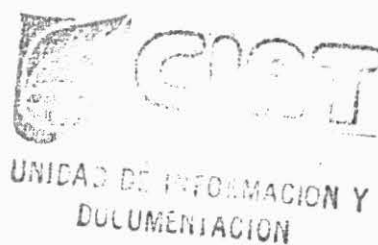


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INTERNATIONAL COOPERATION ACTIVITIES AT CIAT:

A STRATEGY PAPER



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I. INTRODUCTION

II. A RATIONALE FOR INTERNATIONAL COOPERATION AT CIAT

- A. CIAT's Mandate
- B. CIAT's Role in the Generation and Transfer of Technology
- C. CIAT Parameters in International Cooperation
- D. The Generation and Transfer of Technology: The Transfer Chain

III. PROBLEM IDENTIFICATION

- A. In Countries
- B. At CIAT
- C. Identification of Commodity Technical Problems
- D. Overall CIAT Outreach Objectives
- E. Expectations

IV. OPERATIONAL OBJECTIVES

- A. Criterion Variables of Outreach Activities
 - a.1. Research Networking
 - a.2. Manpower Development
 - a.3. Regional and Country Outposting
 - a.4. International Agricultural Research Center Networking
 - a.5. Communications Networking
 - a.6. Publication Information
 - a.7. Consulting and Technical Assistance
- B. Integration of Research and Technology Transfer at the Operational Level

V. THE SOLUTION MODEL: STRATEGIES

- A. Information and Documentation Inputs
- B. Resource Component

b.1. Office of the ADG/IC

b.2. Postgraduate Training

b.2.1. Training at CIAT

b.2.2. Training in-countries

b.2.3. Staffing and Methodology

b.2.4. Funding

b.2.5. Recruiting

b.2.6. Follow up

b.3. Conferences

1) Network Workshops

2) Specific Problem Conferences

3) Methodology Workshops

4) Production Strategy Conferences

5) Management Meetings

b.4. Scientific Information and Documentation Services

b.4.1. Documentation Services

b.4.2. Library Support Services

b.4.3. Networking of Documentation Data Bases and
Information Retrieval

b.4.4. Message Production Support Services

b.5. Public Information and Message Design

b.5.1. Public Information Design

b.5.2. Editorial Services

b.5.3. Audio-Visual Message Design

b.5.4. Visitors Program

C. Outreach Model for each Commodity

D. Definition of available technologies

E. Projection of availability of new technologies

VI. OPERATIONALIZATION OF THE SOLUTION MODEL: TACTICS

A. Regional Service Programs

- a.1. IDRC Supported Outreach in Cassava
- a.2. UNDP Project
- a.3. Proposed Additional Regional Service Program Funding

B. Bilateral Programs

- b.1. Guatemala
- b.2. Honduras
- b.3. Panama
- b.4. Peru
- b.5. Colombia
- b.6. Brazil

C. Future Regional Project Outposted Staff

- c.1. Peru
- c.2. Venezuela

D. Summary of Staffing Pattern

E. International Center Relay Teams

VII. EVALUATION

I. INTRODUCTION

Shortly after taking over his post in early January 1977 the Associate Director General for International Cooperation at CIAT (ADG/IC) was asked by the Director General (DG) to prepare a Position Paper on International Cooperation for presentation at the meeting of the Board of Trustees of CIAT to be held on May 5, 1977.

A step-wise approach to the production of such a paper was decided upon. A first draft (Basic Document A) was circulated among Directors and Program Leaders on February 15th. Extensive commentaries and collaborations on form and content were received, and incorporated in a second draft which was then subjected to an Internal Workshop on International Collaboration held at CIAT on March 3rd. In addition to all Program Leaders, Directors, and most senior staff, the Members of the Executive Committee of CIAT were present and participated in the discussions.

A summarized document on International Cooperation was presented to the TAC Quinquennial Review Mission to CIAT on April 22nd. It contained fundamental positions and suggested guidelines for action in technology transfer, together with suggested organizational and staffing patterns.

On the basis of the comments and opinions accumulated with the previous iterative steps, a final proposed policy and action paper was finally drawn, and completely rewritten, following a systems approach, which is presented to the Board of Trustees in this final version.

Grateful appreciation is expressed by the ADG/IC responsible for this final version, to CIAT Program Leaders and Staff, to members of the Executive Committee of CIAT, to Mr. Luis Crouch, Chairman of the Board of Trustees, to Dr. Frank Byrnes, former Training Communications Director of CIAT for their frank comments and contributions of content, as well as corrections of form of the original drafts.

Special thanks are due to Dr. Fernando Fernández and Dr. Fernando Monge, for their experienced contributions in their respective fields of Training and Documentation, to Dr. Fritz Kramer, for his help in setting up a systems modeling format for the present paper, and to Dr. John L. Nickel, DG of CIAT for his constant and helpful advice and experienced guidance.

II. A RATIONALE FOR INTERNATIONAL COOPERATION AT CIAT

In the recent years CIAT has redefined the interpretation of its mandate, reassessed and sharpened the goals and boundaries of its research programs, established a tentative outreach scheme, and a whole new institutional structure, both in operating programs as well as in its support activities.

The present position paper is a proposal to the Board of Trustees of CIAT of a set of considerations, objectives, strategies and approach systems, which in their aggregation would complement in the area of International Cooperation and more specifically in the function of technology transfer, the body of policies and programs that has already evolved for technology generation at the Center.

A. CIAT's Mandate

The objectives of CIAT have been restated as:

"To develop and deliver to national institutions improved technology which will contribute to increased production, productivity and quality of specific basic food commodities in the tropics, principally Latin America, thereby enabling producers and consumers, especially those with limited resources, to increase their purchasing power and improve their nutrition".

Operationally, CIAT may be viewed as an institution devoted to the generation and transfer of technology to be applied in the LDC's (with particular reference to Latin America) in order to increase food production mainly on cassava, field beans, beef (emphasizing tropical pastures and forages) rice and swine and with moderate collaborative efforts on maize, and eventually other commodities.

B. CIAT's Role in the Generation and Transfer of Technology

Despite efforts during the last five years to increase national output of basic food crops and livestock and only partially successful attempts to limit population growth, the first half of the decade of the seventies in Latin America, shows very little progress toward increased per capita food production. With the exception of rice, only limited increases are evident in national mean yields of the basic food stuffs, maize, field beans, cassava, beef and swine; all of which still remain at very low levels of physical production and of economic productivity.

Per capita food production figures are probably best as indicators of the overall situation. In all regions of Latin America, food production has practically stagnated since 1970, resulting in a declining output per capita. This decline contrasts with the overall improvement observed during the 1960's.

As the less developed countries of the world, and especially of Latin America, strive to acquire new technology and put it to use in increasing their food production and in improving the welfare of their rural populations, and their populations at large, the International Research Centers, and specifically CIAT in its mandated commodities, are unequivocally committed to play an important supporting role. As an advanced research center, well staffed, and equipped, with deep awareness of agricultural problems and resources, and of technological environmental and social constraints to the production of the commodities it deals with, CIAT, should and does design

and activate both base and complementary programs to those of collaborating countries in commodity research, and technology transfer.

A collaborative position of CIAT in technology generation and transfer should not come from any degree of imposition of CIAT's methodologies, materials, or training systems on the countries it serves. It should arrive from a freely executed mutual approach between CIAT and any collaborating country for the purpose of reinforcing the capacity of national programs to develop through their own channels, systems, skills and efforts the kinds of ultimate food production technology, that will improve the economic, social, and nutritional well-being of their populations.

CIAT does have an advantage, not generalized, in technology generation, as compared to most national programs in various aspects of production of its mandated commodities. Early and constant contacts may make national programs aware of how they could better utilize the research, training, communication and documentation facilities available at CIAT in the degree and measure appropriate to their own needs.

CIAT generated and/or adopted technologies may be made available to national programs at intermediate, or advanced levels of development as each case may demand. The national programs, in turn, will test, validate,

adopt and adapt such technologies to their own needs. A feedback mechanism will assure that any relevant technologies may be further returned to CIAT from cooperating countries for test and validation elsewhere.

C. CIAT Parameters in International Cooperation

CIAT views its role in International Cooperation primarily from the standpoint of a research institution. It addresses itself to country problems in its mandated commodities, striving to solve them, creating better varieties of plants, with higher yields, disease and pest resistance, tolerant to stresses of several kinds, of high nutritional value, requiring low input levels, and susceptible of being utilized at scale neutral input levels, and in farming systems amenable to use by poor farmers. It also strives to develop the type of methodologies and systems, and components of systems of production that can be quickly and easily transferable over vast geographical areas, within the tropics.

CIAT is fully aware that in order for its technology to be adopted and adapted, developed further and used, it has to define certain parameters of action as well as those of its own limitations. The technology transfer criterion, as well as research collaboration with countries requires trained personnel, organized commodity or disciplinary programs, and sound structural institutional bases in those countries. CIAT can play

a very important role in training the personnel that will collaborate in future programs, and maintain close institutional linkages, all the way from the directive, and programmatic, to the operational levels. The strengthening of national research capabilities must in the short term aim to help transforming national institutions, when warranted, from performing essentially adaptive research and technology validation activities with a strong support from the International Centers and other external agencies, to collaborate in developing their own materials and establishing stronger horizontal relationships with all kinds of institutions in the world.

The mechanisms for technical and economic validation of new varieties and methodologies in farmer's fields must be improved at the national level. International Centers have an important role to play in this connection, given the above mentioned considerations on the progressive nature of institution building in the countries.

Country personnel in charge of disseminating technology commonly lack practical orientation and experience needed to diagnose field production problems as well as in a more pragmatic conception of the farm problem as a whole. CIAT's action in commodity production training may make a significant contribution. Since CIAT's training is guided by a learning-by-doing philosophy and emphasizes an integrated approach to the farm problem which includes inputs in farm economics and communication

theory and practice, it can produce important and long range effects on national programs.

All these activities flow in the direction of the creation of useful technology for the production of food commodities and its efficient diffusion to farm producers in the collaborating countries. However, as is shown in Fig. 1, the building of a production model rests not only on building blocks that are related to technology generation, transfer, and adoption. For technology to be adopted, factors such as production risks, commodity credit programs, storage facilities, transportation, availability of inputs and their price, relative to the commodity price, labor availability, tax structure, land tenancy, and concentration size of holdings, etc., are just as important if not more, in defining the final success of a country in achieving a significant increase in productivity and total national production of a given commodity.

The success of other IARCs with their commodities, such as wheat and rice, points to the potential effect of powerful new technologies in altering original equilibria and opening the door for key factors listed on the right hand side of Fig. 1, to be manipulated in achieving spectacularly large production increases.

