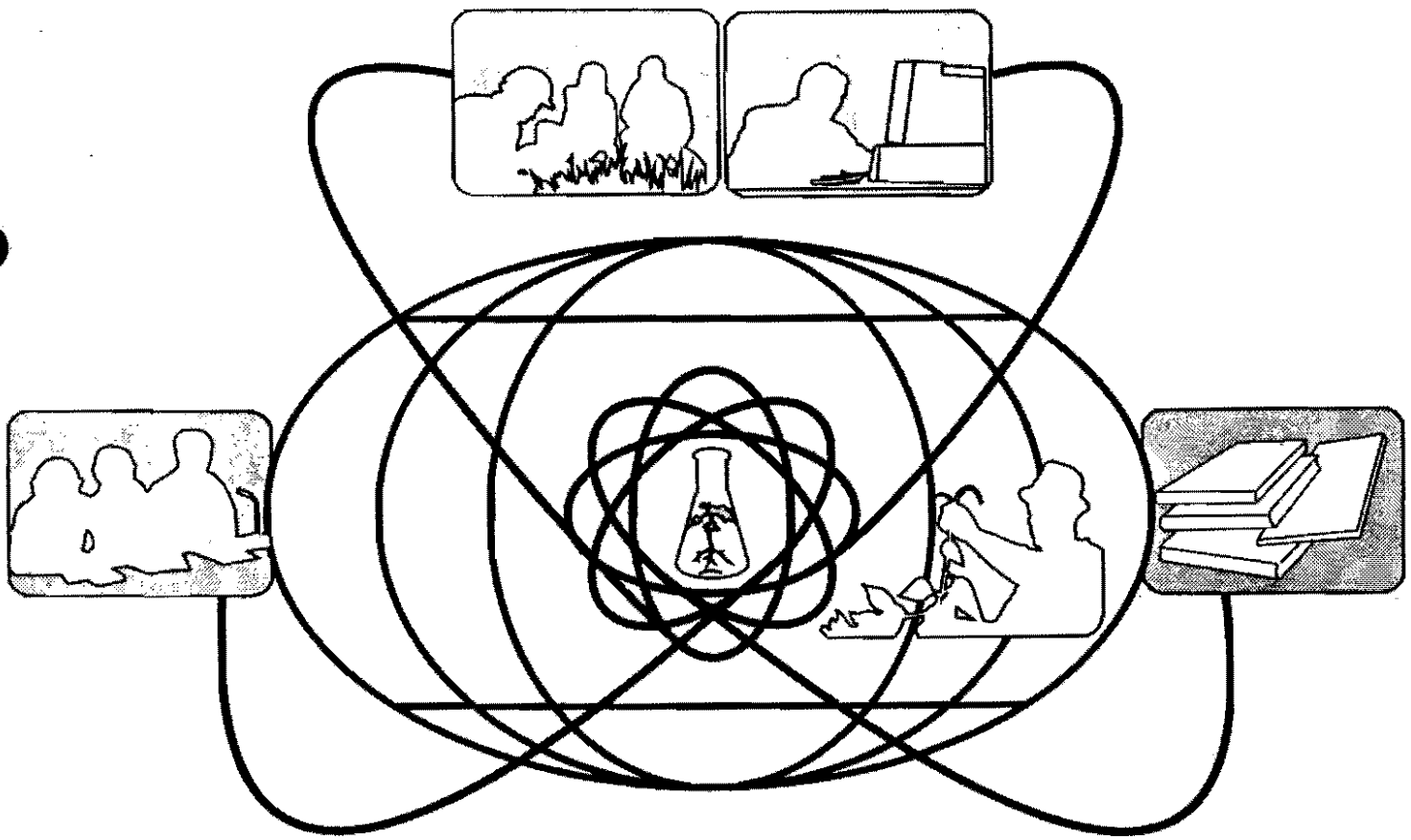
Review of
Institutional Relations and Development Support



December 1992

Cen[illegible]onal de Agricultura Tropical

Draft

Executive Summary and Introduction

December, 1992

CIAT
Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

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EXECUTIVE SUMMARY

1. Institutional relations and development (**IRD**) refer to (1) CIAT's linkages with donors and partners, with science and technology, and with the Center's broader institutional environment; and (2) CIAT's developing and strengthening organizational assemblages for agricultural and resource management and development.

2. IRD is a center-wide function. However, there are specific areas at CIAT, such as communications, documentation, training, etc., which give specialized support to IRD.

3. Initially, this specialized support was scattered in various sectors and units. A first grouping, in 1987, merged the former Communications and Information Support Unit with Training and Conferences into a TRAINING AND COMMUNICATIONS SUPPORT PROGRAM (TCSP). In early 1992 the TCSP evolved into the short-lived INSTITUTIONAL DEVELOPMENT SUPPORT PROGRAM. From this emerged **INSTITUTIONAL RELATIONS AND DEVELOPMENT SUPPORT (IRDS).**

4. IRDS is a grouping which (1) focuses the support given to CIAT's linkages with its stakeholders, shareholders, and partners to attune it to CIAT's overall strategies for fulfilling the Center's mission; and (2) deals with the development and strengthening of organizational assemblages for agricultural and resource management research and development.

5. Operationally, IRDS comprises: (1) an Information and Documentation Unit; (2) a Communications Unit; (3) a Project Development Office; (4) an Institutional Relations Area; and (5) a Professional Development Area.

6. The full Review-Report includes an introduction; six self-contained documents (Nos. 2-7) on IRDS operational units or parts thereof; one document (No. 8) on CIAT's experience with the development of organizational assemblages for research and development (**R&D**); and a brief look into the future. The executive summary will follow the same sequence.

7. The **Information and Documentation Unit** helps CIAT's scientists access world scientific literature, both at CIAT and elsewhere. Since 1989, the Unit has progressively modernized its services. State-of-the-art technology has been incorporated to maximize effectiveness and efficiency in serving users.

8. A shift toward automation was implemented systematically throughout the Information Unit. Bibliographic databases on CD-rom were acquired. End-user work stations for direct access to internal and external databases were installed. Card catalogs were automated with the aid of a standard software (Micro CDS/ISIS) for

indexing and cataloging. Newly incorporated desk-top publishing technology facilitates production of bibliographies and other publications. The number of microcomputers was increased to reap the benefit of technologies such as electronic text scanning, machine translation, and electronic reference books and working tools for technical processing and delivery of user services.

9. Networking for sharing resources (locally, regionally, and internationally) complemented automation. Participation in FAO's cooperative database, AGRIS, increased. Connection to telecommunications networks such as CGNET and BITNET improved linkages with research institutions and information banks worldwide.

10. New, user-oriented, publication series such as National Bibliographies and Quick Bibliographies were launched, while established series (e.g., *Bibliographic Bulletin*) were modernized.

11. Outreach activities included training NARDS members in organizing, managing and accessing scientific information; exhibits at congresses and meetings; and orientation of hundreds of visitors seeking technical advice on information management.

12. Modernization, new and improved services, and outreach activities are probably causally related to a dramatic increase in the public and technical services workload. For example, bibliographic database searches increased elevenfold, from 272 in 1987 to 3194 in 1991.

13. About half of the services rendered by the Information and Documentation Unit were for CIAT staff. The rest were for external users, mainly agricultural researchers, especially from Colombia and Latin America. Users from Africa and Asia were a small minority.

14. Relevance, effectiveness, and efficiency of information services have been evaluated: relevance and user satisfaction rated highly. Process improvement for greater efficiency has been ongoing. Stretching the productivity of human resources to the limit, services output increased substantially even as personnel was reduced by more than 20%.

15. CIAT's document collections and databases on cassava and beans were compared with the world's three largest bibliographic databases, AGRIS, AGRICOLA, and CABI. To a large extent, CIAT's collections complement the other three; and, for Latin American researchers, they are more accessible.

16. The Information and Documentation Unit is facing difficult challenges. The demand for services has grown exponentially; personnel has been reduced substantially; purchasing power of static core funds is eroded by increases in costs of scientific literature, which are more than ten points above average U.S. inflation; and a newly

established Resource Management Research Division has information needs that differ qualitatively from those of CIAT's established Programs and Units.

17. Approximately half the services of the Information and Documentation Unit are rendered to NARDS. To cease attending this clientele, although saving resources, would be undesirable because NARDS can ill afford replacing the services from elsewhere.

18. To cut costs, generate income, and provide alternative services, some options under consideration or in early implementation are more focused alert services; increased use of external databases; the inclusion of information services among the costs of special projects; special projects on information and documentation; bringing in new partners to share the workload; further automation; and cutting back on dispensable services.

19. In 1992, the former Publications Unit and Public Information, together with Graphic Arts, were joined, under a newly recruited head, becoming CIAT's **Communications Unit**. This eliminated inefficiencies rooted in excessive compartmentalization.

20. From 1987 to 1991, 104 scientific publication were produced and 25,000 copies distributed, mostly to NARS in Latin America.

21. Graphic Arts almost quadrupled production of camera-ready pages from 1988 to 1991 with the introduction of computerized desk-top publishing technology. In-house printing reached five million pages per year in 1990 and 1991. About 90% were technical materials.

22. CIAT, like most CGIAR centers, previously maintained a low profile in public awareness and did not seek media coverage. This attitude changed as competition intensified for scarce funds. CIAT's Communications Unit is making public awareness a major activity.

23. Twenty-six press releases were written, and 30,000 copies distributed from January through October 1992. Results are beginning to show. In 1992, CIAT appeared in the press at least 55 times in Colombia, and a dozen times internationally. The prestigious German paper *Frankfurter Allgemeine Zeitung*, in its 21 October 1992 edition, published a major feature on CIAT's work on erosion control in cassava production on Andean hillsides. It was adapted from a CIAT press release. CIAT was also featured in the London Financial Times.

24. CIAT is the focus of two international TV programs filmed in 1992. *Fruits of the Earth* is an educational series on the world's major food crops, produced by a Swiss company for a German TV network. It is broadcast worldwide in six languages. A

Fruits of the Earth crew spent 10 days at CIAT and across Colombia in November, filming a special feature on beans. *The New Explorers* program popularizes science, especially for young people. It goes on U.S.Public Broadcasting Network, and then to high schools and colleges across the USA and Canada where it is used as a classroom resource. An *Explorers* crew will film CIAT cassava research in December 1992. In Colombia, CIAT was featured on about 10 television programs broadcast across the country in 1992.

25. In 1992 CIAT produced its first video for public awareness. *A Fragile Paradise: The environmental challenge of Latin America* focuses on environmental problems in the region, and strategies of CIAT and cooperating national programs to increase food production in an environmentally sustainable way. Shot in Costa Rica, Haiti, Brazil, and across Colombia, the film includes dramatic sequences on deforestation in the Amazon.

26. *A Fragile Paradise* will be made available for television broadcast in developing nations at no cost. Permission has been granted to Pacific Mountain Network (PMN), based in Colorado, USA, to use the film in their "classroom channel" for 10,000 public schools. PMN also formally expressed interest in showing the film through its network of 207 broadcasting stations. With its affiliate networks, PMN's potential audience is 93 million households in USA and Canada. A Spanish edition is being made available to TV networks across Latin America.

27. A **Project Design Office (PDO)** was established in 1992 to improve the quality of proposals submitted to donors, and to increase CIAT's knowledge of donor programs and priorities. It assists program staff to design projects and prepare proposals.

28. The PDO's main activities are to coordinate the project proposal preparation process; train CIAT staff in project design and proposal writing; liaise with and collect information on donors. About 30 proposals, meeting high standards of technical quality and effective communication, are to be produced yearly. Standard procedures and methods for project development have already been established. From March to November 1992, 12 proposals with requested funds totalling US$18 million have been submitted to donors; six were approved, one was rejected, and five are still under donor review.

29. **Conferences** are an important mechanism for face-to-face communication among people. IRD support to CIAT conferences includes planning, logistics, and assistance in facilitating participant interaction. From 1987 through 1991, 2850 participants took part in 73 CIAT conferences on strategic and operational planning; networking; exchange of scientific information, and discussion of research issues; linkages with farmers; and miscellaneous matters.

30. The Center's conference facilities are also the venue of many in-house meetings, and meetings of external users. Events on record in 1991 numbered 1234 with a total of 5779 room-hours use. Use in 1992 dropped to 968 events and 4823 room-hours because of reduced training activities and fewer meetings among CIAT staff.

31. CIAT's **Visitors Office** programs meetings for visitors with CIAT staff; provides guided tours of CIAT; furnishes general information on the Center; arranges transport and excursions; and provides linkages with housing, banking and travel. During October 1989-September 1992, 10,082 persons visited CIAT. Seventy-eight were from donor agencies or related to the donor community; 1021 were from partner institutions or related to them (705 from Colombia; 316 from other countries); and 8983 were from other communities related to CIAT's interests (8516 from Colombia; 467 from other countries).

32. **Training** NARDS researchers and technology intermediaries is a major CIAT input to institutional development. From being supply driven, CIAT training shifted gradually to being demand led. Consequently, individual trainees were increasingly selected as part of targeted institutional development efforts where the focus was on enhancing research teams or more complex entities such as integrated interinstitutional R&D programs.

33. Training at CIAT comprised (1) introductory commodity research and production courses; (2) individualized on-the-job training; (3) specialized courses; (4) combinations thereof; and (5) research programs leading to M.Sc. or Ph.D. theses.

34. Introductory R&D courses and their combination with individualized training were for entry-level researchers, and technology transfer specialists who would interact with researchers. Individualized training, specialized courses, and higher degree training usually were for more advanced researchers. However, some development workers received individualized training, and some entry-level researchers proceeded straight to higher degree training.

35. CIAT organized, or collaborated in, short in-country courses (of one to two weeks' duration) which addressed the use of new technologies.

36. The total number of NARDS members trained at CIAT from 1987 through 1991 was 1067. Most were from Latin America and the Caribbean (91.2%). However, for training in beans and cassava, about one in every five trainees came from outside the region. Another 2515 persons (mostly university graduates) participated in 131 in-country training events held in Latin America and the Caribbean with CIAT participation.

37. An account of the impact of this training on institutional development is presented, country by country for each of CIAT's commodity research programs, for seeds, and biotechnology, in Document No. 6 *Training for Tropical Agricultural Research and Development*.

38. Routine evaluation during training showed that CIAT's training standards are high. However, effects on trainees' job performance and career development need to be assessed over the long term. In a 1992 survey of 1987-91 alumni, ex-trainees acknowledged that training at CIAT had substantially increased their (1) overall job performance; (2) capacity to relate their work to farmers' needs; (3) capacity to innovate in their jobs; and (4) capacity to train their support staff. Also acknowledged was less intense, but positive impact on alumni's leadership capacity; the performance of their teams; and the teams' capacity to relate their work to farmers' needs.

39. Training at CIAT gives young agricultural scientists from industrialized countries the opportunity to obtain first-hand experience in international agricultural research. Thirty-seven such candidates came to CIAT between 1987 and 1991.

40. Between 1987 and 1991, 64 scientists completed higher degree research programs at CIAT. About two-thirds were from developing countries, the rest from industrialized countries. Of those from developing countries, two-thirds followed M.Sc. programs; whereas, four-fifths of those from industrialized countries followed Ph.D. programs.

41. In Colombia, a research thesis is a requisite for obtaining a first degree in agriculture. CIAT offers Colombian students the opportunity of doing their thesis research at the Center, under joint supervision of a University and CIAT scientist. In 1987-1991, 189 such research projects were completed.

42. Gender distribution among CIAT trainees from NARDS varied among research disciplines. The percentage of women was 50% in biotechnology; 39.6% in social sciences, biometrics, and information and documentation; 33.9% in mainly laboratory-oriented disciplines; 10.1% in seed-related activities; 9.0% in disciplines where field work predominates; and 7.1% in nonspecialized commodity research and production courses. Among Colombian undergraduate research students and postgraduate trainees from industrialized countries the gender ratio was close to 1:1 (48.7% and 51.4% women, respectively).

43. CIAT's in-country training aimed at extensionists and other technology intermediaries. However, the Center's comparative advantage is training researchers and, furthermore, the number of extensionists who need training exceeds CIAT's capacity to meet such needs. CIAT has therefore developed a strategy of developing national and, especially, **subregional training capacities**, so that they may assume responsibility for training extensionists.

44. The end-product of developing training capacities has three components: (1) a legitimized training body; (2) a cadre of trainers with subject-matter expertise and command of adult education methodology; and (3) appropriate training materials.

45. Legitimization has been provided either by an international network such as the Central American Bean Research Network PROFRIJOL, or by a national interinstitutional mechanism such as the National Consultative Rice Council in Venezuela.

46. The process of training trainers is as follows: first, subject-matter specialists with an inclination and, preferably, talent for training are identified from an interinstitutional and international pool of human resources. These specialists are then helped to acquire a command of communication skills and adult education (andragogy) techniques. As an integral part of their andragogic training, the future trainers prepare their own training materials, which respond to the priorities identified by their mother institutions.

47. The trainers continue being active in research and/or extension. Thus, they maintain first-hand experience of what they help others to learn, while continuing to be a research and/or extension resource. By having first-hand experience, they overcome a major drawback of Latin American superior agricultural education: the teaching of subjects in which the teachers lack experience.

48. Small countries can hardly have fully fledged extension training facilities of their own, with trainers having first-hand and high-quality experience of the training contents. In contrast, regional bodies have this capacity and can allow small countries access.

49. Training materials, prepared as part of the trainers' training, respond to individual countries' extension priorities shared--by consensus--across countries.

50. The training materials are called *learning units*, in congruence with the basic philosophy of helping others to learn rather than teaching them. Each unit contains a sequential text, guidelines for practical exercises, instructions for evaluating the learning process, and visual aids (slides and overhead projection transparencies). All parts are bound in loose-leaf binders for easy updating and introduction of location-specific adjustments.

51. A *mother* learning unit deals with the principles of adult education, assessment of learning needs, facilitating learning, including how to establish learning sequences and design and produce learning units.

52. Three subregional training teams have been established. The oldest, on beans for Central America and the Caribbean, has already delivered nine courses and has obtained external funds for a project to train 1000 extensionists over a five-year

period. The second one, on rice in the northern Andean region is up and running. And the third one, on cassava in the South American subtropics, is in the final stages of development.

53. CIAT has taken on a wide range of **institutional development targets**: disciplinary research teams; multidisciplinary commodity research teams; commodity research networks; integrated commodity research and development systems; farmer-centered participatory research; commodity-specific training bodies; and advanced research networks.

54. CIAT applies a wide range of activities to institutional development: training; advising and counselling; joint research; information and communications support; supply of germplasm; research and development promotion; inter-institutional convening; role modelling; and even the management of new institutional models (e.g., networks). For any particular case of institutional development, the specific circumstances define which activity is brought into play, and the relative intensity among activities.

55. Document No. 9, *A retrospective and prospective view of CIAT's activities in institutional development for tropical agricultural research and development* attempts to take stock of CIAT's institutional development experience. After taking an inventory of the types of institutional development in which CIAT has engaged, it deals with **farmer-linked research and development** (FL-R&D).

56. A distinction is made between two situations:

(a) Peasant farmers; small production units; often low-value products; difficult access to credit and purchased inputs; poor links with markets; lack of organization into common interest groups.

(b) Commercial farmers; larger size production units; products of varying value, often decreasing; may have access to credit and purchased inputs, but input costs often rising; links with markets; often members of well-organized common-interest groups, such as growers' associations.

They are referred to as **peasant farming** and **commercial farming**. The former is typical of bean and cassava production; the latter of rice production (especially under irrigation) and certain livestock production systems.

57. In peasant farming, two R&D approaches converge on farmers: on-farm research (OFR) and farmer participatory research (FPR).

58. In OFR, researchers, extensionists, and social scientists interact with farmers to diagnose and prioritize constraints to the farmers business. Available solutions-- usually technological-- are tested on - farm (with variable farmer participation). If solutions are lacking, feedback is given to off-farm research for their development. The approach is technology driven, relying on off-farm research, and is usually commodity specific. Technological solutions are frequently components for existing production systems; they are often seed-embodied technologies, complemented with management techniques. Farmers involved in OFR benefit from quick solutions to specific (usually biophysical) production problems.

59. FPR aims at improving farmers' lot through enabling them to improve their socioeconomic situation. It is socially rather then technologically driven. It brings together farmers and off-farm researchers to jointly design technological solutions to farmer-felt needs. It also links other players, who may help farmers in dimensions other than technological, and link them with their institutional environment, including markets. It initiates an open-ended process of farmers' social development.

60. Integrating insights from OFR and FPR, some conclusions for **peasant-farmers-linked R&D (PFL-R&D)** emerge.

(a) Technology generation for peasants is best done with farmers on-farm, thus including their rationale of optimizing resource utilization, which cannot be adequately simulated in on-station research.

(b) Small teams (2-4 persons) of well-trained and motivated researchers have been found to be effective for OFR and FPR.

(c) OFR-FPR teams should be linked to off-farm research, to articulate farmers' demand for technology when it exceeds OFR-FPR's capacity to innovate; and to remain cognizant of opportunities for innovation that may be outside farmers' and FPR's horizons.

(d) Peasants need to be linked to a market, to prime a cycle of technology demand and utilization, which should lead to a sustained process of social development.

(e) PFL-R&D does not arise spontaneously, nor is it self-organizing. Promotion and coordination are necessary to initiate and maintain PFL-R&D modules. Strong proactive coordination is evident in successful cases, whereas lack of suitable promoters doomed others. Responsibility for promoting and coordinating is expected to shift over time as farmers become self-reliant.

(f) Some emerging issues are how to ensure successful leadership succession; how to replicate PFL-R&D modules in large numbers; how much linkage to off-farm research do new modules need; and how should off-farm research deal with growing demands from increasing numbers of PFL-R&D modules.

61. **Commercial-farmers-linked R&D (CFL-R&D)** clearly differs from PFL-R&D:

(a) On-station research and on-farm technology validation have been effective and efficient in solving relevant production problems. For this to occur, farmers' needs must be clearly formulated and properly addressed by research.

(b) On-station research and on-farm validation of technology can be effectively performed by small research teams, whereas technology dissemination needs a large number of technology intermediaries. Seed-embodied technologies can spread without such manpower, but integrated crop management, combining seed-embodied and management techniques, needs actively advising farmers to spread.

(c) Linkages among farmers, research, technology validation, and dissemination need close coordination. Successful cases usually have an interinstitutional mechanism with a strong representation of farmers' organizations. Such mechanisms have brought together public sector research, universities, and public and private sector extension.

(d) Teams for training extensionists have been institutionalized by interinstitutional CFL-R&D coordinating bodies. Thus the need for training large numbers of field advisors is being met.

(e) Noticeable examples of CFL-R&D are the collaboration on rice between ICA, FEDEARROZ, the University of Tolima, and CIAT in Colombia; and the National Consultative Rice Council in Venezuela, which brought together public, private, and nonprofit organizations to implement a National Rice R&D Plan. The integration of public and private institutions and nonprofit organizations, and the strong participation of end-users clearly distinguish this model from the traditional model of public sector research and extension.

62. Some of CIAT's experience in developing integrated institutional assemblages for commodity-specific R&D is illustrated with six case histories in Document No. 9, *A retrospective and prospective view of CIAT's activities in institutional development for tropical agricultural research and development*.

63. An appraisal across the six cases assessed the extent to which most common shortcomings of agricultural research in developing countries had been overcome. For each case, the appraisal looked at whether (1) it was orientated toward end-users; (2) planning, monitoring, and evaluating mechanisms had been established; (3) research and development were balanced; (4) interinstitutional integration existed; and (5) the new institutional assemblages were likely to be sustainable. Considerable variation in these different aspects is part of the richness of CIAT's experience.

64. CIAT's experience in institutional development is enormous, involving many types of institutional assemblages, many types of interventions, the R&D of very different commodities, and manifold countries and institutions. CIAT can build on this strong foundation as it faces new and evermore challenging needs of institutional development for resource management research and development.

65. In-depth case studies of CIAT's institutional development experience would undoubtedly broaden and deepen present insights, as well as surfacing highly useful operational aspects. This might be the subject for a special project. The output, in the form of easily accessible information, would be widely distributed among potential users, particularly for those involved in the so-called "devolution" of CIAT's activities to other institutional players.

66. IRDS moves confidently into the future. The course for action is set by CIAT's Strategic and Operational Plans. Human resources are able and committed. Emerging technologies are expected to greatly enhance information management and communications. Participatory methods facilitate face-to-face communication and the synergistic collaboration among people and institutions. To stay effective and efficient, IRDS is determined to stay at the forefront of information and communications technology, and the latest developments in interpersonal communication.

67. CIAT must work with new partners, some of whom will differ from those met before. The new set of institutional players will come together in interinstitutional arrangements, some of which will be without precedent. All the partners' contributions will be vital for the overall outcome. Failure by any partner may jeopardize the common enterprise. Inevitably, some partners will be weak, whereas harmonious and effective collaboration with others will be difficult to achieve. IRDS is aware of the entailed risks, and is ready to tackle difficulties with prudence and determination.

68. Finally, IRDS is not without concerns. With the advent of resource management research, new users expect new activities and outputs. At the same time, many former activities will continue for germplasm development research. Despite increasing demands, no growth of IRDS' core budget is foreseen.

69. Creative innovations are already being presented and implemented to adjust to this difficult situation. Labor-saving technology has been incorporated wherever possible, and more will be brought in whenever possible. But hardware and software acquisition needs capital; and there are limits to substituting hardware for people. When these limits are reached, probably soon, resources commensurate with the task at hand will still be needed. With due respect, IRDS would like to share this concern with CIAT's governance and management.

INTRODUCTION

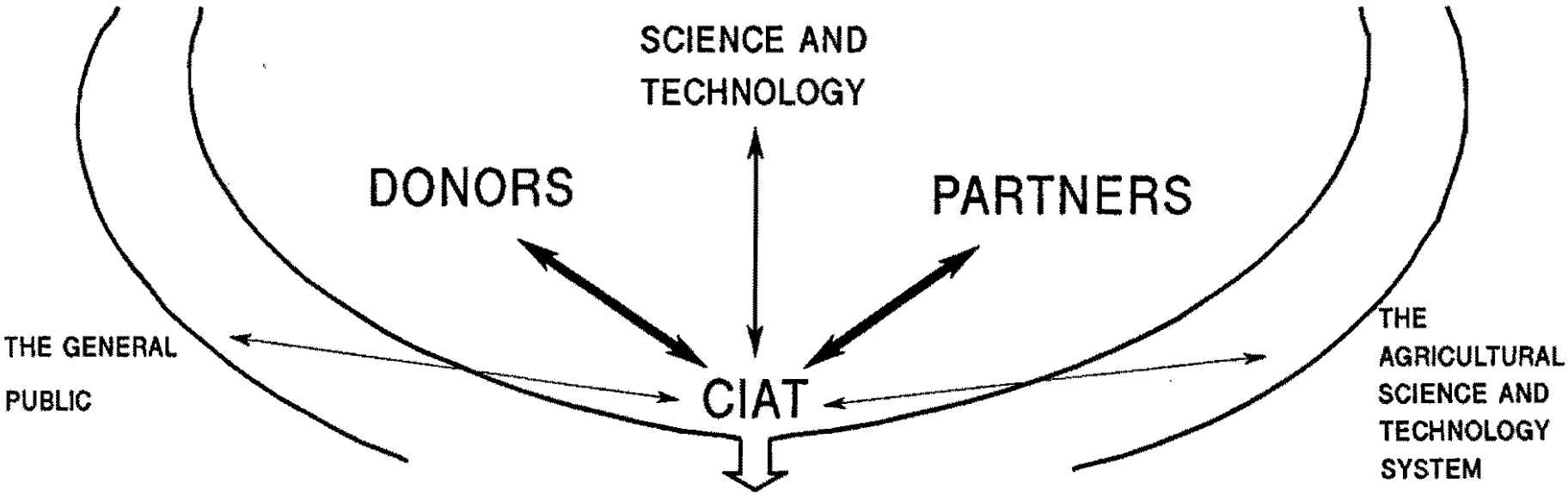
Institutional relations and development is about (1) CIAT's linkage to its donors and partners, to science and technology, and to the Center's broader institutional environment (Figure 1); and (2) strengthening agricultural research and development systems or components thereof.

Institutional relations and development is a center-wide function. All managers and scientists participate in it. They link-up to varying degrees with partners, donors, science and technology, etc.; and they contribute to the development and enhancement of agricultural R&D.

However, there are specific areas at CIAT, such as communications, documentation, training, etc., which give specialized support to institutional relations and development. Initially they were scattered in various sectors and units. In 1987, a first grouping merged the former Communications and Information Support Unit with Training and Conferences into a TRAINING AND COMMUNICATIONS SUPPORT PROGRAM (TCSP). In early 1992 the TCSP evolved into the short-lived INSTITUTIONAL DEVELOPMENT SUPPORT PROGRAM. From this, finally, emerged INSTITUTIONAL RELATIONS AND DEVELOPMENT SUPPORT (IRDS), a grouping which (1) focuses the diverse linkage support components and activities to attune them with CIAT's overall strategies in fulfillment of the Center's mission; and (2) deals with organizational assemblages for agricultural and resource management research and development.

This prologue will introduce IRDS' various specialized linkage support services, and the support to institutional development. It will also present IRDS' organizational arrangement and personnel.

FIGURE 1. CIAT'S MAIN LINKAGES



MISSION

ALLEVIATE HUNGER AND POVERTY IN THE TROPICS WHILE PRESERVING THE RESOURCE BASE

LINKAGES

SCIENCE AND TECHNOLOGY

Science and technology worldwide is the repository of scientific knowledge and methodological know-how. Researchers permanently draw on this resource and, symmetrically, they contribute to it with the results of their endeavors (Figure 2). The IRDS' Information and Documentation Unit helps CIAT scientists to tap the world's scientific information resources. The Communications Unit supports the Center's scientists in communicating their research output to the world. Documents No. 2 and No. 3 respectively report on the Information and Communications Units.

DONORS

CIAT's links with donors have to do with (1) propitiating a favorable attitude towards the Center; (2) securing funds; and (3) accounting for the Center's use of resources, and for its achievements and impact (Figure 3). The IRDS' support to fostering CIAT-donors links is embodied in the Communications Unit (propitiating and accounting), and in the Project Development Office (fund raising). Documents No. 3 and No. 4, respectively, report on the Communications Unit and the Project Development Office.

PARTNERS

CIAT's partnership with other institutions refers to jointly pursuing CIAT's mission. There are three main types of relations between CIAT and its partners (Figure 3). (1) Collaboration in joint endeavors. (2) Mutual complementarity, where the outputs of CIAT's activities serve as inputs to partner institutions or viceversa. (3) Enabling, by which CIAT contributes to improving the performance of partner institutions.

A wide range of IRD activities supports CIAT-partner linkage:

* The Communications Unit attends communication through media (Document No. 3), while both the Conferences and Visitors offices facilitate face to face communication (Document No. 5).

* The office of the Associate Director provides information and advice on interinstitutional mechanisms.

* Improved performance of partner institutions is enabled through training (Documents No. 6 and No. 7), provision of information (Document No. 2), and support on interinstitutional mechanisms.

