instruction from the staff of the Agronomy Department at the Escuela Agricola Panamericana, the Seed Technology Laboratory, Mississippi State University, and visiting instructors from the Caribbean area on various aspects of Seed Technology. The needs and objectives of each participant and his previous level of experience and training received primary consideration. Special effort was made to insure that the instruction was on a level relevant to the needs to each individual participant. In all lectures and practical work, the instruction was keyed to special problems of Central America and the Caribbean and conducted on a realistic basis. Each participant was encouraged to ask questions, present problems and work on problems related to his own country, objectives, and interest. Instruction at the course was in Spanish. For those instructors who were not bilingual, interpreters were provided.

II. CURRICULUM

<u>Topic</u>	<u>Total Hours</u>
Program development	10
Seed Production	4
Harvesting	4
Processing	20
Analysis	8
Drying	8
Storage	8
Marketing	6
Management	12
Student Evaluation	4
	<u>84</u>

A. Seed Program Development: The development and implementation of a workable seed program requires an understanding of basic concepts and considerations of many interrelated factors. The concepts and factors presented in the course were discussed in lectures and participant seminars. Specific points included prerequisites and objectives of seed programs, technical elements of a seed program and specialized programs within a comprehensive development structure, recommended courses of action and implementation.

B. Seed Production: Seed improvement programs frequently fail due to lack of understanding and application of the techniques and practices used in increasing the quantities of seed from a handful of a new variety to the many tons necessary for impact at the farmer level. Areas covered included basic production procedures and special problems of production related to the tropics.

C. Seed Harvesting: Seed harvesting is one of the critical areas where timing and techniques may determine the success or failure of a seed program. Techniques of mechanical harvest, seed threshing and time of harvest were covered in addition to adaptation of local procedures for use in seed production.

D. Seed Processing: Seed processing facilities are necessary in a seed program to assure an adequate amount of a reasonably uniform, quality seed product which will be acceptable in organized marketing channels. No matter what the field of interest of a participant, a basic knowledge of seed processing is necessary in implementation of the program. Therefore, emphasis was devoted to processing procedures of individual basic machines applicable to Central American crops and operation of a processing plant as a system.

E. Seed Analysis: While there are seed analysis laboratories in various stages of development in all countries in Central America, a basic knowledge of seed analysis and its role as a quality control tool is necessary for anyone working at any level in a seed program. Therefore, instruction in seed analysis was included; however, no attempt was made to make accomplished seed analysts of the participants.

F. Drying: Since seed drying is one of the least understood areas in seed technology, basic seed drying principles, components of seed drying systems, and practice in design of drying systems was emphasized.

G. Storage: In the humid tropics, one of the major problems of maintaining an adequate supply of high quality seed is providing a satisfactory storage environment in which seed can survive. With this in mind, instruction was keyed to the considerations of seed storage, seed deterioration and the requirements necessary for maintaining a good environment for the seed.

H. Marketing: Since the production of good high-quality seed in adequate amounts and at a reasonable price is of no avail unless the seed reaches the cultivator in good condition in time for planting, the study of marketing systems, sales promotion techniques, salesmanship techniques and an attempt at solving some of these problems is necessary.