Even though CIAT is in no position to be involved in modeling or suggesting national commodity production policies, yet because of its knowledge of the potential impact of new technologies, it should reach national government

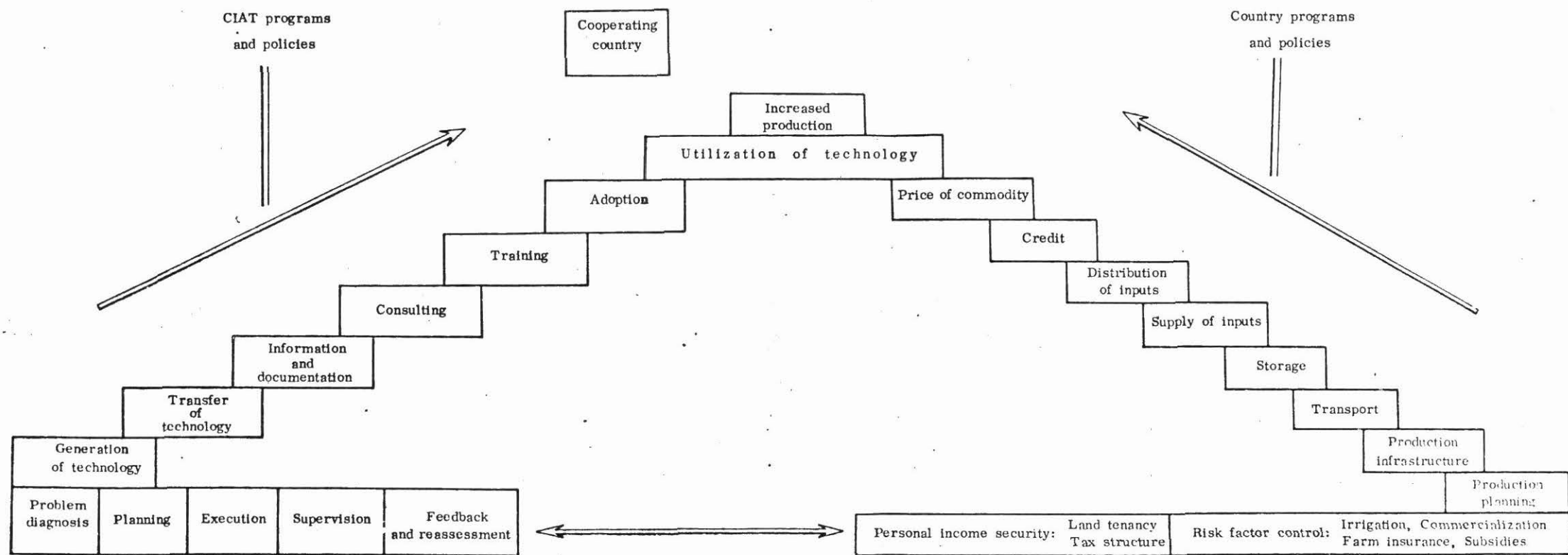


Fig.1

Building Block Model of CIAT and Cooperating Country Commodity Production Programs

agricultural planners and policy makers, and expose to them in workshops the characteristics and potentials of those new technologies. It should also bring together teams of commodity production leaders, planners, and officers in decision making positions from several countries, in workshops, for the purpose of discussing means for utilizing the new technologies, in their own respective benefits.

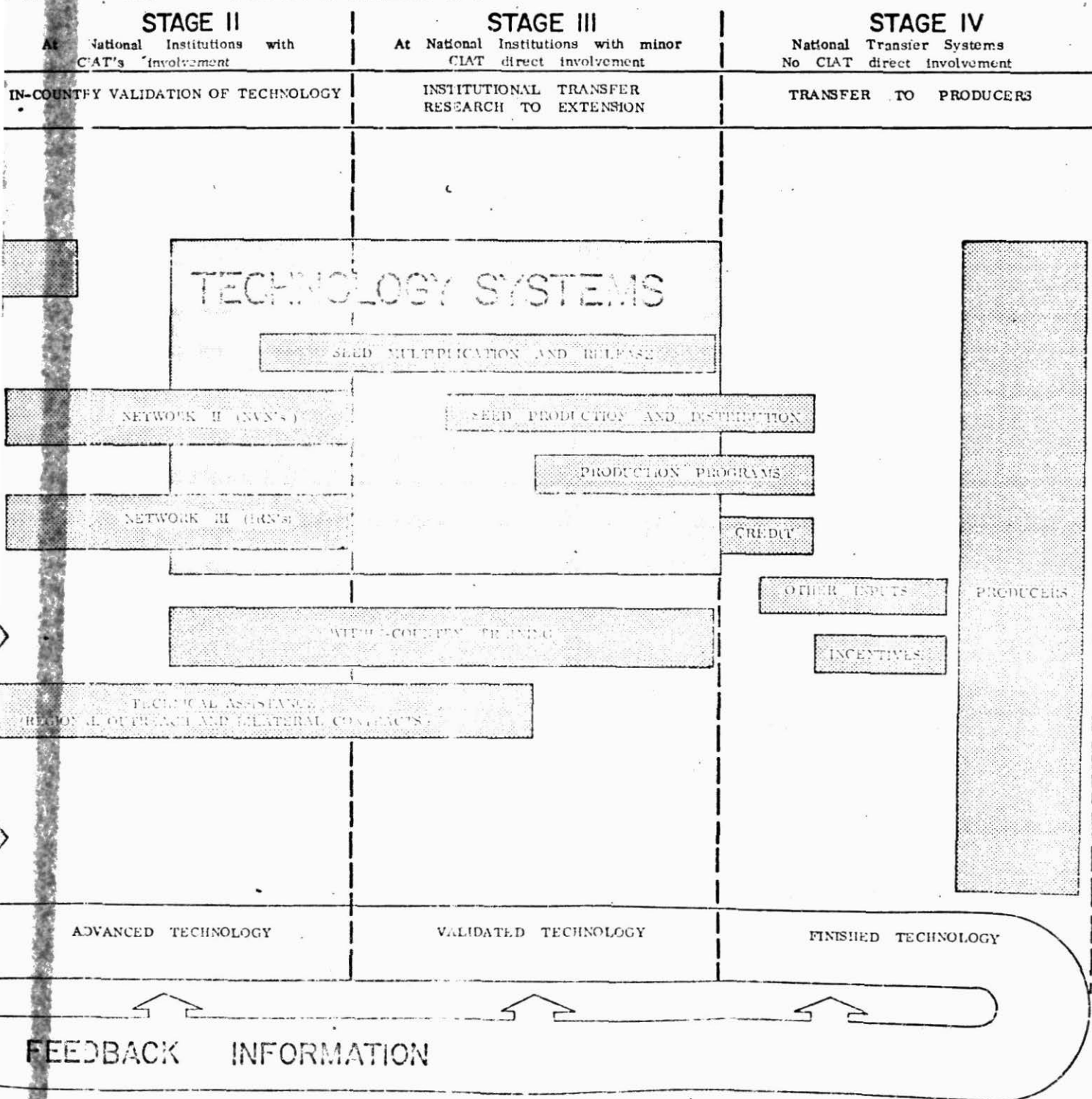
In defining its parameters of action in outreach, CIAT foresees institutional participation in: a) building research bases for the creation of new technology through commodity programs of research, on its own, and in collaborative networks or through bilateral arrangements with national programs, b) transferring technology through training, communications, documentation services, field demonstrations, and plant propagation materials, and seeds, c) helping national institutions to build manpower resources with competence and skill in agricultural research, and extension, d) creating the necessary mechanisms for exchange of ideas in workshops, seminars, and conferences, related to the development of cooperative networks in research, to the identification and proposals for solution of production problems, and for the evaluation of results.

D. The Generation and Transfer of Technology: The Transfer Chain

A graphic representation of this process is given in the next page.

(Fig. 2)

MAIN OF TECHNOLOGY



include public as well as private sector agencies in the country.

THE TRANSFER CHAIN

Fig. 2

STAGE I

At CIAT

POOL OF KNOWLEDGE

GENERATION OF NEW TECHNOLOGY

TRAINING AND INFORMATION

IN-C

Basic Research by Cooperating Institutions

Existing Knowledge

Existing Technology

Technology developed elsewhere

CIAT
RESEARCH
BY
EACH
COMMODITY
PROGRAM

NETWORK 1 (CORT'S)

TRAINING IN RESEARCH

TRAINING IN PRODUCTION

WORKSHOPS AND MEETINGS

TRAINING MATERIALS

EXPERIMENT STATION MANAGEMENT

SCIENTIFIC INFORMATION SERVICES (DOCUMENTATION, PUBLICATIONS, ETC.)

DEVELOPMENT OF TECHNOLOGY

NEW TECHNOLOGY

TRANSFERABLE TECHNOLOGY

Note: The term "National Institutions"

The technology transfer chain may be structurally considered as fitting a simple communication model from source to receiver and back.

The initial stage of the transfer chain begins with research to generate technology, which is then transferred through training and other means (Stage I). Succeeding steps (Stage II) of local (within-country) validation and/or adaptation to local environmental and socio-economic factors are followed by inter-institutional research-extension linkages (Stage III) and lastly, wider dissemination and adoption or rejection by farmers takes place (Stage IV).

The first of the four stages in the chain that is, the passing of new technologies and know-how to national institutions and private enterprises engaged in adaptive research, is the major area of activity for the international centers.