FIGURE 2. CIAT'S LINKAGES TO SCIENCE AND TECHNOLOGY

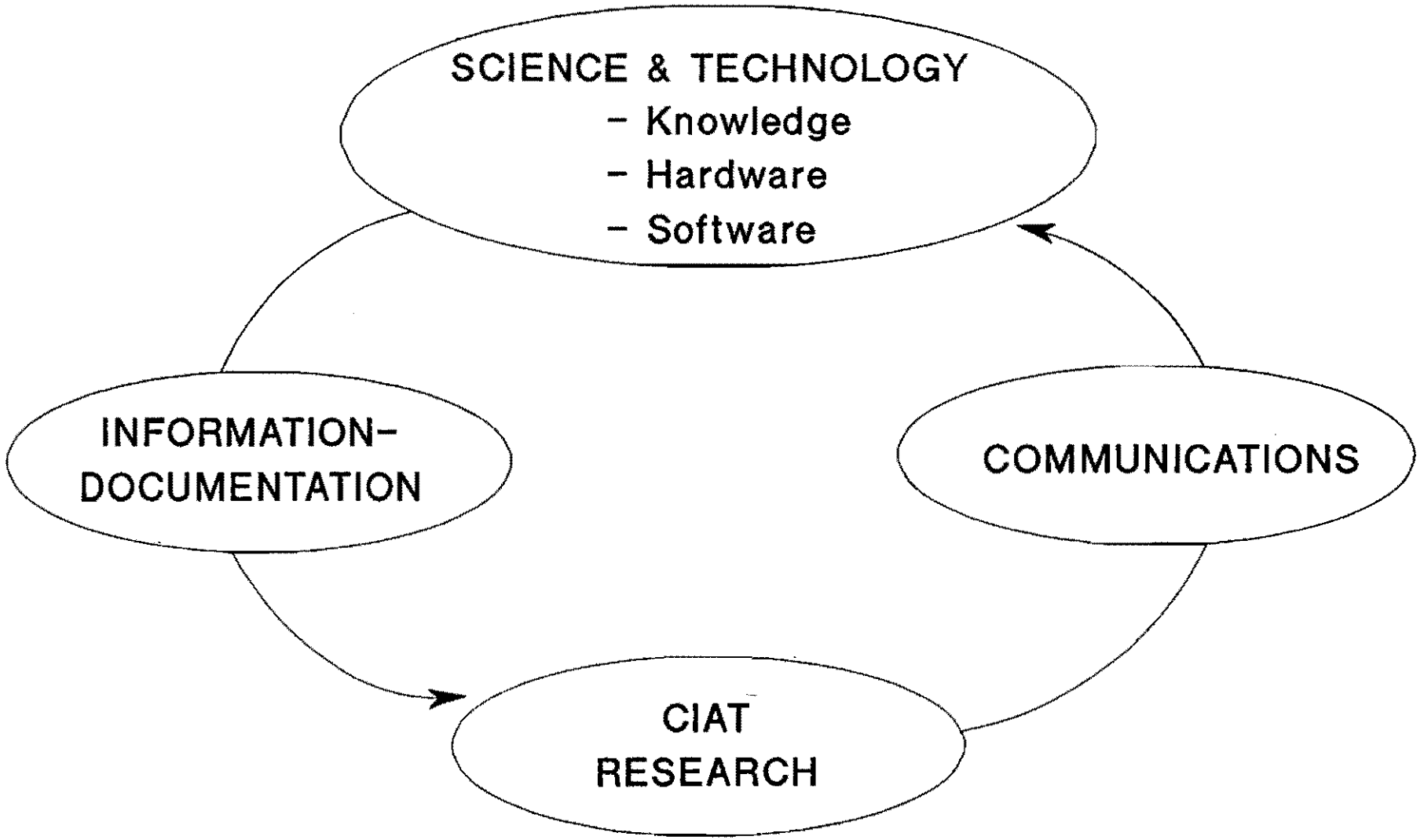
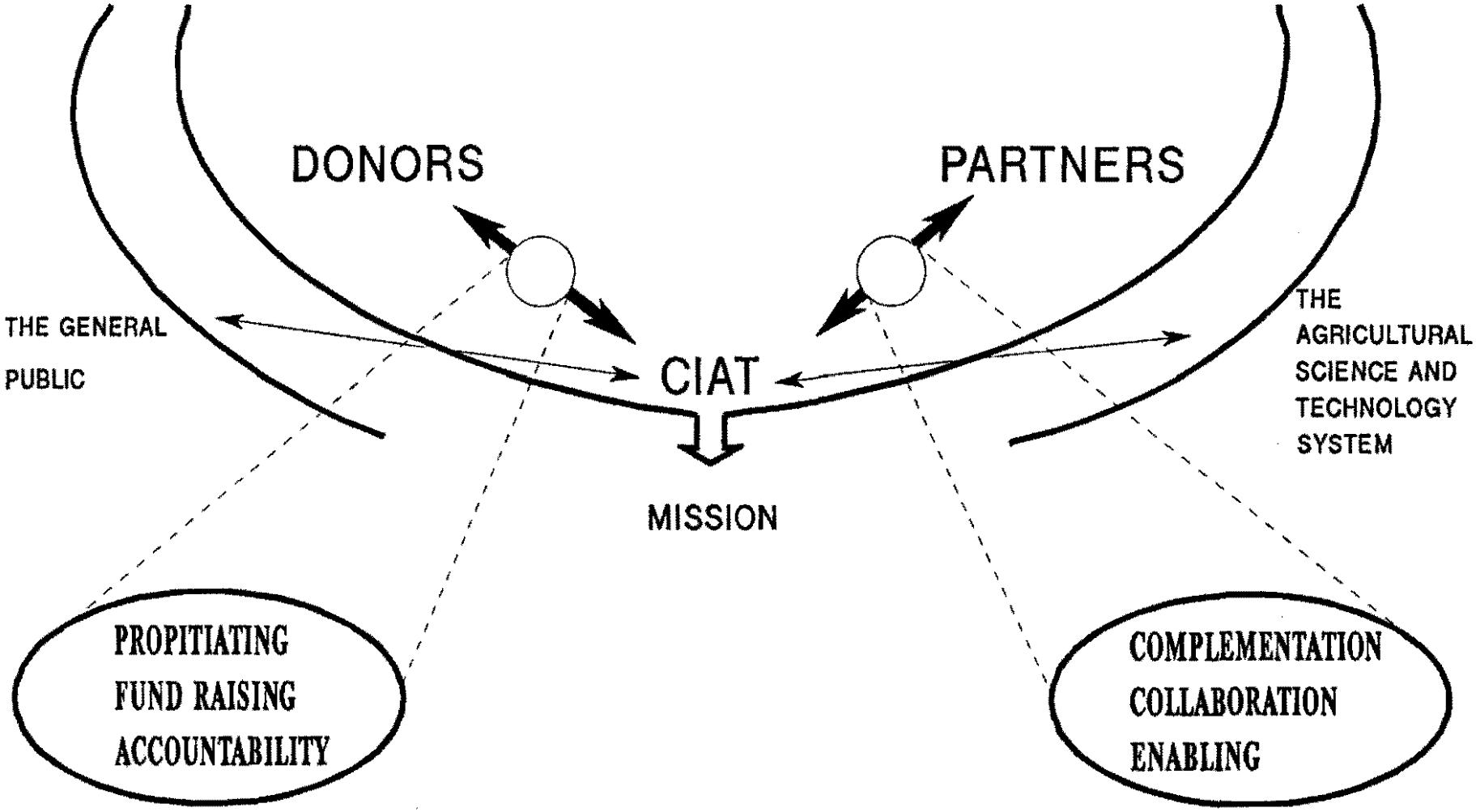


FIGURE 3. CIATS FUNCTIONAL LINKAGES WITH DONORS AND PARTNERS.



THE AGRICULTURAL SCIENCE AND TECHNOLOGY SYSTEM

Linkage to the agricultural science and technology system beyond CIAT's partners and donors (Figure 4) is maintained through media produced by CIAT's Communications Unit. These media foster the awareness of agriculturalists on technical progress, trends, and opportunities related to CIAT's mandated sphere of influence.

THE GENERAL PUBLIC

Awareness of the general public on CIAT's mission, goals, activities, achievements, and impact is promoted by media from the Communications Unit.

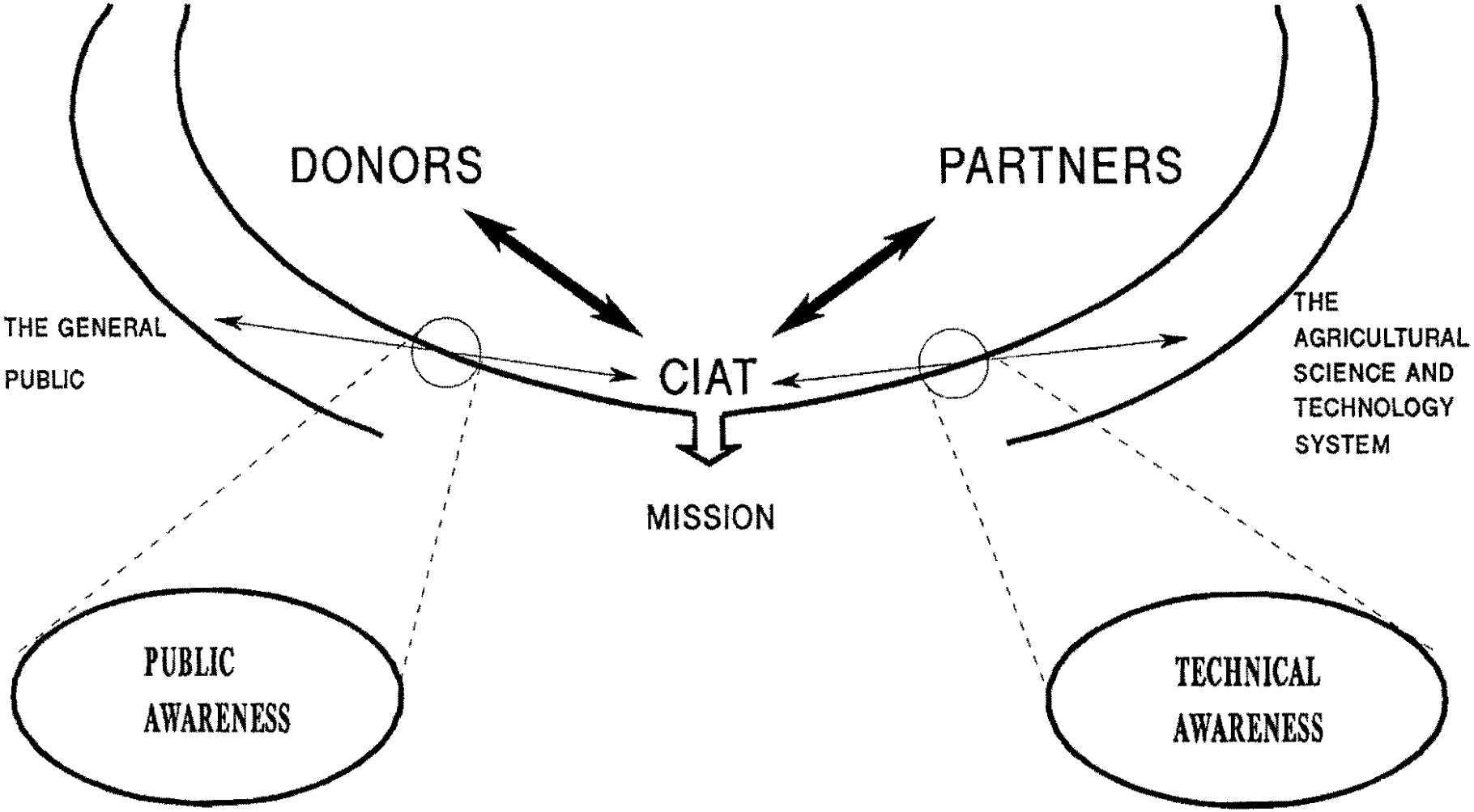
THE COLOMBIAN COMMUNITY

CIAT's linkage with the Colombian community (local, departmental, national) is a special case. Three elements are key to this linkage: CIAT's recognition of Colombia's hospitality; a symbiotic and synergistic relation between CIAT and host-country institutions; and a need to maintain Colombia well informed on CIAT and its meaning for the host-country.

The IRDS' contributions to the tightness of CIAT-Colombian links include:

* communication through media (Document No. 3);
* visits to CIAT (Document No. 5);
* preferential service to the Colombian agricultural sector in training (training of university students close to graduation; advantages in the proportion of Colombians in CIAT's research training [Document No. 6]); and
* wide sharing of CIAT's information-documentation resources (Document No. 2).

FIGURE 4. CIATS FUNCTIONAL LINKAGES WITH STAKEHOLDER AND THE GENERAL PUBLIC.



INSTITUTIONAL DEVELOPMENT

CIAT has for many years provided training, communications, and information support to the development of commodity-specific national research programs and international research networks. However, when the former Training and Communications Support Program was transformed into an Institutional Development Program, and shortly after into INSTITUTIONAL RELATIONS AND DEVELOPMENT SUPPORT, additional support functions were recognized and legitimized: (1) the synthesis of CIAT's experience in the development of real institutional models; (2) the transfer to NARDS of such integrated knowledge on institutional models; and (3) support to CIAT's assembling real institutional models.

Document No. 9 is a first attempt at synthesizing part of CIAT's institutional development experience, and at envisaging the application of such experience to the Center's new interinstitutional research paradigm.

AN INFORMATION SYSTEM

Coordinating, planning, monitoring, accounting for, and evaluating (1) the manifold linkage activities targeted at the large variety of CIAT's stakeholders and audiences, and (2) the Center's involvement in institutional development, would be extremely difficult, if not impossible, without an effective information system. Modern technology makes such a system feasible. IRDS is well underway in setting up such a system which is unique in its kind (Document No. 8).

COVERAGE OF REPORTS

The period covered by the different documents varies. The long established units and areas, such as Information and Documentation, Communications, Conferences, and Training report back until 1987. Other IRDS components, which are either newer or have been incorporated more recently, start their reports at later dates. Case-histories reported in Document No. 9 go back beyond 1987. Finally, Documents No. 6, on Training, and No. 5, on Conferences, report through 1991 rather than 1992, because the last year was one of transition towards new ways of operating, as well as one of exceptional and temporary reductions in activities due to CIAT's shortage of funds.

ORGANIZATIONAL ARRANGEMENT AND PERSONNEL (December 1992)

ORGANIZATIONAL ARRANGEMENT

IRDS comprises: (1) an Information and Documentation Unit; (2) a Communications Unit; (3) a Project Development Office; (4) an Institutional Relations Area; and (5) a Professional Development Area (Figure 5).

The Communications Unit; the Information and Documentation Unit; and the Project Development Office, are described in the respective reports (Documents No. 2, No. 3, and No. 4). Each of the three components is headed by a senior staff person who reports to the Associate Director, Institutional Relations.

Professional Development is described in Documents No. 6 and No. 7. The training of researchers from the NARDS is coordinated directly by the Associate Director. The development of national and subregional training capacities--for the training of extensionists in commodity-specific technologies--is led by a senior research fellow.

Institutional Relations encompasses two functions: Interinstitutional Mechanisms, and Institutional Liaison.

Interinstitutional mechanisms is about

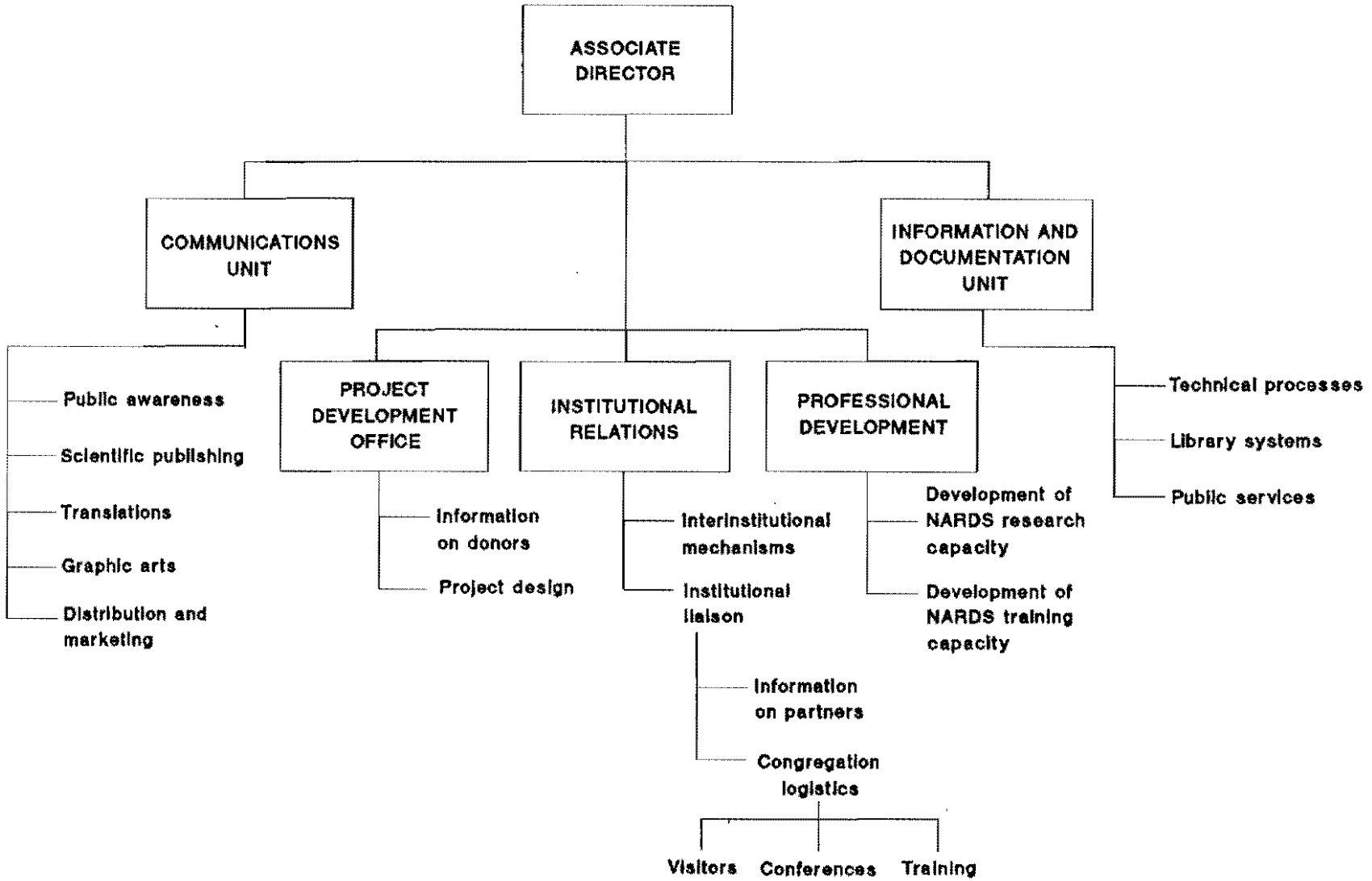
* synthesizing CIAT's experience on institutional development (Document No. 9);
* facilitating the transfer of that experience to NARDS; and mainly
* supporting the assemblage of interinstitutional bodies which are key to the implementation of CIAT's strategy for the 1990s and beyond.

This function is in the Associate Director's office.

Institutional Liaison deals with information management about partners (Document No. 8, p. 8), and with the logistics of moving, and looking after, trainees, visitors, and conference participants (see Document No. 6, p.10, functions of the former Registrar and Orientation Officer; and Document No. 5). A General Administrative Staff position is responsible for Institutional Liaison.

FIGURE 5. THE ORGANIZATIONAL ARRANGEMENT OF

INSTITUTIONAL RELATIONS AND DEVELOPMENT SUPPORT



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ACKNOWLEDGMENT

Institutional Relations and Development is, by definition, a support area for CIAT's essential business: development-oriented research. It is a privilege to be able to complement and support the work of CIAT's Research Programs and Units in the noble mission of ALLEVIATING HUNGER AND POVERTY IN THE TROPICS WHILE PRESERVING THE RESOURCE BASE.

We are grateful to CIAT's management, and to all CIAT scientists, for making our work challenging and rewarding, in an atmosphere of frank collaboration and collegiality.

We are indebted to our colleagues in the NARDS, for they have allowed us to join in the struggle to improve the living conditions of their people. From them, and with them, we learn about institutional development. And through our NARDS colleagues, we keep the lifeline open to the end users of our joint efforts to generate technology: the people on the land.

Our heartfelt thanks to our support staff. Without their commitment to the task, and their excellence on the job, the work reported in the attached documents would not have been possible.

Draft

Report of the Information Unit

1987 - 1992

Activity Report

December 1992

For Internal Circulation and Discussion Only

Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

Draft

Report
of the Information Unit
1987 - 1992

CIAT
Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

REPORT OF THE INFORMATION UNIT 1987-1992
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REPORT OF THE INFORMATION UNIT 1987-1992
EXECUTIVE SUMMARY

The trend for the past six years shows a steadily increasing demand for information services in CIAT's Information Unit. There is a correlation between increased demand for these services and access to scientific information. The basic services have not changed, but the mechanisms for delivering the information have been completely altered by innovations in automation, networking and outreach.

In 1989 the Information Unit developed a short and medium-term plan for automation. The decision was made to modernize the Library, integrate the sections with the same database standards, automate the card catalog and improve user access to internal and external bibliographic databases.

The automation plan was implemented systematically in all sections of the Information Unit. Benchmark developments were: the installation of external bibliographic databases on compact disc; end-user workstations for direct access to internal and external databases; adoption of Micro CDS/ISIS as the software standard for indexing and cataloging and conversion from a manual to an automated card catalog; adoption of desktop publishing techniques to facilitate production of bibliographies and other publications; and investment in more microcomputers, in particular, to take advantage of microcomputer-based new technologies such as scanning, machine translation software, electronic reference books and working tools in order to make technical processing and delivery of user services more efficient.

Another factor that complemented automation was an increase in networking activity at the local, regional and international level. From greater participation in cooperative databases such as AGRIS, to connection to telecommunication networks such as CGNET and BITNET for rapid communication with other agricultural research institutions, to production of collective catalogs with other IARC institutions--these and other networking activities have resulted in greater sharing of resources and collaborative projects for the benefit of all.

In addition to automation and networking, a final key factor that permanently altered the environment of the Information Unit was an intensive outreach effort. This included new publications series, training in how to organize, manage and access scientific information, exhibits at congresses and meetings to reach new audiences and orientation for hundreds of visitors seeking technical advice on information management.

The impact of these changes is seen in the dramatic increase in public and technical service workload statistics, but especially in database searches. This is a direct result of increased availability of the information. The demand for CIAT commodity related

information from the specialized databases produced in-house is only one-third of the demand for scientific information on other topics available in external CD databases. CIAT consumes half of the information services. A very large percentage is consumed by researchers in Colombia followed by the rest of Latin America. Africa and Asia represent small minorities. There has been little change in the distribution over the past six years.

Several evaluation studies have been conducted over the past two years to determine the efficiency and effectiveness of Unit products and services, to ensure that services are demand-driven and to ensure that the Unit is current with the changing strategies and priorities of CIAT. There have been evaluations of cost of services, user satisfaction with services, relevance of book and journal collections and a comparison of the CINFOS commodity database with other major databases to determine complementarity, duplication and uniqueness of coverage. Results of some evaluation studies have helped to make management decisions on the continuation of key user services.

The major constraints facing the Information Unit are a substantially reduced personnel base after a major reduction in force in 1992, a slowly declining operating budget, extraordinary rate of inflation in cost of acquisitions, in particular, journal subscriptions and exponential increases in demand for services. Inflation in the cost of scientific and technical journals has reduced the purchasing power of the Information Unit. Each year as unit costs rise, more journals must be canceled to compensate. Cancellation of titles to keep up with inflation is causing serious erosion in the journal collection. Also, as more of the Unit's operating budget is consumed by acquisitions, there are fewer resources to improve any other existing services or to develop new ones. This is a cause for concern with a new Resource Management Division to support.

Several options are being considered to cope with this dilemma. Major changes will have to be made. Since half of the Unit's services are consumed by research collaborators, outside of CIAT, care will have to be taken not to disenfranchise this user group of services they can ill-afford to purchase elsewhere. If basic services are trimmed back, a cheaper substitute must be found to replace them.

Options being considered to cut costs, generate income and provide alternative services include development of diversified, more focussed alert services, increased access to external databases, charging special projects for information support, developing special projects, developing closer liaison with CIAT programs, bringing in new partners to share the workload, continuation of automation for efficient, effective access to information and cutting back on existing services that are redundant and costly to produce.

REPORT OF THE INFORMATION UNIT 1987-1992

Background

The trend for the past six years shows a steadily increasing demand for information services in CIAT's Information Unit. There is a correlation between increased demand for these services and the availability of scientific information. The basic services have not changed, but the mechanisms for delivering the information have been completely altered by innovations in automation. The Unit's objectives, which have provided a framework for this process, were clarified in 1989. They are:

- To identify the scientific information needs of CIAT staff and research partners
- To collect, organize, and disseminate scientific information utilizing the most efficient and effective technologies available
- To participate in networks with other agricultural research institutions and information providers in order to promote greater exchange of information resources
- To promote training for information end-users and intermediaries in methods for managing and accessing scientific information

The primary audiences served by the Information Unit have remained constant, although the distribution of services has varied over time. They are CIAT staff, CIAT trainees, researchers, undergraduate and graduate students (including those doing theses at CIAT), university lecturers, agri-professionals, agroindustry, farmers, administrators, and librarians and documentalists.

The objectives, basic services and audiences have remained constant over the period, but there has been a phenomenal increase in demand for services, especially in literature searches. This is due primarily to increased access to information via bibliographic databases coupled with an intense outreach and training effort. This has not only allowed Unit staff to deliver more flexible, timely services, but it has also stimulated user need for the information. Users perceive that they can get immediate answers to their queries.

This report will document the changes and improvements in processes for the major functional areas during the six-year period and show their impact statistically. The report will also discuss recent efforts to evaluate the efficiency and effectiveness of Information Unit products and services. Finally, the report will propose options for the provision of information and documentation services in the future that take into

consideration current constraints of limited human and financial resources and increased demand for services.

1.0 ORGANIZATIONAL CHANGES

1.1 TREND TOWARDS AUTOMATION

Antecedents. The CIAT External Program Review report of January 1985 identified serious computation needs of the then Communications and Information Unit. It recommended that immediate action be taken to computerize the process of registering documents, including the installation of word processing equipment. Six years later, most services and products of the Information Unit would be automated. The Unit would also have reached a level of technical sophistication that would allow it to take a leadership role in the testing and implementation of new information technologies, not only locally, but on behalf of the CGIAR system as well.

Initially, technological innovation was slow and limited in scope since the Unit was without a head and without leadership for two years from 1987-1989. The manual Termatrex system of information recovery, in operation since 1978, was replaced by ISIS, software developed by Unesco for managing bibliographic databases on mainframe computers. The conversion of the CINFOS database of specialized documents on cassava, beans, and tropical pastures, from a manual to an automated environment began in 1986 and was completed in 1989. Access to literature searches remained limited, however, due partially to the slow conversion process and also to the lack of a public terminal for ready user access to the database.

Word processing was implemented on a limited basis in 1987 with the arrival of the Unit's first two microcomputers. One of the computers was also used for online searches of DIALOG databases. The processing section used a microcomputer program to produce catalog cards, although the catalog, itself, was not automated. In 1988 three additional micros were acquired to prepare bibliographic records and abstracts for uploading to the CINFOS commodities database.

Administrative functions were automated gradually between 1987 and 1989 by discrete function. The lack of integration of these applications between functional sections of the Unit resulted in duplication of effort and inefficiency. Applications to manage workload statistics and control of loans were written in DBase. Acquisitions orders were controlled through the IBM System 36 administrative mini-computer. Other database management packages were used to produce bibliographies.

1989 Transition Year. By late 1989, the Unit, under new leadership, developed a short and medium-term plan for automation consistent with its newly clarified goals and objectives. The decision was made to modernize the Library, integrate the sections with the same database standards, automate the card catalog and improve user access to

internal and external bibliographic databases.

By early 1990, there were 11 microcomputers in the Unit which were used to manage all aspects of standardized administrative functions including word processing, spreadsheets, graphics applications and to produce the new automated card catalog being developed in Micro CDS/ISIS, database management system software. The Unit began using the program, ENGSPAN, for machine translation of author abstracts from English to Spanish. In addition, the Unit installed three compact disc drives for searching bibliographic databases on CD. Also, modems were installed to access electronic mail networks and expedite requests for photocopied documents from external suppliers. Finally, a terminal for the CINFOS database, previously accessible only from the offices of the specialized information centers, was installed in the Main Reading Room.

In 1991, desktop publishing techniques were implemented to improve the appearance of two alert service publications. Four more micros and a laser printer were added to the inventory, primarily to support increased demand for database searches and the production of the automated catalog. Scanning equipment was evaluated to facilitate the input of abstracts into the CINFOS databases. It was also evaluated for use in automating the preparation of the Pages of Contents alert service.

New Interface for Automated Catalog. Efforts in 1992 have been dedicated to refinements of existing services and expansion of these to new audiences. The Unit developed a tri-lingual (English, Spanish, French) user-friendly interface for searching the automated card catalog and presented it at a national Micro CDS/ISIS users meeting in Bogota. The interface was made available for distribution to users in developing countries in Asia, Africa and Latin America. The multi-user version of the automated catalog was loaded on the prototype local area network in CIAT's Rice Program to offer remote access to the Library collection and to solicit evaluation of the service by program scientists.

BITNET. The Unit also implemented access to BITNET, international research telecommunications network, for CIAT scientists. A user guide was developed, orientation and demonstration sessions organized to stimulate use of the network, and explanatory materials on services available through the network were circulated.

Compact Disc Development. Finally, in the area of compact disc development, the Unit participated in product acceptance testing of the CGIAR's CIARL BRS (Compact International Agricultural Library Basic Retrospective Set) full-text compact disc, prior to its release for public sale and distribution. The Unit, in collaboration with CGNET, also evaluated search software for a prototype compact disc on cassava literature under investigation.

1.2 REORGANIZATION AND HUMAN RESOURCE DEVELOPMENT

Reorganization - 1990. The decision to automate processes and services in 1989 was responsible for a major reorganization in 1990 and resulted in a total restructuring of processes, rather than personnel. There was a reallocation of two persons to the Reference section to reinforce existing public services which were very weak. Automation and standardization forced integration and compatibility of work processes between functional sections of the Information Unit.

Demand for Training. As a result of the reorganization, there was an immediate need for training across the board in all sections. Technical processes staff received training in the new software applications for processing publications and building automated catalogs. Public services staff received training in searching automated databases for retrieval of information since most reference services prior to 1990 were delivered using manual sources. The reference group also learned techniques for training others in order to teach users how to access scientific information. All needed training in software applications for DOS, word processing, spreadsheets, graphics, and database management. There were no positions in the Unit that were not affected in some way by automation. The process pointed to a real need for a Library Systems office to network all of the automated processes of the Unit. This function was created in the second reorganization of March 1992.

Reorganization - 1992. This reorganization was a direct outcome of a CIAT-wide institutional reduction in force which resulted in a 22% reduction in staff in the Information Unit and a loss of six positions. The CINFOS, specialized information centers on beans, cassava and tropical pastures, which had been the vanguard of the Information Unit for nearly twenty years, were dissolved. The CINFOS technical functions of indexing, abstracting and database production were absorbed into Technical Processes while the CINFOS public service functions of literature searching, reference query service and production of bibliographies were absorbed into Public Services. Acquisitions and Cataloging, formerly separate sections, were also absorbed into Technical Processes. In short, three sections were merged into one with effectively seven fewer staff to perform the same work. The Reference Section was renamed Public Services and absorbed the responsibility for Photocopy Services. A new small section, Library Systems, was created to provide technical support for networking, database development and testing, systems backstopping and training--new and urgent needs that resulted from the change to an automated work environment.

2.0 INNOVATIONS IN TECHNICAL PROCESSES

2.1 ADOPTION OF MICRO CDS/ISIS

Integration of Databases. The change to automation had the greatest impact on the technical service functions such as acquisitions, cataloging, indexing and abstracting.

With the adoption of Micro CDS/ISIS as the database management software standard, four bibliographic databases (each using different software) were merged into one and many manual processes disappeared altogether. This resulted in greatly improved efficiency, consistency and flexibility. Many print and electronic products are now derived automatically from the single master database including the public catalog, the serials catalog, the commodity database, the abstract journals, the bibliographic bulletin, the input to the AGRIS database, the quick bibliographies, SDI (selective dissemination of information) and the lists of publications produced by CIAT staff, among others.

Exchange of Bibliographic Records. Micro CDS/ISIS software is used widely in developing countries to manage bibliographic collections. The Information Unit's decision to adopt Micro CDS/ISIS as the processing standard has allowed the Unit to participate in projects at national, regional and international levels for the exchange of scientific information in machine-readable form. For example, diskettes with references and abstracts on beans or references to all the journals held on biotechnology and genetic resources can be exchanged with other ISIS users. The Unit also participates in the production of collective catalogs in ISIS to promote greater sharing of information resources.

Increased Input to AGRIS Database. Finally, the Unit has increased its participation in the FAO-sponsored AGRIS bibliographic database as a direct result of streamlining the input process. The relevant references to CIAT publications are stripped off the Unit's main database in Micro CDS/ISIS, exported in the AGRIS format and sent to AGRIS on diskette for subsequent publication in the AGRIS database online, on compact disc and in print.

