ANNUAL REPORT

SEED UNIT

December 1989

For Internal Circulation and Discussion Only

Centro Internacional de Agricultura Tropical

SEED UNIT REPORT

1989

The development of effective National Seed Systems (NSS) in Latin America has not kept pace with advances in research except in industrial crops hybrids and rice in some countries This is limiting the impact of advances made by CIAT and NARDS For some crops such as beans cassava tropical pastures and corn there are no organized national seed systems The constraints operating upon such crops are exacerbated under small farmer s production systems

Goal and Focus

The Seed Unit complements the commodity programs by developing organizational and production technologies that facilitate the availability of improved seeds to farmers Both the organizational and production technologies are aimed at increasing the impact of research by a) increasing the productive life-span of improved cultivars b) accelerating adoption of improved seeds and c) increasing the amounts of supplied/utilize improved seed

Starting in 1988 the Unit sharpened its focus upon the special needs of beans cassava and tropical pastures cultivators 1989 has also been a year of innovations as the Unit has moved into more strategic areas of research initiating new and very promising areas of work for the development of seed systems

Research during 1989 thus centered on two specific tasks 1 Development of seed systems and 2 Seed production technologies

These objectives required an interdisciplinary approach within the Unit and between the Unit and the Programs in which production scientists and social scientists worked together to define problems and design strategies Program staff assisted in the design and execution of most

activities Research and training centered on those CIAT commodities for which there are no organized seed systems beans cassava tropical pastures and corn It also concentrated on those regions/countries which have the greatest needs as well as the conditions for accelerated take-off and where follow-up studies could be carried out by CIAT outreach staff or existing national seed projects Guatemala the Dominican Republic Ecuador Peru Bolivia Colombia and Northeastern Brazil were the countries that fit these conditions

Achievements

The major achievements of 1989 were 1 Multidisciplinary research in the organization and production technologies of strategic importance 2- Initiation of courses focussed on the development of relevant seed systems and 3- Thrust on basic seed production of cassava tropical pasture and beans

More detailed information is presented below for each of the three major activities 1- Research on seed systems management 2- Research on seed production processes and 3- Human resource development
Other activities such as human resource development basic seed production and documentation are support activities for these three main objectives

Seed Systems Management

One constraint in the adoption of improved seeds is the lack of organized seed systems which can capture and mass produce the scarce quantities of seeds of improved varieties being developed by researchers in order to make sufficient quantities of quality seed available where needed and when needed in a sustainable fashion Therefore one area of research is the development of organized seed systems

This activity involves diagnosing existing systems identifying social/ organizational constraints and proposing solutions to work with or overcome those constraints Given the limitations of the conventional

(industrial) seed systems and traditional (farmer saved seeds) systems the Unit has been focusing on an approach that capitalizes on the best features of both systems This new approach has been refered to in CIAT literature as "the non-conventional approach" and has required the participation of seed technologists with experience in the organization of seed systems and the incorporation of social scientists who can canalyze and diagnose the social/economic constraints

To form this multi-disciplinary team the Unit added to an agricultural economist in 1988 and an anthropologist in 1989 (a Rockefeller fellow) The capacity acquired with the addition of these scientists has allowed the initiation of research in several strategic areas i e the comparative advantage of non-conventional (traditional artisanal small scale local seed production/distribution) systems and the initiation of pilot projects in cassava seed production and pilot seed lots of bean-varieties

The emphases for seed system development in Colombia was upon cassava tropical pasture and beans in Guatemala upon beans in Ecuador upon beans and maize (in cooperation with CIMMYT) and the Dominican Republic upon rice

In Colombia 13 organizations have initiated cassava seed production The Unit and the Cassava Program worked together to catalyze the initiation of this process Eight organizations are also participating in the initiation of a pasture seed system and several organizations are initiating bean seed production A take-off for Colombian bean seed systems is anticipated for 1990

Artisanal seed production initiated in 1987 in Guatemala had already accomplished much by 1989 A regional workshop was organized by CIAT (in July) to share the Guatemalan experience with other countries in their region This event triggered the initiation of bean seed production in Honduras and Dominican Republic

In the Dominican Republic a participatory diagnosis of constraints acting upon their rice seed program was carried out during research by seed sector personnel in September The information obtained is guiding the design of follow-up activities All of the above activities were designed and carried out by the commodity program staff posted in those specific regions

The specific activities/events carried out in support of the development of national seed systems (NSS) are presented in Table 1 The mechanisms used included consultations taking advantage of national or regional seed seminars diagnosis and strategic planning with leaders of NSS and documentation of programs/cases with successful features One key objective during these events is to facilitate the sharing of successful experiences in the development of seed systems among countries

Seed Production Process

A second constraint in seed systems development is the extant production technology Existing temperate zone technologies are capital intensive and have been designed mainly for large and captive markets etc Even though many principles are useful the lack of adequate methodologies pose a serious barrier to the entry of potential participants in the system Research in the Unit concentrates on simplified seed production methodologies especially relevant to small-scale seed production units The Unit is pursuing this objective by carrying out research on 1 Specific component technologies 2 Integrating those components into a flow or production process (PP) Both kinds of research concentrate on methodologies of international relevance (Table 2) where CIAT as an international center has a comparative advantage