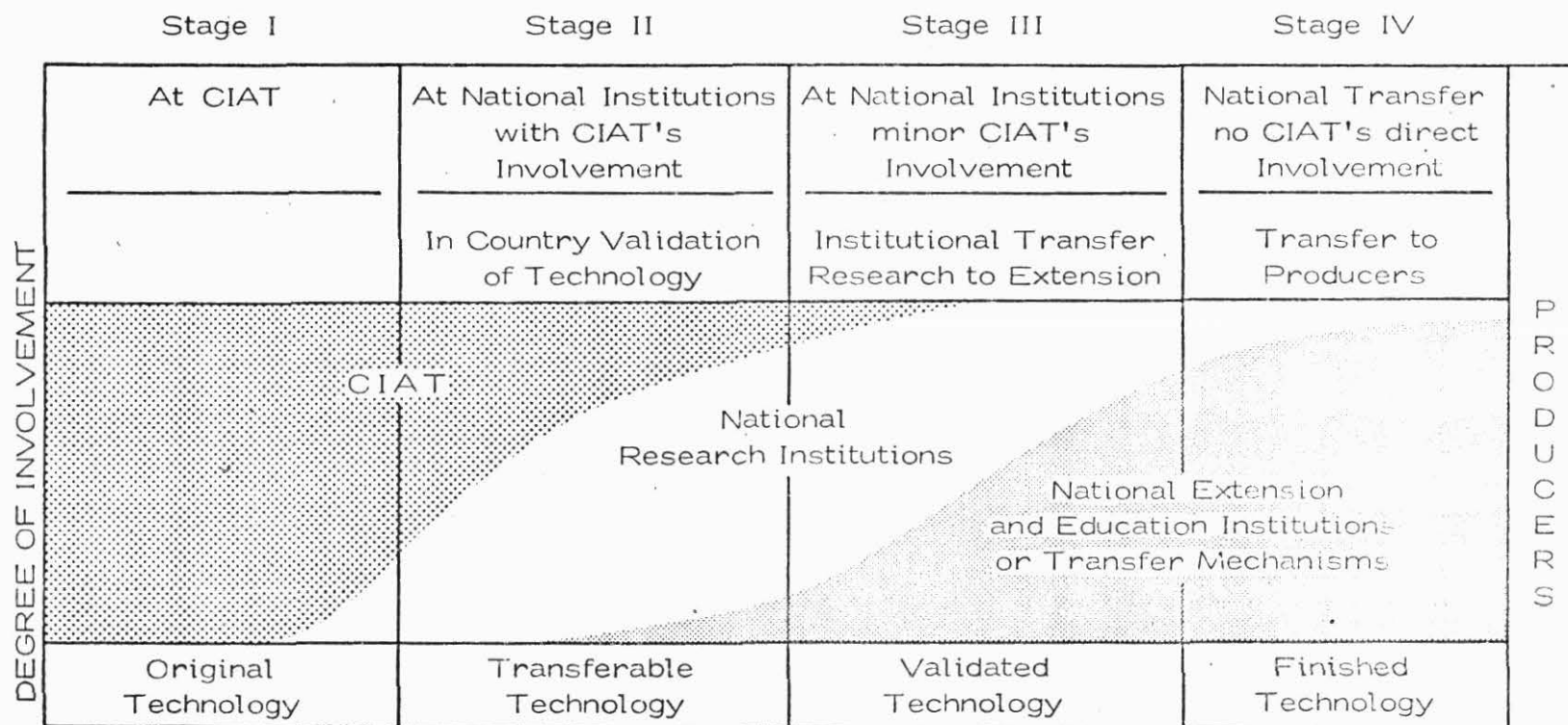
In succeeding stages the major responsibility passes increasingly to the national level. Continuing assistance from CIAT is needed, however, to ensure an uninterrupted flow of technological information. The traditional separation of research and extension in most countries, makes this flow particularly difficult, and the common insufficiency of practical farming experience and technical know-how among extension workers reduces their credibility in the eyes of farmers.

As presented graphically in the next page, CIAT will establish collaborative

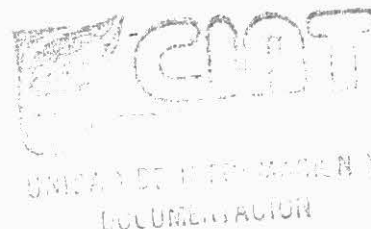
ties with countries for the validation and transfer of technologies, (Fig.3) progressively decreasing involvement up to Stage III of the transfer chain. Any direct involvement of CIAT in the last stage of the chain would be minimal, since national institutions must bear the entire responsibility here. Some indirect involvement, however, could take place, especially through mass media information, such as films or video-tapes distributed to national TV networks.

Fig. 3

Degree of Involvement of CIAT and National Institutions in the Stages
of the "Transfer Chain of Technology"



III. PROBLEM IDENTIFICATION



A. In Countries

The present situation in most countries, in regard to the rate of increase of production of the commodities with which CIAT deals, has been described in Chapter II. With the exception of a few countries, and two of the commodities: rice and beef, the rate of increase of production per capita has experienced diminishing trends.

The rate of population increase in most of the tropical regions exceeds 3% per year and in Latin America is one of the highest in the world. For example: Colombia in barely 25 years may reach a population of 55 million inhabitants (presently 25 million), Ecuador 16 million (presently 7 million), and Perú 33 million (presently 15 million).

The acceleration of research output and the development of mechanisms and techniques for quick transfer, validation and adoption of technologies to the countries is of urgent necessity.

The constraints that have been identified in the countries, in general, but which require systematic and specific evaluation in each one, are listed and explained below:

1. Absence of new technologies.

A large number of countries are using old, traditional varieties with low yield potential; their cultural practices are designed mostly to the use of low levels of inputs, and savings of energy (human and animal)

but are not geared to high productivity derived from increased plant populations and application of inputs (which use more seed, chemicals, and money, all of them costly and scarce) and do not, in many cases make the best possible use of the natural resources with which farming areas are endowed, within natural limitations.

2. Limited generating and adaptive research capabilities.

Many national institutions have evolved slowly, and in some cases certain commodity national programs do not even exist. Problems in these countries range from almost absolute absence of research capabilities on the one extreme, in some, to good physical and structural research facilities in other but which may be inhibited from performing a good research function because of financial constraints, policy considerations, or lack of sufficient numbers of trained scientists.

3. Defficient mechanisms for technology validation, adaptation and adoption.

Existence of preventive blocks to the transfer of technology have been identified in some countries. These blocks take the form of a) lack of personnel, knowledge, skills and motivations of their existing personnel, b) objectives and purpose of the national institutions, c) their organization, and their internal interrelations between their public-private-rural sectors.

4. Ineffectual strategies and deficiencias of focus and approach in technological transfer.

The setting up of priorities on the basis of ineffectual objectives, dubious decisions and precarious strategies and approaches to technological transfer have led to failures in many research and extension operations in Latin America and throughout the world.

5. Technical capabilities of research and technology transfer personnel.

The absence of trained personnel, its lack of practical agricultural production experience, and skills, their low level of preparation in methodology and content, for effectiveness in undertaking research in many disciplines connected to agricultural commodity production, their inability to focus on significant production problems and to identify breakthrough opportunities, and poor communications between research and extension, are all real problems in many countries.

6. Government policies in commodity production: weak or absent.

Exercises in developing coherent government policies in commodity production are of very recent occurrence in many countries. Such exercises are in many cases, focused erroneously, are not well founded, have insufficient content, are not coordinated, their partial sub-policies do not follow converging paths, are short of instruments and mechanisms, either legal, operational, infra-structural or financial. In a such a bed the seed of new technology may not bear fruit, or even get to the point of germinating.

B. At CIAT

A set of problems has also been identified at CIAT in regard to its mandate, structure, and internal and external outlook of how to gear and equip itself to conduct its assigned mission. These are:

1. Nature of the mandate: mixed commodity - geographical.

CIAT has: (a) several commodities under its mandate; (b) they are uniquely distributed as animal products (beef and swine), which involve both the primary (pastures and feeds) and at the secondary (meat) production levels in the farm economy; (c) some (cassava, beans) are subject to marked localized consumer references; (d) are not usually planted in large scale production fields; (e) are less easy to propagate, and distribute; (f) require new technologies for harvest and post-harvest storage (cassava); (g) one crop in its mandate (beans) has had a traditionally problem - solving rather than break-through - oriented mentality in their research among its particular scientific community.

Additionally the mandate specifies a high - in some cases - and an exclusive - in others - dedication to technology - generation and transfer in Latin America (rice, swine, beef, and maize). This fact creates certain definite requirements for specificity of performance under prescribed soil conditions, and attaches a wild level of built-in

genotype - environment interaction (i.e.: allie soils) into the research generation and transfer system components of CIAT's strategies.

2. Organizational structure

A commodity oriented structure for the CIAT programs was adopted sometime back, with multidisciplinary teams focused on convergent and integrated research objectives aimed at solving problems, and generating materials and methodologies basic to increased production, and amenable to use in a vast array of farmers systems, including very specifically, those unable of using high levels of out-farm inputs.

To this structure, a new one was recently added, which includes technology transfer as a joint and equal responsibility to research to each commodity program. The outreach function of each program, as viewed today at CIAT, is conceptually and pragmatically not only a necessity, but also an added justification for its very existence.

Assuming that the technology it produces is useful to make it accessible to the final users requires advanced careful planning in devising strategies and tactics, and implementing them within the outreach function, not only at the whole centers (CIAT) directive level, but primarily at the Commodity Program level. The assignment of one or more headquarters core scientists to outreach has been a fundamental decision in the right direction. However, this decision has to be

complemented by further actions on the problem presented next.

3. Outlook of the Commodity Programs on outreach

Self-analysis of progressively how much, and when shifts of emphasis should be made between research and outreach efforts, are crucial to CIAT's efforts and future success. Being primarily a research center, CIAT from that position should view objectively its future programming, being ready to make changes in emphasis between research generation and transfer with the full and enthusiastic participation of its staff. The outlook on outreach may need a shifting ratio of research generation/technology transfer, which will allow for continuing excellence and emphasis in research, while allocating gradually more emphasis to outreach in research networks, seed multiplication, technology validation and training of scientists as advances in core research are realized.

The allocation of resources to all the outreach functions at CIAT may need to be expanded and revised from time to time to keep pace with the opportunities arising from research achievements. It is well to bear in mind that the success of private research/sales organizations is based on at least a 1:1 budget and action ratio. Even though CIAT expects a backing up and substantially heavier involvement and budgeting of technology transfer personnel at national programs, as its training functions succeed, it should be prepared to effect additional future commitments to its outreach budget.

It is apparent that CIAT should not depart from the philosophy of being essentially an achievement center - achievement being quantifiable not in terms of research papers and reports on scientific findings (no matter how fine and sophisticated) - but fundamentally in terms of "useful technologies produced on a short span of time". This has required and will continue to require an adjustment of the conceptual thinking of its scientific staff. Expected rewards of its scientific staff should not be primarily measured in terms of the traditional scientific personality image to the eyes of its peers in commodity - surplus countries, but rather by the final and impersonal appreciation of the poorly nourished peoples of today, and those of the future, who have a right to afford and improve their daily meals for years, to come, as a consequence of the pragmatic, idealistic, unerring efforts of highly and rightly motivated scientists. The pursuit of individual scientific satisfactions and goals, is compatible with the mission orientation of CIAT, as long as they stay within mission limits.

C. Identification of Commodity Technical Problems

Certain commodities with which CIAT deals, present certain types of fundamental problems, which require identification, discussion and presentation of proposals for action. Such action may involve from (1) simply activating research projects at CIAT, (2) to developing a multi-

institutional approach in which CIAT, other IARC's and other national research programs operate jointly or apportion among themselves parts of the task, to (3) cases where CIAT's mandate may need to be either expanded or reduced.