2.2 AVAILABILITY OF ELECTRONIC WORKING TOOLS

Basic working tools in electronic format that facilitate technical processes have been incorporated into the work flow. Acquisitions staff routinely consult Books in Print on compact disc to verify orders and catalogers refer to Library of Congress name and subject authority files also on CD. This results in more precise, complete orders, greater productivity and increased quality and standardization in cataloging and indexing.

2.3 EFFECT OF TELECOMMUNICATIONS ON ACQUISITIONS

In late 1989, the Information Unit became CGNET users, in 1991 TELEBUZON (Colombia) users and in 1992 BITNET users. The Unit uses these telecommunications networks to communicate with other libraries and documentation centers around the world in order to request copies of documents needed by CIAT scientists. This has resulted in faster turnaround time on the delivery of document orders by eliminating an 8-10 day delay for receipt of the order by mail. In some instances, complete documents can be received and sent as electronic files through the networks. Telefax service is also used, when necessary, for urgent delivery of the source document.

3.0 INNOVATIONS IN PUBLIC SERVICES

3.1 TRANSFORMATION OF REFERENCE SERVICE

New Database Tools. In 1987 the tools for answering routine reference questions and conducting literature searches for users were almost entirely manual, print-based and limited to local availability. In 1992, the options are complex, unlimited in scope and almost entirely electronic. The reference staff have at their disposal a variety of secondary research tools ranging from the locally-produced automated catalog and CINFO commodity database for access to the CIAT book and document collections, subject-specialized, commercially-produced bibliographic databases on compact disc available in-house and access to over 500 other external databases available online through DIALOG Information Services.

Role of Telecommunications in Reference. The reference staff can also solicit information from or refer questions to all the documentation centers in the CGIAR system through the CGNET telecommunications network. There is similar rapid access to the documentation centers in fifteen agricultural institutions in Colombia through a national electronic mail network.

Electronic Reference Books. In addition, there are reference sources such as directories and statistical compendiums and Current Contents now available in electronic format for consultation online in the Information Unit.

Training in Database Selection and Searching. In 1991, the Information Unit implemented weekly training seminars for CIAT staff to help them better understand the breadth of options available for searching scientific information, and in particular, to help them learn how to search bibliographic databases on CD. The Unit staff also participate in CIAT advanced commodity training workshops by giving a two-day course on access to and management of information for visiting scientists.

3.2 NETWORKING ACTIVITIES

The Information Unit participates in networks to share information resources with other libraries and documentation centers in the region and elsewhere in the developing world where beans, rice, cassava and tropical pastures are important commodities.

Traditional Networking. Traditional network activities dating from before 1987 and continuing to today include: gift and exchange of CIAT serial publications with over 500 libraries and documentation centers for free serial publications from these same institutions; input of references to CIAT publications in the FAO-sponsored cooperative bibliographic database, AGRIS; and contribution of multiple copies of the Pages of Contents series for compilation and distribution to NARS institutions through the Colombian national agricultural information system.

Colombian Agricultural Information Network. A new era of more dynamic networking began in 1989 with the initiation of three major projects. In Colombia, the Unit participated in a Colciencias-sponsored project to organize a national agricultural information network. More than 10,000 references of Colombian publications from CIAT's database were compiled in Micro CDS/ISIS. This project continued through 1991 and included the installation of an electronic messaging network in each of the participating institutions to allow for rapid exchange of requests for documents and database searches. The final phase of the project, the production of a compact disc, is underway now. The Information Unit has taken an active role as participant, evaluator and advisor to the project.

IARC Union Catalog of Serials. The second dynamic networking project begun in 1989 was the IARC Union Catalog of Serials, coordinated by ICRISAT. The objective of the project is to disseminate information about the journal holdings of the twenty international agricultural research centers to developing countries to assist with document delivery. The Unit contributed 3,500 serial records to this Micro CDS/ISIS database. This is an ongoing project and the database is updated annually. The Information Unit is the official distributor for this application (and others developed by ICRISAT) in Latin America and the Caribbean. The Unit recently produced a Spanish translation of the documentation manual and has actively promoted the distribution of the product to agricultural research institutions in the region.

CIARL BRS Compact Disc Project. The Information Unit has been an active participant in another CGIAR information networking project--the CIARL BRS (Compact International Agricultural Research Library Basic Retrospective Set). The BRS compact disc set contains the full-text of selected publications from the IARCs published between 1965 and 1986. The Unit participated in the evaluation of the prototype disc in 1989. In 1992, the Unit was one of four institutions (the only IARC) conducting technical product acceptance testing of the final set before its release for public distribution and sale.

Rice Program Support. The Information Unit also supports research network activities. In 1991, the Unit began collaborating with CIAT's Rice Program, INGER network, to index the Latin American literature on rice. IRRI had official responsibility for coverage of the Latin American publications, but the coverage was almost non-existent. The database is now updated weekly with descriptors in English and Spanish. The Rice Program sends the updates to IRRI for compilation in its world database of rice information.

INFO-REM. Recently, the Information Unit has been an active participant in a CGIAR system-wide remote electronic meeting on CGNET (INFO-REM) to discuss issues relating to information management of interest to all the international centers. This forum is being promoted as a mechanism to share information of mutual interest regarding developments in new information technologies, management of the information

function, collaboration with information providers and producers and collaboration with national agricultural research institutions on projects relating to information management.

3.3 OUTREACH ACTIVITIES FOR DISSEMINATION OF INFORMATION

The increase in the demand for Information Unit services can be attributed to two factors: 1) increased availability of the information as a result of automation and 2) an intense outreach campaign over the past three years. To accomplish this goal, the Unit concentrated its outreach efforts in four areas: publications, training, exhibits and orientation.

Publications. The Unit prepared two promotional brochures describing its products and services and how to get access to them. One was developed in collaboration with CIP and CIMMYT and was published in French, English and Spanish. These were distributed widely at meetings, to program mailing lists and to visiting scientists. The Unit, in conjunction with CIAT's commodity programs, also developed a new series of quick bibliographies targeted to specific needs of CIAT research partners. These newer publications complement the Abstract Journals, Bibliographic Bulletin and Pages of Contents, also produced by the Unit. The quick bibliographies have also been distributed widely by outposted staff in Africa and Latin America.

Training. In 1990 the Unit developed a prototype training module on how to manage and access agricultural research information. The two-day workshop was offered to visiting scientists attending CIAT's advanced commodity training courses from 1990 to 1992. The Unit also developed a mini-workshop for CIAT staff on how to search CD-ROM databases. The workshop is offered weekly. In addition, the Unit designed an internship training program to attract visiting information specialists to CIAT to develop special projects. Finally, the Unit developed a course on techniques for automated input to FAO's AGRIS bibliographic database. The course was presented in Bogota and its objective was to stimulate national participation in the AGRIS database.

Exhibits. In the past three years, the Unit has organized five information exhibits at agricultural or scientific congresses and meetings: an international agricultural information congress in Budapest, a bean network meeting in Panama, a national agronomy society meeting in Cali, an ICA congress in Bogota and a cassava biotechnology network meeting in Cartagena. In addition, Information Unit brochures have been sent with CIAT scientists for distribution at other meetings. The objective of the exhibits is to reinforce contacts, to create an awareness of CIAT publications and Information Unit products and services and to demonstrate databases in order to stimulate use of this service by CIAT research partners.

Orientation. The Information Unit hosts hundreds of visitors each year seeking not only a general orientation to information services, but also seeking specific advice on how to

organize and manage an information service. The Unit has shared its model with information personnel from Brazil, Venezuela, Peru, Ecuador, Costa Rica and Colombia.

4.0 IMPACT OF INNOVATIONS ON SERVICE STATISTICS

4.1 PUBLIC SERVICES

The most dynamic increases in information demand can be seen in public service statistics. These show that in most years CIAT has received more than half of the public services followed by Colombia receiving one-third and the rest of the Latin American region receiving 15%. CIAT's information services are used minimally by African and Asian research institutions, however, data for 1992 shows this trend might be changing.

Database Searches. There has been more than a 1,000% increase in database searches over the six-year period (**Figure 1**). Searches increased 100% between 1989 and 1990, the first year of transition to a fully automated environment which saw the addition of four compact disc databases (**Table 1**). The CD databases complemented the existing CINFO commodity databases and online DIALOG searches. There was another 100% increase in 1991 when searches reached a peak of 3,194. This exponential increase was due to the availability of eight CD databases plus greater publicity and training. In 1992, databases searches declined slightly (4%) due to more restrictive policies on search services, including the implementation of fees for services for external users.

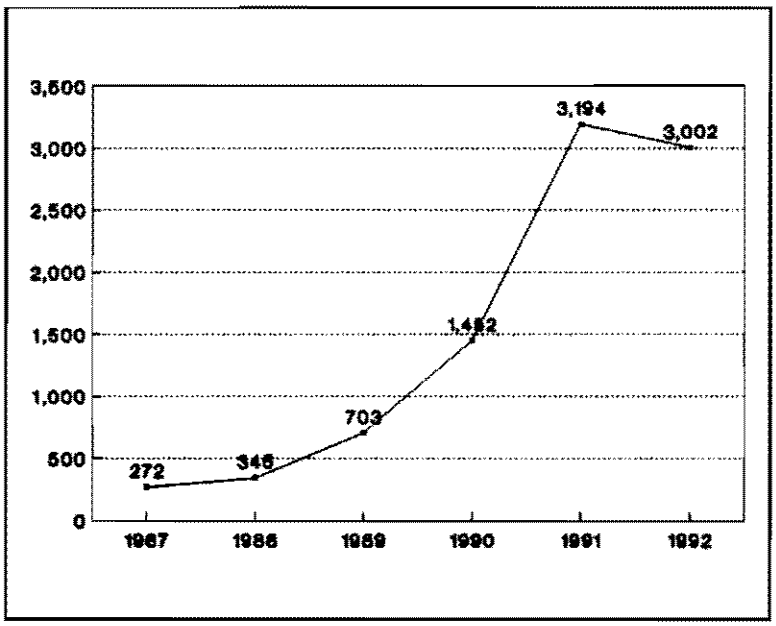


FIGURE 1. Bibliographic database searches 1987-1992.

TABLE 1. Public services summary

	1987	1988	1989	1990	1991	1992
Database Searches						
Online	11			58	22	8
CINFOS database	261**	345	703	785	852	761
CD-ROM				639	2,320	2,233
TOTAL	272	345	703	1,428	3,194	3,002
Reference Questions Answered				1,599	1,941	3,778
Publications Loaned	3,000	3,900	4,359	6,586	4,991	6,855
Documents Photocopied	33,838	28,528	23,051	24,208	25,758	18,308
**Searches of the CINFO database in its manual format						

	1990		1991		1992	
	Events	Persons	Events	Persons	Events	Persons
Training	11	158	20	156	30	139
Exhibits	1	260	4	509	3	166
Visitor Orientation		229		326		283
TOTAL	12	647	24	991	33	588

Searches of the CD-ROM and CINFOS databases were comparable in 1990, but by 1991 CD-ROM searches had outnumbered CINFOS searches by 3 to 1. This pointed to an urgent need for research information on topics other than cassava, beans and tropical pastures.

Searches in the CINFOS commodity databases, produced internally, increased 226% over the period **(Figure 2)**. The biggest increase in CINFOS use (103%) occurred between 1988 and 1989 when a public terminal was installed in the main reading room of the Library. Prior to that time access was available only from the offices of the documentalists.

Online use of the DIALOG databases has dropped in the past three years as a result of greater availability of CD databases in-house. This is expected to change in the near future, however, as the Information Unit begins to support CIAT's new Resource

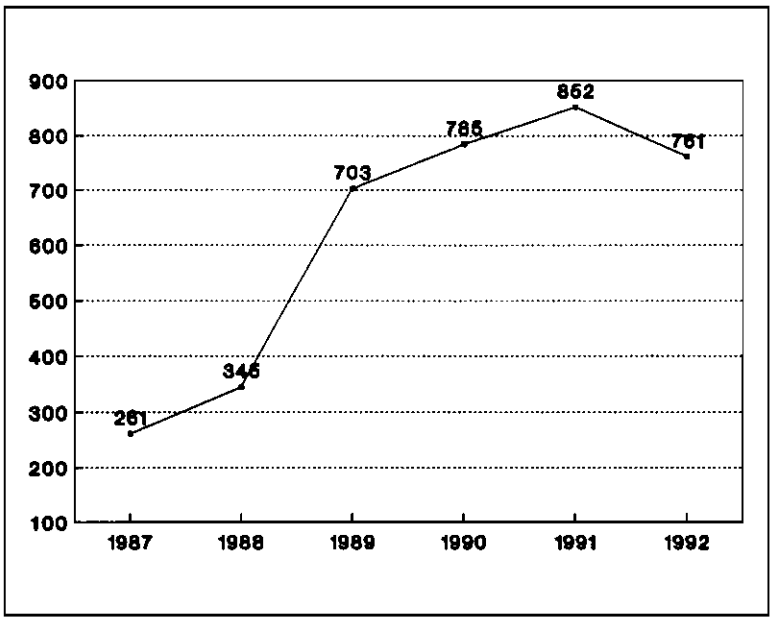


FIGURE 2. Searches in CINFOS database 1987-1992.

Management Division. The Unit's existing collections and databases do not support the new research areas adequately or at all. The Unit will have to resort to online searches of other databases and reliance on current contents-type alert services to fill this gap.

Data on distribution of searches by requestor (**Table 2**) show that, for the period, 40-50 % of the searches have gone to CIAT researchers or students conducting their theses at CIAT, as a group. Other researchers (including CIAT trainees) occupy second place and have received an average of 20-25% of the searches followed by undergraduate students with an average of 11%. While the raw numbers have gone up exponentially the distribution between categories of users has remained fairly constant with the exception of 1992.

There was a significant increase in the number of searches by CIAT researchers in 1992, up 57% (from 943 in 1991 to 1,483 in 1992). More than three-fourths of all searches in 1992 were for CIAT and CIAT research collaborators (**Figure 3**). This is attributed to the weekly training sessions on database searching begun in November 1991 which stimulated use. On the other hand, searches by all other user categories were reduced. Particularly notable is a 58% decrease in searches by undergraduate students. This is a result of charging for services. There were also significant reductions in searches by researchers, down 43% from 1991 and agri-professionals down 51%.

The geographic distribution of searches has also undergone a significant change in 1992 (**Table 3**). Prior to 1992, the Latin American region (excluding CIAT) received more than 50% of the searches and as much as 68%. This dropped to 28% in 1992 as there was a better distribution of search services to other regions. Searches for Colombia decreased by 69%, down from 1,857 in

TABLE 2. DISTRIBUTION OF LITERATURE SEARCHES BY REQUESTOR

	1987	%	1988	%	1989	%	1990	%	1991	%	1992	%
CIAT Researchers	138	50.74	85	24.64	121	17.21	553	37.31	943	29.52	1,483	49.40
CIAT Trainees	6	2.21	39	11.30	89	12.66	256	17.27	444	13.90	338	11.26
CIAT Undergraduate Students	--	--	30	8.70	101	14.37	111	7.49	250	7.83	200	6.66
CIAT Postgraduate Student	--	--	--	--	30	4.27	30	2.02	81	2.54	54	1.80
Researchers	45	16.54	43	12.46	89	12.66	82	5.53	429	13.43	245	8.16
Agri-Professionals	15	5.51	33	9.57	32	4.55	85	5.74	226	7.08	111	3.70
University Lecturers	19	6.99	16	4.64	49	6.97	56	3.78	86	2.69	59	1.97
Post-Graduate Students	2	0.74	14	4.06	17	2.42	30	2.02	79	2.47	80	2.66
Undergraduate Students	15	5.51	57	16.52	87	12.38	164	11.07	395	12.37	164	5.46
Librarians/Documentalists	8	2.94	11	3.19	22	3.13	52	3.51	149	4.66	126	4.20
Agro-Industrialists	5	1.84	3	0.87	8	1.14	18	1.21	48	1.50	35	1.17
Agri-Producers	--	--	9	2.61	22	3.13	27	1.82	39	1.22	36	1.20
Others	19	6.99	5	1.45	36	5.12	18	1.21	25	0.78	71	2.37
TOTAL	272		345		703		1,482		3,194		3,002	

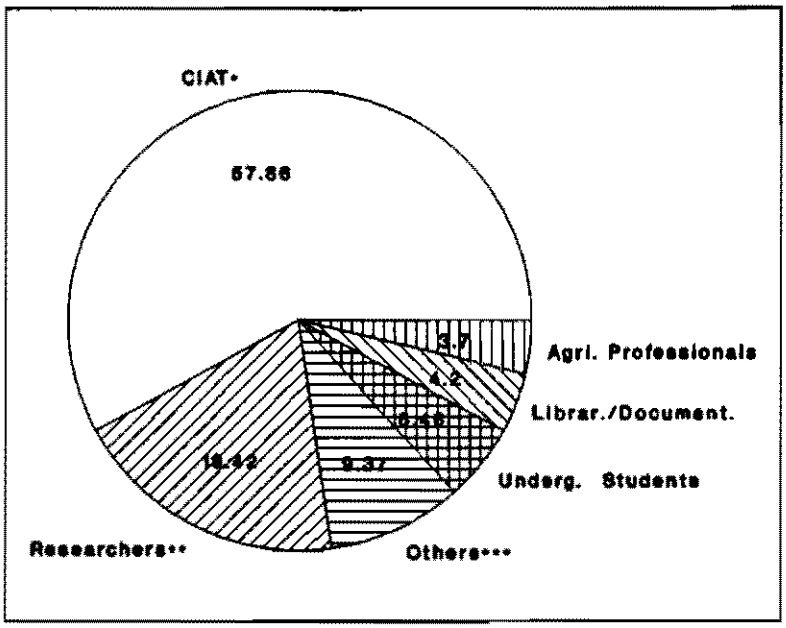


FIGURE 3. Distribution of searches by requestor 1992.

CIAT* (CIAT researchers, undergraduate and postgraduate students)
Researchers** (Includes NARS trainees at CIAT)
Others*** (University Lecturers, Agro Industrials, Post-Graduate Students, Agro-Producers, Administrators)

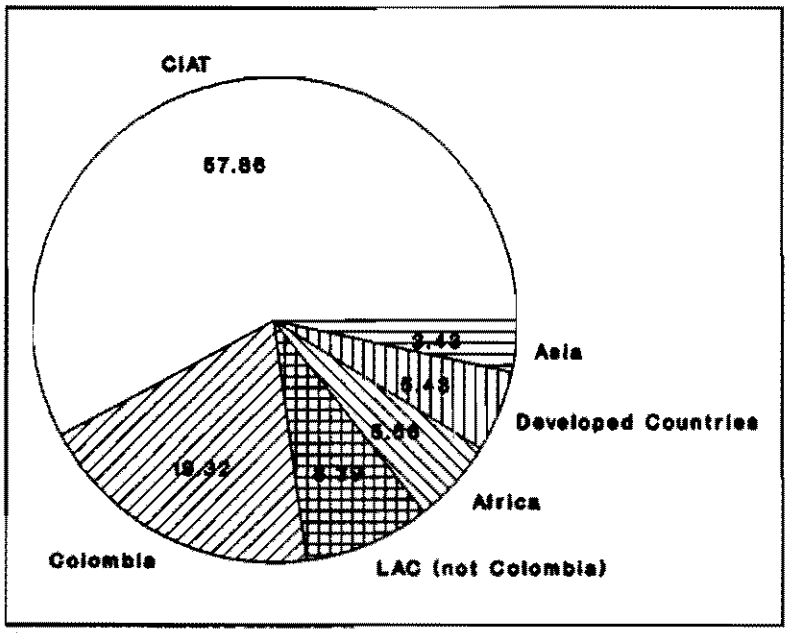


FIGURE 4. Distribution of searches by geographic area 1992.

TABLE 3. Distribution of literature searches by geographic area

	1987	%	1988	%	1989	%	1990	%	1991	%	1992	%
Area												
L A C (not Colombia)	50	18.94	87	25.22	116	16.50	342	23.08	304	9.52	252	8.39
Colombia (not CIAT)	61	23.11	140	40.58	363	51.64	493	33.27	1,857	58.14	580	19.32
CIAT	130	49.24	85	24.64	121	17.21	553	37.31	943	29.52	1,737	57.86
Africa	3	1.14	13	3.77	70	9.96	52	3.51	31	0.97	167	5.56
Asia	9	3.41	2	0.58	14	1.99	12	0.81	18	0.56	103	3.43
Developed Countries	11	4.17	18	5.22	19	2.70	21	1.42	40	1.25	163	5.43
Other Countries	--	--	--	--	--	--	9	0.61	1	0.03	--	--
TOTAL	264		345		703		1,482		3,194		3,002	

TABLE 4. Distribution of photocopied documents by requestor

	1987	%	1988	%	1989	%	1990	%	1991	%	1992	%
CIAT Researchers	16,003	47.29	17,930	62.85	12,393	53.76	13,845	57	14,616	56.74	8,843	48.30
CIAT Trainees			--	--	--	--	586	2	987	3.83	1,656	9.05
CIAT Undergraduate Student					--	--	--	--	--	--	299	1.63
Researchers			1,715	6.01	2,562	11.11	3,529	15	3,698	14.36	2,566	14.02
Agri-Professionals			1,600	5.61	1,451	6.29	189	1	392	1.52	388	2.12
University Lecturers			679	2.38	146	0.63	296	1	329	1.28	340	1.86
Post-Graduate Students			1,030	3.61	--	--	42	0	285	1.11	2,946	16.09
Undergraduate Students			5,349	18.75	1,965	8.52	626	3	2,351	9.13	345	1.88
Librarians/Documentalists					3,787	16.43	3,806	16	2,181	8.47	846	4.62
Agro-Industrialists			205	0.72	747	3.24	1,289	5	906	3.52	9	0.05
Agri-Producers			20	0.07	--	--	--	--	--	--	70	0.38
Others			--	--	--	--	1	0	13	0.05	--	--
TOTAL	33,838		28,528		23,051		24,209		25,758		18,308	

1991 to 580 in 1992. On the other hand, there were significant increases for Africa (438%) and Asia (472%) and for developed countries (307%). The increases in Asia and Africa are due to training of NARS scientists in information access and to intensive outreach efforts, especially in collaboration with CIAT outposted staff in order to identify key regional audiences. Geographic distribution for the period can be seen graphically in **Figure 4.**

Reference Questions Answered. Reference questions involve assisted use of the collection, compilation of facts, directory information and referrals that do not require a literature search in a database. Data is only available for 1990-1992, but the increased demand seen in automated literature searches is also true for reference questions **(Table 1).** There was a 136% increase between 1990 and 1992 due to wider publicity on the availability of the information services at CIAT.

Materials Loaned. There has been a 129% increase in the loan of publications from the general collection over the six-year period and a 37% increase in circulation from 1991 to 1992, alone. **(Table 1)** (Books are loaned only to CIAT staff.) This indicates more CIAT users and a better use of the existing collection. Loan privileges were extended to the faculty of the Universidad Nacional Agronomy Department in Palmira in late 1991. An average of 192 persons used the Library daily in 1992. The Library is open to the public in the afternoon, but statistics show that use is equally distributed between morning and afternoon hours. During evening hours and on Saturdays, there are an average of 10 users.

Photocopy Service. The number of documents photocopied during the period have remained consistent (25-28,000 per year) with the exception of 1992. **(Table 1)** The 29% drop in statistics between 1991 and 1992 is due to more reliable record-keeping in 1992, and is probably more accurate as an annual average for the period. The total number of photocopies (pages) distributed in 1992 was 245,086.

The majority of documents requested for photocopy service come from the scientific journal collection. A much smaller number of requests (12% of the total in 1992) are for CINFOS commodity-related documents. The greatest demand for CINFOS documents was from CIAT staff (40%), NARS scientists in training at CIAT (27%), other researchers (12%) and post-graduate students (11%).

The greatest demand for photocopies from the journal collection as a whole in 1992 was from CIAT staff (48%) followed by post-graduate students (16%), external researchers (14%) and CIAT trainees (9%) **(Table 4).** These four user categories together receive 90% of the services **(Figure 5).** The high volume of external use indicates a major regional support role for the Information Unit in providing access to costly journal collections not readily available elsewhere.

The geographic distribution of photocopied documents shows that Colombia has consistently received 30-35% of the copies over the six-year period followed by the rest of Latin America receiving approximately 10% **(Table 5).** Distribution to Asia and Africa combined does not exceed 2% of the service. Service to developed countries is equally low which is to be expected.

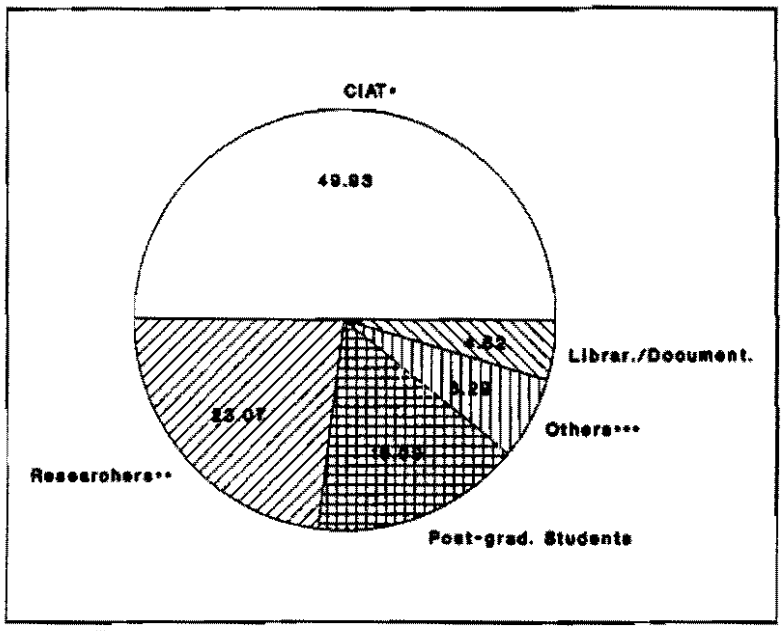


FIGURE 5. Distribution of photocopies by requestor 1992.

CIAT* (CIAT researchers, undergraduate and postgraduate students)
Researchers** (Includes NARS trainees at CIAT)
Others*** (University Lecturers, Agro Industrials, Post-Graduate Students, Agro-Producers, Administrators)

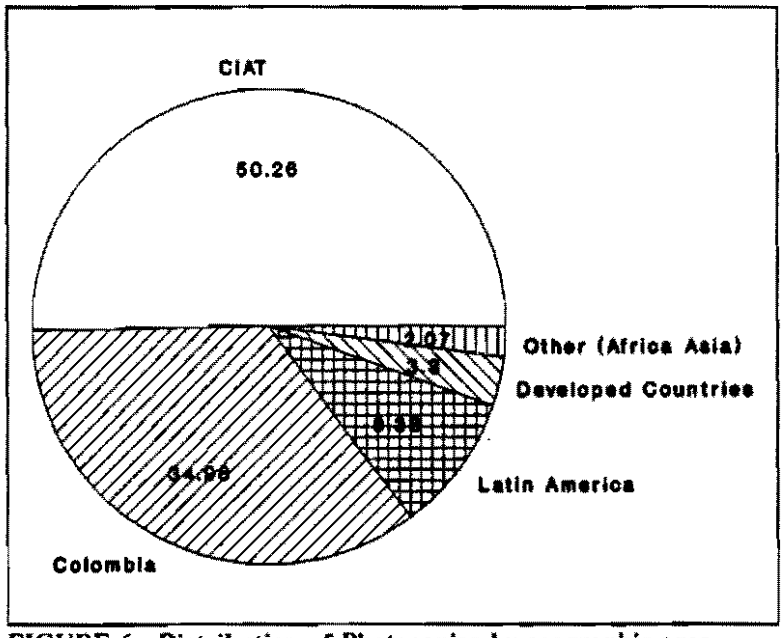


FIGURE 6. Distribution of Photocopies by geographic area 1992.

TABLE 5. Distribution of documents photocopied by geographic area

	1987	%	1988	%	1989	%	1990	%	1991	%	1992	%
Area												
L A C (not Colombia)	4,061	12.00	901	3.16	2,253	9.77	1,155	44.77	2,667	10.35	1,719	9.39
Colombia (not CIAT)	11,843	35.00	8,316	29.15	8,000	34.71	8,046	33.24	7,640	29.66	6,404	34.98
CIAT	16,005	47.30	18,677	65.47	12,393	53.76	14,431	59.61	14,616	56.74	9,202	50.26
Africa	677	2.00	97	0.34	273	1.18	490	2.02	244	0.95	330	1.80
Asia	338	1.00	43	0.15	22	0.10	29	0.12	208	0.81	47	0.26
Developed Countries	677	2.00	494	1.73	110	0.48	57	0.24	382	1.48	605	3.30
Other Countries	237	0.70	--	--	--	--	--	--	1	0.00	1	0.01
TOTAL	33,838		28,528		23,051		24,208		25,758		18,308	

CIAT and the Latin American region (primarily Colombia) receive at least 95% of all photocopy services (**Figure 6**). The photocopy service is self-supporting. Colombian users are charged a reduced price per copy (US$.03) consistent with local pricing for commercial photocopies. Users in all other developing countries pay US$.10/page and must pay in dollars or in CIAT coupons purchased with dollars. It is probable that the higher unit cost and the dollar basis has inhibited greater use of this service by other countries in the region and by Asia and Africa.

Training, Orientation and Exhibits. Data for training and orientation activities has been kept for the past three years (**Table 1**). In 1992 there were a total of 30 training events and 139 persons trained. There were 2 formal courses in information access and management for visiting NARS trainees and 28 mini-workshops on techniques for searching CD-ROM databases offered to CIAT staff. A total of 283 received orientation in information management and access in CIAT's Information Unit. Many of the visitors were from national programs and were seeking technical advice on the organization and management of information systems in their institutions and countries. The Unit has participated in five exhibits in four countries over the period, described in Section 3.3 above. In 1992 the Unit organized three exhibits and made contacts with 166 persons, the majority being cassava researchers.

Publications Distributed. The Unit has published a variety of publications over the period, most of them bibliographic in nature. The primary purpose of the publications is to inform users of the published research results on commodities of importance to CIAT and also to alert them to the contents of recent journals and books received by CIAT, available on loan or through the photocopy service. All publications are listed in the bibliography at the end of the report.

ABSTRACT JOURNALS - The volume of subscriptions to the CINFOS Abstract Journals on Cassava, Beans and Tropical Pastures has risen over the period from 1500 to 1700 (**Table 6**). The share going to the Latin American region (excluding Colombia) has risen from 27% in 1987 to 42% in 1992. When distribution to Colombia is added the percentage has risen from 47% to nearly 60% in 1992. Distribution to developed countries follows from 15-20% over the period. From 10-16% of the distribution has gone to Africa over the period and 5-7% to Asia. In 1992 there were more subscriptions to the Bean Abstracts (709) than Cassava Abstracts (538) or Pastures Abstracts (479). Also, there were more subscriptions for the Spanish version than the English version of Bean and Cassava Abstracts.

PAGES OF CONTENTS. This monthly alert service provides current contents information on approximately 900 of the most important scientific journals received at CIAT, distributed across six broad subject series. The distribution dropped by 50% over the period from 700 in 1987 to 388 in 1992 (**Table 6**). This is due to a purging of the mailing list in which institutional subscriptions (principally libraries and documentation centers) were substituted for individual subscriptions in order to reach a broader audience. The total distribution for Latin America including Colombia is 60%, comparable to that for the Abstract Journals. Colombia receives about one-fourth of all copies. CIAT sends a large quantity to ICA monthly for compilation and distribution in a national agricultural pages of contents series. Africa receives 16-19% and Asia 2%. The majority of requests for photocopy service originate from the Pages of Contents service.