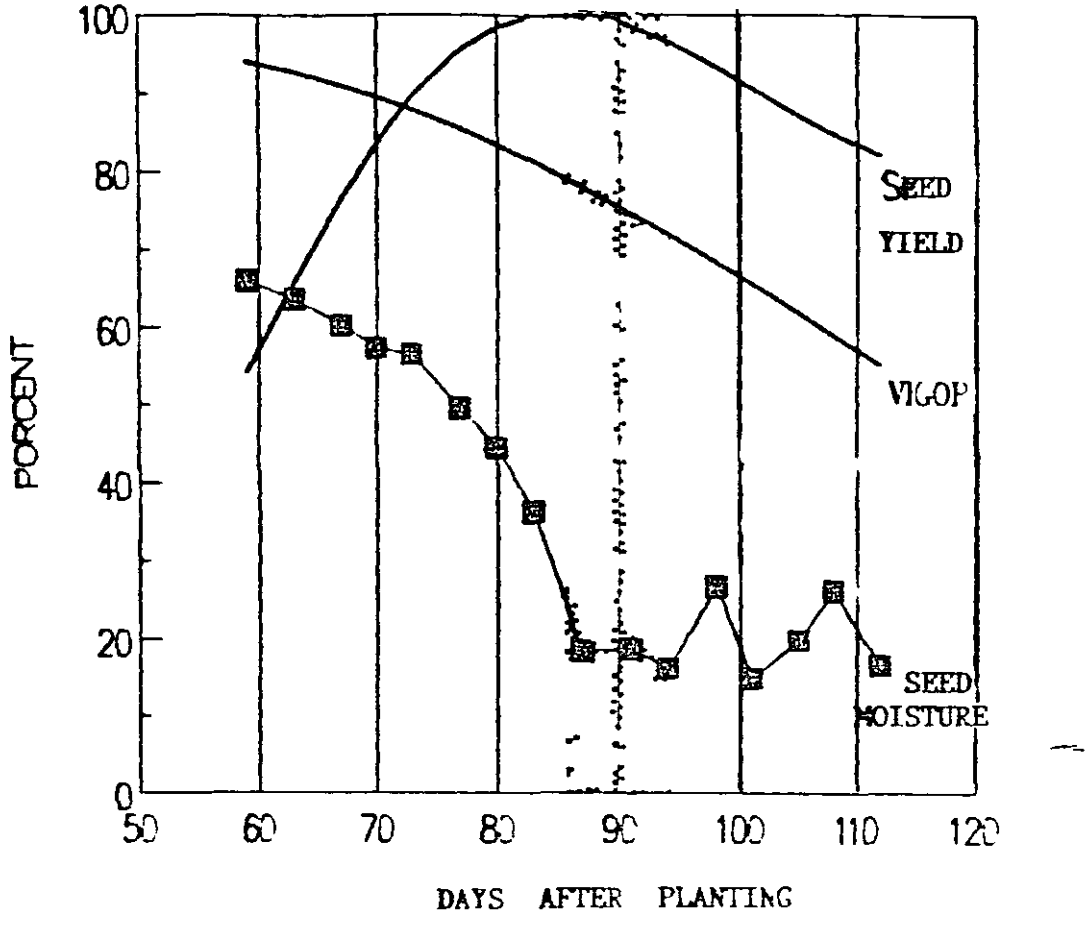
a Research on Specific Component Technologies

Seed production in the tropics faces problems during maturation drying selection and storage Inadequate methodologies at these

stages leads to total or partial loss of seed The research approach to overcome these constraints is to develop preventative low-cost techniques which should assure quality seed at reduced cost Table 2 shows the research activities (in more detail) Some of the research activities carried out in 1989 will be briefly described below

- Effect of premature timely and delayed harvest on bean seed yield and quality (study completed in 1989) This study was designed to gain more understanding of field deterioration of bean seed production in the humid tropics The results show that there is an optimum time (shaded) when the seeds should be harvested (escape from weathering) if yield and quality are to be assured Any delay decreases both yield and quality

OPTIMUM HARVEST TIME FOR BEAN SEED PRODUCTION



OPTIMUM HARVEST TIME TO ASSURE YIELD
AND QUALITY ON BEAN SEEDS PVA 916

- Diagnosis of the quality of bean seeds utilized by small farmers (in process) This study was carried out to gain experience in the traditional seed systems of the Darien and Pescador farming communities The preliminary results indicate that there is high receptivity to visual seed selection techniques and that both farmers and field agronomists lack an understanding of the implications of seed moisture levels for seed quality and storability

- Effect of visual-manual selection on bean seed quality (completed in 1989) Previous research in 1988 showed that between roguing of inadequate plants rejection of inadequate pods and visual selection of threshed seeds the last practice was the most effective in truly separating quality seeds Another study with bean farmers indicated the desire of farmers to select seeds visually This research carried out in 17 seed lots shows that visual selection is very effective in upgrading quality Visual selection attains a level of quality up and above the quality obtained with mechanical selection This component has already been incorporated in the ISSP for beans

Effect of mechanical and visual-manual selection on bean seed quality

Attributes Evaluated	Performance in percentages		
	Mechanically[1] selected	Visually[2] rejected	Visually[2] selected
Germination	91	79	95
Vigor Germination after AA test	86	70	92
Vigor Vigorous seedlings after AA test	77	60	88
Field emergence	59	54	79

1 using an air-screen cleaner composed of two screens and one air system Normally a final product in most operations

2 Visual selection was done on seeds that had already been mechanically selected

b Research on Integrated Seed Production Process (ISPP)

In this type of research the component technologies generated at CIAT or elsewhere concerning seed production are integrated into a flow or sequential process This is being done for beans cassava and tropical pastures The process for (conventional) seed systems was implemented in the early 80 s based on existing state-of-the-art seed plant with a capacity of 1500-2000 tn for easy flowing seeds A prototype small scale seed conditioning plant was installed in early 1989 This experimental prototype has a capacity to handle anywhere from 50-500 tn per year This prototype gives CIAT a capacity to test and incorporate specific components into a flow or process that includes harvest/threshing drying cleaning grading packaging treating and storing the quality control throughout this process

These processes have been presented to scientists form the whole of Latin America through a range of CIAT activities The small scale seed conditioning plant was used for training activities and basic seed production throughout the year The plant is in constant use for bean seed production with excellent results However the process being assembled is designed to be relevant not only for beans but for a wide range of seeds of legumes corn pastures and cereal crops