Examples of the above may be in 1) cassava harvesting research, in 2) post-harvest technology of cassava, identification and cataloguing of bean virus; in 3) expanding CIAT's role in rice work in Latin America to include upland rice, and tropical rain forest ecological conditions for its beef program.

D. Overall CIAT Outreach Objectives

The present situation in the countries and in CIAT has been identified in the proceeding sections. This identification should be a continuing dynamic processes of information and documentation requiring permanent CIAT involvement.

For the present situation an initial set of Overall Objectives for CIAT's outreach (confined to a focus on the commodities of its mandate) is listed below:

- 1) Transferring and assisting countries in the validation of new CIAT technology.
- 2) Helping national institutions to strengthen their research capabilities.
- 3) Increasing the amount and flow of scientific and technical information.
- 4) Establishing research linkages between CIAT and client countries.
- 5) Helping to bridge the gap between research and extension within countries.
- 6) Helping national governments to develop strategies for effective use of new technologies.

E. Expectations

In the former sections definition of country and CIAT problems, overall objectives, operational objectives and parameters of action have been presented. These will lead in successive sections of this paper to the presentation of proposed strategies and tactic activities following the presentation of operational objectives.

Should these be approved, it is expected that the CIAT commodity production programs (rice, cassava, beans, beef, and swine, primarily, and maize secondarily) will receive a powerful thrust and momentum that may provide expectations of carrying on country programs along with CIAT partnership within CIAT's means and resources, and stemming from all its potential for initiatives to very significant levels of production increase. While these levels cannot be pre-quantified, because of the complexity of factors interacting to produce final country results, the expectations should be high and optimistic. The road is open and the challenges are known.

Accepting them means an all-out institutional effort, with every one in its right post, putting on a very important piece of the action. Well thought, well coordinated efforts, with decisive, effective actions, sensing and monitoring constantly the operational milieu would lead to successful and highly quantifiable achievements.

IV. OPERATIONAL OBJECTIVES

Past experience has indicated that even though an institution may have decided towards where it is heading either in research or technology transfer, it must explicitly define a set of goals and quantifiable and clear cut objectives - namely criterion variables. These should be subject to breakdown of component projects and subprojects, each one with defined objectives in terms of targets (direction), magnitude and scope (dimension), and chronology (time) elements.

A. Criterion variables of Outreach Activities

The criterion variables of outreach will be treated in this document as operational goals in the medium term (5 years), not only as conceptual model, but also as defined targets:

a.1 Research Networking. The organization of outlying research for CIAT's programs involves careful nurturing, understanding and cooperation between CIAT and national institutions.

Outlying tests themselves need to be carefully analyzed to establish a hierarchical system of priorities. An appropriate nomenclature may facilitate the organization and execution of testing networks. Three networks, with varying degrees of involvement on the part of CIAT, are proposed. They are presented graphically in the next page, and their interrelationships are expressed below:

Network I: CIAT Outlying Replicated Tests

These CORT's (Fig.4) purport to accumulate research information on performance over location and years of specific treatments (includ-

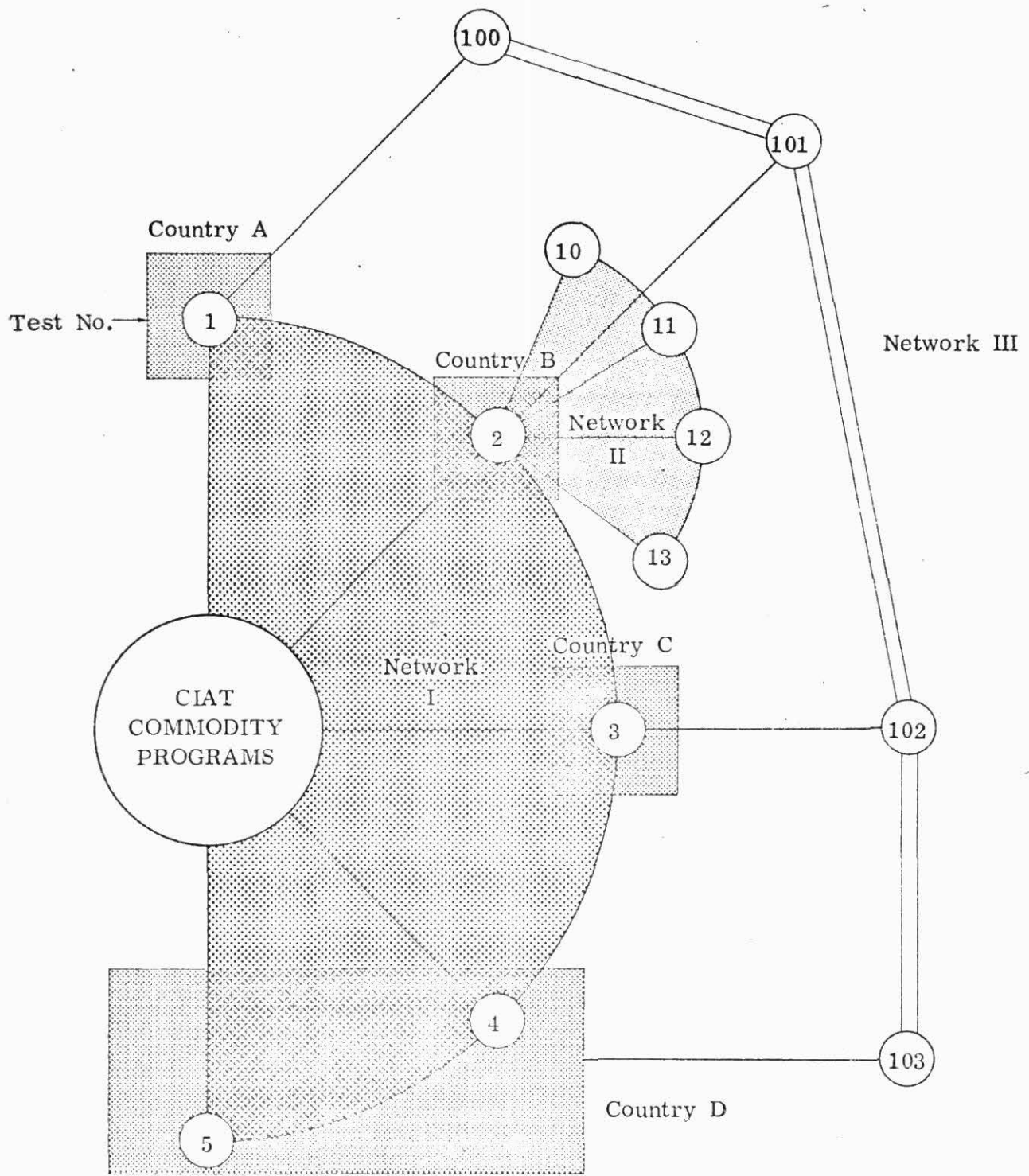


Fig. 4

ing varieties under this general designation), for the purpose of selecting treatments with best performance, according to pre-established criteria. They may be spread over a number of locations and years where the technologies being tested are expected to apply. They are mostly under direct control of CIAT, and in many cases also funded by CIAT. Data are collected by CIAT's programs, mostly directly and in certain cases with the cooperation or through national programs, analyzed, and interpreted by CIAT staff. These CORT's constitute CIAT's own testing network (NW I), and may be spread over a number of countries (i.e. the bean program International Bean Rust Nursery (IBRN) set of trials).

Network II: National Validation Networks

These NVN tests cover a given country or a small regional group of countries, and explore variations in performance of a restricted number of previously selected treatments. They are placed within a restricted territory, but exposed to more specific environmental interaction effects than are CORT's. Also, the technologies tested in the NVN's are of a more detailed and finished nature, and may include inputs of additional research and technologies developed by national institutions.

Such would be the case for example, of the present CIAT collaboration in Honduras, whereby CIAT provides germplasm and technical advice, and the Government of Honduras carries out the research activities within the country with the financial aid of IDB. It might involve also selected rice, cassava, or forage advanced selections derived from CIAT original material placed in competition with entries from other original sources in national program tests.

Network III: International or Regional Networks

These IRN's stem from the need to have a broader perspective of the geographical areas covered by CIAT and the overall performance and conditions of application of finished technologies. They may be organized by CIAT or by other IARC's. This might be, for example, the case of finished beef production technologies in alluvial soils, or of rice varietal tests in Central America, or of maize variety tests in the Andean area, under supervision of CIAT in cooperation with CIMMYT. Presently, the Latin American Bean Network organized by CIAT, would be an example of an on-going network of this type. (IBYAN).

The formation and organization of research networks is a joint responsibility of the commodity programs and the Associate Director General of International Cooperation. (ADG/IC). He will play a major role in assessing needs of the countries as well as possibilities of collaboration, country resources and, in general, the feasibility of setting up such networks in terms of the particular situation in the countries. On the other hand, to do this, the ADG/IC will also have to be perfectly knowledgeable in what the CIAT programs can offer, and maintain close communication with program leaders in order to accomplish a balance and help in decision-making in terms of realities, both on the part of CIAT as well as on the resources and the needs of the countries.

The following commodity networks will be operational at CIAT:

- a) Bean network
- b) Cassava network
- c) Rice network

- d) Andean maize network
- e) Forage evaluation network
- f) Swine nutrition network

a.2 Manpower development. CIAT addresses itself to the problem of developing skilled, cooperative scientific manpower in research and production in collaborating countries through a program of graduate training, conferences, and workshops.

Its Training and Conferences activities are designed to:

- a) Prepare the professional manpower needed to integrate commodity networks
- b) Prepare personnel skilled in commodity production and communication and training abilities to act as in-country production trainees
- c) Bring together network scientists and also planners and policy decision-makers to reinforce research and development activities.

During the II Internal Workshop on Training held at CIAT, in April, 1976, the following were established as the primary objectives of Training and Conferences:

- 1) To contribute toward developing cooperative networks on field beans, cassava, rice, beef, maize, and swine.
- 2) To help national institutions strengthen their agricultural research and development capabilities regarding CIAT's commodities.

- 3) To assist scientists of collaborating countries and their planning and policy decision making offices by providing supporting information to enable them to formulate policies and plan strategies that involve the utilization of promising new commodity production technology.

The following operational objectives are defined in this area:

- 1) Specialized graduate training in specific research fields of CIAT commodities.
- 2) Multidisciplinary integrated training in field-testing of technology and in production practices on a single commodity basis.
- 3) Assistance to national commodity programs by CIAT in the analysis and assessment of scientific and technical manpower needs and in the planning for appropriate training to fulfill those needs.
- 4) Help to national institutions to establish and conduct within-country production training programs on CIAT mandated commodities.
- 5) Development and production of training materials for use in CIAT-based training as well as for within-country training, and specific on-the-job training.
- 6) Provision of personal and institutional follow-up and communication backstopping to graduates of CIAT's training programs.
- 7) Organization of conferences for research scientists, development workers, and decision-makers either separate or as combined groups, to transfer information, obtain feedback and develop research and

production strategies.