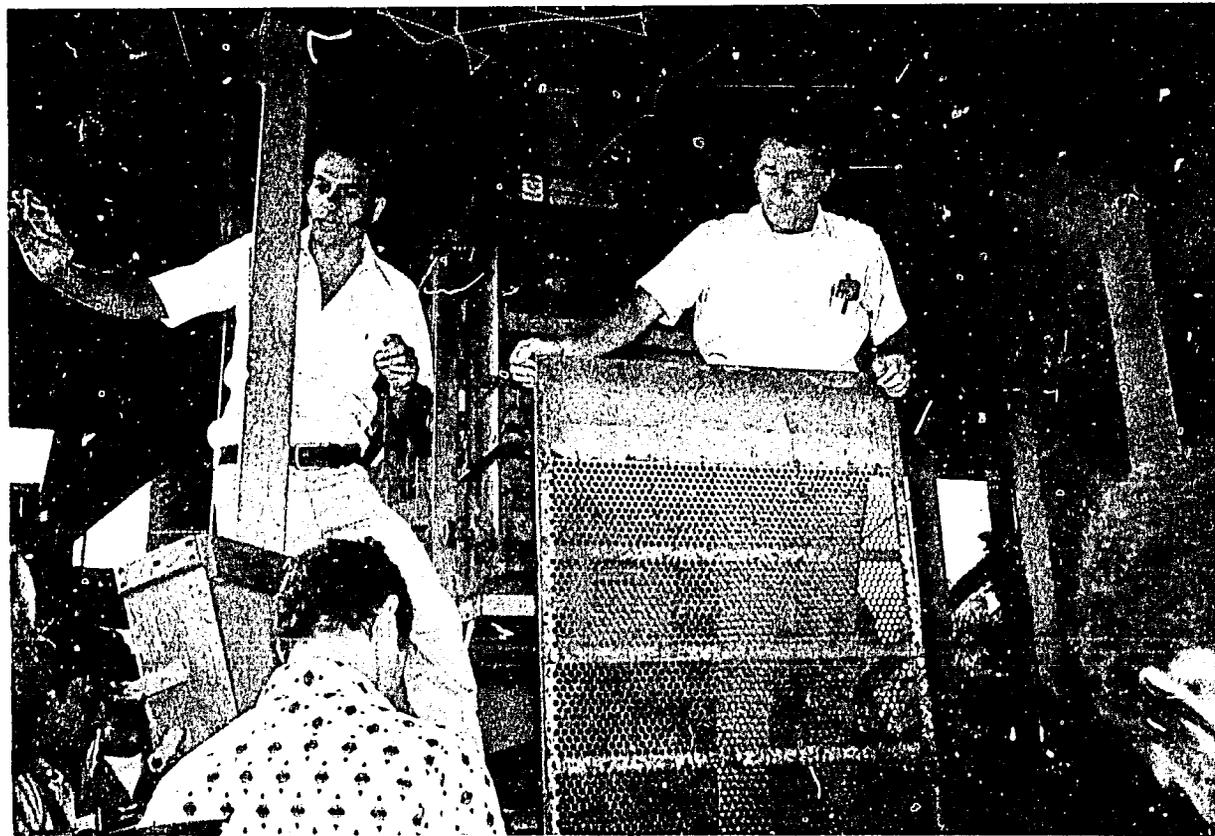
I. Management: At all levels of seed production, the influence of control and management is always present. Often, those involved in production, processing and distribution of seeds fail to take adequate note of its importance. Thus, understanding of the basic process of management was emphasized, and such things as pre-harvesting evaluations, drying and storage operations and problems in obtaining high-quality standards for a total seed program was covered.

J. Participant Evaluation: Participants were evaluated at the termination of the course by a written examination. In addition, individual discussions were conducted with the participants in order to clarify difficult points.

K. Seminars: Seminars were scheduled as requested by the participants. Special effort was made to impress upon the participants that all of the instructors in the training course were anxious to help solve their problems and to discuss any subject related to seed technology which will be relevant to their problems.



Classroom discussions provide information on various aspects of seed program development



Practical exercises and demonstrations assist in the application of classroom knowledge

Plan of Instruction
IV International Seed Technology Training Course
31 October - 13 November, 1976