Another area in which an integrated sequential flow process is being developed is in cassava seed (stake) production The process depends upon good field agronomy positive selection at harvest simple storage ot branches preparation of stakes (cutting treating packaging) prior to planting and quality control throughout The process is constantly being changed to accomodate innovation and will play an important role in a cassava seed production course to be carried out in early 1990 for Colombians involved in the pilot projects throughout the country

The San Gil cooperative has become famous within Colombia from the organizational point of view The production process in San Gil however had some limitations The SU assisted in perfecting it The production system has been improved and is being used as a model

for the entire region around San Gil This is one case of farmers themselves being the central actors in the production/distribution of bean seeds

A fourth area where a production process is being assembled is in pasture seeds This project is being jointly carried out with the Tropical Pastures Seed Specialist and in cooperation with many Colombian organizations The process which includes field agronomy harvesting techniques postharvest management and quality control is being assembled based on the experience of CIAT and participating organizations

In summary the research activity of the Seed Unit is going through a very innovative phase Instead of attempting to transplant whole production processes from one situation to another research is focusing upon the most pressing constraints present in the production systems encountered in the mandate regions/crops Research focuses upon post-harvest technology which is the main constraint in the tropics once the adequate component technologies are identified they are immediately incorporated into an integrated flow or production process This is giving CIAT a unique capacity to contribute in seed systems development The up-to-date information gathered in both organizational and production technologies has been presented in the courses workshops and publications

Human Resource Development (HRD)

The real actors in the development of *effective seed systems* at the national level are key individuals in govermental and nongovermental organizations Lack of trained personnel has been a limiting factor However the greater awareness of national leaders has created a need for more effective strategies on the part of the Unit

Training has targeted two levels of clients decision makers and production technologists The activities designed for the first set of

clients were workshops and consultation trips Starting in 1989 the workshops have been either held regionally or directly in the target country One such activity was held in Guatemala on beans another in the Dominican Republic for the Caribbean and a third in Ecuador These activities were planned and executed with the CIAT commodity out-reach staff

Training for production technologists are either CIAT-based or carried out in selected regions or countries In 1989 the SU offered the first advanced course on Development of Seed Systems in which emphasis was given to small farmers systems There were 130 applicants for 25 vacancies The clients were national research organizations seed certifying services and NGO s from Central America Andean region and North eastern Brazil

The objective of the advanced course was to generate seed development managers and trainers of others Therefore in this course the trainee developed the abilities to

1 Diagnose their specific seed situation identifying constraints and designing action plans to overcome those constraints
2 Propose a seed production process capitalizing on local production resources and
3 Diagnose their needs and then design and carry out training programs this technique has been referred to as 'training of trainers'

As indicated above the response to this course was beyond the capacity of CIAT which reinforced the importance of "the training of trainers' programs launched by the Unit starting in 1988 The results of these programs are evident Colombia for example has organized a range of training activities on its own with minor assistance from CIAT Guatemala Bolivia and North eastern Brazil have also organized in-country training activities with minor assistance from CIAT There are cases of programs in Mexico Bolivia and Peru where training is

already being provided independently of CIAT in which former CIAT trainers are playing a key role This is a positive sign of the impact of CIAT s strategy of training trainers A greater effectiveness will be sought after in 1990 through the selection of committed trainers from commited institutions with follow-up support from the Unit and outreach program staff The range of CIAT-based and regional courses are presented in Table 3 and 3b

Breeder/Basic Seed Production (BB Seeds)

The objective of this activity is to assist the CIAT commodity programs overcome serious constraints in the availability of original seeds of promising lines or recently released cultivars This activity focuses mainly on Colombia and upon the crops for which there is as yet no national capacity to provide original seeds This is the case for beans cassava and tropical pastures In the case of rice the Unit simply provides minor assistance in the post-harvest conditioning (drying cleaning treating packaging) for I C A

The seeds of any crop the Unit produces have two main uses 1- Widespread validation research between CIAT and their NARD counterparts and 2- To supply original seeds (an elite class of seeds) to commercial seed producers who in turn mass-produce This is done in close coordination with the ICA Seed Division which provides the follow-up to seed enterprises

The specific ammounts of seeds produced are presented in Tables 4a to 4e BB seed production in beans cassava and tropical pastures gained strength in 1989 Bean seed production is carried out directly at CIAT's Palmira station This activity has increased from 1988 to 89 and it is planned to further increase in 90 to assure the availability of newly released varieties This is part of a plan jointly carried out by ICA Seed Division/Seed Unit/Bean Program under a non-conventional seed scheme

There is also an increase in the production of pasture seeds This is jointly carried out with the TPP In contrast with beans pasture seeds are produced under contract arrangements with commercial seed companies In cassava practically no seed (stake) production was carried out by the S U prior to 1988 The first fields were established in 1988 Since then the activity has been highly successful The first basic seeds of recommended varieties were harvested in 1989 and supplied to both commercial seed multipliers and station operation within CIAT with excellent results New promising lines coming out of the Cassava Breeding Program were added to this program in 1989 in anticipation of their release in 1990 Contrary to previous misconceptions cassava seed production is an activity that is proving highly succesful The simple methodologies presented by the Seed Unit are being readily adapted by other organizations At this time there are four organizations in the Cauca Valley one in Tolima four on the North Coast and four in Villavicencio participating in cassava seed production

In addition to the direct involvement of the S U in production of BB seeds a post-harvest service on a fee basis is provided utilizing the conventional seed plant This activity targeted the development of corn seed production that is being implemented by the National Federation of Cereal Growers This Federation s program has been most successful by providing quantities of improved corn seeds packaged in 5 12 5 25 and 50 kg containers to small farmers that have considerable impact