Types of training imparted at CIAT will be:

- a) Short courses (1 - 2 months) on research methodology
- b) Short courses (1 - 2 months) on production of a given commodity
- c) Medium length courses in single commodity production with stress on field training (5 to 10 months)
- d) Research internships in the commodity programs (usual span of time: 4 - 12 months)
- e) Research fellowships for M.S. and Ph.D. candidates (usual span of time: 12 to 24 months)
- f) Post-doctoral research fellowships (6 months to 24 months)

The numbers of trainees and emphasis on the respective programs will depend on approved core and special fund financing. All types of training are at the post-graduate (post B.S. or Ing. Agr.) level: Training for less than B.S. or Ing. Agr. may be occasionally needed in some in-country courses, where CIAT training services may not reach - because of insufficient numbers - a required number of students with college degrees.

Research fellowships in addition to preparing personnel for national programs, may help CIAT identify potential candidates - especially at the post-graduate level - to fill some of its vacant positions.

a.3 Regional and country outposting. To facilitate the outreach operations on selected commodities on selected areas, CIAT will outpost a definite number of outreach and of research scientists in selected locations, for both regional service, and bilateral contract in specific country service. A proposed staffing

pattern is presented later in Chapter VI. Scientists operating out of CIAT central base will support outreach operations, involving themselves within programmed boundaries in such activities.

a.4 International Agricultural Research Center Networking

An integral approach to solving technology transfer problems between International Centers for the use of their respective, either commodity or geographically - bound priority clients, is through agreements to establish commodity relay teams, either at Center headquarters, or in the locations where they have concentrated research and/or outreach activities.

Preliminary experience at CIAT is being obtained with CIMMYT and IRRI relay teams, and further relay team agreements between CIAT and other IARCs will be considered and proposed.

a.5 Communications Networking

In addition to the normal activities of a specialized scientific library, CIAT has a Documentation Center providing abstracts on cards on a monthly basis on cassava, field beans (under tropical conditions) and agricultural economics in Latin America. Tropical pastures and forages documentation is being planned to start in 1977.

The regular distribution of abstract cards and provision of specific topic searches to subscribers, will be complemented by annual compilations of abstracts in book form.

Documentation activities are presently characterized by a greater integration of documentation per se with other communication activities such as the publication

of monographs giving state-of-the-art reports based on existing knowledge to date, while providing the analytical views of the scientist/writer; the continuation of the current series of Manuals such as Field Problems of Cassava; and selective reproduction of published journal articles which should reach a wider audience.

The major advantage of documentation activities as compared to the more traditional publication of only bibliographic listings is that as soon as documents are collected the information is provided to the scientists. The increased importance of CIAT's documentation activities, as indicated by user countries, makes it necessary to complement in-house documentation by linking with international networks (such as TYMNET) via telex and international telephone lines via Satellite for access to documentation and library data bases. Communication and exchange of information between international center scientists and others in related fields (as recommended by the CGIAR Review Committee), will also be emphasized through networking.

The Tables of Contents are produced from journals in Plant, Animal and Social Sciences so that photocopies of articles chosen from them may be obtained either locally or from CIAT. In this fashion national institutions will use the CIAT Library as a back-stop to fill photocopying requests for those materials not locally available. CIAT will bulk mail the Tables of Contents each month to the a national institution in a given country for internal distribution. Arrangements of this type are presently being implemented with Argentina, Brazil, Paraguay and Venezuela.

a.6 Public Information

In the past, CIAT has concentrated on reaching the scientific and technical community through the written media. Very little emphasis has been given to writing publications intended for wider audiences. However, it is very important at the present stage of CIAT's development, to have more and better publications of this latter nature. As previously mentioned, scientists and outreach specialists need these tools not only for diffusing technical results but also for promoting a more accurate picture of CIAT internationally.

Given the recognized importance of making CIAT well known at the countries' level, an expansion of activities along this line is planned through the addition of a Message Design Unit which, besides designing and originating publications of scientific information, audio-visual materials, such as video-tapes transferred to films will also aid in improving in-house presentations of CIAT's activities to visitors as well as provide scientists and outreach specialists with a powerful tool for diffusing CIAT's image and activities through in-country talks and presentations, and in TV networks in selected countries.

Five 15-20 minute films will be produced in 1978-79. One Senior Coordinator of Public Information has been requested for this section in 1978.

a.7 Consulting and Technical Assistance

CIAT does receive requests for technical consultation with national programs, including regional corporations, farmers cooperatives and farmers associations. These involve furnishing scientific information, providing CIAT scientific and technical manpower for technical assistance over prescribed and limited periods of time to evaluate projects,

help in developing programs, assisting with research station development, assisting with the start up or beginning operation of commodity production programs, and in organizing and conducting in-country training. The trend towards increased pressure of the countries for this type of CIAT services is already evident. CIAT has been contributing its manpower in a limited manner to national programs for these types of consultation. They will continue to the extent that they do not unduly tax the capacity of the programs to effect other priority activities, but will not be detracted from actively pursuing an assistance operation, wherever it is felt that it belongs within the central area of CIAT's objectives

B. Integration of Research and Technology Transfer at the Operational Level

A set of criterion variables, susceptible of quantification in their various components has been presented in the former section. No less important is the qualitative integration of the technology generating and transfer functions at the operational levels, namely within the commodity programs. The achievements of unified criteria for all the disciplinary sections interacting and collaborating within each commodity program, the establishment of clear and defined projects and subprojects with specific objectives and time tables, under close supervision of program leaders is an essential organizational task.

The definition of which transferable technologies will become available in the context of a time-scale, will permit a close relationship and coordination between the research and technology transfer phases of each program. A yearly revision and forecast for each program will be required as to its available transferable technology.

It is expected that while some specific outreach personnel will be committed to genuine validation tests, and training, and while certain research personnel will be fully engaged in research, the majority of the staff will be involved to a relatively lesser or greater degree in some sort of outreach function.

The awareness and organizational implications of such balanced activities within each program will be recognized, assessed, and oriented properly by the program leaders and the ADG/R and the ADG/IC.

V. THE SOLUTION MODEL: STRATEGIES

In the systems analysis a Solution Model or set of strategies is a design for achieving specified operational objectives. In our International Cooperation Model the design sequence presented next, will be followed:

a. Information and Documentation Inputs

An office will be set out within the organization of the Documentation Section of the Direction of Scientific Information and Documentation, charged with the function of assembling information which may help support and guide the commodity programs to steer a course of action leading to objective and meaningful goals. This "Country Documentation Office" will assemble information required to present Country and Regional, general and commodity profiles, which will be updated.

The following information will be assembled, filed, collated, interpreted, catalogued, synthesized and circulated to Directors, leaders, and scientific staff:

- (a.1) National organizations, research stations, and staffing patterns;
- (a.2) Environmental (climatic, soils, geographic) data, including maps and aerial photographs;
- (a.3) Social and economic data, and studies;
- (a.4) Available country and sectorial profiles;
- (a.5) Information on significant development projects such as drainage or irrigation, road constructions, etc.

Each trip report from every scientist at CIAT will be used to update the information bank at the Country Documentation Office. This information will be strictly used for CIAT purposes and for improving the Center's base for understanding the realities of country

development needs, improving the test designs, and making sure that CIAT commodity programs goals are relevant to the countries needs.

b. Resource component (Fig. 5)

(b.1) Office of the Associate Director General for International Cooperation

The office of the ADG/IC will outline and operate the following set of strategies:

1. Deputize for the DG and collaborate in overall administration of CIAT with DG and ADG/R
2. Coordinate with ADG/R and program leaders, research activities at the interphases with national programs, specifying the type number, location and timing of projects
3. Exercise overall administration duties on the various programs related to International Cooperation (training and conferences, documentation and library, public information and public relations, relay units and outreach and bilateral contract staff)
4. Establish interinstitutional contacts between CIAT and country agricultural development and research programs, aiming at the structuring and maintenancy of solid collaborative links
5. Help national commodity programs identify and assess their manpower needs, availing themselves of training opportunities offered at CIAT
6. Aid to outreach operations of the Commodity Programs in transferring germplasm, advanced breeding material, and basic seed, and establish the basis for operational systems for local seed production

7. Negotiate* agreements with other international organizations
(IICA, CATIE, etc.)
8. Negotiate* specific bilateral agreements between CIAT and collaborating countries
9. Negotiate* arrangements for outposting staff and exercise supervision on their operations
10. Negotiate* agreements with other IARC's for the establishment of relay teams
11. Assemble country information on soils, geographical climatic data, economic, social, institutional, scientific and general development, resources, research projects, and scientific manpower, in order to develop country profiles, for use in the assessment of goals and relevance of operation of the commodity programs
12. Help to organize and establish information and documentation bases in collaborative systems
13. Help to create, present and extend a knowledge of CIAT's objectives, activities and results to a broad range of audiences, from Government administrators, to donor agencies, national programs, other research institutes, agricultural sector leaders, both from public and private areas, and to the general public.