L	<u>Type</u>		<u>Area</u>
	P	A*	
			PROGRAM DEVELOPMENT
1			Objectives and organization of seed programs
1			Development of seed programs
3			Stock Seed Programs
		5	Problems in Program Planning & Management
			SEED PRODUCTION
2			Seed production procedures
	2		Weed identification and control in the tropics
	2		Special problems in seed production related to the tropics
			HARVESTING
	2		Seed harvest procedures (including threshing & scalping)
			Local harvest procedures adaptable to seed production
			SEED PROCESSING
2			Seed processing facilities
2			Fundamentals of seed processing
	6		Basic seed processing (air-screen cleaner)
	2		Screen selection and arrangement
	2		Size grading of corn
	2		Specific gravity separations
	4		Operation of the processing plant as a system
2			Seed treatments
			SEED ANALYSIS
2			Introduction to quality control facilities and procedures
	1		Purity analysis (seed morphology & identification)
	2		Germination analysis
2			Tetrazolium tests and vigor testing
2			Sampling and seed moisture measurements
			DRYING
2			Seed drying principles
	2		Components of seed drying systems
		4	Practice in design of drying systems
			STORAGE
2			Seed storage - basic considerations
	2		Determination of facility needs for seed storage
	4		Design criteria for different storage problems
			MARKETING
2			Marketing systems
2			Sales promotion
	2		Problems in sales and distribution

<u>Type</u>			<u>Area</u>	
L	P	A*		
			MANAGEMENT	
2			The process of management	
2			Seed production management - planning the production system	
	2		Pre-harvest inspections	
2			Managing harvest-drying operations	
2			Quality evaluations as a management tool	
	2		Problems in attaining high quality standards	
			STUDENT EVALUATION	
2	2			
			SEMINARS	
			Topics as requested by students	
			SUMMARY	Totals
5		5	Program development	10
2	4		Seed production	6
	2		Harvesting	2
6	16		Processing	22
	9		Analysis	9
2	2	4	Drying	8
2	2	4	Storage	8
4	2		Marketing	6
8	4		Management	12
	2	2	Student evaluation	4
				<u>87</u>
			Scheduled instruction	78 hours
			Assigned work	<u>9 hours</u>
			Total excluding seminars	87 hours

* L = Lecture-conference
P = Practical Work
A = Assigned individual work

APPENDIX I

PROGRAM SCHEDULE
 IV International Seed Technology Training Course
 For
 Central America and the Caribbean

31 October (Sunday) Arrival of participants

1 November (Monday)

7:00- 8:00 Inscription
 8:00- 9:00 Inaguration
 9:00- 9:45 Objective and organization of Seed Programs
 9:45-10:15 Coffee
 10:15-11:15 Development of Seed Programs
 1:30- 3:00 Introduction to quality control facilities and procedures
 3:30- 5:00 Function, organization and management of quality control programs.

2 November (Tuesday)

7:00- 9:00 Seed Development and Maturation
 9:00- 9:30 Coffee
 9:30-11:15 Preharvest Management Inspections
 1:30- 3:00 Purity Analysis Testing
 3:00- 3:30 Coffee
 3:30- 5:00 Seed Harvesting Techniques and Procedures

3 November (Wednesday)

7:00- 9:00 Seed Sampling-Techniques Seed Moisture Determinations
 9:00- 9:30 Coffee
 9:30-11:15 Seed Drying Principles
 1:30- 3:00 Components of Seed Drying Systems
 3:00- 3:30 Coffee
 3:30- 5:00 Fundamentals of Seed Processing

4 November (Thursday)

7:00- 9:00 Breeder Seed, Foundation Seed Programs Seed Certification Programs
 9:00- 9:30 Coffee
 9:30-11:15 Design Problems for Seed Drying Facilities
 1:30- 3:00 Air and Screen Machines
 3:00- 3:30 Coffee
 3:30- 5:00 Basic Seed Processing

5 November (Friday)

7:00- 9:00 Weed Identification and Control in the Tropics
 9:00- 9:30 Coffee
 9:30-11:15 Insect Control in Stored Seed
 1:30- 3:00 Basic Seed Processing

5 November (Friday) Continued

3:00- 3:30 Coffee
 3:30- 5:00 Special Problems in Seed Production Related to the Tropics