The BB seed production as well as the conditioning services are designed to be self-financing using the funds generated by the sale of seeds which in turn maintains a rotating fund Bean seed production and cassava seed production and processing services have become financially self-sufficient however tropical pastures will require special attention until these commodities become widely known and the cost of production is lowered as a market develops

Publication/Documentation

Information generated in the Unit supports the two key areas of research
1- *Seed systems development* 2- *Production technologies* A complete list of documents developed are presented in Table 5 To be sure information in seed system development is scarce in any language Therefore both areas of documentation receive high and equal priority

Personnel The Unit has utilized the services of permanent staff and temporary staff to carry out its activities Dr Cilas Pacheco Camargo joined CIAT as the Leader of the Unit in late 87 His work concentrated on administration and production technologies He has been keen on the initiation of cassava seed production After a very fruitful two years he returned to EMBRAPA Brazil (at the end of October of 89)

Dr Adriel E Garay the other Senior member concentrated on seed systems development and production technologies of bean seeds Dr Anibal Monares an agricultural economist concentrated on the socio-economics of non-conventional systems and cassava seed production At the end of October he left CIAT to join IFAD in Pome Dr Les Field an anthropologist and a Rockefeller fellow has concentrated on comparative studies and development of selected traditional and non-conventional seed systems This interdisciplinary team of scientists along with the highly experienced research associates in the Unit and their assistants have contributed to the achievements reported During this year the Unit hired a new training associate who has increased our effectiveness in "training trainers" as well

Many CIAT specialists ICA specialists and local seed organizations within Colombia and Latin America contributed to the courses and workshops organized by the Unit The administration commodity programs and units in CIAT have contributed inmeasurably to the achievements Finally a special appreciation is expressed to the Swiss Development Cooperation which has provided the financial support to the Unit for the new thrust towards developing seed systems with emphasis on small farmers

TABLE 1 SEED UNIT ACTIVITIES IN SUPPORT OF DEVELOPMENT OF NATIONAL SEED SUPPLY SYSTEMS DURING 1988 89

ACTIVITY	CLIENT	PERIOD	OBJECTIVE
Organization and implementation of caraota bean seed production and marketing systems	National Seed Program and PROCIANDINO (Venezuela)	4 8 April 1988	Improve the seed production and marketing system executed by the national program
Implementation of bean seed production project for small farmers	DIGESA ICTA PROGETAPS (Guatemala)	23 29 July 1988	Follow up on the bean project for small farmers
Support to Costa Rican seed program and participation in the organizacion of the PCCMCA round table	Costa Rican National Seed Service and COTERES (Costa Rica)	20 26 March 1988	Prepare the Seed Round Table for the PCCMCA and diagnose the overall basic seed situation
Orientation in planning of cassava seed production for Panama	IDIAP (Panama)	24 May 2 June 1989	Organize a non conventional cassava seed production system
Planning and execution of four pilot projects in the North Coast of Colombia (Dept of Córdoba Algarrobos and Dept of Sucre Albania La Estacion El Socorro)	ICA DRI CIAT (Colombia)	1988/89	Study organizational alternatives for cassava seed production
Organization of seed technology transfer mechanisms addressed at small farmers	SUDENE PAPP (Brazil)	18 July 15 August 1988	Orient follow up on seed trainers trained at CIAT
Participation in the reform of the National Seed Law in Peru	CODEAGRO MAG (Peru)	24 25 August 1989	Adjust the Peruvian Law to the technological advances achieved during the decade
Organization of cassava seed production system for Colombia	ICA/Seed Division CIAT (Colombia)	1988/89	Develop a quality control system for cassava seed and diffuse the use of new varietie in Colombia
Formulation of a bean seed production plan for Colombia (project profile)	ICA/Seed Division (Colombia)		Initiate the development of a non conventional system based both on the private enterprise and on other interested organizations with the support of ICA s Research and Certification Divisions and CIAT s Bean Program and Seed Unit

TABLE 2 SEED UNIT RESEARCH ACTIVITIES 1988 89

ACTIVITY	OBJECTIVE	STATUS
Effect of early optimum and delayed harvest on bean seed production and quality	Design technologies production strategies and appropriate methods for seed production in small units under tropical conditions	Concluded in 1989
Effe t of the application of fungicides and of cultural management practices on be n seed production and quality	Find agronomic management practices that allow the small farmer to produce better planting materials in his own farm	Concluded in 1988
Effect of cultural practices on bean seed quality	Evaluate the cummulative effect of agronomic manag ment practices on physical phyisological and health quality of bean seed	Final phase 1989
Effect of drying methods on rice seed quality	Study the influence of different drying methods on the physical and physiological quality of rice seed and on seed fissuring	Concluded in 1988
Evaluation of quality of bean seed planted by small farmers in two Colombian regions	Develop a qualitative diagnosis of the extent to which available bean seed technology information is used in two grain producing regions of Colombia	Final phase 1989
Selection of white bean genotypes to improve seed quality	Classify white bean germplasm into different qualitative classes in order to better organize its seed distribution to the breeding programs	During field phase 1989
Effect of chemical scarification on Centrosema seed quality during storage	D termine the effect of different chemical scarification processes on the physiological quality of Centrosema seed during storage	Concluded in 1988
Effect of humidity on storage of bean seeds	Determine the effect of humidity and temperature under hermetic storage conditions on seed quality preservation in sy tems adapted to small production units	Concluded in 1988
Determination of bean seed viability by measuring the pH of its exhudate	Find simple and quick alternative trials for internal quality ontrol of bean seed	Concluded in 1988
Design construction and evaluation of a prototype for harvesting Brachiaria seed (carried ou t jointly with CIAT s Tropical Pastures Program)	Develop a practical and efficient system for harvesting Brachiaria	Being developed 1989
Postharvest ma ag m nt of cassava seed	Present the integrated process of cassava take selection storage cutting options treatm nt packaging and quality control	Concluded set up Under ontinuous innovation