TABLE 6. Geographic distribution of publications

	1987	%	1988	%	1989	%	1990	%	1991	%	1992	%
ABSTRACT JOURNALS ON CASSAVA. BEANS. PASTURES												
L A C (not Colombia)	410	27.21	652	36.71	551	35.73	534	36.23	648	40.40	721	41.77
Colombia (not CIAT)	300	19.91	425	23.93	202	13.10	160	10.85	178	11.10	283	16.40
CIAT	--	--	--	--	174	11.28	187	12.69	173	10.79	138	8.00
Africa	152	10.09	283	15.93	232	15.05	213	14.45	224	13.97	203	11.76
Asia	27	1.79	101	5.69	75	4.86	81	5.50	122	7.61	109	6.32
Developed Countries	264	17.52	315	17.74	308	19.97	294	19.95	228	14.21	267	15.47
Other Countries	354*	23.49	--	--	--	--	5	0.34	31	1.93	5	0.29
TOTAL	1,507		1,776		1,542		1,474		1,604		1,726	
*Includes developing countries												
PAGES OF CONTENTS												
L A C (not Colombia)					171	30.48	193	34.22	173	34.60	93	23.97
Colombia (not CIAT)					166	29.59	156	27.66	107	21.40	96	24.74
CIAT					111	19.79	110	19.50	119	23.80	114	29.38
Africa					91	16.22	90	15.96	83	16.60	74	19.07
Asia					9	1.60	12	2.13	16	3.20	7	1.80
Developed Countries					13	2.32	3	0.53	2	0.40	4	1.03
Other Countries												
TOTAL	700		600		561		564		500		388	

TABLE 6. Geographic distribution of publications, cont.

	1987	%	1988	%	1989	%	1990	%	1991	%	1992	%
BIBLIOGRAPHIC BULLETIN												
L A C (not Colombia)					181	46.89	62	33.88	201	44.37	242	48.79
Colombia (not CIAT)					77	19.95	71	38.80	74	16.34	112	22.58
CIAT					61	15.80	44	24.04	123	27.15	88	17.74
Africa					46	11.92	5	2.73	41	9.05	37	7.46
Asia					--	--	--	--	--	--	3	0.60
Developed Countries					19	4.92	--	--	--	--	14	2.82
Other Countries					2	0.52	1	0.55	14	3.09	--	--
TOTAL	450		300		386		183		453		496	
QUICK BIBLIOGRAPHIES												
L A C (not Colombia)							130	100.00	500	74.07	163	19.04
Colombia (not CIAT)									50	7.41	45	5.26
CIAT									50	7,41	40	4.67
Africa									65	9.63	550	64.25
Asia									--	--	50	5.84
Developed Countries									--	--	8	0.93
Other Countries									10	1.48	--	--
TOTAL							130		675		856	

TABLE 6. Geographic distribution of publications, cont.

	1987	%	1988	%	1989	%	1990	%	1991	%	1992	%
SPECIAL BIBLIOGRAPHIES												
L A C (not Colombia)							154	44.77	102	36.04	40	47.62
Colombia (not CIAT)							--	--	32	11.31	22	26.19
CIAT							190	55.23	142	50.18	8	9.52
Africa							--	--	1	0.35	--	--
Asia							--	--	--	--	--	--
Developed Countries							--	--	--	--	14	16.67
Other Countries							--	--	6	2.12	--	--
TOTAL							344		283		84	
OTHER PUBLICATIONS												
L A C (not Colombia)							2,400	48.00	410	43.52	100	29.76
Colombia (not CIAT)							287	5.74	282	29.94	175	52.08
CIAT							--	--	--	--	--	--
Africa							1,100	22.00	120	12.74	25	7.44
Asia							1,063	21.26	10	1.06	25	7.44
Developed Countries							100	2.00	100	10.62	--	--
Other Countries							50	1.00	20	2.12	11	3.27
TOTAL							5,000		942		336	

BIBLIOGRAPHIC BULLETIN. The primary audience for the Bibliographic Bulletin are libraries and documentation centers. The quarterly Bulletin alerts them to new books, journal titles and compact disc databases being received by the CIAT Library that are available for loan, photocopy service or searching.

Distribution has remained fairly constant over the period (**Table 6**). Nearly 70% of the copies are distributed in Latin America, including Colombia (23%) which is not surprising considering that the Bulletin is published only in Spanish. Even so, 8% were distributed in Africa in 1992.

QUICK BIBLIOGRAPHIES. These short, subject-specialized bibliographies were an innovation in 1991. The Unit works closely with CIAT staff, particularly outposted staff, to develop topics that are of critical importance to research or production in the region in question. These quick bibliographies derive from the CINFOS database but are far more focussed than the Abstract Journals and are distributed selectively to key audiences. Twenty-four quick bibliographies in English and Spanish have been developed in this series to date. Figures for 1991 show a concentrated effort on themes of interest to Latin America (81% of distribution) and in 1992 a very strong effort on developing topics relevant to Africa (64% of distribution) (**Table 6**).

SPECIAL BIBLIOGRAPHIES. These publications derive from the CIAT collection or databases and range in topics from economics, women in development, small farmers, national bibliographies by commodity, research output of CIAT scientific staff and specialized commodity studies among others. The majority have been distributed to Latin America (**Table 6**). See bibliography for a complete list.

OTHER PUBLICATIONS. These consist primarily of public information brochures designed explicitly to explain products and services of the Information Unit and to encourage use of the information services. They are generally distributed at meetings, congresses or to Unit visitors. In 1990 a special mailing of the Unit's brochure went to all the rice, beans, pastures and cassava researchers on CIAT's mailing list. If the Unit cannot send a representative to a meeting, it sends a supply of brochures with CIAT scientists. Over 6,200 brochures have been distributed in the past three years (**Table 6**).

4.2 TECHNICAL SERVICES

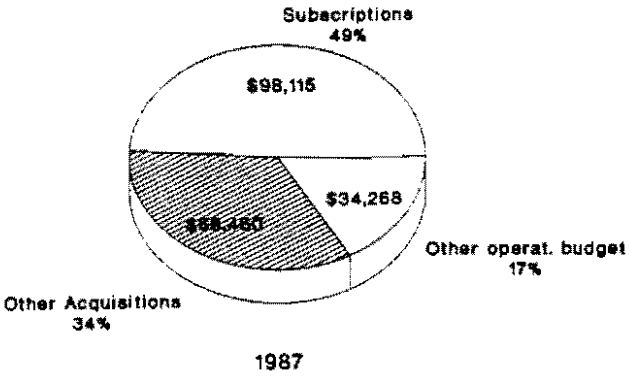
Acquisitions. The trend in Acquisitions has more to do with economics, and in particular with inflation in journal subscription costs, than it does with automation. In (**Table 7**) one can see the amount spent on acquisitions and, in particular, on subscriptions in relation to the total operating budget. In current dollars, there is no significant change either in the amount of the operating budget or in the amount expended for acquisitions over the period. When the figures are adjusted to constant dollars, however, (**Table 8**) there is a significant decrease in the rate of growth in both the total operating budget (4%) and the amount expended for acquisitions (9%). One sees that in the past three years, expenditures for all acquisitions have consumed 73-91% of the operating budget and subscriptions above 64-80% (**Figure 7**). There has been a notable decline (54%) in the number of journal subscriptions purchased from a peak of 1,170 in 1989 to 541 in 1992 (**Table 9**) and (**Figure 8**). This is directly related to a significantly high rate of

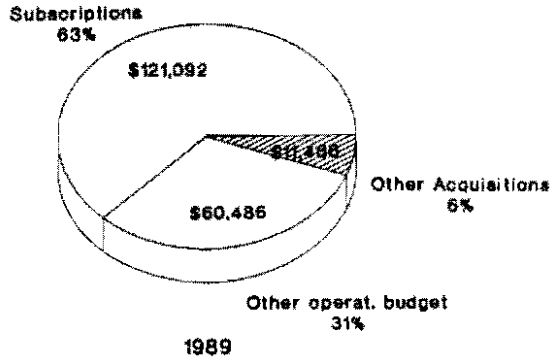
TABLE 7. Operating budget and acquisition expenditures 1987-1992 (current dollars)

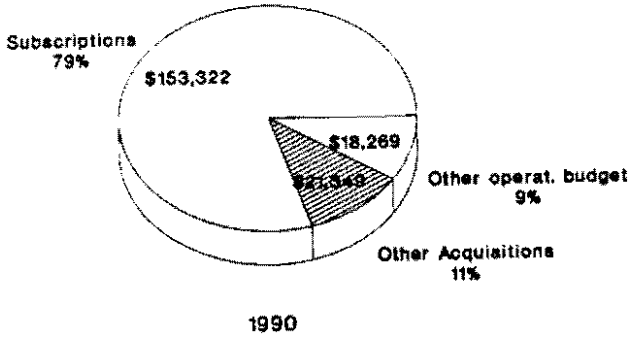
Year	Operating Budget	Acquisition Expenditures	Subscription Expenditures
1987	200,843	166,575	98,115
1988	194,321	250,113	199,248
1989	193,044	132,558	121.092
1990	192,940	174,671	153,322
1991	191,902	157,010	143,870
1992	209,082	153,258	134,600
Rate of growth	.005	-.044	.024
Standard error	.009	.053	.062

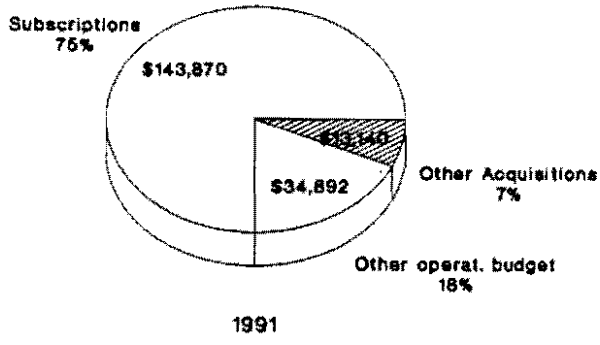
TABLE 8. Operating budget and acquisition expenditures 1987-1992 (constant dollars)

Year	Operating Budget	Acquisition Expenditures	Subscription Expenditures
1987	190,012	157,592	92,824
1988	176,816	227,582	181,299
1989	167,573	115,068	105,115
1990	158,929	143,881	126,295
1991	151,581	124,021	113,641
1992	160,093	117,349	103,063
Rate of growth	-.039	-.088	-.020
Standard error	.010	.053	.062









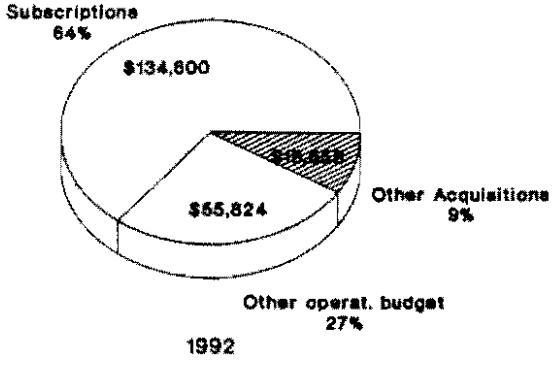


FIGURE 7. Expenditures for acquisitions and subscriptions 1987-1992 US$.

Financial data for 1988 are not included for lack of reliability.

TABLE 9. Technical services summary

	1987	1988	1989	1990	1991	1992
Acquisitions						
Journal Subscriptions						
Purchase	826	938	1,170	649	622	541
Exchange	1,335	1,362	1,362	1,388	1,552	1,742
Sub-total	2,161	2,300	2,532	2,037	2,174	2,283
Books						
Purchase	1,649	1,500	1,351	1,153	391	419*
Exchange	790	1,100	624	297	1,402	865
Sub-total	2,439	2,600	1,975	1,450	1,793	1,284
Photocopies						
Purchase	1,108	1,459	1,458	543	1,635	1,294
Exchange	120	441	98	--	1,813	530
Sub-total	1,228	1,900	1,556	543	3,448	1,824
Others **						
Purchase	3,764	--	7806	2,584	8	45
Exchange	532	--	323	177	8	5
Sub-total	4,296	--	8,129	2,761	16	50
TOTAL	10,124	6,800	14,192	6,791	7,431	5,441

* 181 of these books were ordered for the Library and 283 were ordered as working tools for programs with programs funds.

** Includes microforms, monographic serials, audiovisuals, software, optical media and maps.

TABLE 9. Technical services summary, cont.

	1987	1988	1989	1990	1991	1992
Indexing/Abstracting						
Cassava	630	571	848	719	601	477
Beans	1,073	643	780	906	1,027	651
Tropical pastures	584	662	715	583	985	657
Rice				733	1,338	703
TOTAL	2,287	1,876	2,343	2,941	3,951	2,488
Cataloging						
Journals			75	135	221	137
Books			826	699	1,424	565
Others			693	1,052	900	994
TOTAL	2,100	1,700	1,594	1,886	2,545	1,696
Other cataloging activities						
Input to AGRIS(FAO)database	29	68	161	151	174	514
Retrospective conversion					7,883	3,400
Input to CATAL database				1,200	10,325	3,715

inflation in the cost of production of most scientific and technical journals. This has necessitated strict management and major cancellations in journal subscriptions over the past three years in order to stay within the fixed operating budget. This explains why the amount actually spent on subscriptions has not varied that much in recent years. A comparison of **Figure 7** and **Figure 8** shows that in 1992 the Unit paid $36,500 more for 35% fewer journals than in 1987.

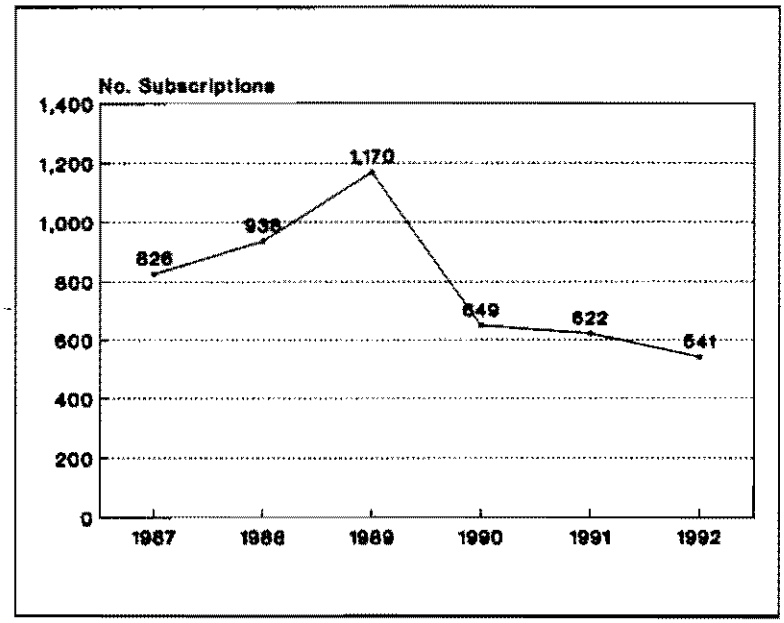


FIGURE 8. Number of purchased journal subscriptions 1987-1992.

To get a clearer picture of what is happening with journal subscriptions, one must look at changes in unit cost over the period. Two sets of data were compared, unit costs for all subscriptions and unit costs for a sample of twenty-two titles which are most in demand for photocopy service (**Table 10**). The data in current dollars show a significant increase in the unit costs for the whole population of journals as well as the sample (**Figure 9A**). The average cost of a journal in 1992 is 109% more than the average cost in 1987 in both the sample and the whole population. In constant dollars, the increase still remains high at 70% for the sample and 71% for the whole population (**Figure 9B**). Inflation accounts for a 4.4% annual increase in the Unit cost over the period, but increases in the base subscription costs account for an additional 9.3% per year for all journals and 11.6% for the sample population. In short, there is an adjusted annual inflation factor of 13.7% for all journals and 16% for the sample population -- for greater than the general inflation for other goods and services.

Even more dramatic is the 89% decline in book purchases over the period (**Table 9**) from 1,649 in 1987 to 181 in 1992. Subscriptions have priority over books. As the unit costs of subscriptions escalate, money is removed from the book budget to cover the excess. In 1992, the Unit ordered more books for the Programs as working tools than it did for the library collection, a fact that shows a serious imbalance in priorities. As a result of its exchange agreements with over 500 libraries, the Unit has been able to offset the diminishing resources for books and journals. In 1992, 76% of all journals, 67% of all books and 29% of all photocopies received arrived free of

TABLE 10. Subscription costs for most requested journals 1987-1992

Title	Country	1987	1988	1989	1990	1991	1992
Advances in Agronomy	USA	58.45	66.19	69.42	72.38	72.38	72.36
Agric. Ecosystems. Envir.	Netherlands	320.00	376.50	407.02	491.74	794.94	816.93
Amer. J. Agric. Econ.	USA	65.00	65.00	65.00	65.00	65.00	90.00
App. Environ. Micro.	USA		220	220	220	250	250
Aust. J. Agr. Res.	Australia	110	110	130	145	160	180
Biometrics	USA	60	60	65	65	80	80
Crop Science	USA	65	65	65	65	65	85
Desc. Plant Viruses	USA	17	17	17	36.59		
Develop. and Change	UK	73.49	93.5	99	116	128	149
Environ. Entomology	USA	66	110	110	110	130	150
Euphytica	Netherlands				714.8	936.36	881.21
Hortscience	USA	125	135	135	135	150	165
J. Plant Nutrition	USA	399	355	399	475	565	635
Nature	UK	250	250	275	295	350	395
Phytopatology	USA	165	165	175	185	200	225
Plant Disease	USA	150	165	165	175	190	210
Plant Physiology	USA	330	375	375	550	550	725
Plant and Soil	Netherlands	732	876	920	1024.99	1344.88	1270.04
Science	USA	196	196	220	240	300	195
Tropical Grasslands	Australia	71.42	98.46	107.56	105.68	104.68	51.58
Exper. Appl. Acarol.	Netherlands	100	251	255.6	368.8	519.1	569.39
Int. Devel. Abstr.	UK	92.39	112.2	115.5	166.9	286.77	374.72
	mean	172.29	198.18	209.5	264.68	344.86	360.49
	STD	164.34	183.60	193.89	243.76	327.82	324.16

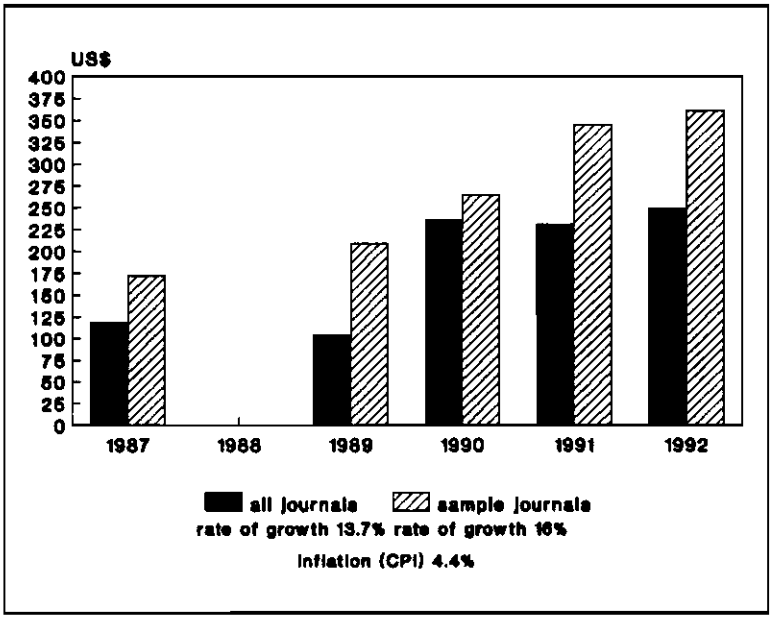


FIGURE 9A. Average unit cost per subscription for all journals compared with sample of most used journals 1987-1992 (current dollars).

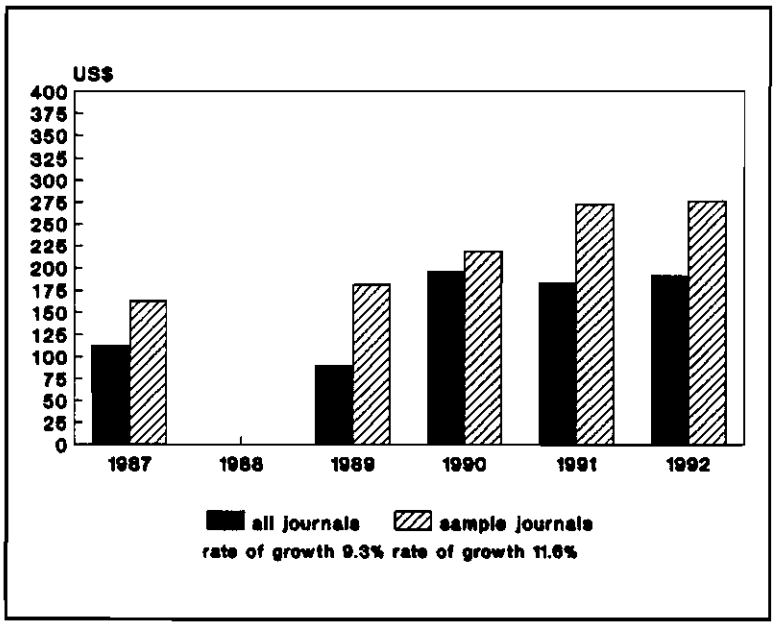


FIGURE 9B. Average unit cost per subscriptions for all journals compared with sample of most used journals 1987-1992 (constant dollars).

Financial data for 1988 are not included for lack of reliability.

charge through exchange agreements (**Table 9**).

In summary, extraordinary inflation in the cost of scientific and technical journals is a highly significant factor which has reduced the purchasing power of the Information Unit. Each year as unit costs rise, more journals must be canceled in order to compensate for the increased cost of the most important journals to be retained. There are two problems. Cancellation of titles to keep up with inflation is causing serious erosion in the journal collection. Acquisitions is also only one of twenty-two services provided by the Unit. As more of the Unit's operating budget is consumed by acquisitions, there are fewer resources to improve any other existing services or to develop new ones.

Indexing/Abstracting. The amount of indexing for the CINFOS commodity databases on pastures, beans and cassava has remained fairly constant at an average of 2,200 documents indexed per year (**Table 9**). Most of the fluctuations have been for personnel reasons such as vacancies or documentalists in training. There has been a real decline in cassava literature indexed over the past four years which is a result of fewer documents available for indexing. Total number of documents indexed began increasing in 1990 as a result of a special collaborative project with CIAT's Rice Program to index Latin American rice literature. A contractor was hired for this purpose. In 1992, however, there was a 37% decrease in the amount of indexing over 1991 as a direct result of the reduction in force and subsequent reorganization which had a severe impact on Technical Processes.

Cataloging and Related Activities. Cataloging, similar to reference services, has profited by the automation of technical processes. There was a notable (18%) increase in cataloging between 1989 and 1990 and a significant increase (35%) between 1990 and 1991 (**Table 9**). This increase coincides with the automation of the cataloging database which resulted in a much more streamlined, agile production process. The dramatic (33%) decrease in cataloging in 1992 is partially a result of a drop in book and journal purchases, but mostly a result of the permanent loss of personnel, subsequent reorganization and training of new staff in cataloging techniques. With the reorganization, indexing and cataloging was merged. The volume of publications arriving for processing has remained constant, but there are 50% fewer staff (5 instead of 10) in the Section since March 1992 to handle the workload.

Input of CIAT publications to FAO's cooperative bibliographic database, AGRIS, increased 195% between 1991 and 1992 and an amazing 1700% over the period from 1987 to 1992. This is a direct result of automation of cataloging which allows automatic exportation of records to other databases with the minimal amount of handling.

The new automated card catalog, CATAL, now has more than 16,000 machine-readable records. Approximately two-thirds of these were entered in the database in 1991 and 1992 in a retrospective conversion project. The other 35% reflect current cataloging over the three-year period 1990-92.

5.0 EVALUATION OF COLLECTIONS, PRODUCTS AND SERVICES

During the past three years the Unit has conducted a variety of evaluations to determine the efficiency and effectiveness of its products and services, to ensure that services are demand driven and to ensure that the Unit is current with the changing strategies and priorities of CIAT. There have been evaluative inventories of book and journal collections and publication exchange agreements and a complete revision of the selection policy used for guiding the acquisition of new publications. The Unit also conducted a three-part evaluation of its services including assessment of services audiences and costs, user survey of the commodity abstract journals, and evaluation of the specialized information centers CINFOS database.

5.1 BOOK AND JOURNAL COLLECTION EVALUATIONS

The Unit conducted a physical inventory of the general book collection in 1990. Qualitative evaluations of the book and journal collections were begun in 1992. Senior Staff were asked to assist the Unit staff in evaluating more than 25,000 books for relevance and quality. Unit staff are evaluating more than 3,000 serial titles including journals, periodicals, indexes, abstracts and annual reports for relevance, quality and period of retention. A particular emphasis is being placed on qualitative evaluation of journals received free (60% of all journals) through exchange agreements with 550 institutions. Exchange agreements for journals which are not relevant to CIAT's research priorities will be canceled.

5.2 DEVELOPMENT OF NEW SELECTION POLICY

The publication of the new CIAT Strategic Plan in 1991 pointed to the need to provide information support for entirely new program areas and to change the focus of the support of the traditional research areas. Previously, the Unit had no formal, documented selection policy to guide decisions on the acquisition of publications for the collection. Rather, there were informal, mostly unwritten traditional practices. In late 1991, the Unit surveyed CIAT principal staff and research assistants and associates in order to determine the relative research importance of over 122 topics. Opinions were sought on the importance of traditional subjects as well as new research areas addressed in the Strategic Plan. The results of the survey were used to craft a new selection policy in 1992. The new policy provides scope and coverage information for subjects of primary and secondary importance. It also gives guidance on aspects of language, format, age of document and treatment. The policy is currently being validated and revised through a series of interviews with selected senior staff in all of the major research areas.

5.3 ASSESSMENT OF COST OF SERVICES PROVIDED

This study, conducted in November and December 1991, is an inventory of all services provided by the Information Unit at the time and shows the allocation of resources, both human and financial, between services. The results show that the distribution of resources is consistent with the demand and that the services receiving more use consume a greater percentage of the resources. This is true for the journal collection, reference service, photocopy service, CINFOs database and abstract journals.

Two of the 21 services documented, the journal collection and the CINFOS database/abstract journals, account for one-half of the total Unit budget. One quarter of the services consume 70% of the human and financial resources. Subscriptions, alone, consume 71% of the operating budget and 32% of the entire Unit budget. Subscriptions have an average annual inflation rate of 20%. The study points out that there needs to be an annual adjustment to the operating budget to absorb this inflation and prevent serious erosion of the collection.

Almost 20% of the total budget and 25% of total personnel allocation (full-time equivalents) were spent on the CINFOS database and production of the abstract journals. This is a disproportionately high cost when one compares the number of CINFO database searches conducted in 1991 (852) with the number of searches in commercially-available compact disc databases (2,320). The CINFOS database, however, is the source from which many different products derive that together have formed the base for most of the Unit's public services, to date.

5.4 USER SURVEY OF CINFOS ABSTRACT JOURNALS

The objective of the user survey was to evaluate the need and usefulness of the abstract journals as a source of information, the appropriateness of the content and format and the pattern of use by subscribers. The purpose was also to determine the interest in an alternative product that could provide a similar service for less cost. The Unit mailed 1200 questionnaires to subscribers of the journals and received 447 responses (37.3%).

The results showed a high level of satisfaction with the abstract journals as they currently are and very little interest in a change of format. There is reason to believe that many subscribers use the abstract journal as a current awareness service to keep apprised of developments in commodity research. There is also a strong indication that the abstracts substitute for a subscription to the source journals.

The abstract journals are used most often by clients in developing countries, and especially in Latin America and the Caribbean. The journals are equally as useful as other sources of information such as personal contacts, working documents, annual reports, journals and databases. If the journals ceased publication it would affect the subscribers work a lot. Eliminating abstracts from the journals would have an extremely negative impact on their usefulness. Further, the current subject coverage is appropriate and preferred over a more subject-specialized service tailored to the needs of the subscriber. There is a strong preference for receiving the journals in paper instead of in diskette. Finally, most subscribers would prefer a service that is more frequent than the existing service (either monthly, bi-monthly, or quarterly). They would also prefer greater currency of the information indexed.

5.5 EVALUATION OF THE CINFOS DATABASE

The objective of this study was to determine coverage, duplication and uniqueness of the literature on beans and cassava produced in 1987 and 1988 referenced in CIAT's CINFOS (specialized information centers) databases and in the principal agricultural databases, CAB, AGRICOLA and AGRIS. The purpose was also to typify coverage by category of publication

(journal, monograph, analytic of book chapter, proceeding, thesis), by language and by country of origin of principal author.

The study analyzed 7,803 references recovered from searches in the CAB, AGRIS, AGRICOLA and CIAT databases for all the literature on beans and cassava published in 1987 and 1988.

Coverage. The results show that for the period studied AGRIS had the best coverage of beans and CIAT had the best coverage of cassava. The best pair and best trio of databases for beans was AGRIS-CAB and AGRIS-CAB-CIAT, respectively. For cassava the best pair and trio were CIAT-CAB and CIAT-CAB-AGRIS.

Duplication. Duplication was higher in coverage of the bean literature than it was for cassava. Forty-eight percent of CIAT's bean database was duplicated in other databases, while its cassava database was duplicated by 39%. Duplication of CIAT in any one of the other three databases did not exceed 32% for beans or 26% for cassava. Duplication was highest in the AGRICOLA database with levels at 85-87% for both beans and cassava.

Uniqueness. Approximately 50% of all the bean references in the CIAT, CAB and AGRIS databases were unique, that is, not duplicated in any of the other databases, while only 15% of AGRICOLA references were unique. AGRIS and CIAT registered even higher levels of uniqueness for cassava literature with 65% and 61% respectively.

Typology: Category of Publication. The majority of references in all four databases were from journals. CAB and AGRICOLA had much higher levels (84-88%). CIAT and AGRIS had a much broader distribution of references among the five types of document categories analyzed for both beans and cassava. Both were strong in monographs, analytics and conference proceedings. This reflects the selection policies of the databases. CAB and AGRICOLA cover primarily refereed journals, while CIAT and AGRIS cover refereed journals as well as gray, unconventional literature.

Typology: Language of Publication. English was the primary language for all databases, followed by Spanish and Portuguese in CIAT and AGRIS. CIAT had the best coverage of literature in Spanish.

Typology: Country of Origin of Principal Author. For both the bean and cassava literature, fifteen countries (seven of them in Latin America) supplied 75% of the information.

6.0 SCIENTIFIC INFORMATION SERVICES: OPTIONS FOR 1993-1998

6.1 CONSTRAINTS

The greatest challenge facing the Information Unit over the next six years is the increased demand for services in the face of declining human and financial resources. The trend of rising demand began in 1989 with the increased availability of information, speeded by advances in automation. Only in 1992 do we begin to see a change in the trend. In the beginning of 1992, at

the peak of the services curve, the Information Unit lost six full-time positions, three of them professional-level. The Information Unit, working with 21.5% fewer staff, has already reached it. saturation point. In addition, the Unit's operating budget has had a real decline over the past six years. This has resulted in interruption of service for important scientific journals that support basic research at CIAT. It has also had a negative impact on the Unit's ability to conserve historic collections, modernize processes or develop new services to expand the dissemination of published research results to CIAT's actual or potential partners.

Recently, CIAT's Strategic Plan created a new Resource Management Division, nearly doubling the size of the institution in terms of its mandate, personnel base and need for scientific information support. In particular, there are new information needs in new disciplines never before supported by the Information Unit. Neither the Unit's collections of books, journals and databases nor the Unit's subject-specialized staff can adequately support the demands of these new and different research areas. If the Information Unit is at the saturation point meeting the demands of the "old CIAT" in 1992, how can it possibly absorb support to the "new CIAT" in 1993-1998?

6.2 OPTIONS FOR THE FUTURE

It is clear that the Information Unit can no longer offer services at the same level as before. With decreased staff and financial resources there will have to be some fundamental changes in the traditional way of doing things as well as increased institutional support if the Unit is to be expected to have any impact at all in the next six years. CIAT's research collaborators consume half of the Information Unit's services. Whatever changes are implemented must take care not to disenfranchise this important client group of access to scientific information. Alternatives are being considered to cut costs, generate income and provide alternative services. The following options which might help to achieve this objective are being considered. Decisions must be made in the very near future.

Develop Diversified and More Focussed Services.

- Develop a new series of subject-specialized alert bulletins to cater to the new research areas of CIAT. These bulletins would have greater frequency (bi-monthly) and would focus on the latest literature appearing in several databases on the topic. Complimentary subscriptions to the alert bulletins on diskette could be offered to national program partners.

Advantages: The service would be demand-driven. It would be more specialized, cheaply-produced, more current and oriented to a more specific clientele. Only those subscribing to the alert bulletins would receive the service.

Disadvantages: Many researchers prefer a general current awareness service, similar to the Unit's Abstract Journals. Many also prefer paper only. Those without access to micros would not receive the information. Abstracts for references from external databases would not be included to avoid copyright infringement problems.