6 November (Saturday)

7:00-11:00 Practical Work in Seed Processing Seed Laws and Regulations

7 November (Sunday)

Free Time

8 November (Monday)

7:00- 9:00 Screen Selection and Arrangements
 9:00- 9:30 Coffee
 9:30-11:15 Seed Treatments
 1:30- 3:00 Dimensional Sizing Equipment for Cleaning and Grading
 3:00- 3:30 Coffee
 3:30- 5:00 Germination Analysis - Seedling Evaluation

9 November (Tuesday)

7:00- 9:00 Specific Gravity Separations
 9:00- 9:30 Coffee
 9:30-11:15 Tetrazolium Tests and Vigor Testing
 1:30- 3:00 Harvesting and Drying Principles
 3:00- 3:30 Coffee
 3:30- 5:00 Seed Quality Evaluations

10 November (Wednesday)

7:00- 9:00 Basic Considerations of Seed Storage
 9:00- 9:30 Coffee
 9:30-11:15 Facilities for Seed Storage
 1:30- 3:00 Design and Structures for Seed Storage
 3:30- 3:30 Coffee
 3:30- 5:00 Processing Plant Operation

11 November (Thursday)

7:00- 9:00 Controlled Environmental Storage
 9:00- 9:30 Coffee
 9:30-11:15 Conveying and Handling
 1:30- 3:00 Processing Plant Design
 3:00- 3:30 Coffee
 3:30- 5:00 Processing Plant Operation

12 November (Friday)

7:00- 9:00 Examination
 9:00- 9:30 Coffee
 9:30-11:15 Sales Promotion
 1:30- 3:00 Distribution and Marketing

12 November (Friday) Continued

3:00- 5:00 Presentation of Certificates

13 November (Saturday)

Participants depart for home countries.

APPENDIX II

INTERNATIONAL PARTICIPANTS

- | | |
|--|--|
| 1. Sr. Adolfo Gustavo Fuentes C.
9a. Calle 0-52 Zona 12
Guatemala, Guatemala | 2. Sr. Jorge Pineda Mejia
30C 12-60 Zona 12
Guatemala, Guatemala |
| 3. Sr. Hector Lizarraga
Tela Railroad Company
La Lima, Cortes
Honduras, C. A. | 4. Sr. Victor Manuel Sanchez
Planta procesadora de semilla
mejorada
1 era. Ave. 17-20 calle
Barrio las Palmas
San Pedro Sula
Honduras, C. A. |
| 5. Sr. Ovidio Flores Henriquez
Apartado Postal 707
San Pedro Sula
Honduras
Central America | 6. Sr. Jose Enrique Espinoza
CEDEN
Apartado Postal 1478
Tegucigalpa, C.C.
Honduras, C. A. |
| 7. Sr. Jorge Fortin
Planta de Semillas
Frente Shell Universitaria
Tegucigalpa, D. C.
Honduras, C. A. | 8. Sr. Jose Roberto Martinez
Barrio Buenos Aires
Casa No. 1005-5a Ave.
Tegucigalpa, D. C.
Honduras, C. A. |
| 9. Sr. Jose Antonio Coello
Banco Nacional de Fomento
Comayaguela, D.C.
Honduras, C. A. | 10. Sr. Antonio Rodriguez Caramo
Banco Nacional de Fomento
Comayaguela, D. C.
Honduras, C. A. |
| 11. Sr. Noe Reyes Parada
Pioneer de Centroamerica
Apartado Postal No. 13
Chinandega
Nicaragua | 12. Sr. Juan Tomas Gamez
Apartado Postal 2655
Comision Nacional del Algodon
Managua, Nicaragua |
| 13. Sr. Jose A. Gutierrez
Apartado Postal 2655
Comision Nacional del Algodon
Managua, Nicaragua | 14. Sr. Jiurin Haar Garcia
Comision Nacional del Algodon
del Palacio de Comunicaciones
1 cuadra abajo
Managua, Nicaragua, C. A. |
| 15. Sr. Pedro Joaquin Martinez I.
CONAL
Apartado Postal 2655
Managua, Nicaragua, C.A. | 16. Sr. Carlos A. Gutierrez Tapia
Comision Nacional del Algodon
Apartado Postal 2655
Managua, Nicaragua, C.A. |