(continues)

TABLE 2 SEED UNIT RESEARCH ACTIVITIES 1988 89

ACTIVITY	OBJECTIVE	STATUS
A COMPONENT TECHNOLOGIES		
Effect of early optimum and delayed harvest on bea seed production and quality	Design technologies production strategies and appropriate methods for eed production in small units under tropical conditions	Concluded in 1989
Effect of the application of fungicides and of cultural management practices on bean seed production and quality	Find agronomic management practices that allow the small farmer to produce better planting materials in his own farm	Concluded in 1988
Effect of cultural practices on bean seed quality	Evaluate the cummulative effect of agronomic management practices on physical phyisological and health quality of bean seed	Final phase 1989
Effect of drying methods on rice seed quality	Study the influence of different drying methods on the physical and physiological quality of rice seed and on seed fissuring	Concluded in 1988
Evaluation of quality of bean seed planted by small farmers in two Colombian regions	Develop a qualitative diagnosis of the extent to which available bean seed technology information is used in two grain producing regions of Colombia	Final phase 1989
Selection of white bean genotypes to improve seed quality	Classify white bean germplasm into different qualitative classes in order to better organize its seed distribution to the breeding programs	During field phase 1989
Effect of chemical scarification on Centro ema s ed quality during storage	Determine the effect of different chemical scarification processes on the physiological quality of Centrosema seed during storage	Concluded in 1988
Effect of humidity on stor ge of bean eeds	D termine the eff ct of humidity and temperature under hermetic storage conditions on seed quality preservation in systems adapted to small production units	Concluded in 1988
Determination ot bean seed viability by measuring tl e pll of its exudate	Find simple and quick alternative trials for internal quality control of bean seed	Concluded in 1988

(continues)

TABLE 2 (CONTINUED)

ACTIVITY	OBJECTIVE	STATUS
Design construction and evaluation of a prototype for harvesting Brachiaria se d (carried out jointly with CIAT s Tropical Pastures Program)	Develop a practical and efficient system for harvesting Brachiaria	Being developed 1989
Evaluation of the effect of different storage systems on the quality ai d production of cassava seed	Determine the best cassava seed (stakes) storage system and its effect on production	In progress 1989
Effect of positive selection on cassava seed quality	Define cassava stake selection technologies in the field	In progress 1989
Characterization of the potential of three promising cassava lines for accelerated multiplication	Determine suitability of varieties for accelerated increase	In progress 1989
B INTEGRATED SEED PRODUCTION PROCESS (ISPP)		
Design construction and operation of a stationary dryer for the non conventional seed system in oper ition at COAGRO San Gil (Colombia)	Improve postharvest management and quality control procedures for bean seed This institution will fulfill the pilot role in order to diffuse its organizational scheme in Colombia	Concluded 1988
Design constru cti n operation and ev luation of a small scale seed conditioning plant using low cost simple machinery and equipment	Develop simple and inexpensive methodologies for non conventional seed production systems and use of high quality seed in order to improve postharvest technology among small scale (50 100 t) farmers in organized communities Present an integrated scheme of the production process	Concluded in 1989 Under continuous use and uptading
Cassav eed (take) production system	To present the integral process including field agronomy selection of pla ts at harvest storage utting/treating packaging and quality control	Basic process concluded and in constant innovation

TABLE 3 PRINCIPAL TRAINING ACTIVITIES OF THE SEED UNIT DURING 1989

NAME OF COURSE	MAIN SUBJECTS COVERED	SITE	ORGANIZING ENTITY	NO OF PARTICIPANTS	DATE	PARTICIPANTS
COURSES AT CIAT						
First Advanced Course o Seed Production Systems for Small Farmers	Role of seeds in agricultural development seed quality quality control seed humidity content rice varietal maintenance appropirate drying technology communication with the small farmer seed production and distribution	COLOMBIA	CIAT	34	15 May 23 June	Seed Unit
IN COUNTRY/REGIONAL COURSES						
Course on Seed Production Systems for Small Farmers	Role of seeds in agricultural development seed quality quality control bean and cassava seed production methodology for seed diagnosis formulation and evaluation of a seed project appropriate drying and storage technology differentiation of seed as a product	COLOMBIA	ICA/CIAT	17	30 Oct 3 Nov	Seed Unit
Phase I of Course on Non Conventional Bean Seed Production	Agronomic management of non conventional bean seed production seed conditionning quality control phytosanitary requirement in bean seed production	ECUADOR (Ibarra)	INIAP/CIAT	21	22 27 January	Giraldo Monares Aguirre
Central American Workshop on Bean Seed Production and Distribution for Small Farmers	Appropriate bean seed production technologies tools for seed program development non conventional seed systems designing activity plans for each country follow up	GUATEMALA (Jutiapa)	CIAT/ DIGESA/ ICTA	46	24 28 July	Camargo Garay Monares Gutiérrez
Phase II of the Course on Non conventional Bean Seed Production	Seed conditionning with equipment appropriate for small farmers organization and seed distribution for small farmers	ECUADOR (Ibarra)	INIAP/CIAT	25	16 18 August	Giraldo Monares

(continues)

TABLE 3 (CONTINUED)