Increase Access to External Databases.

- o Invest a greater portion of the operating budget in access to external databases either online via telecommunication networks or locally via compact disc to obtain information to support CIAT's new research areas. Invest in other intermediary sources such as Current Contents for these new research areas.

Advantages: This will provide current access to the research results being published in areas not traditionally covered by the Information Unit. This will reduce the need to make large investments in additional journal subscriptions. Copies of the source articles would be ordered, as needed from document suppliers.

Disadvantages: Costs of online searching would increase dramatically, but would be offset to a degree by savings from not subscribing to new journals.

Charge Special Projects for Information Support.

- o Implement an institutional policy, effective January 1993, of charging special projects a fixed percent for the support of information services to include such items as journal and book purchases, photocopies, publications, bibliographies, database subscriptions, and searches, etc. This would allow the Information Unit a margin to develop information services and products to support the demand of new research areas.

Advantages: This would guarantee continuity for important journal subscriptions and would also guarantee that the minimum of documentation materials needed to support projects would be available.

Disadvantages: Donors or Programs may object.

Develop Special Projects.

- o Develop special projects in collaboration with other IARCs or national institutions to obtain resources necessary to provide improved information and documentation services to CIAT research partners and to strengthen information resources in the region.

Advantages: Would generate more income for the Unit to help preserve core journal collections intact. Would generate value-added products such as collective catalogs or shared databases where the resources of many would be distributed to many. Would provide the Unit the opportunity to use its international perspective and experience to network with other regional and international institutions.

Disadvantage: Would represent a greater commitment of Information Unit human resources in project design, management and implementation.

Develop Closer Liaison with CIAT Programs.

- Existing staff from the Information Unit will have additional responsiblility as information liaison on behalf of the Information Unit to each program area of the new CIAT. These staff will stay in close conmunication with the program staff to guide selection of books, journals and databases, to develop information products of value to the program and to work collaboratively on projects where information and documentation expertise is required.

Advantages: This will ensure that the Unit is well-informed of research information needs and priorities and that the products and services developed by the Information Unit are responsive to those needs.

Disadvantages: It will take staff away from other duties and responsibilities in the Information Unit.

Bring in New Partners.

- Continue networking with national, regional and international institutions to create opportunities to share resources or collaborate in the production of information products. Pursue discussions with CABI, AGRIS, the National Agricultural Library (U.S.), the new European Consortium for Research on Tropical Agriculture and other IARC information and documentation units to develop joint databases or cooperative indexing projects.

Advantages: If CIAT participates in cooperative projects, it will receive the benefits, or access to more information, at less cost. Cooperative indexing agreements between CIAT and major database producers might result in cheaper access to quality products such as CD-ROMs and wider dissemination of CIAT published information to a much larger client base. It is also an opportunity to network with other CGIAR centers and possibly reduce large local investments in database production.

Disadvantages: CIAT would lose control over product design and content decisions and marketing aspects.

Continue Automation for Efficient, Effective Access to Information.

- Implement a local area network in the Information Unit to improve efficiency and effectiveness of database production, share administrative software and improve communication.

- Install an integrated library system to control and integrate basic functions of catalog production, circulation, serials control, authority file control, acquisitions and administrative reporting.

- Develop integrated products that derive automatically from database services.

- o Implement scanning technologies for automatic transfer of author abstracts to the bibliographic record in the database and for production of pages of contents.

- o Increase use of telecommunications networks for rapid delivery and receipt of information.

Advantages: There would be an increase in productivity by reducing or eliminating manual routines and duplication of effort. There were be greater ease in developing information products.

Disadvantages: There would need to be a modest capital investment, although it would be amortized rapidly because of increased productivity and accuracy.

Cut Back on Existing Services.

- o Stop publishing abstract journals on beans, cassava and tropical pastures, effective with 1993. Continue indexing for these commodities, but according to a new, more restricted selection policy that reflects changes in focus in the new Strategic Plan.

- o Stop writing original abstracts. Use only author abstracts when available and scan them into the bibliographic record.

- o Stop manual translation of abstracts. Include abstracts in the original language only. Continue to use ENGSPAN for machine translations from English to Spanish.

- o Stop indexing refereed journals for the local database which are already indexed by CAB, AGRICOLA, BIOSIS, FSTA or other international databases received by the Information Unit. Concentrate on indexing regional literature in Spanish or Portuguese and quality gray literature that is not well-covered by the above databases, only in subjects of research interest to CIAT.

Advantages: Ceasing the writing of original abstracts, manual translations and the publication of the Abstract Journals will alleviate the pressure on the cataloging/indexing staff who currently cannot keep up with the flow of incoming documents. Processing backlogs would be reduced and possibly eliminated and indexing would be more current. This would ultimately provide more up-to-date database service to the users. A decision to stop duplicative indexing of literature already covered by the major databases (and available locally in the Information Unit) would free up staff time to index more quality regional and gray literature which is currently not well-covered by the other databases.

Disadvantages: The main beneficiaries of the Abstract Journals, the cassava, beans and pastures researchers and libraries in national agricultural research institutions, will lose a free alert service that, for many, substituted for first-hand access to the journal collections. These users probably cannot affort to subscribe to alternative sources commercially available.

LIST OF PUBLICATIONS OF THE CIAT INFORMATION UNIT
1987 - 1992

General Bibliography Series

1987

Mejía M., Mariano ; Pizarro, Esteban A. Introducción y evaluación de germoplasma forrajero en América Tropical : bibliografía (1931-1985). -- Cali, Colombia : Centro Internacional de Agricultura Tropical, Unidad de Comunicaciones e Información, 1987. 316 p. Es.

Rubiano, Miguel ; Núñez, Víctor Manuel ; Gomez V., Stella. Rice : bibliography = Arroz : bibliografía / comps., Miguel Rubiano, Víctor Manuel Núñez, Stella Gómez V. -- Cali, Colombia : Centro Internacional de Agricultura Tropical, Programa de Arroz, 1987. 408 p. En, Es. -- (Serie: fascículos bibliográficos del CIAT ; no. 2)

1988

Centro Internacional de Agricultura Tropical. Bibliography on bean research in Africa : supplement 1988. -- Cali, Colombia : CIAT, 1988. 221 p. En. 655 Ref.

Centro Internacional de Agricultura Tropical. Cassava research in Africa : a bibliography : supplement 1988. -- Cali, Colombia : CIAT, 1988. 474 p. En. 1302 Ref.

Janssen, Willem ; López Santa, Jorge ; González V., Francy. Snap beans : present status in the developing world and bibliography of research (1919-1987). -- Cali, Colombia : Centro Internacional de Agricultura Tropical, 1988. 411 p. En.

Lareo, L.R. ; González V., F., comps. Acceptability and nutritional quality of common beans (Phaseolus vulgaris L.) : a bibliography. -- Cali, Colombia : Centro Internacional de Agricultura Tropical, 1988. 279 p. En. 614 Ref.

1989

Amaya Puerto, Susana ; Rizo P., Nora. Selección bibliográfica sobre comunicación agrícola / compiladoras, Susana Amaya P., Nora Rizo P. -- Cali, Colombia : Centro Internacional de Agricultura Tropical, 1989. 42 p. Es.

López, J. Snap beans : present status in the developing world and bibliography of research : supplement to the bibliography, 1989. -- Cali, Colombia : Centro Internacional de Agricultura Tropical, 1989. 99 p.
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Draft

The CIAT Communications Unit: 1987-1997 and Beyond

December, 1992

CIAT
Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

Draft

The CIAT Communications Unit: 1987-1997 and Beyond

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CIAT
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International Center for Tropical Agriculture

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25 Nov 92

THE CIAT COMUNICATIONS UNIT: 1987-1997 and beyond

Mission statement: To effectively communicate CIAT research results, accomplishments, and challenges, through print, electronic media, and personal contact, to various target audiences. Most CIAT communication falls into one of two categories:

Scientific communication: Directed primarily to increase communication among scientists in developing countries of the tropics, but also among researchers in the developed nations, as well as educators and extension specialists.

Public awareness. Planned communication activities to promote a positive image of CIAT. Target audiences are in the donor countries, primarily to encourage donor funding; and in partner countries, to maintain a favorable working environment. CIAT PA activities focus mainly on the mass media: providing written and visual materials to the press, and helping the press report on CIAT activities. Demands for PA, especially in English, are increasing as competition intensifies for scarce funds.

THE FOUNDATION: 1987-1991

During this period, what is now the CIAT Communications Unit operated as three separate units under the Training and Communications Support Program: Scientific Publication, Distribution, and Translation; Public Information; and Graphics Arts.

Scientific publication, translation, and distribution.

One hundred and four scientific books were published, and 25,000 copies were distributed, mostly to NARS in Latin America. [1]

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[1] Prepared by Dr. Thomas H. Hargrove, editor and head, Communications Unit, International Center for Tropical Agriculture (CIAT), Cali, Colombia. Presented at the CIAT Annual Program Review, 2 December 1992.

The translation unit was started in 1988 when CIAT acquired ENGSPAN, a Spanish-to-English computer translation program developed by the Pan American Health Organization. By December, 1991, 9,782 pages of text had been translated by ENGSPAN.

Graphic arts.

By 1991, more than 4.6 million pages of educational materials were being printed in-house at CIAT. Production of camera-ready pages had almost quadrupled from 1988 to 1991 with the introduction of computerized desktop publishing technology. Production of camera-ready pages by commercial agencies had almost ceased by 1991.

THE TRANSITION: 1992

In January, 1992, the three groups responsible for most CIAT communication--*Scientific Publication, Public Awareness*, and *Graphics Arts*-- were merged as the CIAT Communication Unit under the management of a unit head. Appendix 1 gives the organization structure.

Overall staffing. Staff positions total 42; of those, 24 positions are in Graphics Arts and the remainder in Scientific Publication, Public Awareness, Translation, and Distribution. The Unit head fills one of the two international positions; the other was "frozen" until recently. The vacancy has been advertized widely, and selection of the new senior editor will soon begin.

Scientific publication. Five local editors handle Scientific Publication; three for Spanish publication and two for English.

Sixteen major scientific books were released from January through October, 1992; nine were in Spanish and seven in English (Appendix 2). In addition, one working document and twelve brochures were released.

Twenty-four publications are now in the editorial process (Appendix 3).

Publications Advisory Committee. CIAT has had no clear policies on the publication of scientific literature, nor on procedures or funding. A Publications Advisory Committee was established in 1992 to assist in the planning and scheduling of future publications, and in decisions on which books to publish. Appendix 4 gives its Terms of Reference.

Publication proposals. The Publication Advisory Committee prepared a standardized publication proposal format (Appendix 5). It was developed from

similar formats required by commercial publishers such as Academic Press or John Wiley.

Scientists who are planning or considering a future CIAT book (monographs, conference proceedings) or other major editorial projects now submit a proposal to the PAC for review. The PAC recommends approval or disapproval, and sets priorities for publication.

Publications revolving fund. In the past, CIAT has budgeted a yearly pre-set amount to support book publishing (US$21,000 for 1992). Income from sales has been debited against that budget. Any surplus funds at the end of the year went to Administration.

In 1992, we took the first steps to make book publishing self-sustaining, or profitable if possible, by establishing the Publications Revolving Fund. The PAC drafted procedures for operating the PRF (Appendix 6).

Translation. One person handles computed-based translation through EngSpan, a program developed for the Pan American Health Organization. From January through October, 1992, almost 1,000 pages of English text were translated by computer.

Another 340 pages of text, mostly Spanish to English, were translated by hand.

Distribution. Almost 45,000 copies of CIAT periodicals were distributed from January through October, 1992. About 4,200 books and more than 3,600 study guides and audiotutorial units were sold. We distributed 30,500 press releases.

CIAT promoted its publications through an exhibit in the Cali Book Fair in November.

Graphic arts. Despite a 20% reduction in personnel, GA produced 2,132 camera-ready pages for printing by October, 1992. Improved use of desktop publishing enabled production to remain high with a reduced staff. More than 37,300 slides and 27,600 B&W prints were produced. About 4.1 million pages were printed in-house. (Appendix 7).

Distribution of high-speed photocopiers across CIAT enabled better use of offset printing facilities, compensating for understaffing in the printshop.

Public awareness. In January, 1992 CIAT had one PA specialist who writes in Spanish, and no one for English. We located talents for English writing within CU, gave intensive training (mainly through writing press releases), and shifted responsibilities so that one person now works on English-language PA.

Print media.

Press list. CIAT had no formal press list, except for about 20 addresses in Colombia, as 1992 began. We have built a list of 1,100 media outlets, worldwide.

Press releases. Twenty-six press releases were written, by PA writers, science editors, and trained CIAT spouses, and distributed in both English and Spanish (Appendix 8).

Media coverage. Monitoring of use of our press materials is difficult. There is no clipping service that covers Latin America, but we recently learned of, and subscribed to, a service for the major Colombian papers. (The CGIAR has just subscribed to an international clipping service, on behalf of all Centers.)

Nevertheless, we know that CIAT appeared in the press at least 55 times in 1992, including 10 articles in the international press. CIAT was also featured in the *London Financial Times*.

A major feature on CIAT work to deal with erosion problems associated with cassava production on the hillsides was published in the 21 October edition of the prestigeous German paper *Frankfurter Allgemeine Zeitung*. It was adapted from a CIAT press release.

Press visits. About 50 journalists visited CIAT in 1992. All were Colombian.

Special problems. CIAT's location makes the international press difficult to attract. Centers like IRRI and CIP get considerable "spinoffs": a journalist visits the host country to report political stories, and stays a couple of extra days to visit those Centers. But most foreign journalists who visit Cali, come to report on the *narco* traffic. They keep a low profile, and leave as soon as possible. We are addressing new ways to attract foreign media in 1993.

Television. Success in attracting television has been greater than with the print media; CIAT is the focus of two international TV programs filmed in 1992. My theory: TV production is so expensive that international travel is only one of many factors to consider. Both TV crews came, or will come, to Colombia specifically to film CIAT programs. And both were attracted by articles published as press releases.

"Fruits of the Earth." This is an educational series on the world's major food crops, produced by a Swiss company for a German TV network. It is broadcast worldwide in six languages. A "Fruits of the Earth" crew spent 10 days at CIAT and across Colombia in November, filming a special feature on beans.

"The New Explorers." This program seeks to popularize science, especially for young people. It is carried on the U.S. Public Broadcasting Network. The program then goes to high schools and colleges across the USA and Canada where it is used as a classroom resource. "Explorers" will send a crew to film CIAT cassava research in December.

Colombian TV. CIAT was featured on about 10 local TV programs in 1992. Most were subsequently broadcast across Colombia.

Video. In 1992, CIAT produced its first video for PA purposes: *A Fragile Paradise: The environmental challenge of Latin America.* We will make it available for television broadcast at no cost in developing nations. The English edition was finished in late September and the Spanish, 2 months later.

Paradise focuses on environmental problems of the region, and strategies of CIAT and cooperating national programs to increase food production in an environmentally sustainable way. It was shot in Costa Rica, Haiti, Brazil, and across Colombia. The film includes dramatic footage of forests being felled in the Amazon.

The film was a joint production of AGCOM, a U.S.-based agricultural film company, and CIAT. It is available in 3/4-inch Umatic, 1-inch, VHS, or Betamax, and various systems (NTSC, PAL, etc.). Its length is 27 min., 45 sec. (appropriate for a 30-minute TV feature).

Distribution (English). We gave demonstration copies of the video to The Discovery Channel, Public Broadcasting Service, and the Pacific Mountain Network, based in Denver, Colorado. We have received two distribution offers in the USA and Canada from PMN, which provides satellite access to educational programs for public TV stations and for educational institutions.

PMN wants to use the program for two purposes: 1) for the 207 Public Broadcasting Stations on its network--which has a potential audience, through its affiliate networks, of 93 million households in the USA and Canada, averaging 2.2 persons each; and 2) For 10,000 public schools through its satellite "classroom channel." Average school viewership is 400 students.

We immediately granted PMN classroom rights. But we are holding off on the PMN TV offer until we get a response from the Discovery Channel and PBS, which might give better coverage plus payment, which would help us recover some costs.

But the PMN offers alone, we believe, justify the costs of the film.

Distribution (Spanish). The Spanish edition of *Paradise* was launched on 25

November at the first conference ever held of the managers and programmers of the top television networks of every Spanish-using country. Sponsors were the Government of Spain and Telepacífico (the TV network from Cali). CIAT was its venue.

One conference objective was to establish a satellite network for the sharing of educational programs, especially science, among all Hispanic countries. CIAT welcomed the television leaders, showed *Paradise*, then presented each a broadcast-quality copy. The video is available for broadcast across Latin America at no cost.

As a "spinoff" from the project, we are also making a 1-hour tape of "stock" video footage, which we will provide to TV stations.

THE FUTURE: Plans For 1993-97

Staffing and reorganization. An international position for Science Editor/Writer will be filled in 1993. The CU Unit Head will continue to have primary responsibility for Unit management, plus all PA activities. The new Editor/Writer will assume primary responsibility for management of the scientific publication program, in Spanish and English, under the direction of the Unit Head.

A local editor will coordinate and maintain quality control for all Spanish scientific publication. Another local editor will assist the CU head in coordination of all PA, in both Spanish and English.

We will continue to identify persons with communication *talents*, including CIAT spouses and other expatriates in Cali, and teach them the *tools* and *skills* essential for writing and editing. Thus, we will build a "pool" of contract writers and editors us to expand our editorial capacity while adding as few positions as possible. Included in the pool will be journalism students who must complete a 6-month "practical."

Graphic arts. By 1993, CIAT artists and designers will have better command of our computer-aided design software. By 1995, the printshop should have at least one press that is interfaced to a PC. For many printing jobs, that will eliminate the physical reproduction of camera-ready pages.

The filing and retrieval system for thousands of slides and prints in photography is inadequate. We will establish a photo laboratory, probably with images stored on compact discs. CIAT scientists should be able to search the system from the

local-area network. We will also start a library of stock video footage.

Scientific publication.

Categorization, guidelines, and responsibilities. CIAT's scientific publications have not been categorized; nor have clear publication guidelines been established. The Publications Advisory Committee has drafted a categorization of publications, and guidelines for their compilation, editing, manufacture, and distribution (Appendix 9). In 1993, these will be finalized.

Changes in scientific publication. The need for scientific publication will clearly continue through 1997. Some new initiatives will be:

-Electronic publication. Compact disc technology opens the door to vastly cheaper, and easier, access to scientific data. All major IARC publications (including those of CIAT) from 1962 through 1987 will be published in 1993 as a CGIAR CD-ROM set. In 1993, the set will be updated through 1992, then updated yearly.

By late 1993, all CIAT scientific publications will be archived in electronic form. This will save on costs of rekeying publications for the CGIAR discs, and will facilitate the compiling of specialized electronic reference sets.

-Copublication. We will increase copublication, or joint publication with other agencies, through two distinct fronts:

> -With HDC[2] publishers. These arrangements will be mainly for joint publication of scientific books, primarily in English. CIAT will turn over responsibility for the editing and manufacte of certain books to the HDC publisher. Along with that package comes exclusive distributorship in the lucrative HDC markets. CIAT will take additional copies--at manufacture cost--off the same press runs for sales in LDCs only. This method will be cost-effective, in both financial and human resources, in getting more materials out. Similar arrangement should be possible with Spanish-language publishers.
>
> -With LDC[3] publishers. Certain books, particularly those closer to the extension level, will be designed for easy and inexpensive translation and copublication by national agencies. These include field identification guides that require color printing, and highly illustrated

[2]Highly Developed Country

[3]Less Developed Country

"primers." The first CIAT book designed specifically for copublication will be *Field Problems of Tropical Beans*, to be first published by CIAT in Spanish and English in 1993. National agencies should handle editions in Portuguese, Kiswahili, French, and other languages.

-Funding and distribution of publications. Publications with a market value should be self-sufficient, through the Publications Revolving Fund, by 1994.

Distribution. CIAT will promote its publications at the Bogotá International Book Fair in 1993.

With increased distribution, HDC sales should partially subsidize LDC distribution. We hope to re-invest profits in more technology to streamline the publication-distribution process.

Public awareness.

Press relations. CIAT will increasingly enlist the international and local media as partners in the task of informing the investor community, opinion leaders and decision makers, and national agricultural leaders of our activities and goals. This will be through several initiatives.

-Press releases. We will release 1 press release/week, in both English and Spanish.

-Press days will be held at least twice a year.

-Placement in prestigeous media. We have contracted a Washington D.C.-based public awareness firm to help develop CIAT's overall PA strategy, and to identify specific articles to target for key media. (The firm was directly responsible for placement of CIP's "hairy potato" story, which appeared first in the *Christian Science Monitor*, then was picked up by the *Washington Post*, then the momentum grew and CNN even featured it. The firm also handled a feature on CIMMYT's new rust-resistant wheat, which was published first in the *Wall Street Journal*, then picked up by the *Post, Science, Los Angeles Times, Toronto Star*, etc.)

CIAT and the Latin American program of IBPGR will bring John Madeley, editor of *International Agricultural Development* and correspondent for BBC and the *London Financial Times*, from the UK in January, 1993. Madeley will spend 5 days reporting on each Center's work.

CIAT, CIMMYT, and CIP are sponsoring the travel of an Australian journalist across Asia to visit Center projects in that region sometime in 1993. This

initiative was encouraged by The Crawford Fund.

-Monitoring and economic evaluation of PA efforts. We have initiated a PA database of all CIAT media coverage. We request advertising rate cards that give fees in centimeters or inches from each paper or magazine that mentions CIAT.

We then put a dollar value on the coverage by comparing what it would cost if "purchased" through advertising. Categorization of the source of the coverage (i.e. press releases, personal interview, etc.) will help us measure effectiveness of each type of PA activity. Advertising rates also give a good measure of the *quality* of CIAT media coverage; the most prestigeous media, and those with the widest readership, have the highest rates. We can assess our efforts monthly by their "dollar value."

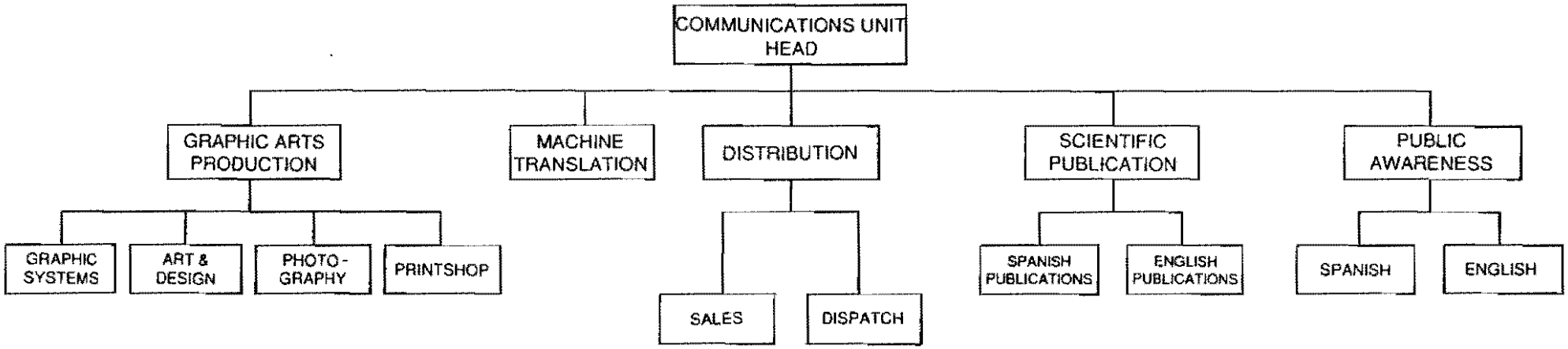
National Geographic feature. *National Geographic* is preparing a major "commodity feature" on rice. Obviously, 90% of the article will focus on Asia, and IRRI will be prominent. But we hope that CIAT and Latin America can get at least a photo or two and a couple of paragraphs. (I wrote the proposal for the NG rice feature, and have met personally and by phone with its writer and photographer in its planning.) With a subscription list of 12 million, and readership of 70 million, it would be well worth our efforts.

Video. We must obviously move further into video if we are to truly increase CIAT's exposure. If our 1992 investment in *A fragile environment* proves worthwhile, we may make another video yearly afterward. English editions will be targeted to HDCs, and Spanish, across Latin America. We hope to recuperate some costs from sales of the English editions; we will continue to provide Spanish editions free of cost.

-Video news releases, 3- to 4-minutes each, will be prepared and released to international and local TV networks. The footage shot for the 1992 video will be invaluable for these releases.

-A "stock footage" tape of scenes of CIAT work and commodities in Brazil, Haiti, Costa Rice, and across Colombia will be made available to TV networks.

Appendix 1



Organizational structure of the CIAT Communications Unit

Publications, January to 31 October 1992

Books/Libros

Title	Editor
Snap beans in the developing world	Bill Hardy
Evaluaciones de tecnología con productores: Metodología para la evaluación abierta. Unidad de Instrucción No. 1	Ana Lucía de Román
Manual para la evaluación de tecnología con productores	Ana Lucía de Román
An atlas of cassava in Africa: Historical, agroecological and demographic aspects of crop distribution	Elizabeth de Páez
CIAT, CIMMYT, and CIP: Their role in agricultural research in Latin America and the Caribbean	Elizabeth de Páez
Arroz en las Américas 13(1), abril 1992	Francisco Motta
Arroz en las Américas 13(2), agosto 1992	Francisco Motta
Pasturas Tropicales 14(1), abril 1992	Alberto Ramírez
CIAT International 11(1), August 1992	Thomas R. Hargrove Alexandra Walter
CIAT Internacional 11(1), agosto 1992	Thomas R. Hargrove Alexandra Walter
CIAT International 11(2), October 1992	Thomas R. Hargrove Alexandra Walter
CASSAVA newsletter 16(1), August 1992	Elizabeth de Páez Ana Lucía de Román
YUCA boletín informativo 16(1), agosto 1992	Ana Lucía de Román

Title	Editor
Arroz en América Latina: Mejoramiento, manejo y comercialización	Francisco Motta
Papel del CIAT, el CIMMYT y el CIP en la investigación agrícola de América Latina y el Caribe	Margarita Baena Francisco Motta
Pastures for the tropical lowlands: CIAT's contribution	Bill Hardy

Working Documents/Documentos de Trabajo

Title	Editor
Participación de los productores en la selección de variedades de yuca	Ana Lucía de Román

Brochures/Volantes

Investigación para el crecimiento sostenible de la producción agrícola.

Suscripción/renovación a Pasturas Tropicales 1992.

Keep up-to-date! (1992).

Manténgase al día! (1992).

Establecimiento y renovación de pasturas.

Snap beans in the developing world.

Gender analysis in agricultural research.

Análisis de género en la investigación agrícola.

Arroz en América Latina: Mejoramiento, manejo y comercialización.

CIAT History and organization.

Shareholders in development: Germany and CIAT.

Shareholders in development: Japan and CIAT.

Press Releases/Boletines de Prensa

Title	Writer
Wild Mexican bean protects crops without chemicals.	Alexandra Walter
Un frijol silvestre protege los cultivos sin plaguicidas.	Alexandra Walter
Seeds of new thoughts become seeds of hope for Latin American farmers	Margarita Baena
Investigadores y agricultores siembran semillas de futuro para América Latina.	Margarita Baena
First "train the trainers" class graduates from CIAT.	Claudia Muñoz
El primer grupo del proyecto "Capacitar a los Capacitadores" se gradúa en el CIAT.	Claudia Muñoz
Beauty: a reason behind genetic diversity in beans.	Alexandra Walter
No sólo como pan vive el frijol.	Alexandra Walter
Helping world feed, without destroying itself is focus of U.N. agriculture briefing.	Margarita Baena
Alimentar a la humanidad sin destruir el planeta es tema de reunión en las Naciones Unidas.	Margarita Baena
Cassava conquers new markets.	Bill Hardy
La yuca conquista nuevos mercados.	Bill Hardy
South American forage legume spreads to China.	Alberto Ramírez
Leguminosa forrajera originaria de América del Sur se propaga en China.	Alberto Ramírez
Scientists pit disease against cassava pest.	Claudia Muñoz
Enfermedad de la yuca vs. plaga.	Claudia Muñoz
"Friendly insects" battle across continents to save a neglected crop.	Bill Hardy

Title	Writer
"Insectos benéficos" sudamericanos combaten en Africa las plagas de un cultivo olvidado.	Bill Hardy
New CIAT book on women in agricultural research.	Bill Hardy
Nuevo libro del CIAT sobre mujeres que participan en la investigación agrícola.	Bill Hardy
Aerial photo of CIAT.	Alexandra Walter
Foto aérea del CIAT.	Alexandar Walter
Unexplored possibilities for "popping beans" -a lost crop of the Andes.	Loretta Ferguson
Nuevas posibilidades para las ñuñas" -un cultivo perdido de los Andes.	Loretta Ferguson
CIAT's gene bank: witness to our past, guardian of our future.	Margarita Baena
El banco de germoplasma del CIAT: testigo del pasado, custodio del futuro.	Margarita Baena
Does international agricultural research pays its dues?	Alexandra Walter
¿Aporta su cuota la investigación agrícola internacional?	Alexandra Walter
New IDB book examines lessons from Latin American development.	Margarita Baena
Nuevo libro del BID evalúa experiencias sobre el desarrollo de América Latina.	Margarita Baena
Gene banks: trustees of the world's genetic diversity, not museums.	Margarita Baena
Cassava: new alternatives for the scapegoat of hillside erosion.	Margarita Baena
Nuevas posibilidades para la yuca, el chivo expiatorio de la erosión en laderas.	Margarita Baena
Savannas: where the grass is greener than ever.	Margarita Baena

Title	Writer
Sabanas: donde la pradera es más verde que nunca.	Margarita Baena
First global meeting on high-tech. cassava.	Bill Hardy
Primera reunión mundial sobre alta tecnología en yuca.	Bill Hardy
Getting seeds flowing at Peru's Amazon forest frontier.	Bill Hardy
Haciendo fluir las semillas en la frontera de bosque amazónico del Perú.	Bill Hardy
Cassava turns to cyanide for self-defense.	Bill Hardy
La yuca usa el cianuro para su autodefensa.	Bill Hardy
Latin American course on in vitro germplasm management.	Claudia Muñoz
Curso Latinoamericano sobre Manejo de Germoplasma *in vitro*.	Claudia Muñoz
You're covered! Cover legumes for savannas and degraded environments.	Bill Hardy
Leguminosas nutritivas cubren sabanas y ambientes degradados.	Bill Hardy

Publications in Editorial Process or in Press

31 October 1992

Title	Editor
Systeme standard pour l'evaluation du germoplasme du haricot	
Maní forrajero perenne: Una alternativa para ganaderos y agricultores	Alberto Ramírez
El pasto *Brachiaria humidicola* en los Llanos Orientales de Colombia	Alberto Ramírez
Impacto socioeconómico de sistemas agroforestales en la selva baja del Ecuador	Alberto Ramírez
Pasturas Tropicales 14(2), agosto 1992	Alberto Ramírez
CIAT Internacional 12(2), octubre 1992	Thomas R. Hargrove Alexandra Walter
Rice in Latin America: Improvement, management, and marketing	Elizabeth de Páez
Forage germplasm under small-plot grazing: Evaluation methodologies	Elizabeth de Páez
Farmer evaluations of technology: Preference ranking. Instructional Unit No. 2	Bill Hardy
Arroz en las Américas 13(3), diciembre 1992	Francisco Motta
CASSAVA newsletter 16(2), December 1992	Elizabeth de Páez Ana Lucía de Román
YUCA boletín informativo 16(2), diciembre 1992	Ana Lucía de Román
Pasturas Tropicales 14(3), diciembre 1992	Alberto Ramírez
Cassava Program Report (Working document)	Elizabeth de Páez

Title	Editor
Conducting on-farm experiments	Elizabeth de Páez
Evaluating pastures with animals	Elizabeth de Páez
Memorias desarrollo rural amazonía peruana	Bill Hardy
Problemas de campo en los cultivos de frijol en el trópico	Bill Hardy
Centrosema: Biología, agronomía y utilización	Francisco Motta
Manual de uso correcto de plaguicidas	Francisco Motta
Descriptores varietales: Arroz, frijol, maíz, sorgo	Francisco Motta
Problemas de producción de frijol en el trópico	Ana Lucía de Román
Fundamentos científicos del cultivo del arroz	Ana Lucía de Román
Pudriciones radicales del frijol en América Latina y Africa: Diagnóstico, metodologías de investigación y estrategias de manejo	Ana Lucía de Román

PUBLICATIONS ADVISORY COMMITTEE
Terms of Reference

The CIAT Publications Advisory Committee was established on 7 July, 1992. Its purpose is to advise management on issues concerning the publication and distribution of CIAT educational materials.