International Participants (continued)

- | | |
|---|---|
| 17. Sr. Alejandro Chavez Morales
Instituto Tecnológico de Costa Rica
Sede San Carlos
Alajuela
Costa Rica, C.A. | 18. Sr. Victor M. Arauz M.
Empresa Nacional de Semilla MIDA
Panama, Rep. de Panama |
| 19. Sr. Roman Vasquez Melo
Empresa Nacional de Semillas
Alanje
Provincia de Chiriqui
Republica de Panama | 20. Sr. Olmedo Tapia Jaen
Instituto Nacional de Agriculture
(INA)
Divisa, Provincia de Herrera
Rep. de Panama |
| 21. Sr. Inocente Hernandez A.
Planta de Semillas de Divisa
Provincia de Herrera
Rep. de Panama | 22. Sra. Gladys de Famiglietti
Empresa Nacional de Semillas - MIDA
Panama, Rep. de Panama |
| 23. Sr. Armando Rodriguez Maldonado
Ministerio de A.A.C.C. y Agro-
pecuarios
Telefono 28434
Cochabamba
Bolivia, S:A. | 24. Sr. Gilberto A. Abreu Vargas
Estacion Experimental Arroceras -
Yuma
Bonaio, Rep. Dominicana |
| 25. Sr. Vinicio R. Reyes Villar
Director Departamental de Semillas
CNIECA, San Cristobal
Rep. Dominicana | 26. Sr. Vinicio Castillo Tejada
Estacion Experimental Arroceras Yuma
Yuma - Bonaio
Rep. Dominicana |
| 27. Sr. Jose Alberto Bisano
Calle 4 No. L.3. Los Jardines
Santiago de los Caballeros
Republica Dominicana | 28. Sr. Juan Rafael Estrella
Estacion Experimental Arroceras Yuma
Yuma - Bonaio
Republica Dominicana |

APPENDIX III

LIST OF THIRD YEAR STUDENTS AT EAP

Carlos Allen Rodriguez Rodriguez
Costado Oeste Para el LLano
Alajuela, Costa Rica

Gilbert G. Murillo Mondragon
125 vs. Este Palacio Episcopal
Tilaran, Gte, Costa Rica

Williams Fco Hernandez Aguilar
Santiago Puriscal
San Jose, Costa Rica

Victor Rodolfo Guzman Urrutia
4a Ave. 3-55 Zona 2
Mazatenango, Guatemala

Jose Ramon Cardenas Sequeira
Nicoya - Centro - Guanacaste
Costa Rica, C. A.

Alvaro Mejia M.
K 11a # 7a - 03 Apdo Aereo 1376
Manizales - Caldas
Colombia, S. A.

Ray Bradford
Ciudad Jardin R-S
Managua, Nicaragua

Luis Gustavo Concepcion
R/do. German Quintana M.
Apartado 6775
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Jose Alexis Matute
Colonia Kennedy Blogue 41, casa 12 Zona 1
Tegucigalpa, Honduras, C.A.

Roberto Jose Jimenez Montero
Apartado Postal, No. 1056
San Jose, Costa Rica

Rafael Angel Rodriguez Toledo
350 vs este del Kinder La Salle
Sabana sur, San Jose, Costa Rica

Jose Gilberto Garcia Jovel
Cuilco - Huehuetenango
Guatemala, C. A.

Joaquin Rolando Zavala Guifarro
Escuela Agricola John F. Kennedy
San Francisco, Atlantida, Honduras

Guido Luis Bellavista Nunez
Calle 3, Avenidas 6 y 8
Alajuela, Costa Rica, C. A.

Wilfredy Padilla
Sta Barbara, Sta Cruz
Gte, Costa Rica

Marion Navarro
Frente Ermita, Caballo Blanco
Cartago, Costa Rica

Milton Flores B.
Colonia 21 de Octubre sector
Diagonal 4 casa 6. Tegucigalpa
Honduras, C. A.