* the initial phases of

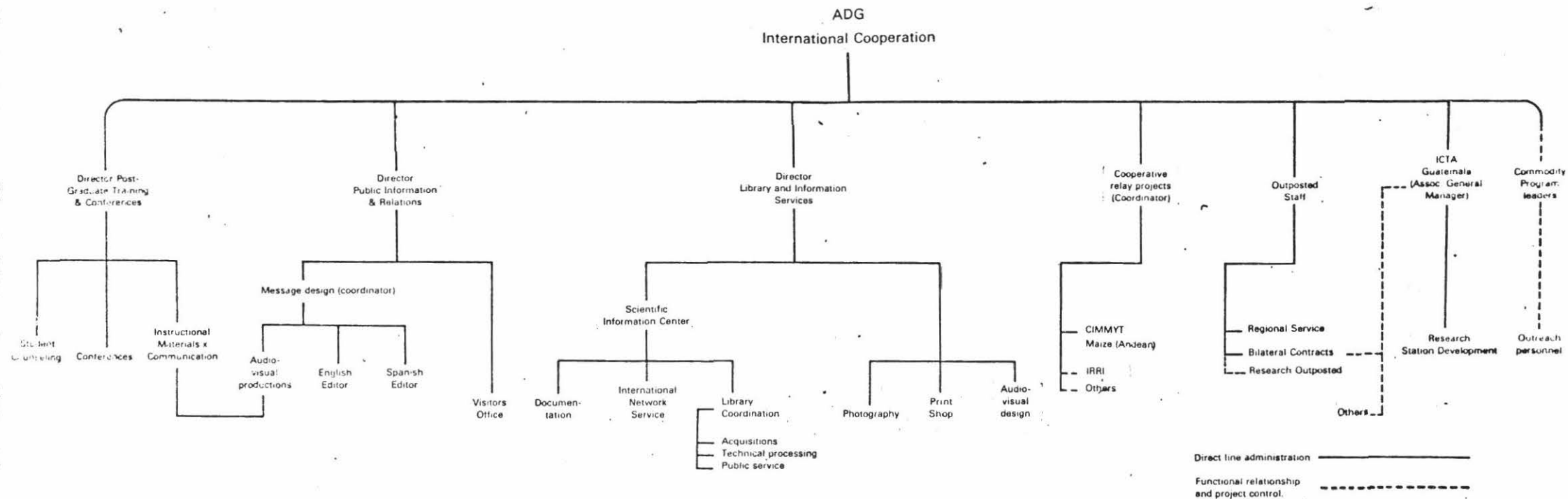


Fig. 5 . Organization of International Cooperation

(b.2) Postgraduate Training

Training activities of CIAT will be primarily oriented to developing networks of research scientists and transfer personnel regarding CIAT's commodities. The following strategy will be followed:

(b.2.1.) Training at CIAT

- 1) Opportunities will be provided for young scientists to come to CIAT for post-graduate internships of 5 - 12 months in research methodology or in production technology of individual commodities
- 2) Short term 1 - 2 months and medium term up to 6 months multidisciplinary courses in production will be organized periodically
- 3) In accord with selected graduate schools, opportunities will be offered for the conduct of MS thesis and Ph.D dissertation research at CIAT
- 4) A limited number of (6 months) internships will be offered for training in management of experiment stations with particular application to CIAT commodities
- 5) A limited number of short term (2 - 3 months) internships will be offered in documentation information and in instructional technology and in biometrics with special application to CIAT's commodities
- 6) Post-doctoral fellowships will be made available for 6 - 22 months high level training of scientists of the Ph level from both developing and developed countries
- 7) Training materials will be developed to assist with instruction at CIAT and also in countries
- 8) Assessments will be made of immediate and medium term needs

of country programs for trained scientists to help national institutions plan for those needs.

(b.2.2.) Training in-countries

In addition to training offered at headquarters CIAT will assist (on a limited basis) interested countries to organize and conduct within-country training programs in national research and development institutions. These programs must be directly related to CIAT's commodities. Expansion of this assistance will be contingent on availability of special projects or bilateral contract funding.

(b.2.3.) Staffing and Methodology

Training activities at CIAT will be conducted in each commodity program by (a) direct individual supervision by senior staff scientists, and (b) a senior staff in charge of production training assisted by associate personnel. A modular approach will apply to orchestrate instructional inputs commodity specific and non-commodity specific such as experiment design, production management and communication. A leader of training will orchestrate the training activities for all of CIAT and will provide the necessary administrative and logistic support. A special section on training materials will assist senior scientists in the development of essential instructional materials.

(b.2.4.) Funding

Approximately between one half and two thirds of the funds needed for all types of training at CIAT are expected to be allocated in the center's budget. The rest will come from interested donors of various countries. A major portion of these will be constituted by a special project to be financed by

the UNDP in 1977-1979. Additional funds will be sought on a special project basis as needs and opportunities arise.

(b.2.5.) Recruiting

CIAT selects candidates for training among the best scientists who work in the national research and development programs directly on CIAT's commodities. The academic levels required are adapted to the availability of professionals of various levels, which tend to vary considerable from country to country.

(b.2.6.) Follow up

Each commodity program will maintain close contact with former trainees working in national institutions and private enterprise in the countries, in connection with the operation of testing networks, transfer of materials and technology information, multiplication of training within country and receiving feed-back information on the needs and on the results of the application of technologies emerged from CIAT.

(b.3) Conferences

A number of 3 - 5 day events will be organized to bring together scientists and/or decision makers. The types of events planned are:

- 1) Network workshops, annual or biennial to congregate former CIAT trainees and other scientists participating in the center's international testing networks, to exchange information, agree on plans for germplasm exchange and testing and on technology validation for local conditions, ie. Meeting of the International Rice Testing Network.

- 2) Specific problem conferences, to eventually bring together research scientists on specific disciplinary-commodity problems, ie. Plant Protection of Cassava.
- 3) Methodology workshops, sometimes commodity specific, other times cutting across CIAT's commodities; ie. a Seminar on allocation of research resources.
- 4) Production strategy conferences, including scientists and decision makers from national institutions to discuss development and implementation of plans for effective utilization of new technologies emerging from CIAT, ie. Presentation days seminar; Commodity Production Planning Conferences.
- 5) Management meetings, regarding the administration of the center and program reviews, both internal as well as external.

b.4 Scientific Information and Documentation Services

Library and Documentation Services to CIAT scientists, primarily, and to national programs collaborating with CIAT, secondarily will be continued and improved in efficiency, scope, and easiness of retrieval. Editing will

be removed from the former position in this program to a new message design unit, under an additional leadership position. Message production will be expanded in terms of additional audio-visual production capabilities, retaining its printing and photography facility within this program.

b.4.1. Documentation Services

The Cassava and Tropical Bean Abstracting and Documentation Services will be continued. Funding will be requested to organize the material already filed and abstracted on computer tapes, in order to constitute data bases, which will be linked to international information retrieval networks. Tropical pastures and forages abstracting will be initiated. The documentation work on agricultural economics, will be focused on CIAT's commodities.

An additional documentation service, will be started in close liaison with the office of the ADG/IC. It will involve the gathering of information on countries, with whom CIAT is expected to collaborate or is collaborating through their national agricultural research programs. Information will be collected in the following areas: (a) maps; geographical, soils, climatic data; (b) natural resource survey information; (c) country statistics; (d) institutional survey; (e)

technical manpower resources; (f) development projects. Country profiles for use by CIAT commodity programs will be prepared, allowing the programs to assess the validity of their objective and to steer their actions towards relevant goals in terms of the needs of the country at large, and of the realities and needs of small farming operations, in particular, in each country or region.

b.4.2 Library Support Services

Library acquisitions will continue at present rate, with some transfer of filing of publications to microfilm and microfiche. This will enable the Library to better utilize available and residual space. It will also accelerate the retrieval of library information and help in reducing postage costs in information exchange. The Table of Contents publication will be continued.

b.4.3 Networking of Documentation Data Bases and Information Retrieval

A linkage with the international network of data bases available at over 50 computer locations throughout the world will be planned, and realized provided the project is found to be technically, and economically viable. Access to computer data retrieval systems is expected to be made through telephone line from Cali to Bogotá, microcomputer set up in Bogotá, and the use of a Satellite wide band through possible arrangements with TYMNET/RCA/TELECOM, which are in the study phase now. The CIAT information retrieval system on its own future data bases on beans, cassava, and tropical forages and nutrition, will in turn be made available on the same conditions to all research institutions. An information network of IARC's interested in this idea will be promoted.

b.4.4. Message Production Support Services

The printing and photography sections will continue providing support in producing publications , photographs and slides.

A new audio-visual section will be integrated, the total forming the Message Production Support Service. Movie film, Super 8. and 16 mm, and video-tape production capabilities, as well as audio production material per se for radio programs or in conjunction with movie films, filmstrips or sets of slides for educational, public relations, general information and training will be produced.

In Fig. 6 are listed the publications, materials for training and audio-visual messages to be produced.

b.5 Public Information and Message Design

A new position of senior staff level is being requested for a Public Information and Message Design Program leader. This program will be reinforced with the two present editors, and will operate with the additional help of the training materials and communication specialist located in the Training Program.

Strategies for this program follow:

b.5.1. Public Information Design

A series of message design products printed and in audio-visual form, will be produced for the types of audiences indicated in Fig. 6 . They will aim at transferring information based on the results of CIAT research, and its potential for increased production to a wide spectrum of audiences, ranging from the general

Fig. 6 Audiences to be reached by CIAT Messages Employed

Audience Media	Personal ADG's	"VIP" Newsletter	Scientific Publ. & services	Press Releases	Farm Magazines	TV, Radio	Not-CIAT other CIAT series	Training A	Training B	Training C	Conference Training	Scientific Meetings	Travel Kits
General public				x		x							
Policy-makers	x	x		x	x						x		
Administrators	x	x	x	x			x	x			x		
Scientists	x		x	x			x	x	x		x	x	
Change Agents				x			x	x	x	x			
Farmer Organizations				x	x	x	x		x	x			
Farm Leaders	x		x	x	x	x	x			x			
Farmers				x	x	x							

public, passing through farmers, scientists and agents of change (extension) to government planners and decision makers.

The office of the Director of the Program will collaborate with the ADG/IC in supporting the latter in public information and public relation projects, with the design of various types of messages, and also through personal action.

b.5.2. Editorial Services

The Director of the Public Information Program will work actively with the Commodity Program Scientists in developing materials for publication and other forms of message. It is expected that he will do a considerable amount of design and writing himself, and receive the close support of the Spanish and English editors.

b.5.3. Audio-Visual Message Design

Several 15-30 minute movies on the commodities on which CIAT works will be made on video-tape and movie film. A general movie on CIAT is also planned. The design of these movies will be made in cooperation with commercial TV-movie film makers. Educational video-tapes, sets of educational slides with accompanying cassettes (audio-tutorial material) will be produced.

b.5.4. Visitors Program

CIAT receives some 4,000 visitors per year. This program will receive instructional material, in the form of printed pamphlets, general information on CIAT programs, and achievements and audio-visual explanatory material. Not only its public information, public relations nature, but its need to produce conditions for sheltering and insulating CIAT scientists, for continuing creative work will be carefully programmed and monitored.

C. Outreach Model for each Commodity

The following model is presented as an example for a sequence of actions to be conducted within an outreach strategy model for a given commodity. This example is in operation on cassava for Southeast Asia.

1. Compile benchmark information and collect observations on country practices and identify problems that need technological solutions in the production area.

Methods:

- a) Visits and personal contacts
- b) Correspondence
- c) Country profile on technology and resources
- d) Set up a data base
- e) Assess steps that need solution in an organized analytical problem dissection.