Responsibilities of the PAC include:

1. Define the types of communication materials ("publications") produced by CIAT (books, working documents, newsletters, press releases, etc.), and their target audiences. Specify sources of funding, and editorial and graphics arts support for each.

2. Develop criteria, guidelines, and procedures for the submission of proposals for the various types of publications.

3. Screen and prioritize proposals for books and other publications.

4. Advise management and recommend policies on issues and problems concerning publication, including sensitive institutional issues regarding content.

5. Advise on appropriate media for publication of various types of CIAT data.

Operating procedures of the PAC include:

1. The PAC will consist of six CIAT staff appointed on a yearly basis to advise CIAT management on all matters related to publication. The head of the CIAT Communications Unit, or his or her representative, will be an *ex-officio* member.

2. The PAC will meet bimonthly, or as required by demand. Special meetings will be called to review specific problems or opportunities in publication.

3. The Secretary of the PAC will take minutes of each meeting for distribution to CIAT management.

Format for Publication Proposals for CIAT Authors

I. Tentative title

II. Type of publication (monograph, field manual, conference proceedings, working document, etc.)

III. Authors (for monographs) or technical editors

IV. Language(s)

V. Justification. Does the proposed book contribute to CIAT's mission? Does it focus on a need that existing books do not already fulfill?

VI. Target audience (include size if possible)

VII. Table of contents, and a 50-word paragraph describing the book

VIII. Estimated length. An average, double-spaced page of pica type, 65-spaces/line, has about 300 words

IX. Special requirements (color photos, extensive tables or artwork, maps, index, etc.)

X. Estimated date for submitting complete manuscript, including paper copy, diskettes in WP5.1, all photos, and illustrations

XI. Possibility of joint publishing with other agency?

XII. Publication cost to be borne by CIAT, or by a program, or by an outside funding agency

XIII. Other details of interest or importance

Appendix 6

FONDO ROTATORIO DE PUBLICACIONES

(Publications Revolving Fund)

1. The FPI will be converted to the Publications Revolving Fund. The current balance in the FPI will go to the FRP.

2. External editorial, production, supply, and promotional expenses for CIAT publications will be debited against the fund. This refers to services purchased outside of CIAT; the PRF will not, for example, be debited for time that CIAT editors, designers, artists, etc. invest in a publication. Editorial services contracted outside of CIAT would, however, be debited. The largest expenses will be for paper and printing.

3. All income from publications sales will be credited to the FRP.

4. The Publications Advisory Committee will be responsible for setting FRP policy; the head of the Communications Unit will be responsible for its direct management.

5. The CU head can authorize the payment of publication-related and promotional expenses (editorial contracts, printing, advertising, etc.) directly from the FRP. Expenditures that are not directly related to publication and distribution are subject to PAC approval.

6. The Budget Office will maintain the FRP records, like any other CIAT budget.

7. The FRP will support only marketable publications that have a commercial value. The FRP will not support publications produced for public awareness purposes.

8. CU will only market publications whose proceeds contribute to the FRP. In cases where a CIAT program wishes CU to market a publication for which it has paid, a markup will be added, which will go to the FRP. The FRP will reimburse the program actual production expenses for copies sold.

9. Certain noneducational items that promote the image of CIAT *and that have a resale value* (t-shirts, coffee cups, etc.), and are to be sold by the CIAT bookstore, can be debited/credited to the FRP.

10. CIAT scientists are encouraged to seek donor support for certain publications, especially volumes of conference and workshop proceedings. In such cases, the funds will go into the FRP. The conference sponsors and the concerned program will be provided a predetermined number of publications for distribution to cooperators; the balance will be offered for sale.

Appendix 7

GRAPHIC ARTS FIGURES

06-Nov-92

	1988	% Change	1989	% Change	1990	% Change	1991	% Change	1992 OCTOBER
IMPRESSIONS (Books, Bulletins, ect.)	1,289,925	(38.22)	796,920	14.89	915,588	52.10	1,392,620	(23.92)	1,059,540
IMPRESSIONS (Working Documents, Old Formats, Duplications)	1,857,620	17.00	2,173,333	40.11	3,045,065	8.02	3,289,293	(16.32)	2,752,626
IMPRESSIONS (Special Covers and Cards, New Formats)	1,467,501	(3.50)	1,416,095	(20.44)	1,126,615	(64.10)	404,441	(33.25)	269,949
TOTAL IMPRESSIONS	4,615,046	(4.96)	4,386,348	15.98	5,087,268	(0.02)	5,086,354	(19.74)	4,082,108
TOTAL PHOTOCOPIES	3,471,914	(0.18)	3,465,553	4.50	3,621,573	(4.61)	3,454,556	(42.05)	2,002,061
POSTERS AND GRAPHICS	5,342	(49.46)	2,700	89.22	5,109	(0.96)	5,060	(57.87)	2,132
SLIDES	58,217	14.83	66,851	(22.61)	51,733	16.83	60,438	(38.29)	37,296
PRINTS B/W AND COLOR	4,928	(3.63)	4,749	22.13	5,800	(13.52)	5,016	450.82	27,629
PHOTOGRAPHIC SESIONS	167	70.66	285	(19.30)	230	13.48	261	(22.99)	201
WORKING ORDERS	1,815	(16.47)	1,516	(7.19)	1,407	(9.52)	1,273	(26.24)	939

Press Releases/Boletines de Prensa, 1992

No.	Título	Autor	Fecha	Fotos	Fecha impresión	Fecha envío interno	Fecha envío externo
PRI-001	Wild Mexican bean protects crops without chemicals.	A. Walter	Marzo	1	Abril	10 junio	3 julio
BPI-001	Un frijol silvestre protege los cultivos sin plaguicidas.	A. Walter	Marzo	1	Abril	10 junio	3 julio
PRI-002	Seeds of new thoughts become seeds of hope for Latin American farmers.	M. Baena	Marzo	1	7 abril	10 abril	3 julio
BPI-002	Investigadores y agricultores siembran semillas de futuro para América Latina.	M. Baena	Marzo	1	7 abril	10 abril	3 julio
PRI-003	First "train the trainers" class graduates from CIAT.	C. Muñoz	Marzo	0	2 abril	10 abril	3 julio
BPI-003	El primer grupo del proyecto "Capacitar a los Capacitadores" se gradúa en el CIAT.	C. Muñoz	Marzo	0	9 abril	10 abril	3 julio
PRI-004	Beauty: a reason behind genetic diversity in beans.	A. Walter	Abril	1	9 abril	10 junio	24 agosto
BPI-004	No sólo como pan vive el frijol.	A. Walter	Abril	1	27 abril	10 junio	24 agosto
PRI-005	Helping world feed, without destroying itself is focus of U.N. agriculture briefing.	M. Baena	Abril	0	27 abril	10 junio	3 julio
BPI-005	Alimentar a la humanidad sin destruir el planeta es tema de reunión en las Naciones Unidas.	M. Baena	Abril	0	27 abril	10 junio	3 julio

No.	Título	Autor	Fecha	Fotos	Fecha impresión	Fecha envío interno	Fecha envío externo
PRI-006	Cassava conquers new markets.	B. Hardy	Abril	1	27 abril	10 junio	24 agosto
BPI-006	La yuca conquista nuevos mercados.	B. Hardy	Abril	1	27 abril	10 junio	24 agosto
PRI-007	South American forage legume spreads to China.	A. Ramírez	Abril	1	8 mayo	22 mayo	24 agosto
BPI-007	Leguminosa forrajera originaria de América del Sur se propaga en China.	A. Ramírez	Abril	1	26 mayo	3 junio	24 agosto
BPI-008	Scientists pit disease against cassava pest.	C. Muñoz	Abril	1	18 mayo	22 mayo	24 agosto
BPI-008	Enfermedad de la yuca vs. plaga.	C. Muñoz	Abril	1	26 mayo	3 junio	24 agosto
PRI-009	"Friendly insects" battle across continents to save a neglected crop.	B. Hardy	Abril	1	28 mayo	18 agosto	11 sept.
BPI-009	"Insectos benéficos" sudamericanos combaten en Africa las plagas de un cultivo olvidado.	B. Hardy	Abril	1	28 mayo	18 agosto	11 sept.
PRI-010	New CIAT book on women in agricultural research.	B. Hardy	Mayo	0	18 mayo	22 mayo	24 agosto
BPI-010	Nuevo libro del CIAT sobre mujeres que participan en la investigación agrícola.	B. Hardy	Mayo	0	21 mayo	22 mayo	24 agosto
PRI-011	Aerial photo of CIAT.	A. Walter	Junio	1	26 mayo	No	3 julio
BPI-011	Foto aérea del CIAT.	A. Walter	Junio	1	26 mayo	No	3 julio

No.	Título	Autor	Fecha	Fotos	Fecha impresión	Fecha envío interno	Fecha envío externo
PRI-012	Unexplored possibilities for "popping beans" -a lost crop of the Andes.	L. Ferguson	Junio	1	28 mayo	3 junio	28 sept.
BPI-012	Nuevas posibilidades para las "ñuñas" -un cultivo perdido de los Andes.	L. Ferguson	Junio	1	28 mayo	3 junio	28 sept.
PRI-013	CIAT's gene bank: witness to our past, guardian of our future.	M. Baena	Junio	1	28 mayo	30 junio	9 sept.
BPI-013	El banco de germoplasma del CIAT: testigo del pasado, custodio del futuro.	M. Baena	Junio	1	28 mayo	30 junio	9 sept.
PRI-014	Does international agricultural research pays its dues?	A. Walter	Junio	0	28 mayo	3 junio	3 julio
BPI-014	¿Aporta su cuota la investigación agrícola internacional?	A. Walter	Junio	0	28 mayo	3 junio	3 julio
PRI-015	New IDB book examines lessons from Latin American development.	M. Baena	Junio	0	17 junio	30 junio	11 sept.
BPI-015	Nuevo libro del BID evalúa experiencias sobre el desarrollo de América Latina.	M. Baena	Junio	0	17 junio	30 junio	11 sept.
[a]PRI-016	Gene banks: trustees of the world's genetic diversity, not museums.	M. Baena	Julio	1	2 julio	No	No

a. Edición especial. Sólo se imprimieron 50 copias para el viaje del Dr. M. Iwanaga.

No.	Título	Autor	Fecha	Fotos	Fecha impresión	Fecha envío interno	Fecha envío externo
PRI-017	Cassava: new alternatives for the scapegoat of hillside erosion.	M. Baena	Julio	1	31 julio	18 agosto	15 sept.
BPI-017	Nuevas posibilidades para la yuca, el chivo expiatorio de la erosión en laderas.	M. Baena	Julio	1	31 julio	18 agosto	15 sept.
PRI-018	Savannas: where the grass is greener than ever.	M. Baena	Julio	1	31 julio	18 agosto	17 sept.
BPI-018	Sabanas: donde la pradera es más verde que nunca.	M. Baena	Julio	1	31 julio	18 agosto	17 sept.
[b]PRI-019	First global meeting on high-tech. cassava.	B. Hardy	Agosto	0	20 agosto	19 agosto	19 agosto
BPI-019	Primera reunión mundial sobre alta tecnología en yuca.	B. Hardy	Agosto	0	20 agosto	19 agosto	19 agosto
PRI-020	Getting seeds flowing at Peru's Amazon forest frontier.	B. Hardy	Oct.	0	7 oct.	15 oct	20 oct.
BPI-020	Haciendo fluir las semillas en la frontera de bosque amazónico del Perú.	B. Hardy	Oct.	0	7 oct.	15 oct.	20 oct.
PRI-021	Cassava turns to cyanide for self-defense.	B. Hardy	Sept.	0	21 sept.	23 sept.	23 sept.
BPI-021	La yuca usa el cianuro para su autodefensa.	B. Hardy	Sept.	0	21 sept.	23 sept.	23 sept.

b. Edición especial. Sólo se envió a la prensa nacional.

No.	Título	Autor	Fecha	Fotos	Fecha impresión	Fecha envío interno	Fecha envío externo
PRI-022	Latin American course on in vitro germplasm management.	C. Muñoz	Oct.	0	15 oct.	15 oct.	20 oct.
BPI-022	Curso Latinoamericano sobre Manejo de Germoplasma *in vitro*.	C. Muñoz	Oct.	0	7 oct.	15 oct.	20 oct.
PRI-023	You're covered! Cover legumes for savannas and degraded environments.	B. Hardy	Oct.	1	23 oct.	30 oct.	4 nov.
BPI-023	Leguminosas nutritivas cubren sabanas y ambientes degradados.	B. Hardy	Oct.	1	16 oct.	30 oct.	4 nov.
PRI-024	Pasture technology helps protect forest margins of the Peruvian Amazon.	A. Ramírez	Nov.	0	30 oct.	30 oct.	4 nov.
BPI-024	Tecnología de pasturas para la protección de márgenes de bosque en la Amazonia del Perú.	A. Ramírez	Nov.	0	30 oct.	30 oct.	4 nov.
[c]BPN-025	Primera Reunión Nacional de Economía Agrícola.	C. Muñoz	Nov.	0	9 nov.	9 nov.	9 nov.
PRI-026	Pioneer book on rice in Latin America released at Cali book fair.	E. de Páez	Nov.	0			
BPI-026	Informe de vanguardia sobre el arroz de América Latina es lanzado en la Feria del Libro en Cali.	E. de Páez	Nov.	0	13 nov.	23 nov.	17 nov.
[c]BPN-027	El ICA entrega a los ganaderos y agricultores del país dos nuevas variedades de pasto.	A. Ramírez	Nov.	1	17 nov.	24 nov.	17 nov.

c. Edición especial. Sólo se envió a la prensa nacional.

Appendix 9

CATEGORIES OF CIAT SCIENTIFIC PUBLICATIONS

Publication (type)	Initiated by:	Edited by:	Resp. for edit. quality:	Funded by:	Distributed by:	Revenues to:
Monographs and Multi-Authored Monographs	CIAT scientists, via a Publication Proposal.	The CIAT Communications Unit (in some cases, CU may contract the editing to an outside agency).	CU and authors.	CIAT in most cases, through a Publications Revolving Fund. Scientists are encouraged to seek donor subsidies to widen distribution and lower prices.	CIAT and its authorized distributors (authors and programs may purchase copies for distribution to cooperators).	The Publications Revolving Fund.
Conference/Workshop Proceedings	The conference coordinator, via a Publication Proposal.	CU.	CU and the Conference Coordinator.	The agency that sponsors the conference, in most cases.	The sponsoring agency and the program that sponsors the conference. CU will purchase additional copies, above conference-related distribution, at cost for CIAT distribution.	Publications Revolving Fund.
Bibliographies	The Information Unit and specific programs.	IU.	IU and Programs.	Programs pay for reproduction.	Programs and CU.	Publications Revolving Fund.
Quick Bibliographies	Programs	IU.	IU.	Programs.	Programs.	None.
Commodity Newsletters	Programs, with CU support	CU.	CU and programs	Cassava: CU Rice: Program.	CU, but programs control distribution list.	None
Pasturas Tropicales	Pastures scientists.	CU.	Editorial committee and CU.	CIAT, 800 suscriptions. 300 suscriptions paid by recipients.	CIAT.	PRF.

CATEGORIES OF CIAT SCIENTIFIC PUBLICATIONS

Publication (type)	Initiated by:	Edited by:	Resp. for edit. quality:	Funded by:	Distributed by:	Revenues to:
Working Documents	Programs.	Programs.	Programs.	Programs.	Programs.	None.
5-Year Program Reports	Programs.	?	?	?	?	?
Journal Articles	Scientists.	CU, on request.	CU and scientists.	Programs.	The journals and CIAT scientists (reprints)	None.
Translations of Non-CIAT Books (only one)	INGER.	INGER, CU.	CU.	INGER and CU.	INGER and CU.	PRF

Project Design
for Tropical Agricultural Research and Development
1992

Activity Report

December 1992

For Internal Circulation and Discussion Only

CIAT
Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

Project Design

for Tropical Agricultural Research and Development

1992

November 1992

CIAT
Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

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Summary

The Project Design Office was established in 1992 to improve the quality of proposals submitted to donors as well as to increase CIAT's knowledge of donor programs and priorities. It assists program staff in the design of projects and preparation of proposals.

The Project Design Office works closely with the Projects Support Office, Graphic Arts and the Editing section of the Communications Unit. The Project Design Office assists program staff in the initial activities of the project cycle up to approval of the proposal by the donor agency. After that, the Project Support Office takes over and is responsible for contracting with the donor, progress reporting and coordinating any project evaluations with the donor.

The main activities of the Project Design Office include:

- coordination of the proposal preparation process
- training in project design and proposal writing
- donor liaison and documentation

The immediate clients of CIAT's Project Design Office services are the program staff. Secondary clients are consortium partners. The long term beneficiaries are the donors who receive better quality proposals from CIAT.

The principal outputs of the Project Design Office include:

- completion of approximately 30 proposals annually that meet high standards of technical quality and communications effectiveness
- completion of a reference guide and training materials in project design and proposal writing
- trained CIAT program staff in aspects of project design
- establishment of internal CIAT operating procedures for project identification and proposal submissions
- collection of donor documentation resources and establishment of a donor data base

CIAT's approach to project design is based on the logical framework matrix and work breakdown structure which links project activities to project outputs. This is the design approach most commonly used by bilateral donors. This approach facilitates not only project design but also donor progress reporting and evaluation.

The need for improving the quality of CIAT proposals is in response to the increasingly competitive nature of donor funding. Donors are facing flat budgets and increased demands for new programs (e.g., Eastern Europe and the Republics of the former Soviet Union). In addition, there is now an increased number of CGIAR centers. The net result is increased competition.

The Project Design Office is meeting this new competitive challenge by providing training programs for producing high quality proposals; utilizing state of the art desktop publishing equipment and software; and conducting extensive research on donor programs and priorities.

PROGRAM REVIEW - PROJECT DESIGN OFFICE

1.0 Overview Of Establishment, Roles And Responsibilities

1.1 Background

From 1987 to 1991, the Special Projects Office, within CIAT's Finance and Administration Division, was responsible for providing assistance in the design of projects and preparation of proposals as well as in the progress reporting to donors and the coordination of project evaluations.

In 1992, which served as a transitional year, CIAT decided to establish a Project Design Office with the specific functions to improve the quality of proposals submitted to donors as well as to increase CIAT's knowledge of donor programs and priorities. This was done in response to the increasingly competitive nature associated with donor funding.

The Project Design Office is part of CIAT's Institutional Relations and Development Support. The Project Support Office, which is responsible for contracting, progress reporting and coordinating evaluations, is part of CIAT's Finance and Administration Division.

Both the Project Design Office and the Project Support Office are funded by the budgets of projects which include a component for indirect costs. Once the Design and Support costs have been covered, the rest of the indirect costs received from the donors for projects are then redistributed to CIAT's operating programs.

1.2 Responsibilities Of The Project Design Office And The Project Support Office

Both offices serve in a support role to CIAT's research programs. The distinction in responsibilities is best seen in terms of different parts of the standard project cycle.

Most projects have a cycle which include the following activities:

- identification
- appraisal and design
- approval
- contracting, project implementation, monitoring and control
- termination and end-of-project evaluation

The project cycle is illustrated in Figure 1. The Project Design Office is responsible for providing services to the programs for the steps up to receiving approval for the proposal from the donor agency. Thereafter, the Project Support Office takes over for the implementation of the project. In other words, the Project Design Office is heavily involved in the early stages of the project cycle whereas the Project Support Office is more involved later in the project cycle.

Figure 1

Responsibilities of the PDO and PSO for Different Parts of the Project Cycle

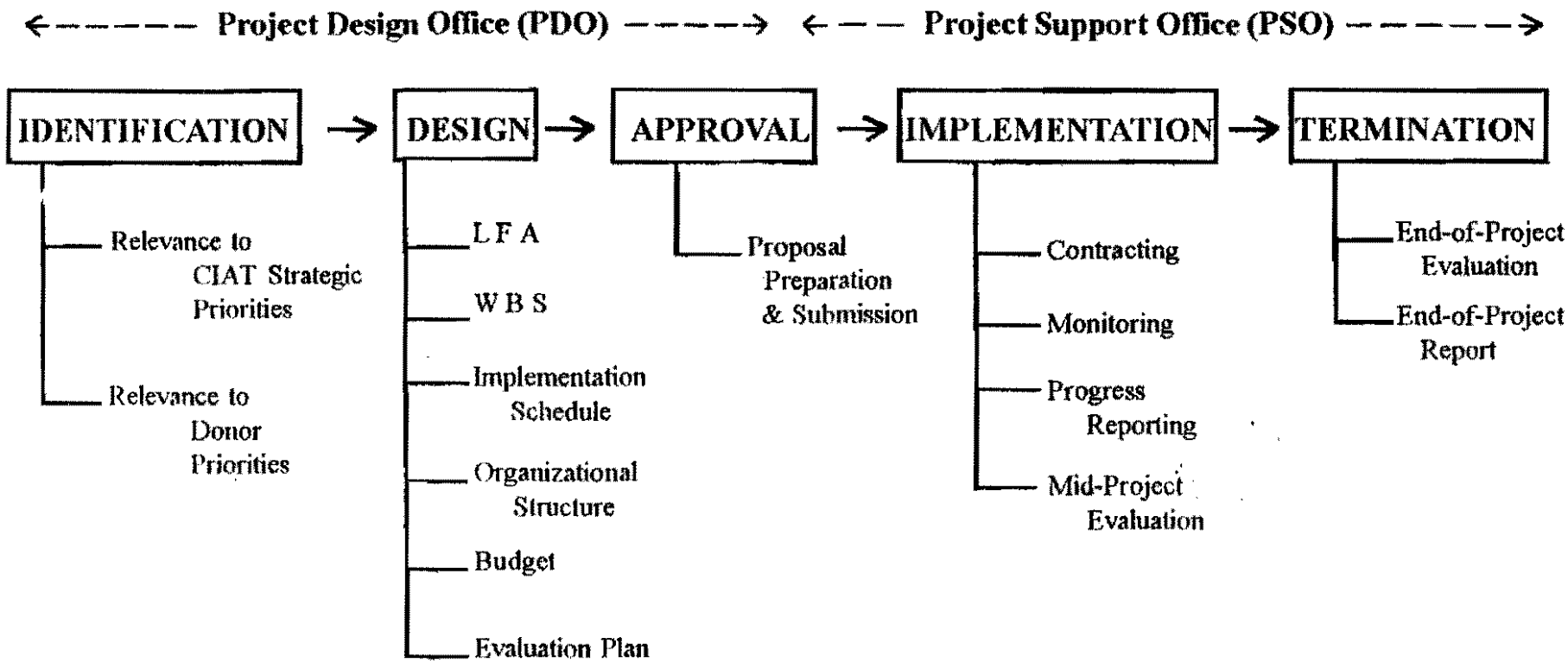
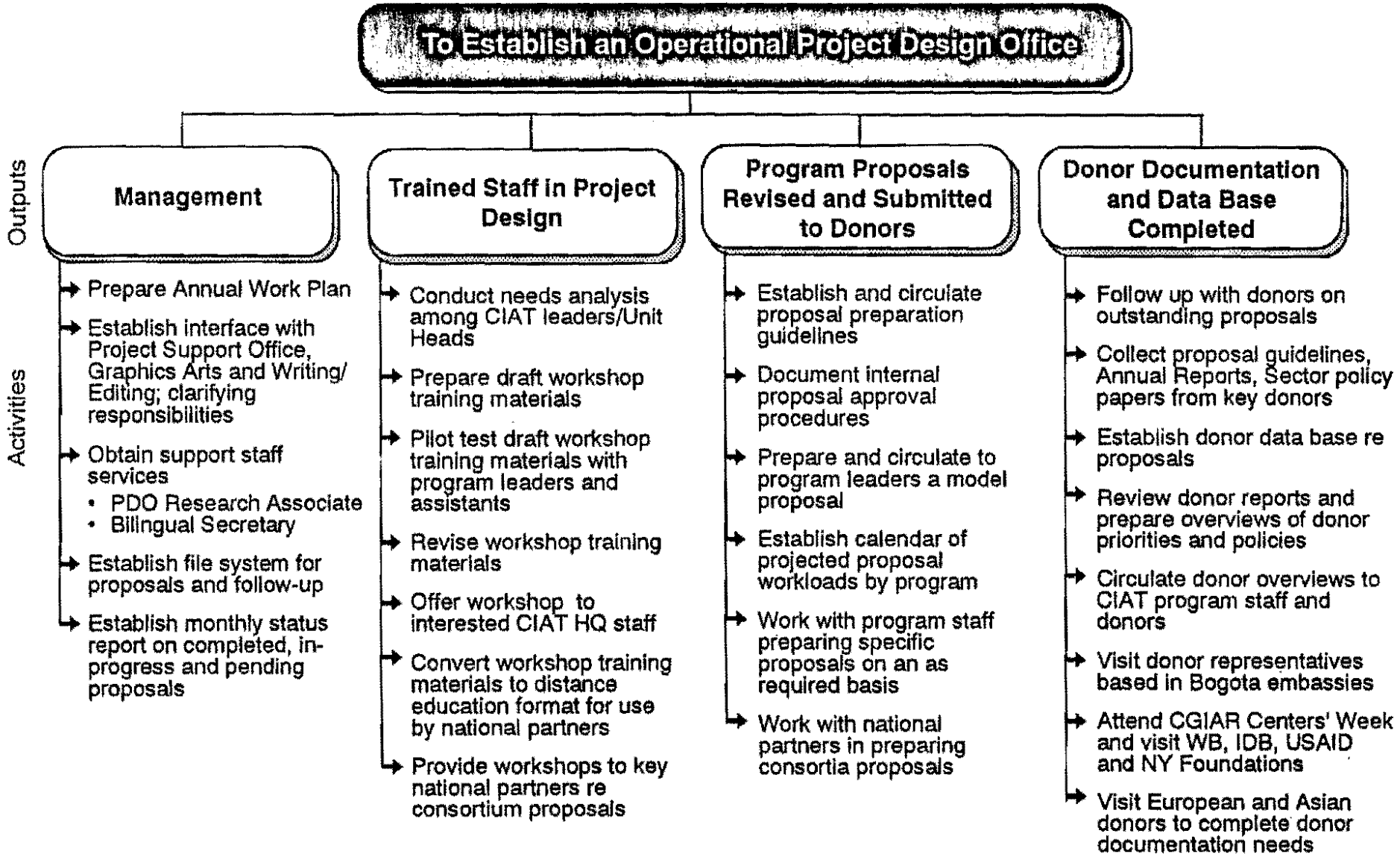


Figure 2

Work Breakdown Structure for Establishment of Project Design Office (Activities Linked to Outputs)



1.3 *Principal Activities Of The Project Design Office*

The principal activities and responsibilities of the Project Design Office are illustrated in Figure 2 and include:

Coordination of the Proposal Preparation Process

- Working with CIAT program staff preparing specific proposals that address donor concerns and which meet high standards of quality both technically and in terms of communications effectiveness.
- Preparing and circulating proposal guidelines to be used by CIAT program staff when the donor has not specified any guidelines to be used.
- Preparing and circulating to CIAT program leaders and unit heads a model proposal in terms of components that should be addressed and page layout/design that should be utilized.
- Establishing internal operating procedures for the approval of project ideas and preparation and review of proposals.
- Establishing a calendar of projected proposal workloads by program.
- Preparing and submitting quarterly workplans for proposal preparation to CIAT Director General for approval.
- Maintaining the files of proposals for both those in preparation and those submitted.
- Maintaining a data base of CIAT proposal management information and preparing monthly management reports on the status of proposals.

Training In Project Design And Proposal Writing

- Conducting training needs analysis with CIAT program leaders and unit heads.
- Preparing and revising draft training materials for workshops in project design and proposal writing.
- Offering workshops to CIAT staff at HQ on a semi-annual basis.
- Converting workshop training materials on project design to a distance education format (self-study) for CIAT out-posted staff and for use by national partners in project consortia.

Donor Liaison And Documentation

- Following up with donors on outstanding proposals.
- Advising CIAT program staff as to donor project funding opportunities.
- Collecting proposal guidelines, annual reports and sector policy papers from key donors
- Establishing a donor data base as to appropriate contacts for proposal guidelines and submissions.
- Preparing, for CIAT program staff, overview reports of donor priorities, policies and programs based on documentation reviews and visits to donors.

1.4 Principal Outputs Of The Project Design Office

The principal outputs include:

- completion of approximately 30 proposals annually that meet high standards of technical quality and communications effectiveness. (e.g., from March to November 1992, there were 36 proposal ideas identified by the program staff; 12 proposals were submitted to donors requesting a total of $18 M; six of the 12 proposals were approved; one was not approved; and the remaining five were still under review at the donor agency).
- completion of a reference guide and modular print-based training materials in project design and proposal writing.
- trained CIAT program staff in aspects of project design.
- establishment of internal CIAT operating procedures for project identification and proposal submissions.
- collection of donor documentation resources including annual reports, sector policy papers, proposal guidelines, newsletters, and staff training materials in project design.
- completion of a donor data base identifying relevant donor contacts.

1.5 Clients

The immediate clients of the services of the Project Design Office are CIAT's program staff responsible for project design and proposal preparation. Secondary clients are the project coordinators with CIAT's other partners in a consortium. The long term beneficiaries are the donors who receive better quality proposals from CIAT.

1.6 *Coordination Of Expertise For Proposals Within CIAT*

The Project Design Office is responsible for producing the final version of all proposals where CIAT is the lead partner and which are submitted to outside donors for funding.

In order to ensure that CIAT proposals are of the highest quality, the Project Design Office relies on the assistance of various sections within CIAT including:

- Program Staff - responsible for the technical merits of the proposal and preparing the first draft consistent with donor and PDO guidelines
- Project Support Office - responsible for providing program staff with standard costs for budget items and for arranging the signing off of the budget page by the Financial Controller
- Communications Unit - responsible for editing the final version of the proposal before it is converted to desktop publishing format
- Graphic Arts - responsible for producing the illustrated front cover of proposals and for providing advice on page layout and illustrations
- Project Design Office - responsible for coordinating the proposal preparation process and ensuring that the proposal addresses major donor concerns

1.7 *CIAT Procedures For Approving Project Ideas And Proposals*

In 1992, the Project Design Office recommended to CIAT's Management Committee a set of procedures for initiating and completing the proposal process. A number of revisions were suggested and consensus was reached that there should be a two stage approval process.

The first stage is approval of the project idea by senior CIAT management before work is actually commenced on a proposal. Project ideas normally originate from those identified in CIAT's Medium Term Plan for the coming 5 year period.

Program staff prepare a brief project profile (see Appendix A) which is then submitted through the program leader to the responsible Deputy Director General and then to the Director General for approval. Once the project idea has been approved then the Director General will usually submit the project profile to a perspective donor to ascertain whether there is interest in receiving a detailed proposal. The steps involved in approving the project idea are graphically shown in Appendix B.

The second stage refers to the preparation of the various drafts and final version of a detailed proposal. The steps involved in this process are outlined in Appendices C and D.

1.8 CIAT Approach To Project Design

In 1992, the Project Design Office implemented a new approach to project design which will be utilized for all future proposals for external funding.

This approach is based on a logical framework analysis (LFA) and work breakdown structure (WBS). The approach was developed in the late 1960's and is now used in some form by many bilateral and multilateral donor agencies including:

- United States Agency for International Development
- African Development Bank
- Australian International Development Assistance Bureau
- British Overseas Development Assistance
- Canadian International Development Agency
- Commission of European Communities
- Deutsche Gesellschaft fur Technische Zusammenarbeit (GTZ)
- Netherlands Directorate General for International Cooperation
- Norwegian Agency For Development Cooperation
- Swedish International Development Agency

Some agencies (e.g., International Development Research Centre) and foundations (e.g., Ford) do not use the LFA/WBS approach to project design. However, it is recommended that even when it is not a formal requirement of these agencies, CIAT should whenever possible, use the LFA/WBS approach in its project design and proposal documents.