NAME OF COURSE	MAIN SUBJECTS COVERED	SITE	ORGANIZING ENTITY	NO OF PARTICIPANTS	DATE	PARTICIPANTS
Workshop on Rice Seed Production for the Caribbean	Rice seed production and conditionning seed morphology and development stages humidity and its implications quality control sampling storage seed physiology rice drying	DOMINICAN REPUBLIC	CRIN/CIAT	30	18 30 Sept	Garay Burbano Aguirre
Course on Internal Quality Control	Internal seed quality control	BRAZIL (Pelotas)	UFPEL/CIAT	30	16 28 Oct	
MINOR PARTICIPATION IN COURSES WORKSHOPS, EVENTS						
III International Intensive Course for Non conventional Production of Grain Legume/Seeds	Technical and socioeconomic aspects of bean seed production and distribution and of other andean crops	BOLIVIA (Cochabamba)	PROCIANDINO	25	19 January 4 February	Monares
Seminar on National Policies on Technology Transfer	National policies on cience and technology basic sciences technical development of social sciences	COLOMBIA	UNIVERSIDAD NACIONAL	400	22 24 February	Camargo
Seed Section of XXXV Annual Meeting of the PCCMCA	Policies and criteria on onservation of national resources evaluation of advanced bean line agronomy and physiology nutrition and microbiology	HONDURAS (San Pedro Sula)	PCCMCA	300	3 8 March	Camargo Burbano
Phase II of the Course on Non conventional Seed Production	Non conventional bean seed production seed conditionning phytosanitary procedures non conventional seed production co t alternatives for bean seed distribution	PERU (Calca)	INIAA/CIAT	23	7 12 May	Aguirre Monares

(continues)

TABLE 3a (CONTINUED)

NAME OF COURSE	MAIN SUBJECTS COVERED	SITE	ORGANIZING ENTITY	NO OF PARTICIPANTS	DATE	PARTICIPANTS
Course on Internal Quality Control	Importance of official control factors affecting seed quality pathological problems affecting rice seed production	COLOMBIA (CIAT)	ASCOES	28	4 8 September	Seed Unit
Program of the M S Course on Seed Technology	Drying storage	ARGENTINA (Cordoba)	U NACIONAL DE CORDOBA	9	24 April 8 May	Aguirre
Maize Seed Production and Use in the High Andean Zones	Workshop on Improved Problems and Solutions of Maize Seed in High Andean Zones	ECUADOR (Ibarra)	CIMMYT	30	26 29 June	Camargo
First Meeting of the Industrial Seed Sector	ALADI and the integration of seed marketing in Latin America	COLOMBIA	ALADI/FELAS	100	18 20 July	Camargo Gutiérrez
National Seed Round Table	Seed production systems for small farmers	BOLIVIA	CNS	200	20 22 July	Garay
AOSCA s Annual Meeting	Seed certification	USA (Chicago)	AOSCA	300	30 July 3 Aug	Camargo
II National Seed Seminar	Seed policies and legislation	LIMA (Peru)	FUNDEAGRO	100	22 26 August	Camargo
VI Brazilian Seed Congre s	Seeds as the basis for food production	BRAZIL (Brasilia)	ABRATES	500	15 25 Sept	Camargo Giraldo
Phase I of Course on Non conventional Promotion and Production of Seed of New Bean Varieties	Bean seed production seed quality non conventional seed conditionning equipment	ECUADOR (Cuenca)	INIAP	20	2 10 October	Giraldo
Course on Seed Systems for Small Farmers		BRAZIL (Fortaleza)	SUDENE/PAPP	25	10 20 October	Gutiérrez Aguirre López

TABLE 3b VISITING IN-SERVICE RESEARCHERS DURING 1989

NAME	INSTITUTION*	COUNTRY	DATE
Nestor Arregui	INIAP	Ecuador	16 Jan - 17 Feb
Monica Gordon	CARDI	Antigua	1 Jun - 30 Jun
Mario Garcia	DIGESA	Guatemala	26 Jun - 30 Jun
Naira Camacho	CNS	Panama	26 Jun - 30 Jun
Fernando Herazo	ICA	Colombia	26 Jun - 30 Jun
Demetrio Suárez	IIA	Cuba	24 Jul - 22 Sep
Daniel Pieretti	U N de C	Argentina	27 Jul - 1 Sep
Marino Cubas	MIAC	Peru	1 Aug - 30 Sep
Orlando Montoya	MIAC	Peru	1 Aug - 30 Sep
Javier del Villar	MIAC	Peru	1 Aug - 30 Sep
Hernan Pinzon	ICA	Colombia	4 Sep - 13 Oct
Shirley P Mora	PROTECA	Ecuador	4 Sep - 3 Nov
Carlos Sheran	SRN	Honduras	24 Jul - 22 Sep

* INIAP = Instituto Nacional de Investigaciones Agropecuarias
CARDI = Caribbean Agricultural Research and Development Institute
DIGESA = Direccion General de Servicios Agricolas
CNS = Comite Nacional de Semillas
ICA = Instituto Colombiano Agropecuario
IIA = Instituto de Investigaciones en Arroz
U N de C = Universidad Nacional de Cordoba
MIAC = Midmerica International Agricultural Consortium
PROTECA = Programa de Desarrollo Tecnologico Agropecuario
SRN = Secretaria de Recursos Naturales

TABLE 4a PRODUCTION (KG) OF BEAN BASIC SEEDS

Line/Variety	1988		1989	
	Ha	Kg	Ha	Kg
PVA 476	1 6	2 189	1 6	1 500*
PVA 782	0 4	546		
PVA 916	0 1	144	1 8	2 384
RAB 304	0 16	212		
RAB 383	0 18	245		
Calima	1 1	1 260		
Frijolica P 1 1	0 4	515		
PVA 1261			0 2	197
PVA 773			2 0	2 000*
Total		5 111		6 081

* still in field

TABLE 4b CASSAVA SEED PRODUCTED IN 1989

Variety	Area planted in 1988 (ha)	Stakes Produced in 1989	Area planted* in 1989 (ha)
P-11	8 3	388 000	3 8
P-12	3 7	236 000	5 6
P-13	5 5	166 000	1 3
CH523-7	0 8	10 000	0 7
Venezolana	-	-	1 7
Other materials	0 8	7 000	5 4
Total	19 1	807 000	18 5