2. Field-tests of technology developed at CIAT or previously added to CIAT's own from other research centers.

Methods:

- a) Introduce CIAT varieties, CIAT assembled varieties, and varieties from other research centers.
- b) Field trials for yield, and pest and disease resistance
- c) Test production of need methods against local ones, adapting when necessary
- d) Release better cultivars for propagation and recommend superior germplasm and/or breeding material in advanced or intermediate phases of selection for use in existing national programs

- e) Maintain and increase seed or propagating material from promising cultivars.
3. Workshops on production problems evaluation on CIAT's mandated commodities, and on research results.
- Methods:
- a) Fundamental production problems and analysis of policy formulations.
 - b) Regional coordination workshops .
 - c) Research networking, result analysis and planning meetings.
 - d) Government-research-industry joint workshops, designed for sectorial interplay and cross-reference of information.
4. Manpower development for research, production, policy orientation and formation of an educational base.
- Methods:
- a) Development of a system of post-doctoral, pre-doctoral, pre-master research fellowships.
 - b) Development of production (long and short training courses) for production specialists.
 - c) Development of training aids, materials and training programs
 - d) In-country training courses for extension specialists.
 - e) Model production course development for farm-leaders, local agricultural area managers, managers of cooperatives.
5. Development of Commodity Production Strategies at the Country level by National Programs, with collaborative inputs from CIAT.

D. Definition of available technologies

In defining which materials and methodologies have evolved from its programs to the point of carrying a current and intrinsic potential for increased commodity productivity, CIAT will from time to time add them to a catalogued list, and will organize transfer projects for them in isolated form or as semi-complete or complete packages or systems. Technology presently existent at CIAT and ready to be transferred is indicated below.

d.1. Beans

- d.1.1. Inoculation methodologies
- d.1.2. Planting distances and populations for maize-beans association.
- d.1.3. Methodology for maintaining insect-free grain.
- d.1.4. Seed cleaning and limitation to seed born pathogens.

d.2. Beef Production

- d.2.1. Experimental lines of legume and grass species to be evaluated for productivity, tolerance to insect, disease, drought and acid soil stresses at the Network I level.
- d.2.2. Advanced lines of legume and grass species considered adapted to acid infertile soil areas which are ready for regional testing at the Network II level (About 10-12 lines). These can be planted in about 12 sites in 1977 forming the International Network of Tropical Forage Evaluation ("INTFOR").
- d.2.3. Methods for selecting varieties and species tolerant to acid infertile soil conditions (aluminum toxicity, low phosphorus availability, etc.)
- d.2.4. Methods for establishing grass pastures under savanna and jungle conditions.

- d.2.5. Break the vicious circle of failure of legume inoculation technology by (1) providing national institutions inoculants of guaranteed quality at the time of dispatch, (2) by expediting delivery of both product and technology and (3) by providing a simple experimental design to demonstrate the benefits (or lack thereof) of inoculation. We would like to limit this transfer to legumes adaptable to acid infertile soils.
- d.2.6. Low fertilizer input soil management technologies for Oxisol and Ultisol areas in savannas and jungles. Includes techniques on land clearing, realistic lime requirements, soil fertility evaluation and simplified soil classification systems for grouping soils with common fertility limitations.
- d.2.7. How to increase calving percentages from the average of 45% to 75% in Oxisol savanna conditions in the absence of improved pastures with mineral supplementation and early weaning (in areas where abundant pastures are available for the calves).
- d.2.8. Basic production technology for seed production programs of Stylosanthes guyanensis, Centrosema pubescens, Pueraria phaseoloides, Desmodium spp., Brachiaria spp., Andropogon gayanus, Panicum maximum and Dicanthium aristatum.
- d.2.9. Methodology for country-wide analysis of health problems of beef cattle, including integration of field and laboratory phases, economic analysis of impact of diseases and the control of many of them.

- d.2.10. Low cost infrastructure for beef cattle ranches in savanna areas including locally made windmills, watering tanks and constructions emphasizing use of native materials.

d.3. Cassava

- d.3.1. Clean seed production methods.
- d.3.2. Rapid propagation.
- d.3.3. Stake treatment.
- d.3.4. Weed control methodology
- d.3.5. Storage.
- d.3.6. Solar root drying.
- d.3.7. Selected high yielding lines.
- d.3.8. Biological control of hornworm (preliminary).
- d.3.9. Basic fertilizer recommendations for oxisols (preliminary).

d.4. Ecto-Hemoparasite Project

- d.4.1. Control of vector of hemoparasitic diseases.
- d.4.2. Control of ectoparasites.
- d.4.3. Control of anaplasmosis.

d.5. Germplasm

Collections of beans, cassava and forages.

d.6. Maize

Maize germplasm.

d.7. Rice

- d.7.1. Seed of improved varieties CICA-7 and CICA-9.
- d.7.2. Rice germplasm with blast resistance and other types of disease resistance in materials with good grain quality as measured by consumer preferences in Latin America.

d.8. Swine

- d.8.1. Feeding systems with cassava roots.
- d.8.2. Feeding systems with cassava flour.
- d.8.3. Feeding systems with cassava silage.
- d.8.4. Feeding systems using sugar and sugar cane molasses.
- d.8.5. Feeding systems using opaque-2 maize.
- d.8.6. Feeding systems using fresh banana fruits.
- d.8.7. Feeding systems using soybean grain.
- d.8.8. Feeding systems using cotton-seed meal.
- d.8.9. Feeding systems using rice polishings.
- d.8.10. Management systems under semi-intensive breeding.
- d.8.11. Management systems for fattening pigs in confinement.
- d.8.12. Sanitation preventive programs.
- d.8.13. Control and eradication system for sanitary problems.
- d.8.14. Practical methods for selection, breeding, and improvement of swine breeds in the tropics.

E. Projection of availability of new technologies

The commodity research programs have established projected achievements timetables, under which they expect to accumulate new transferable materials and methodologies to their existing store. As these expectations materialize, the information of the type and features, the potential area of application, and priority of use, and the expected limitations for each type of material or methodology will be reported to the office of the ADG/IC. Coordination for action measures in validation tests will then be established with program leaders and support through communication media will be sought by the ADG/IC from the Message Design and Production Units, once the validative tests demonstrate the superiority or usefulness of the new technology.

VI. OPERATIONALIZATION OF THE SOLUTION MODEL: TACTICS

While most of the activities that pertain to the operationalization of a Solution Model belong at the tactical level, some of them are, of such major importance in terms of institutional commitments and their continuity over a period of years that could be handled either as strategies or at the project execution level.

It is not the intention of this paper to dwell into the programmatic details of international cooperation activities. These will be discussed annually at the time of the Centers' program review. We will only bring forward those of greater importance in terms of continuing commitment of CIAT over a period or years. These may be interpreted, also as strategies within the solution model.

Of these actions, some are already in progress, since before 1977, while others are in the planning stage, and at this time are qualified as proposals.

A. Regional Service Programs

International Cooperation at CIAT involves the programming of activities of service in a regional, rather than on a country by country basis. This does not detract from the fact that some bilateral contracts are in existence and others will be made between CIAT and specific countries.

Regional activity in the different commodities is developed on the basis of the following factors: (1) availability or expectations of improved technology for substantial commodity production increases in a certain regional, (2) selection of regions with the countries with a deficit of production in a given commodity, (3) selection of regions with high dependence

on certain commodities for food, (4) selection of regions with high potential for production, (5) selection of regions with countries actively expanding institution building and designing their own new production policies, backed by appropriate internal government support.

CIAT regional service programs are expected to be funded as follows:

a.1. IDRC supported outreach in Cassava

With IDRC support CIAT has already established two international cooperation positions for cassava research and production, namely:

a.1.1. Cassava outreach - location CIAT.

- responsibility Latin America.

a.1.2. Cassava outreach - location SEARCA, Los Baños, Philippines.

- responsibility, S. E. Asia.

a.2. UNDP Project

This project* is pending approval after it was presented to UNDP for assistance, being reduced from US \$4.4 million to US \$1.6 million.

The project involves engaging the services of three experts at Senior Staff level. One of them, for rice, has already been selected, and as soon as the project is approved will be located in Costa Rica. The others will be located in Brasília, Cerrado Center, Brazil (forages), one in beans in Costa Rica, and two training experts at the MS level, would be located at CIAT. The staffing pattern would

* "International Cooperation for Technical Assistance and Professional Training for Agricultural Production in Tropical America"

be as follows, with indication of duration of these positions:

<u>No. and Program</u>	<u>Location</u>	<u>Initiation</u>	<u>Duration Man/Month</u>	<u>Activity*</u>
(1) Rice	Costa Rica	April 1977	33	R/O
(1) Forages	Brazil	July 1977	30	O
(1) Beans	Costa Rica	January 1978	24	O
(2) Training	CIAT	January 1978	48	T

* R= Research; O=Outreach; T=Training

The project includes support personnel (associate professionals, assistants, technicians, secretaries).

Training courses are also planned within this program, including a provision of scholarships. The additional features of the project are:

a.2.1. Training Programs:

- a.2.1.1. Two six-month courses on Beef Production.
- a.2.1.2. One five-month course on Swine Production.
- a.2.1.3. Two five-month courses on Bean Production.
- a.2.1.4. Two twelve-month courses on Cassava Production.
- a.2.1.5. Two five-month courses on Rice Production.
- a.2.1.6. Four short courses: two in Bean, two in Rice Production,
one month each.
- a.2.1.7. One short course in Swine Production 1 $\frac{1}{2}$ months.

a.2.2. Scholarships for MS level training: 16

a.2.3. One consultation conference.

a.2.4. Technical assistance support funds to countries.

a.3. Proposed Additional Regional Service Program Funding

Requirements of additional personnel to complete the staffing pattern that was left incomplete when the original UNDP project was reduced, and the identification of new alternatives lead to the following proposed set of actions:

a.3.1. Staffing pattern

<u>No. and Program</u>	<u>Location</u>	<u>Initiation</u>	<u>Duration Man/Month</u>	<u>Activity*</u>
(2) Junior/Beef Production Training	CIAT	1978/79	72	T
(1) Bean	Brazil	1979	36	O
(1) Bean	East Africa	1979	36	O
(2) Rice	Brazil	1979	36	O
	Dom. Republic	1979	36	O
(1) Cassava	CIAT	1978	36	O
(1) Cassava	SEARCA Philippines	1978	36	O

* R=Research; O=Outreach; T=Training

Justification for these positions is presented below:

Beans Clean seed production, and the need to expand network testing in regional projects.

Rice. One specialist for outreach on irrigated and upland rice in countries within the Amazon river basin zone of influence. One specialist for the production deficient Caribbean rice area.

Cassava. The new scientist located at CIAT would substitute for a present one leaving on a sabbatical, and will later undertake expanded outreach activities including assisting with country programs in Colombia, Venezuela, Mexico, Brazil and Peru.

The cassava outreach specialist at SEARCA, Philippines, will be a pathologist/entomologist. His mission will be complementing the agronomist already established there in outreach activities in South East Asia.

Beef Production. Training. Two Junior (MS Level) trainers will assist in developing and engaging in training in the area of forages and nutrition.