The advantage is that the LFA gives a convenient overview of the project in a single page and the WBS provides a clear understanding of the major project activities related to outputs due to its graphical presentation.

An example of the logical framework matrix is shown in Appendix E and a Work Breakdown Structure is illustrated in Appendix F. The Project Design Office has recommended that the scientist first prepare the LFA which specifies the goal, purpose, outputs, inputs, indicators and critical assumptions. Once the outputs have been specified, this then provides the basis for preparing the Work Breakdown Structure. The scientist then groups activities around specific outputs.

Many donor agencies now require financial and progress reporting by activity. Evaluation is also related to activities as well as to the accomplishment of the project outputs as identified in the LFA.

The advantage for CIAT in adopting this particular approach is that it facilitates not only design but also donor reporting and evaluation.

While this approach represents a departure from CIAT's traditional way of designing projects and preparing proposals, it should facilitate the review of project documentation by donors and thus help make CIAT more competitive.

The challenge during the coming medium term plan period is to ensure that CIAT program staff receive sufficient support from the Project Design Office to feel comfortable in utilizing this approach. This will be accomplished by providing program staff with reference and training manuals, on-the-job training in project design and proposal writing, and practical workshops.

2.0 *The Donor Context For The CGIAR System And CIAT Proposals*

2.1 *Official Development Assistance (ODA)*

A list of the major donors of official development assistance in terms of total aid is shown in Appendix G. A comparison of donor aid in terms of relative burden (aid as a % of GNP) is shown in Appendix H. The regional distribution of ODA by major donor is shown in Appendix I. The use of aid by major purpose (including the agricultural sector) is shown in Appendix J.

During the early 1980s, many of CIAT's donors were experiencing large annual increases in their aid budgets. Donors would frequently suggest to CIAT an area for the submission of a proposal. For many years, CIAT was basically being sole-sourced for a project and was not submitting proposals for a competition. In this context, as long as CIAT proposals met some basic technical considerations, they were generally acceptable by the donors.

Today, however, donor funding is not increasing in any significant way on an annual basis. Donor countries face large deficits at home which are aggravated by the economic recession. Aid agencies are receiving flat budgets or in some cases nominally increasing budgets (see Appendices K and L). The increase is usually not sufficient to offset inflation and this results in the grants being allocated for development projects being insufficient to keep up with inflation.

This is at a time when there are also competing demands on the existing donor funding to start new programs (e.g., for Eastern Europe, the republics of the former Soviet Union, Somalia). In addition, donor funding for the CGIAR system is now expected to fund an increased number of international agricultural research centers.

The net result is that CIAT can no longer expect to be sole-sourced for many of its proposals. Instead, CIAT will be competing to a much greater extent with other research centers and academic institutes. This will be the case where not only CIAT is the lead partner with a donor but also for cases where CIAT is a consortia member with NARS or a university in one of the donor countries.

2.2 *Implications Of Donor Funding For CIAT Proposals*

Donors receive a large number of proposals (e.g., up to 100 for a single competition). To catch the attention of the donor evaluators, it is essential for CIAT to prepare outstanding proposals, both in content and presentation.

This means that CIAT proposals must have:

- **technical quality** in terms of the definition of the problem; the project rationale and developmental relevance; the scientific competence of the research team; and the proposed solution or methodology to solve the problem
- **comprehensiveness** in terms of addressing the major areas donors expect to see in any proposal (e.g., project management and organization, implementation schedule, reporting requirements, evaluation plan, budget, qualifications of the project team, relevant prior institutional project experience)
- **clarity and conciseness** in how the proposal is written
- **visual impact** in terms of page layout, illustrations and graphics presentation so as to make it easy for the reader to follow the text.

2.3 *Guidelines For Preparing Proposals*

Many bilateral (e.g., BMZ, CIDA, US AID) and multilateral donors (IDB) have specific guidelines for preparing proposals and the guidelines within each agency may differ depending on the program.

While donor guidelines may vary, there are usually common elements or components which virtually all donors expect to find in a proposal.

In 1992, the Project Design Office prepared a set of guidelines (see Appendix M) for preparing proposals for those cases where donors do not supply specific guidelines. The PDO recommended that CIAT should ensure that its proposals contain the following:

- Executive Summary or Abstract
- Background and Rationale
- Project Description
- Implementation Schedule
- Project Organization and Management
- Budget
- Reporting and Project Control
- Evaluation Plan
- Appendices
  (including CVs and CIAT project experience sheets)

Examples of an organization chart, implementation schedule budget format, sample CV and sample CIAT project experience sheets are shown in Appendices N to R inclusive.

3.0 Challenges For The Mid-Term Plan Period (1993-1998)

Some of the major challenges facing the Project Design Office include finding new ways to improve the quality of proposals; coping with the increased demand for services; and becoming better informed of funding opportunities with donors.

3.1 New Ways to Improve the Quality of Proposals

The technical merit of proposals can be facilitated through a peer review. Current procedures assign the responsibility for the technical merit of the proposal to the program leader. The program leader is expected to circulate draft proposals to several other senior staff (some but not all are likely to be in the same program).

The technical review by program staff will be initially done on an informal basis. At some later date, if it is felt group discussion would be an asset in the review of proposals, then some type of small divisional proposal review committee might be considered.

With reference to quality in terms of communications effectiveness of proposals, CIAT already has made several major advances. CIAT now uses PageMaker desktop publishing software for the preparation of proposals. This software allows different font sizes to be used and also permits images to be merged with text. One challenge will be how to utilize images more effectively in proposals. CIAT is already at the leading edge in this area compared to other centers. With a slide inventory of more than 11,000, there is considerable opportunity for CIAT program staff to ensure that the messages being communicated in proposals are reinforced by relevant pictures.

Maintaining reader interest is an important consideration for proposals. This can be facilitated through the judicious use of color. The challenge is to find a low cost technology that can provide color for small production runs. In order to use lithographic printing, Graphic Arts prefer production runs of a minimum of 500. However, when producing proposals, the Project Design Office may only have a production run of 10. Alternatives to lithographic printing must be explored. It is anticipated that the most feasible solution will include a color post-script printer for producing a master proposal and then outside color photocopying services to produce the multiple copies required.

3.2 Coping with the increased Demand for Services

It is anticipated that Project Design Office will be coordinating the preparation of 30 proposals annually. This number will likely grow as core funding for the CGIAR centers remains constant and as donors increasingly turn to relying on competitive bidding rather than sole-sourcing their development projects.

The challenge for the Project Design Office will be to ensure that there are short-term training opportunities for program staff interested in learning more about project design and proposal writing. This will then enable program staff to assume more responsibilities in

project design and proposal preparation. It is also expected that over the next five years, CIAT's programs will be obtaining some desktop publishing software which should facilitate the preparation of proposals.

3.3 Keeping Informed of Donor Opportunities

This is likely to be the most important challenge for the Project Design Office. The first year has been a transitional year in which a framework has been established for the preparation of proposals and operational procedures have been defined. Early in 1993, a training workshop will be offered in the area of project design.

Considerable more effort much be invested in the coming years in donor liaison and documentation. CIAT must become better informed of donor programs and priorities in order to develop a strategy for funding with a specific donor. This requires extensive research and personal contact with the donors on an on-going basis. The results, however, will be the provision of timely information to program staff as to complementary project funding opportunities with our major donors.

APPENDIX A

Date:

CIAT PROJECT PROFILE

Title:

Donor:

CIAT Project Coordinator:

Institutional Collaborating Partners and their Comparative Advantage:

Developmental Rationale/Need:

Consistency With CIAT Mid-Term Plan & Priorities:

Relevance To Donor Priorities:

Innovativeness:

Intended Beneficiaries:
(Target Groups)

Anticipated Impact:

Program Goal:
(the overall development objective that this project and others are expected to contribute to in the long run)

Project Purpose:
(the situation that is hopefully expected to prevail as a consequence of the project)

Outputs:
(the results that can be guaranteed by the project as a consequence of its activities)

Activities (1st Level):
(actions necessary to transform given inputs into planned outputs within a specified period of time)

Inputs:
(the resources to be used in the project in terms of funds, personnel, materials/equipment)
Total Project Budget:

Proposed Type of Funding:

O Unrestricted core O Restricted Core O Complementary

Implementation Period:

Evaluation Methodology: What are the objectively verifiable indicators for measuring effectiveness and efficiency issues?

Internal CIAT Approvals:

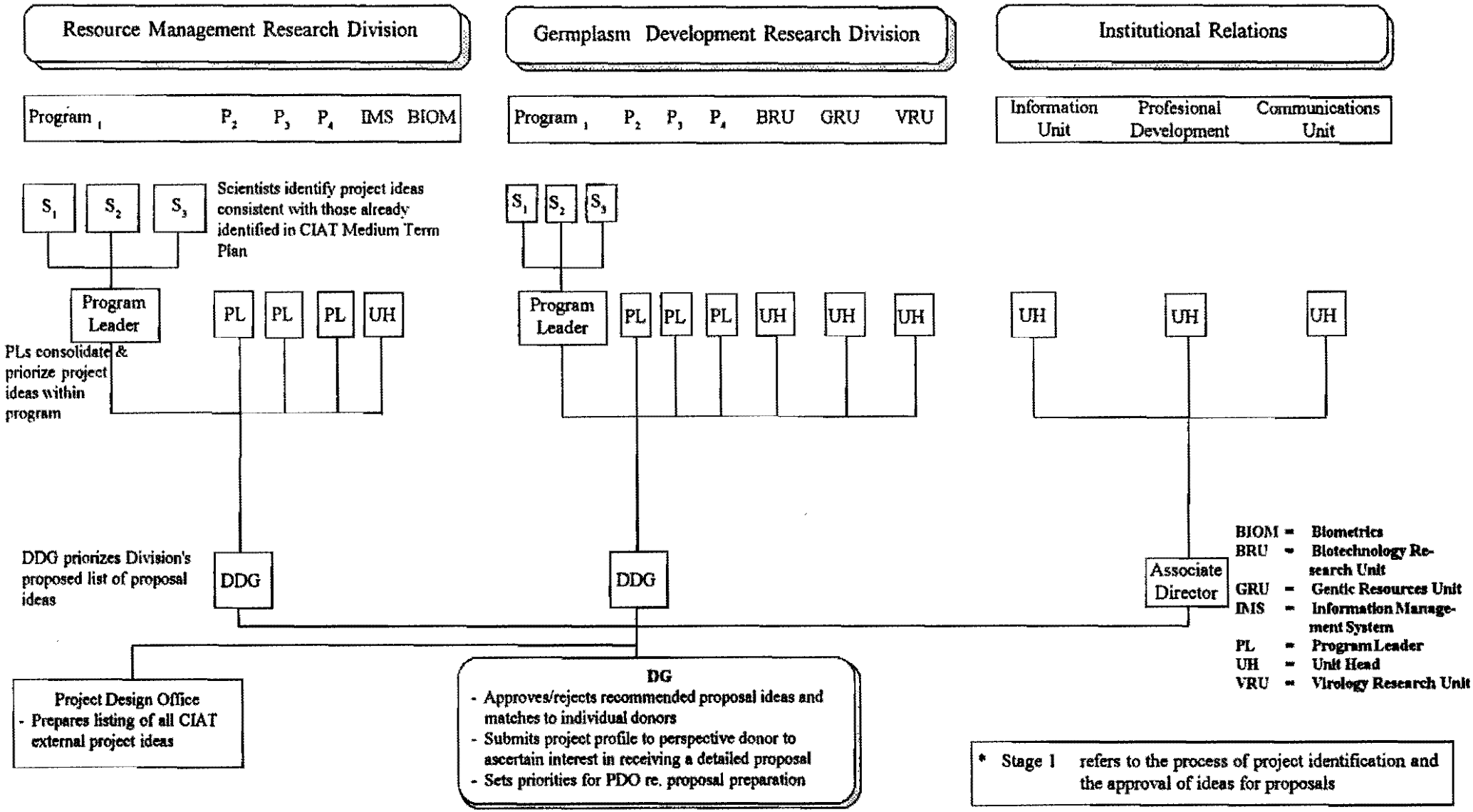
Program Leader/Unit Head

Deputy Director General **Director General**

CIAT

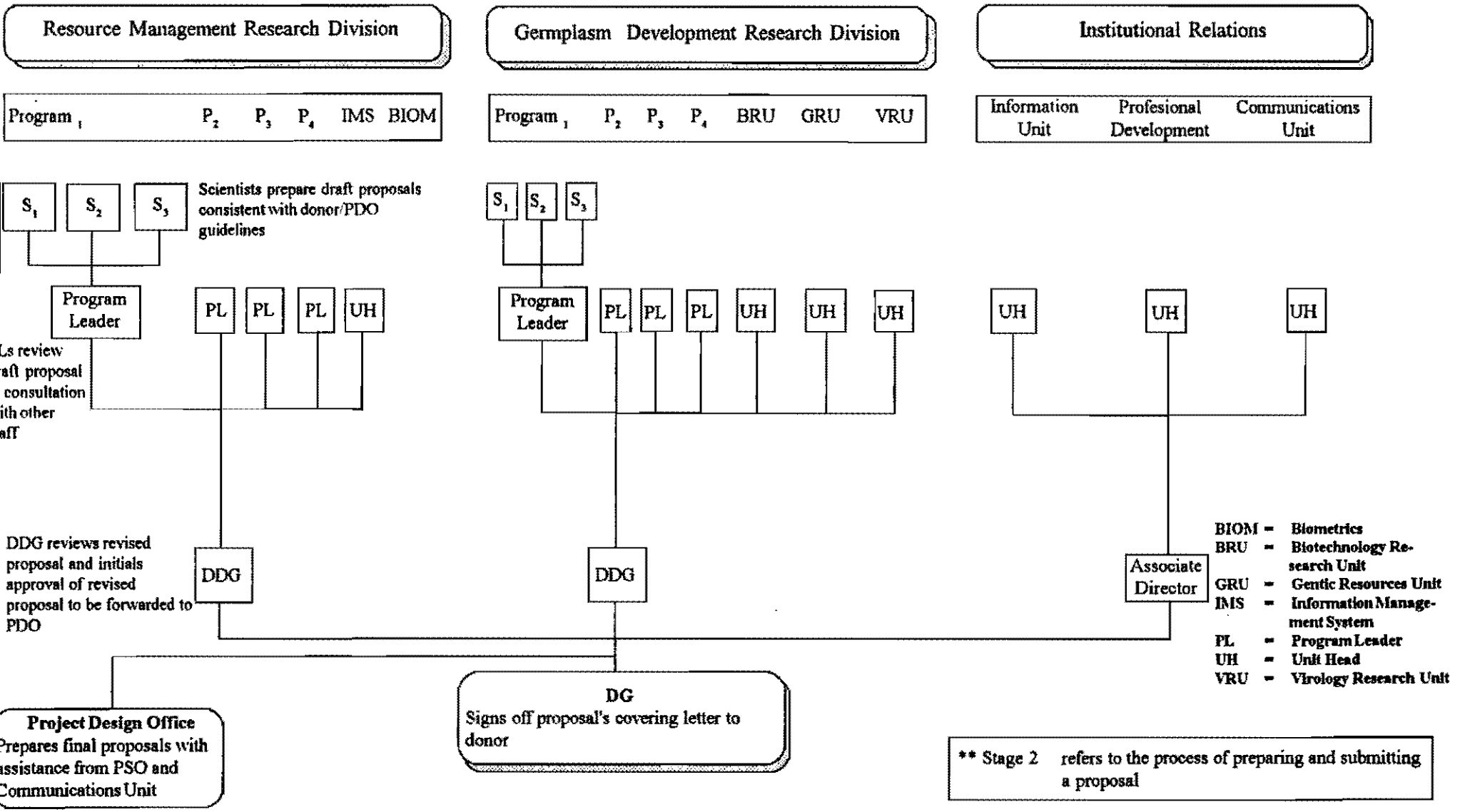
APPENDIX B

Technical and Management Review of Proposal Ideas (Stage 1*)

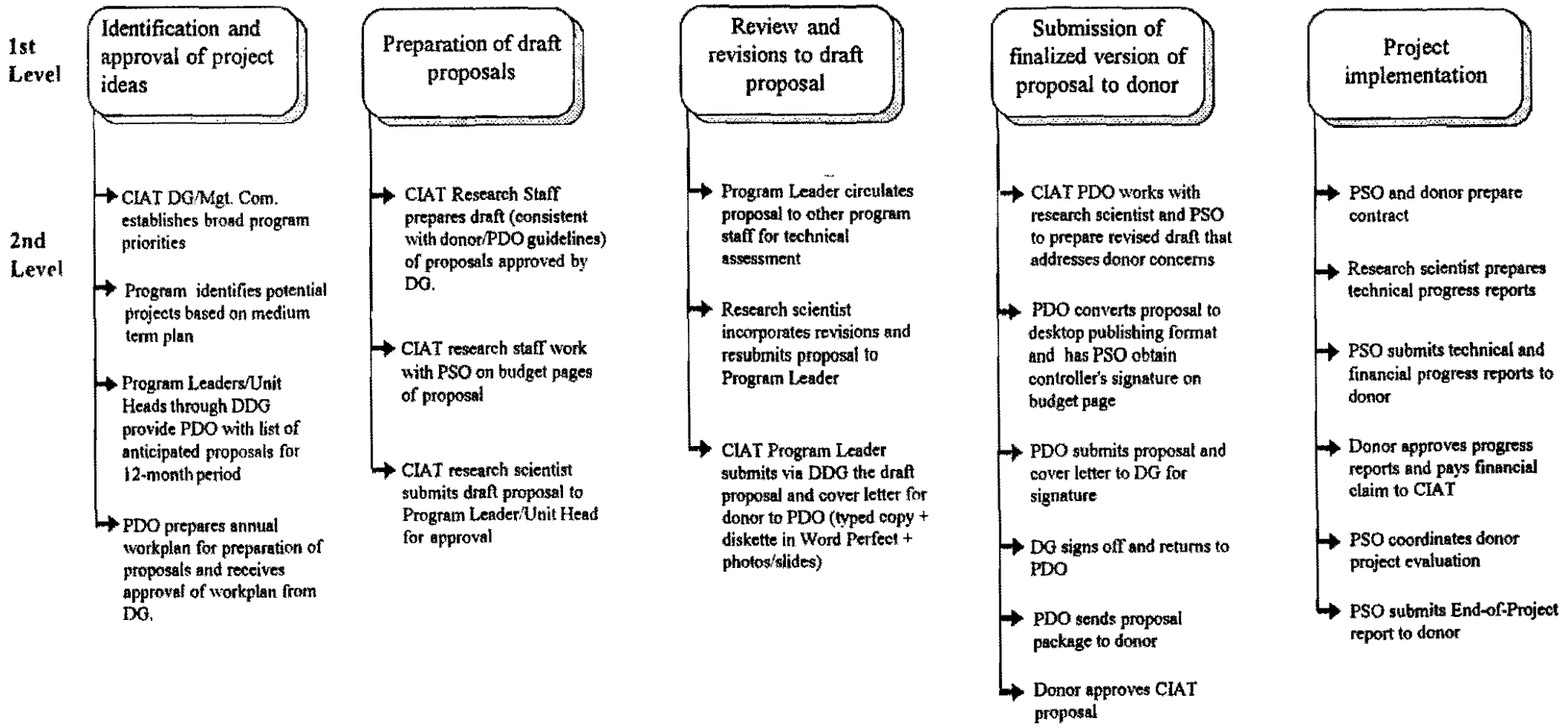


APPENDIX C

Technical and Management Review of Draft Proposals (Stage 2**)



APPENDIX D
Activities in Proposal Preparation and Project Implementation



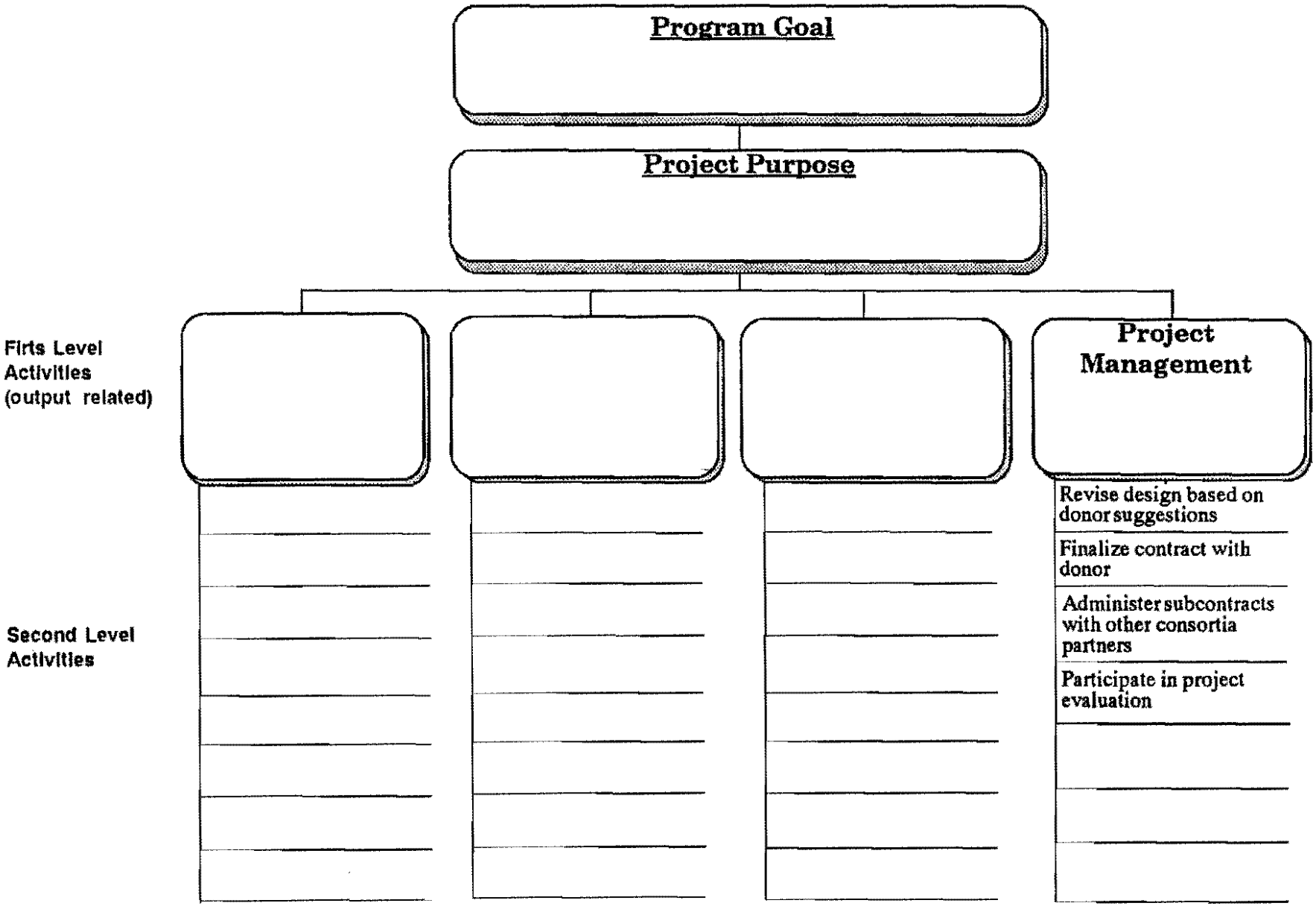
APPENDIX E

Logical Framework Matrix for Project Design

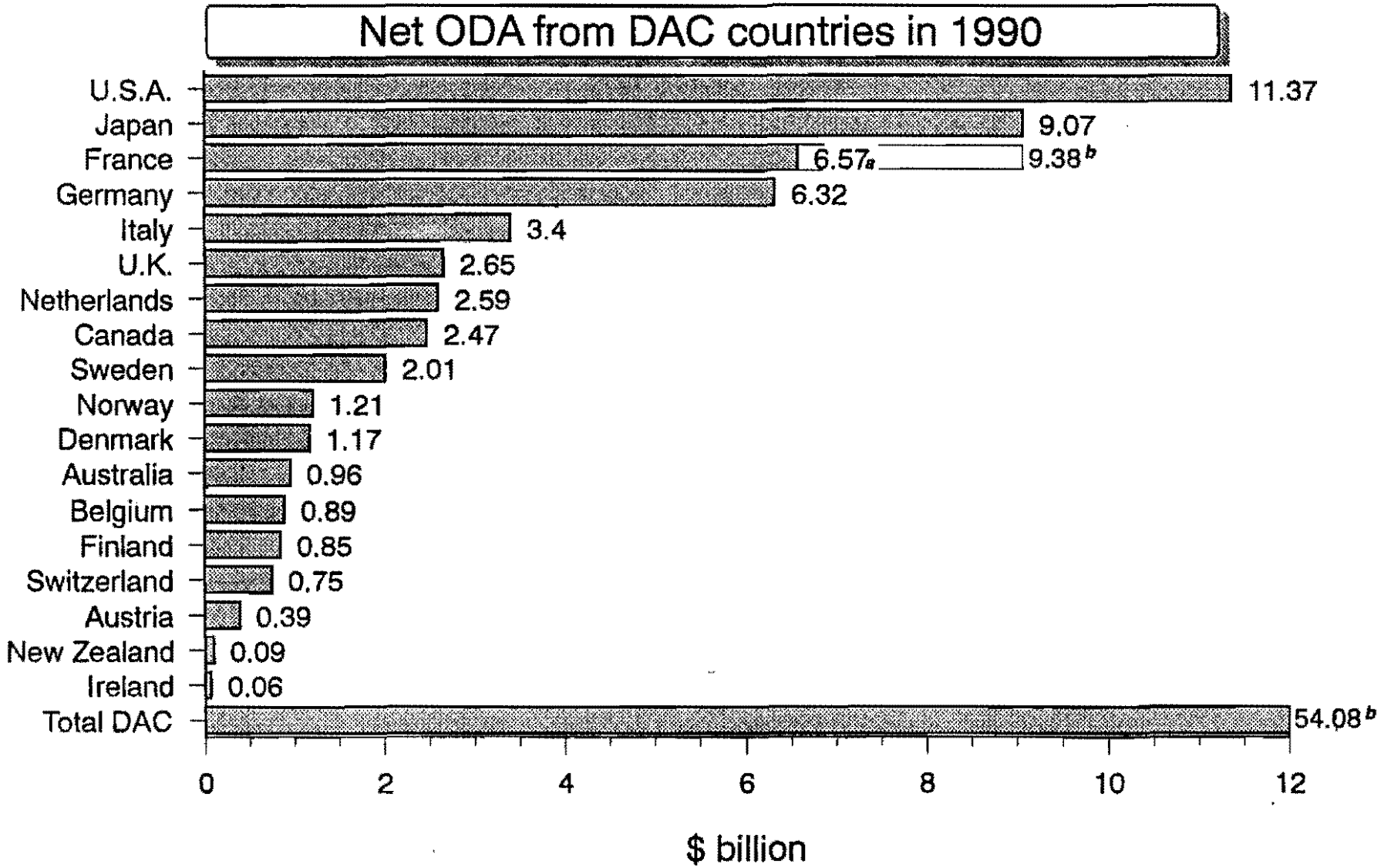
Narrative Summary	Objectively verifiable indicators	Means of verification	Important Assumptions
Program goal: The reason for the project, the desired end toward which the efforts are directed (program or sector goal), and for which the project is a logical precondition	Measures of goal achievement: Conditions which will indicate that the goal has been achieved	The way that the Indicators can be objectively verified	Concerning long term value of program project:
Project Purpose: That which is expected to be achieved if the project is completed successfully and on time. The "real" or essential motivation for producing outputs	Conditions that will indicate that the purpose has been achieved: End of project status The objectively verifiable condition which is expected to exist if the project achieves its purpose. The signs which will indicate that the project is a success	The way that the indicators can be objectively verified	Affecting purpose to goal link: An event or action, over which the project team has little control; a condition which must be assumed to exist if Goal is to be achieved
Outputs: The specific kind of results that can be expected from good management of the project inputs	Magnitude of Outputs necessary and sufficient to achieve purpose: The magnitude of the results and the projected completion dates	The way that the indicators can be objectively verified	Affecting output-to-purpose-link: An event or action, over which the project team has little control; a condition which must be assumed to exist if Goal is to be achieved
Inputs: Activities and resources necessary to produce the outputs	Resources and Expenditures for each activity: The types and cost of resources for each activity with target dates	The way that the indicators can be objectively verified	Affecting input-to-output link: An event or action, over which the project team has little control; a condition which must be assumed to exist if Goal is to be achieved

APPENDIX F

Example of a Work Breakdown Structure Linking Project Activities to Project Outputs



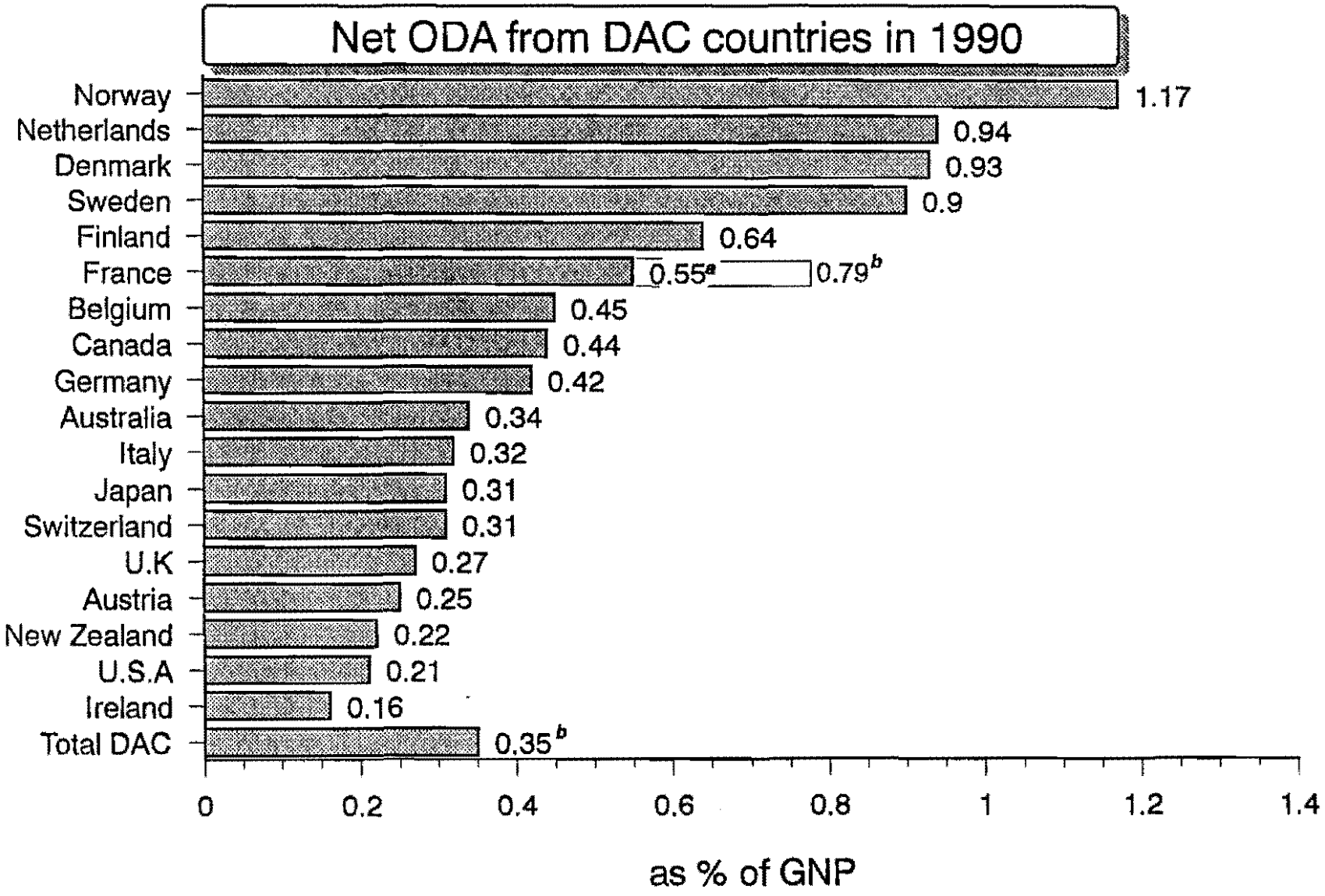
APPENDIX G



a) Excluding DOM-TOM (Overseas departments and territories)
b) Including DOM-TOM

ODA = Official Development Assistance
DAC = Development Assistance Committee, Organization for Economic Cooperation and Development

APPENDIX H



a) Excluding DOM-TOM (Overseas departments and territories)
b) Including DOM-TOM

ODA = Official Development Assistance
DAC = Development Assistance Committee, Organization for Economic Cooperation and Development

Appendix I

REGIONAL DISTRIBUTION OF ODA BY DAC DONORS[a]

Net Disbursements — *Percentages*

	Sub-Saharan Africa		South Asia		Other Asia and Oceania		Middle East and North Africa		Latin America and Caribbean	
	1979/80	1989/90	1979/80	1989/90	1979/80	1989/90	1979/80	1989/90	1979/80	1989/90
Australia	8.3	12.6	20.7	15.8	64.8	61.7	2.6	2.7	1.2	1.2
Austria	14.4	27.6	16.8	9.0	31.6	32.4	24.4	19.6	6.9	4.6
Belgium	58.8	54.1	11.4	8.9	10.0	6.2	10.7	3.7	5.1	6.8
Canada	30.3	31.7	31.0	14.2	6.4	10.4	6.9	5.1	10.0	9.8
Denmark	42.0	45.0	27.9	18.0	10.3	6.4	7.0	5.6	5.3	5.3
Finland	47.6	44.7	18.2	14.9	14.4	9.5	5.9	7.2	6.4	6.8
France	44.0	51.0	6.1	4.3	12.7	12.9	11.4	8.1	21.9	17.3
Germany	32.1	33.3	20.3	12.6	7.6	11.5	24.5	18.4	9.7	11.5
Ireland	60.0	57.9	0.0	7.9	0.0	3.9	0.0	2.6	0.0	3.9
Italy	46.6	49.0	29.7	9.6	5.2	6.9	5.7	8.1	8.9	14.2
Japan	15.9	19.1	38.2	17.3	29.2	41.5	7.6	6.7	6.4	7.7
Netherlands	31.1	34.3	22.4	15.9	9.8	14.0	6.6	4.9	20.8	17.1
New Zealand	5.7	5.1	8.9	3.4	74.0	64.8	1.6	0.0	2.4	1.1
Norway	41.6	46.5	28.2	16.7	9.6	5.5	8.9	2.0	5.5	8.4
Sweden	39.8	40.3	23.4	15.8	14.4	9.2	5.6	3.7	5.4	8.6
Switzerland	33.3	39.7	23.3	13.3	8.4	9.1	5.6	4.4	13.1	11.5
United Kingdom	34.7	43.7	32.6	20.1	8.4	8.9	7.4	3.5	6.7	6.9
United States	14.5	15.5	15.1	9.9	8.9	6.2	39.0	34.1	10.5	15.6
Total DAC	28.8	32.8	21.0	12.2	13.8	16.3	17.6	12.9	11.2	12.0

a) Including imputed multilateral flows, i.e. making allowance for contributions through multilateral organisations, calculated using the geographical disuribution of multilateral disbursements for the year of reference. Excluding unspecified.