* To be harvested in 1989

APPENDIX 4c FORAGE SEED PRODUCTED BY ENTERPRISES

Cultivar/Species/ Enterprise	1988 Area planted (ha)	1988 Production (kg)	1989 Area planted (ha)	1989 Production (kg)	1990 Area planted (ha)	1990 Production (kg)
CAPICA (S capitata)	-	-	19 0	1887	21 0	-
Semillano	-	-	10 0	1187	-	-
Hoechst	-	-	9 0	700	-	-
Gramicol	-	-	-	-	5 0	-
Servicampo	-	-	-	-	6 0	-
Comersia	-	-	-	-	10 0	-
VICHADA (C acutifolium)	1 0	87	11 0	1416	9 5	-
Semillano	0 5	50	2 5	130	1 0	-
Pastos y Leguminosas	-	-	0 5	66	-	-
Distribuidora del Valle	-	-	2 0	262	-	-
Semillas Pance	-	-	-	-	2 0	-
Hoechst	-	-	6 0	958	5 0	-
Comersia	-	-	-	-	1 0	-
Seed Unit	0 5	37	-	-	0 5	-
LLANERO (B dictyoneura)	2 0	70	20	1108	25 0	-
Semillano	-	-	5 0	980	5 0	-
Distribuidora del Valle	-	-	5 0	-	5 0	-
Hoechst	-	-	5 0	102	5 0	-
Servicampo	-	-	5 0	26	5 0	-
Comersia	-	-	-	-	5 0	-
Seed Unit	2 0	70	-	-		-
Centrosema macrocarpum	-	-	2 6	798	3 1	-
Distribuidora del Valle	-	-	0 6	68	0 6	-
Semillas Pance	-	-	2 0	730	2 0	-
Semillano	-	-	-	-	0 5	-
Stylosanthes guianensis	1 5	62	0 5	32	2 0	-
Semillano	1 0	25	-	-	1 0	-
Seed Unit	0 5	37	0 5	32	1 0	-
Desmodium ovalifolium	-	-	2 0	57	3 0	-
Semillano	-	-	2 0	57	3 0	-
GRAND TOTAL	6 5	219	55 1	5298	63 6	-

TABLE 4d AMOUNTS OF SEEDS RECEIVED DISTRIBUTED AND FINAL STOCK (IN KG) OF BASIC SEED IN THE SEED UNIT DURING 1989

Species	In stock as of November 1988	Amount received during 1989	Amount distributed during 1989	In stock as of November 1989
Andropogon gayanus	177 0	82 0	4 0	255 0
Brachiaria dictyoneura	10 0	182 0	124 0	68 0
Centrosema acutifolium	139 5	1354 0	907 0	586 5
C brasilianum	90 0	-	0 5	89 5
C macrocarpum	-	795 0	635 0	160 0
C pubescens	-	-	-	-
Oryza sativa*	185 0	91 155 0	91 155 5	184 5
Phaseolus vulgaris**	9 491 0	7 215 0	4 240 0	12 466 0
Stylo anthes capitata	593 2	53 0	300 0	346 2
S guiananesis	47 5	15 5	38 8	24 2
S macrocephala	-	-	-	-
Zea mays	58 5	1 457 0	1 430 0	85 5
TOTAL	10 791 7	102 308 5	98 834 8	14 265 4

* Includes basic seed produced by Station Operations (CIAT) and conditioned by the Seed Unit for ICA

** Includes 4 900 kg of material harvested not yet classified

TABLE 4e AMOUNT (KG) OF SEED CONDITIONED FOR OTHER INSTITUTIONS UNDER A SERVICE FOR FEE ARRANGEMENT

CROPS	CLIENTS	1988	1989
RICE	ICA HOECHST	63 018	285 258
CORN	FENALCE PROCAMPO	52 247	337 878
SOYBEAN	ICA	23 285	14 265
SORGHUM	CRESEMILLAS	7 335	-

TABLE 5 PUBLICATIONS AND CONFERENCES PREPARED IN 1988/89

PUBLICATIONS IN THE AREA OF SEED SYSTEMS

- Seed for small farmers Support infrastructure C P Camargo C Bragantini R Aguirre A Garay J Fernández de Soto (English and Spanish)

- Seed production systems for small farmers A nonconventional perspective C P Camargo C Bragantini A Monares (English and Spanish)

- Setting a seed industry in motion A nonconventional successful approach in a developing country A Garay P S Pattie J Landivar J Rosales (English in press)

PUBLICATIONS IN THE AREA OF PRODUCTION TECHNOLOGIES

- Almacenamiento de las semillas L Baudet (Spanish mimeo)

- Beneficio de semillas S Davila S T Peske R Aguirre

- Descripcion varietal de arroz G Munoz G Giraldo J E Douglas J Banguero (Spanish in press)

- Manual para el beneficio de semillas P Aguirre y S T Peske (Spanish Portuguese in preparation)

- Metodologia para producir semillas de calidad Frijol arroz maiz sorgo G Giraldo J Fernandez de Soto G Munoz (Spanish second revised edition in press)

PAPERS AND CONFERENCES (1988/89)

CONFERENCES AND LECTURE NOTES IN SEED SYSTEMS

- Antecedentes y bases para un proyecto de produccion de semilla de yuca en la Costa Norte de Colombia J Lopez (mimeo)

- Control de calidad C Bragantini (mimeo)

- Control interno de calidad en semillas C P Camargo (mimeo)

- Diagnóstico cualitativo en semillas Notas preliminares C P camargo (mimeo)

- Diagnostico participativo de limitantes y soluciones relacionados con los sistemas no convencionales de produccion y utilizacion de semillas C P Camargo (mimeo)