B. Bilateral Programs

Bilateral CIAT country programs while generally envisioned and required for some specific cases neither do constitute now, nor will be in the future the most important part of the international cooperation service activities of CIAT.

While CIAT's policy is designed to operate with an aim to integrate as far as possible countries within regions for the purpose of research applications, the realities of size of some countries, the particular needs of some in regard to training, adaptation of technologies, and other requirements of a specific nature, tend to bring CIAT to focus more sharply on some projects in specific countries at certain times. Some countries and institutions aware of these situations tend to assure for themselves security of CIAT support and collaboration on a continuing basis through agreements or contracts. While trying to discourage these agreements, or acting in the case of their existence, in a balanced manner in pursuing an oriented and conceived preference for regional

service activities, CIAT realizes the need for some countries to establish bilateral contracts, either for the purpose of using funds provided by international agencies for contracting scientists to support their research institutions, or to enable their institutions to operate in regard to CIAT in a more favorable atmosphere within their own system of legal regulations.

CIAT will exercise a high sense of responsibility in evaluating invitations to participate in agreements, and in originating proposals for formalization of agreements with any country. It will ascertain whether such agreements might render CIAT incapable of performing its obligations or may force it to depart from its primary, balanced, objective goals, through an overburdened load in the area of bilateral contracts. Yet, within these constraints several bilateral contracts do exist, and other are being studied at present.

b.1. Guatemala

CIAT initiated a cooperative agreement with the Instituto de Ciencia y Tecnologia Agrícolas (ICTA) of Guatemala in 1973. The financing for this project comes from the Rockefeller Foundation. Its aims are to provide technical and administrative support to ICTA in the initial stages of its development. Three CIAT staff members were located in Guatemala. With the departure of one of them in 1976, two were left in 1977. To them, a bean pathologist and a bean breeder were added in 1977, both financed from an AID loan to Guatemala.

Functional aspects of CIAT participation in this project are:

- a. Institutional build-up, in structure and administration.
- b. Organization of research programs on priority commodities.
- c. Physical and administrative development of research stations.
- d. Organization and development of mechanisms of technology transfer.
- e. Development of trained human resources.

b.2. Honduras

CIAT and the Secretaria de Recursos Naturales of Honduras started in 1976 a three years agreement pursuant to a previous agreement between the Government of Honduras and BID, for the purpose of CIAT technical collaboration in a bean development program in that country.

CIAT's participation in this project is through:

- a. Collaboration in research on beans.
- b. Validation of production technology.
- c. Training of technical personnel.

Area pilot project collaboration is planned to continue in bean technology validation, network testing of bean varieties, and in training in Honduras.

b.3. Panama

At the request of the Ministry of Agricultural Development of Panama (MIDA) an agreement was signed early in 1977 between both MIDA and CIAT for the purpose of research support of the Panamanian Institute of Agricultural Research in cassava, maize, beef cattle and swine. Actions on this contract will be

programmed this year. The agreement is very general and of a formal nature, and in the view of CIAT does not represent a special commitment, different in scope and nature to those it would conduct otherwise. However, more countries are requiring formal "Convenios" or agreements with CIAT, in order to establish a legal basis within the framework of their respective laws for collaborative activities.

b.4. Peru

In 1975 an agreement was signed between CIAT and the Ministry of Agriculture of Peru for Cassava Research, in Peru, with funds specifically allocated to CIAT for this purpose by IDRC. A first report from Peru and review on the field by CIAT scientists was made in 1977. A second allocation of funds from IDRC through CIAT is pending, after presentation of new projects by Peru's Ministry of Agriculture.

This model of funding through CIAT will not be encouraged in the future.

b.5. Colombia

Agreements are being negotiated with the Instituto Colombiano Agropecuario (ICA) for a new form of collaborative system, which takes into consideration the new scope, content, and objectives of CIAT's programs, as well as the new objectives, contents and rearrangement of programs, and their location bases resulting from the evolution of policies at ICA. The approach followed is by station operations, as well as by commodities. A finalized agreement or set of agreements will be completed in 1977.

b.6. Brazil

A bilateral program with Brazil is being negotiated, through its national research agency EMBRAPA for collaboration in research and outreach in beans, rice, cassava, beef production and swine production.

EMBRAPA has agreed, in principle, to finance the following positions out of an IBRD loan to EMBRAPA, utilizing a contract already made between IICA and EMBRAPA for recruiting personnel. CIAT would be a subcontractor to IICA, and the positions would be CIAT outposted staff positions. Possibility of some regional activity of this staff would be allowed by EMBRAPA.

b.6.1. Staffing pattern for CIAT/IICA/EMBRAPA/IBRD Personnel (Brazil)

<u>Position</u>	<u>Location</u>	<u>Initiation</u>	<u>Duration</u>	<u>Man/Month</u>
(1) Bean breeding	Goiania	1977	36	
(1) Upland rice breeding	Goiania	1977	36	
(1) Cassava breeding	Cruz das Almas	1977	36	

In addition, several core research funded positions will be established for the Beef Production Program in Brazil, as follows:

b.6.2. Staffing pattern for CIAT core Personnel (Brazil)

<u>Position</u>	<u>Location</u>	<u>Initiation</u>	<u>Duration</u>
(1) Animal scientist	Brasilia	1977	5 years
(1) Agrostologist- Introduction	Brasilia	1977	4 years
(1) Forage specialist	Brasilia	1978	4 years

These positions will be research ones. They will respond functionally to the program leader and the ADG/R, and administratively to the ADG/IC.

C. Future Regional Project Outposted Staff

At very early stages of planning yet, it is proposed that within the period of time specified below the following positions be considered:

c.1. Peru

Pursuant to the possibility of Board of Trustees approval for incorporation into the Beef Production target areas in the infertile oxisols of the Amazonian Tropical rain forest ecological formation, and an agreement with the Government of Peru, which would consider collaboration in research and outreach on tropical forages and beef production, the following staffing pattern would be suggested:

<u>Position</u>	<u>Location</u>	<u>Initiation</u>	<u>Duration</u>
(1) Pasture Agronomist	Pucallpa	1978	5 years
(1) Animal Scientist	Pucallpa	1979	4 years

These positions have been requested for core program financing.

c.2. Venezuela

Two beef production positions, with location at the Llanos Research Center of FONAIAP at Calabozo, Guarico, Venezuela, are being studied. These would be placed at location, linking their work to the Carimagua Center. These and possibly other positions would be established in accordance to the terms of an agreement, which would be eventually reached with the Venezuelan Government and with their own Special Funding.

D. Summary of Staffing Pattern

The following table summarizes the proposed staffing pattern for (1) outposted research, (2) regional services, and (3) bilateral contract staff:

Regional Outreach, Bilateral Contract Research, Outposted Research and Centrally

Posted Outreach Staff

<u>Program</u>	<u>Location</u>	<u>Financing</u>	<u>Type***</u>
<u>Rice</u>			
Breeder	Goiania, Brazil	EMBRAPA/IBRD	BC
Agronomist	Goiania, Brazil	Special Funding	RO
Breeder	San Jose, Costa Rica	UNDP	RO
Agronomist	Santo Domingo, Dominican Republic	Special Funding	RO
<u>Bean</u>			
Breeder	Guatemala	BID/ICTA*	BC
Pathologist	Guatemala	BID/ICTA*	BC
Agronomist	San Jose, C.Rica	Special Funding	RO
Agronomist	East Africa	Special Funding	RO
<u>Cassava</u>			
Agronomist	CIAT	IDRC*	RO
Agronomist	SEARCA, Philippines	IDRC*	RO
Agronomist	SEARCA, Philippines	Special Funding	RO
Agronomist	CIAT	Special Funding	RO

<u>Program</u>	<u>Location</u>	<u>Financing</u>	<u>Type*</u>
<u>Beef Production</u>			
Agrostologist- Introductions	Brasilia, Brazil	Core**	OR
Forage Specialist	Brasilia, Brazil	UNDP**	OR
Animal Scientist	Brasilia, Brazil	Core**	OR
Forage Breeder	Pucallpa, Peru	Special Funding	OR
Agronomist	Pucallpa, Peru	Special Funding	OR
Agrostologist	Calabozo, Venezuela	Special Funding	RO
Animal Scientist	Calabozo, Venezuela	Special Funding	RO

* Present Positions

** New Positions

*** Types: BC= Bilateral Contract Research Staff

RO= Regional Outreach

OR= Outposted Research Staff

E. International Center Relay Teams

An integral approach to solving technology transfer problems between international Centers for the use of their respective geographical - priority bound clients is through the establishment of commodity relay teams, either at Center headquarters or in the locations where they have concentrated research and/or technology transfer activities.

A preliminary experience is being obtained with the establishment of a maize relay team at CIAT, whose last position was filled in January 1977.

Additional relay team positions will be sought with the following composition and location:

<u>Program</u>	<u>Institute</u>	<u>Location</u>	<u>Funding</u>
<u>Cowpeas</u>			
Breeder	IITA	CIAT	Special
Agronomist	IITA	Recife, Brazil	Special
<u>Sorghum and Millets</u>			
Breeder	ICRISAT	CIAT	Special
Agronomist	ICRISAT	CIAT	Special
<u>Upland Rice</u>	IRRI	CIAT	Special
<u>Peanuts</u>			
Breeder	ICRISAT	CIAT	Special
Agronomist	ICRISAT	Maturin, Venez.	Special

Present agreements exist with CIMMYT and IRRI for relay teams at CIAT.

Two CIMMYT relay team members are already posted at CIAT, and one has been designated by IRRI for CIAT headquarters location.

VII. EVALUATION

A final but very important element of the conceptual scheme of International Cooperation is made by the evaluation of the operating system at periodical time intervals.

Evaluations will be made at such intervals that may help to monitor changes and detect problems concerning the pace of technology transfer, and its acceptance or could be used for the assesment of final results at the country or regional level.

Economic and physical data gathering at the farmers level, should follow the accumulation of previous information on physical yields or other factors susceptible of quantification that may give a measure of (a) expected level of results of the technologies evolved at CIAT and transferred to the countries, (b) the degree to which the technologies have been accepted and diffused in the countries, and (c) the actual results obtained at farm, regional, and country levels.

The existence of constraints blocks, and bottlenecks to technology transfer should be monitored. When identified, solutions for their elimination should be proposed and applied either by CIAT, or by the collaborating country.

A constant back-feeding process of information may help CIAT programs at the transfer as well as the research phases to assess to which extent the goals are being accomplished. Additionally, critical examination of the relevance of the program goals, will be achieved, yielding base material either for changes of policy decisions, related to the goals or means, or for a new set of tactics.