- Diferenciacion del producto semilla A Garay A Monares C P Camargo (mimeo)

- El desarrollo de los recursos humanos en la Unidad de Semillas del CIAT U Gutiérrez (mimeo)

- Encuesta para diagnosticar sistemas de produccion y uso de semillas A Monares L W Field y U Gutierrez (mimeo)

- Importancia de la patologia de semillas para los programas de semillas C P Camargo (mimeo)

- Importancia de la semilla en el desarrollo agricola C P Camargo (mimeo)

- Importancia y aplicaciones del vigor de la semilla C P Camargo (mimeo)

- Lineamientos generales para la elaboracion de un plan nacional de semillas C Bragantini (mimeo)

- Métodos de evaluacion economica de experimentos y encuestas a nivel de finca A Monares A Achata (mimeo)

- Necesidad de un proyecto piloto para la produccion de semilla de yuca de buena calidad en la Costa Atlantica J Lopez (mimeo)

- Pitayo Site of a CIAT-supported bean-seed project L W Field (mimeo)

- Politica de ciencia y tecnologia El caso brasilero C P Camargo (mimeo)

- Programas de semillas y sus componentes C P Camargo (mimeo)

- Proyecto de produccion y distribucion de semilla mejorada de yuca en la Costa Norte de Colombia C P Camargo A Monares J Lopez (mimeo)

- Semillas de yuca en la Costa Atlantica J Lopez (mimeo)

- Situacion de la certificacion de semillas en America Latina Limitantes y oportunidades de desarrollo A Garay (mimeo)

CONFERENCES AND LECTURE NOTES ON PRODUCTION TECHNOLOGIES

- Acondicionamiento Principios metodos y tecnicas apropiadas J Fernandez de Soto (mimeo)

- Analisis de pureza fisica E Burbano (mimeo)

- Atributos de calidad de la semilla E Burbano (mimeo)
- Beneficio de semillas R Aguirre (mimeo)
- Calidad de la semilla E Burbano (mimeo)
- Control de calidad en el laboratorio de Phaseolus vulgaris (frijol) E Burbano (mimeo)
- Determinación de la humedad E Burbano (mimeo)
- Diagnostico cualitativo en semillas C P Camargo (mimeo)
- Efecto de la escarificacion quimica en la calidad de la semilla de Centrosema spp durante el almacenamiento E Burbano (mimeo)
- Efecto de la humedad en el almacenamiento hermetico de semillas de frijol R Aguirre (mimeo)
- Efecto de las practicas culturales en la calidad de la semilla de frijol (Phaseolus vulgaris) C Bragantini (mimeo)
- El proceso de maduracion y sus implicaciones en la produccion de semillas Caso del arroz A Garay (mimeo)
- Insecticidas y raticidas mas comunes en el combate de plagas de semillas y granos almacenados J C Londoño (mimeo)
- La calidad de la semilla y sus componentes A Garay (mimeo)
- La dinámica de la humedad de la semilla y sus implicaciones en la produccion de semillas A Garay R Aguirre G Giraldo (mimeo)
- Manejo poscosecha de semilla vegetativa (estacas) de yuca H Collazos (mimeo)
- Metodo para determinar viabilidad de semillas de frijol a traves del pH del exudado de sus ejes embrionarios J C Londono (mimeo)
- Metodos de cosecha y recoleccion de semilla de frijol G Giraldo (mimeo)
- Muestreo de semillas E Burbano (mimeo)
- Principales enfermedades transmitidas por la semilla reconocimiento y pruebas practicas J C Londono (mimeo)
- Producción de semilla de frijol G Giraldo (mimeo)
- Produccion de semilla de yuca J Lopez (mimeo)

- Producción de semilla de yuca en la Unidad de Semillas del CIAT J López (mimeo)

- Pruebas para evaluar la calidad de las semillas E Burbano (mimeo)

- Rice seed testing (physiological purity viability germination vigor and dormancy) E Burbano (mimeo)

- Rompimiento de latencia E Burbano (mimeo)

- Seed quality standards E Burbano (mimeo)

- Sistemas de clasificacion de semillas E Burbano (mimeo)

- Técnicas y metodos apropiados de cosecha trilla prelimpieza secado y almacenamiento de semillas de frijol en los sistemas convencionales no convencionales y tradicionales G Giraldo (mimeo)

- Vigor de las semillas --Una vision practica C P Camargo (mimeo)

TABLE 6 SEED UNIT STAFF DURING 1989

Permanent

CILAS PACHECO Head (until October)
ADRIEL E GARAY Seed Systems and Production Technology
URIEL GUTIERREZ Training Associate
EDGAR A BURBANO Seed Laboratory and Pasture Production
ROBERTO AGUIRRE Postharvest Technology
JOSE FERNANDEZ DE SOTO Seed Plant Management
GUILLERMO GIRALDO Bean Seed Production
JAVIER LOPEZ Cassava Seed Production
HAROLD COLLAZOS Cassava Seed Production
JUAN CARLOS LONDOÑO Laboratory Assistant
GLORIA S DE GARCIA Secretary
REBECA BOLAÑOS Secretary
LUZ ELENA TOBON Secretary
RODRIGO NUÑEZ Laboratory Analyst
GERMAN OYUELA Laboratory Analyst
JORGE VILLEGAS Seed Conditioning Technician
CARLOS ORLANDO VIVAS Seed Conditioning Technician
MARIO ROMERO Field Production Technician
BENJAMIN REINOSO Small Scale Seed Plant Technician
GILBERTO GONZALES Laborer
GONZALO MONZON Laborer
ALBERTO OROZCO Laborer
RUDECINDO PALMA Laborer

Non permanent

ANIBAL MONARES Economist Senior Research Fellow (until October)
LES FIELD Anthropologist Postdoctorate Rockefeller Fellow