Source: OECD. 1991 Report. Development Cooperation. Paris: OECD, 1991

Appendix J

AID BY MAJOR PURPOSES, 1989

Commitments — *Percent of total*

	Australia	Austria	Belgium	Canada	Denmark	Finland	France	Germany	Ireland	Italy	Japan
Social and administrative infrast.	36.0	26.5	46.3	22.2	22.6	30.7	39.0	27.0	44.5	15.4	17.5
Education[a]	26.8	11.2	25.1	13.3	1.5	4.5	24.6	16.4	21.6	5.0	5.8
Health and population	1.0	0.7	13.1	2.4	10.1	9.9	5.2	1.9	7.9	6.7	2.6
Planning and public administ.	5.4	0.2	6.7	2.3	0.3	1.4	5.8	2,4	8.8	0.3	0.8
Other (including water supply)	2.9	14.4	1.5	4.2	10.7	14.9	3.4	6.3	6.2	3.3	8.4
Economic infrastructure	19.9	36.3	6.8	12.3	14.0	22.7	20.6	31.6	2.3	26.4	31.7
Transport and communication	18.3	26.3	5.2	3.3	7.7	10.9	10.7	20.3	2.3	11.9	19.3
Energy	1.5	5.0	1.6	3.8	2.1	11.8	4.8	11.3	–	10.5	6.3
Other	0.1	5.1	–	–	4.2	0.0	5.1	0.1	–	3.9	6.1
Production	20.9	22.8	30.7	16.5	50.5	23.9	9.5	18.4	27.2	38.1	16.9
Agriculture	18.2	2.3	11.2	11.1	23.4	13.4	6.9	6.5	20.9	19.3	10.0
Industry, mining and construction	1.7	20.1	12.0	3.6	27.1	10.0	1.8	9.2	3.5	18.6	6.6
Trade, banking, tourism	1.0	0.4	7.6	0.9	–	0.5	0.1	2.6	2.8	0.2	0.3
Other	–	–	–	–	–	–	0.7	–	0.1	–	1.8
Multisector	3.0	5.7	–	2.4	12.1	2.1	8.1	3.0	2.4	0.4	1.8
Programme assistance	3.4	0.0	–	0.9	0.4	2.4	5.8	4.7	–	6.6	20.6
Debt relief	–	–	–	–	–	3.6	5.4	3.0	–	0.3	3.6
Food aid	7.3	0.9	2.7	7.0	–	0.1	0.9	2.7	–	4.4	0.6
Emergency aid (other than food aid)	1.9	5.6	0.4	1.6	0.0	5.6	–	0.7	7.0	4.5	0.1
Administrative expenses	5.3	1.4	8.9	9.8	–	3.6	2.8	2.8	9.9	3.8	3.4
Unspecified + Support to Private Vol. Agencies	2.4	0.8	4.1	27.4	0.4	5.4	7.9	6.2	6.7	0.3	3.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a) Including students and trainees.

Commitments — AID BY MAJOR PURPOSE, 1989 *(cont'd)* — *Percent of tota*

	Nether-lands	New Zealand	Norway	Sweden	Switzer-land	United Kingdom	United States	Total DAC	Multilateral finance (ODF)			
									Total	EEC	World Bank	UN agencies
Social and administration infrast.	26.0	..	20.4	15.6	21.0	27.2	23.0	25.3	22.4	..	19.4	39.0
Education[a]	7.8	..	8.3	3.6	10.4	12.6	5.8	11.5	4.6	..	4.4	5.5
Health and population	3.3	..	3.4	5.3	5.6	2.8	8.4	4.8	5.3	..	2.3	21.6
Planning and public administ.	0.8	..	2.4	1.8	0.8	2.4	2.7	2.5	4.6	..	4.2	7.1
Other (including water supply)	14.1	..	6.4	4.9	4.1	9.3	6.1	6.5	7.9	..	8.5	4.7
Economic infrastructure	20.2	..	7.9	22.5	9.8	22.7	4.7	20.7	33.0	..	37.8	7.5
Transport and communication	19.0	..	4.8	6.4	6.4	8.7	1.0	11.5	12.5	..	14.3	3.1
Energy	1.0	..	3.2	15.4	2.9	13.1	3.6	6.4	14.7	..	17.4	..
Other	0.2	..	–	0.7	0.4	0.9	0.1	2.6	5.8	..	6.1	4.3
Production	25.2	..	23.3	16.4	24.6	13.4	14.4	17.6	32.4	..	35.7	14.5
Agriculture	19.1	..	19.1	9.1	21.3	8.8	8.3	10.1	15.1	..	16.3	8.7
Industry, mining & construction	5.9	..	3.6	6.8	1.8	4.1	0.4	5.6	13.5	..	15.2	4.3
Trade, banking,tourism	0.2	..	0.5	0.3	1.5	0.4	5.7	1.7	3.8	..	4.3	1.5
Other	–	..	–	0.2	–	0.0	–	0.5	–	..	–	–
Multisector	1.1	..	6.3	1.6	6.5	–	0.1	2.8	0.3	..	0.3	–
Programme assistance	13.8	..	4.5	11.4	7.8	16.3	27.0	13.3	5.7	..	6.8	–
Debt relief	2.2	..	–	–	0.9	2.6	6.4	3.6	–	..	–	–
Food aid	2.3	..	0.5	0.2	4.2	1.5	13.2	4.1	3.1	..	–	19.6
Emergency aid (other than food aid)	3.2	..	11.8	16.7	10.7	1.8	2.1	2.1	3.0	..	–	18.8
Administrative expenses	3.9	..	8.2	3.1	–	4.5	7.1	4.4	–	..	–	0.1
Unspecified + Support to Private Vol. Agencies	2.1	..	17.1	12.5	14.5	9.8	2.0	6.0	0.1	..	–	0.5
Total	100.0	..	100.0	100.0	100.0	100.0	100.0	100.0	100.0	..	100.0	100.0

a) Including students and trainees.

Source: OECD 1991 Report. Development Cooperation. Paris: OECD, 1991

Appendix K

NET OFFICIAL DEVELOPMENT ASSISTANCE FROM DAC COUNTRIES TO DEVELOPING COUNTRIES AND MULTILATERAL ORGANISATIONS

1979-81 average, 1985-90

Net disbursements — *$ million and per cent of GNP*

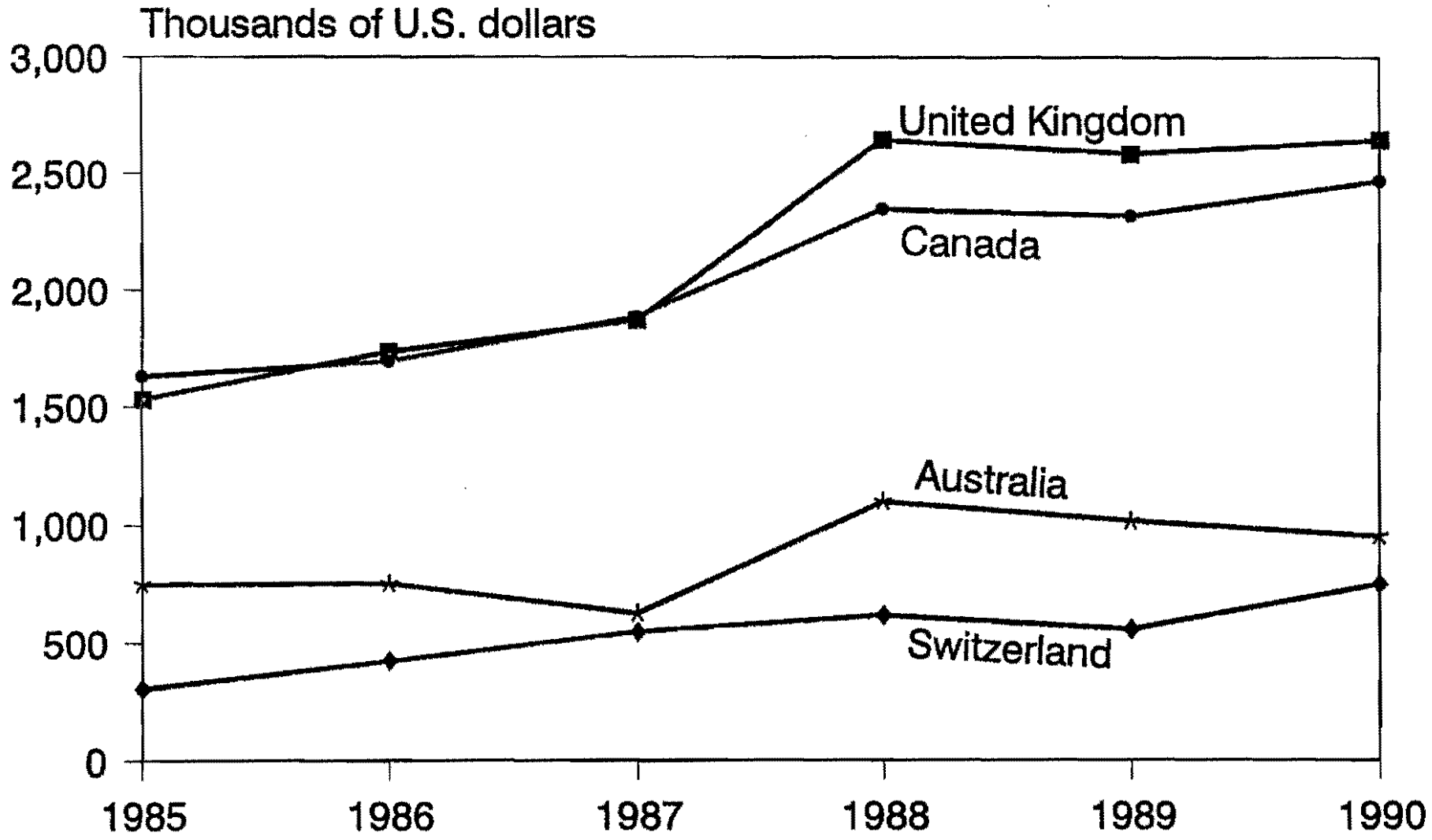
	1979-81 average		1985		1986		1987		1988		1989		1990	
	$ million	As % of GNP	$ million	As % of GNP	$ million	As % of GNP	$ million	As % of GNP	$ million	As % of GNP	$ million	As % of GNP	$ million	As % of GNP
Australia	649	0.47	749	0.48	752	0.47	627	0.34	1 101	0.46	1 020	0.38	955	0.34
Austria	176	0.25	248	0.38	198	0.21	201	0.17	301	0.24	282	0.23	394	0.25
Belgium	604	0.55	440	0.55	547	0.48	687	0.48	601	0.39	703	0.46	889	0.46
Canada	1 106	0.44	1 631	0.49	1 695	0.48	1 885	0.47	2 347	0.50	2 320	0.44	2 470	0.44
Denmark	448	0.73	440	0.80	695	0.89	859	0.88	922	0.89	937	0.93	1 171	0.93
Finland	112	0.24	211	0.40	313	0.45	433	0.49	608	0.59	706	0.63	846	0.64
France	3 929	0.65	3 995	0.78	5 105	0.70	6 525	0.74	6 865	0.72	7 450	0.78	9 380	0.7
Germany	3 380	0.45	2 942	0.47	3 832	0.43	4 391	0.39	4 731	0.39	4 948	0.41	6 320	0.4
Ireland	29	0.17	39	0.24	62	0.28	51	0.19	57	0.20	49	0.17	57	0.16
Italy	541	0.14	1 098	0.26	2 403	0.40	2 615	0.35	3 193	0.39	3 613	0.42	3 395	0.32
Japan	3 070	0.29	3 797	0.29	5 634	0.29	7 342	0.31	9 134	0.32	8 965	0.31	9 069	0.31
Netherlands	1 538	0.99	1 136	0.91	1 740	1.01	2 094	0.98	2 231	0.98	2 094	0.94	2 592	0.94
New Zealand	69	0.32	54	0.25	75	0.30	87	0.26	104	0.27	87	0.22	93	0.22
Norway	461	0.88	574	1.01	798	1.17	890	1.09	985	1.13	917	1.05	1 205	1.17
Sweden	956	0.84	840	0.86	1 090	0.85	1 375	0.88	1 534	0.86	1 799	0.96	2 012	0.90
Switzerland	234	0.23	303	0.31	422	0.30	547	0.31	617	0.32	558	0.30	750	0.31
United Kingdom	2 067	0.42	1 530	0.33	1 737	0.31	1 871	0.28	2 645	0.32	2 587	0.31	2 647	0.27
United States	5 868	0.22	9 403	0.24	9 564	0.23	9 115	0.20	10 141	0.21	7 676	0.15	11 366	0.21
Total DAC	25 238	0.35	29 429	0.35	36 663	0.35	41 595	0.35	48 114	0.36	46 712	0.34	54 077[a]	0.35

a) Excluding debt forgiveness of non-ODA claims in 1990. See notes to table 1.

Source: OECD 1991 Report. Development Cooperation. Paris: OECD, 1991

APPENDIX L

Net Official Development Assistance from four DAC Countries to Developing Countries and Multilateral Organizations (1985-1990)



APPENDIX M

CHECKLIST FOR PROPOSALS BEING SUBMITTED TO PROJECT DESIGN OFFICE

✓ Check that appropriate section has been included

PROPOSAL ORGANIZATION (Printed Version)

Table of Contents and Misc. Lists

◯ Provide table of contents, list of figures, tables, appendices and acronyms

Summary

◯ Provide 1 or 2 page executive summary

Background and Justification

◯ Statement of Problem and target beneficiaries

◯ Consistency with CIAT strategic and operational plans

◯ Developmental relevance and expected benefits/impact

◯ Relevance to donor priorities

◯ Comparative advantage of CIAT and consortia partners

Project Description

◯ Location and general description including: goal, purpose, target groups, outputs, inputs, objectively verifiable indicators and critical assumptions (log frame matrix)

◯ Methodology and description of major activities

◯ Figure showing Work Breakdown Structure (WBS) linking activities to outputs

◯ Implementation time table/duration of project (refer to Gantt chart in Appendices)

◯ Cross sectoral design issues (gender implications, environmental implications)

◯ Future sustainability

Project Organization and Management

◯ Specify roles and responsibilities of each institutional partner

◯ Organizational chart showing financial/management reporting lines and Project Coordinator's position

◯ Composition, roles and responsibilities of Advisory/Steering Committee

Budget

◯ Consult Project Support Office (Controller's Office) for:

* Appropriate budget format and line items
* Standard unit costs (personnel, vehicle maintenance, land use, etc.)
* Inflation rate for years 2 and hence
* Applicable indirect costs recovery rate

(See over)

* Budget provision for Publications/Documentation (publishing and distributing of research findings; acquisition of books, journals, data base searches)
* Budget provision for Training (preparation of training materials and delivery of training -- per diems and travel of instructors and trainees).

◯ State any sub-contracting provision with institutional partners

◯ State rationale/assumption for each major budget item

◯ Describe procurement plan (i.e., use of CIAT Miami Office)

◯ Submit completed budget to Project Support Office for final review and discussion (Budget page of final proposal document will be later signed off by Financial Controller)

Reporting and Project Control

◯ State reports required, format (linked to WBS activities) and frequency (e.g., annual work plans; semi-annual technical and financial progress reports; end-of-project reports).

Evaluation Plan

◯ State if mid-project evaluation is planned and budgeted

◯ State if end-of-project evaluation is planned and budgeted

◯ Provide evaluation matrix outline/indicators for measuring efficiency, effectiveness and impact of the project

Appendices

◯ Map of project research locations

◯ Gantt chart showing duration of each major activity

◯ Terms of reference for sub-contracts

◯ Relevant prior CIAT project experience

◯ CVs of project coordinator and principal project staff

◯ Background sheet on CIAT

◯ Discussion of any technical issues related to the project description

Attachments

◯ Provide covering letter to donor for DG signature

◯ Provide letters of support/commitment from partner institutions (if a joint proposal)

◯ Provide covering memo to PDO from Program Leader/Unit Head through DDG approving the proposal

Diskette

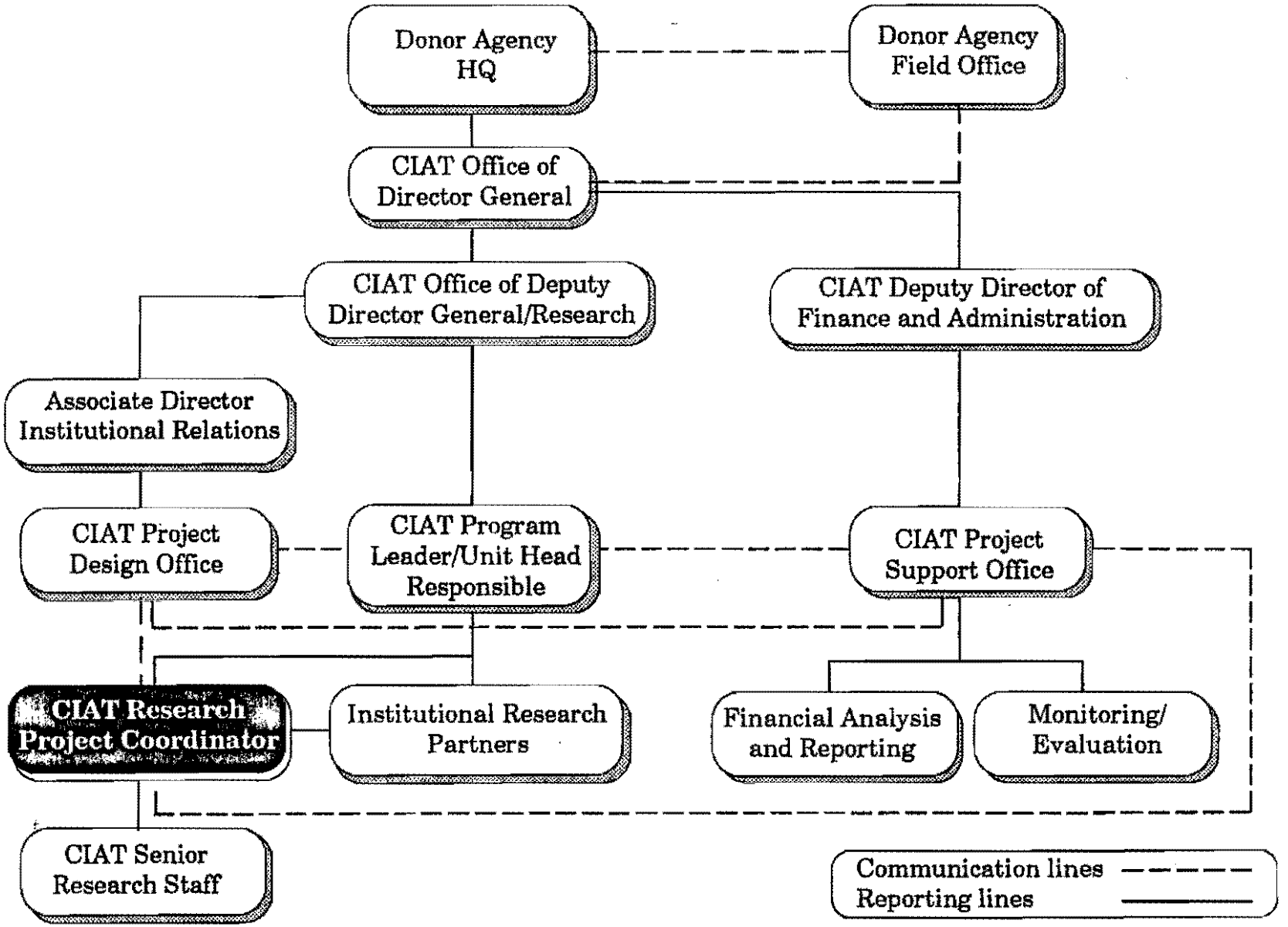
◯ Provide diskette with proposal in Word Perfect, single spaced with no paragraph indentations and no right justification

Prints for front cover and text

◯ Preference is for several relevant color prints (otherwise slides will do)

APPENDIX N

Sample CIAT Project Organization Chart



APPENDIX O

Sample Gantt Chart for Proposal Implementation Schedule of Activities by Quarter

Activity		Year 1				Year 2				Year 3			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
100	*TRAINING*												
110	Conduct needs analysis												
120	Prepare training materials												
130	Deliver training workshops												
200	*RESEARCH*												
210													
220													
300	*PROJECT MANAGEMENT*												
310	Participate in Project's Steering Committee Meeting												
320	Manage project office (HQ)												
330	Manage Field Office												
340	Manage project finances												
350	Manage Project reports												
360	Participate in project evaluation												

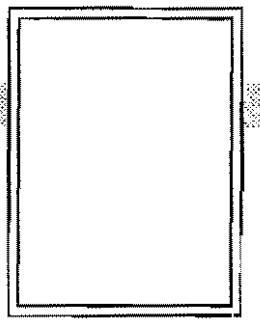
Appendix P

CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL – CIAT
DONOR – GRANT NUMBER – AND PROJECT NAME
BUDGET
IN (US$, CAD, AUS$, DFL, FFR, DM, ETC)

LINE ITEM	Year Nº From DD/MM/YY To DD/MM/YY	Year Nº From DD/MM/YY To DD/MM/YY	Year Nº From DD/MM/YY To DD/MM/YY	TOTAL
PERSONNEL				
Senior staff				–
Support staff				–
Clerical staff				–
Temporary				–
Honoraria				
Total personnel	–	–	–	–
TRAVEL				
National				–
International				–
Total travel	–	–	–	–
OPERATIONS				
Supplies and services				–
Research station support				–
Steering committee				–
Total operations	–	–	–	–
TRAINING				
Total training	–	–	–	–
SUPPORT TO OTHER INSTITUTIONS				–
DIRECT COSTS				
Vehicles use (leasing , rental)				–
Space use (Land, office)				–
	–	–	–	–
INDIRECT COSTS	–	–	–	–
CAPITAL				
Vehicles				–
Office				–
Field and laboratory				–
Total capital	–	–	–	–
TOTAL	–	–	–	–

Itembudg
18-Nov-92
Formatos

APPENDIX Q



CIAT C.V.

Centro Internacional de Agricultura Tropical

Name:	Reinhardt Howeler
Position in Project:	Project Coordinator, Soil Scientist/Agronomist
Citizenship:	Dutch
Country of Residency:	Thailand
Education:	Ph.D. Soil Chemistry, Cornell University, Ithaca, N.Y., 1970 M.S. Soil Fertility, University of Missouri, Columbia, MO, 1966 B. Sc. Tropical Soils, International College Trop. Agric., Deventer, Holland, 1964
Languages:	English, Dutch, Spanish: Fluent French, German, Thai: Considerable ability in conversation, reading and writing
Management/Administrative Experience	**- Centro Internacional de Agricultura Tropical, (CIAT)** Bangkok, Thailand, 1986- present Coordination of ASEAN Cassava Agronomy Network. **- Centro Internacional de Agricultura Tropical, (CIAT)** Cali, Colombia, (1979- 1986) Head of Analytical Services Laboratory.
International Research Experience	**- Centro Internacional de Agricultura Tropical, (CIAT)** Cali, Colombia, 1970- present Research on flooded and upland rice, *phaseolus* beans and cassava, mainly in the area of plant nutrition, soil fertility management (including cassava/mycorrhiza symbiosis) and erosion control. **- Queensland University, Brisbane, Qi.** Australia, September 1978- October 1979 Sabbatical leave, research on micronutrients and mycorrhiza in cassava.

International Research Experience (Cont'd)

- **Centro Internacional de Agricultura Tropical, (CIAT)**
  Regional Office for Asia
  Bangkok, Thailand, 1986- Present
  Coordination of Asian Cassava Agronomy Research Network, conducting collaborative research with national cassava programs in nine countries in Asia.

Teaching and Thesis Supervisory Experience

- Teaching of soil and plant nutrition classes during CIAT's Rice, Bean and Cassava Production Training Courses, usually several times a year.
- Supervision of several Ph.D and Master's degree thesis projects for US and Colombian universities.
- Since 1986, giving lectures on cassava plant nutrition at Kasetsart University in Chatuchak, Bangkok, usually 1-2 times per year.
- Supervising 2 Master's degree projects at Kasetsart University.

Major Publications and Reports

- See attached list for scientific publications.

Editor of four books:

1. Manejo y Conservación de Suelos de Ladera, 146p. 1984
2. Cassava Breeding and Agronomy Research in Asia, 346p. 1988
3. Proceedings 8th Symp. Intern. Soc. Trop. Root Crops, 712p. 1990
4. Cassava Breeding, Agronomy and Utilization Research in Asia, 438p. 1992.

On Editorial Board of three International Journals:

1. Plant and Soil, International Journal on Plant-Soil Relationships.
2. Fertilizer Research, International Journal covering all Aspects of Fertilizers and Soil Fertility Management.
3. Field Crops Research, An International Journal.

Professional Memberships

- American Society of Agronomy
- American Soil Science Society
- International Society Tropical Root Crops
- Indian Root Crops Society
- Colombia Soil Science Society

APPENDIX R

Sample CIAT Project Experience Sheet

DEVELOPMENT OF CASSAVA GERMPLASM FOR THE DRIER TROPICS AND SUBTROPICAL AGROECOSYSTEMS OF AFRICA, ASIA AND LATIN AMERICA	
Donor: International Fund for Agricultural Development (IFAD), U.S.A.	
Location: EMBRAPA/CNPMF, Cruz das Almas, Bahia, Brazil	Duration: 5 years (1990-1994)
Status: Ongoing	Total value: $US 950,000

Goal: This project aims to enhance food security in the drier tropical and the subtropical areas of the world, through the introduction of preselected cassava germplasm from Brazil.

Objectives:

- to reduce food deficits in marginal areas of the drier tropics, with special emphasis on sub-humid and semi-arid sub-Saharan Africa.
- to broaden the genetic base of the international cassava collection by collecting and evaluating the Brazilian germplasm, and developing improved populations adapted to the drier tropics and the subtropics.

Outputs:

- improved welfare of small farmers in the target region.
- improved germplasm management and overall research capacity of national institutions working with cassava.

Description of activities: This project is being conducted in Brazil, under agreements among CIAT, Empresa Brasilera de Pesquisa Agropecuaria (EMBRAPA) through its Centro Nacional de Pesquisa de Mandioca e Fruticultura (CNPMF), and the Empresa Catarinense de Pesquisa Agropecuaria (EMPASC).

Principal activities include:

- collecting and conserving cassava germplasm in the drier regions of Northeast Brazil.
- evaluating cassava germplasm in sites in Brazil.
- developing elite plant populations through traditional and advanced breeding techniques.
- transferring improved populations to Africa, Asia and Latin America through the international cassava network.

CIAT's role: CIAT is the lead partner responsible for overall project management, donor reporting and administering subcontracts to the secondary partners in the consortia.

Evaluation: During the fourth year of the project, an external committee will review the work of the project in Brazil and will make recommendations for a possible project extension for a further five-year period.

CIAT personnel involved:	**Consortia partners:** CNPMF and EMPASC
Dr. Carlos Iglesias Dr. Anthony Bellotti	**Other partners:** IITA (International Institute for Tropical Agriculture, Nigeria)

Draft

CIAT Conferences 1987-1991 and Visitors to CIAT 1989-1991

Activity Report

December 1992

For Internal Circulation and Discussion Only

CIAT

Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

Draft

CIAT Conferences 1987-1991
and
Visitors to CIAT 1989-1991

Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

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INTRODUCTION

Bringing people together in conferences and receiving visitors are two important mechanisms that link CIAT with partners and donors, and with members of the local and other communities. The present document reports on CIAT conferences held during 1987 - 1991; and on visitors who came to CIAT during 1989 - 1992.

First, it summarizes the services provided by the Conferences and Visitors Offices.

Second, it gives an overview of the types, size and number of CIAT conferences; it reports on the geographic origin of conference participants; and it informs on the use of CIAT's conference facilities.

Finally, it reports on types and numbers of visitors.

CONFERENCES AND VISITORS SUPPORT SERVICES

CONFERENCES

The Conferences Office provides the following support services:

General

* Maintenance of conference facilities (rooms and equipments).
* Coordination of conference rooms use.

Pre-conference

* Conference planning: advice on conference design; programming (conference per se; interpretation; linkage with editorial services; linkage with public awareness; linkage with food and housing; social activities).
* Announcements and invitations; distribution of pre-conference information.
* Travel arrangements: tickets; visas; stop-over lodging reservations.
* Housing reservations at CIAT or elsewhere.
* Assembly of materials to be distributed at the conference.

Conference implementation

* Reception of participants at airports and transport to CIAT.
* Registration of participants; distribution of materials; consolidation of list of participants.
* Reimbursement of travel expenses.
* Secretarial assistance and coordination of temporary secretarial support for: transcription, reproduction and distribution of documents.
* Use of projection and audio equipment.

* Attention to participants' individual needs: arrangement of appointments; telecommunications; travel; health care.

* Social events for participants and accompanying persons: coordination; transport.

VISITORS

Visitors to CIAT are attended by the Visitors Office which

* Programs meetings with Center staff;

* Provides guided tours of CIAT;

* Provides general information on the Center;

* Arranges transport;

* Arranges excursions; and

* Provides linkage with services such as housing, banking, and travel.

The Visitors Office also supports applicants to CIAT principal staff positions when they come for interview; and it assists in making new employees acquainted with CIAT while they are being induced.

Finally, the Visitors Office assists in acquainting the families of CIAT personnel with the Center.

CONFERENCES

During 1987-1991, 73 conferences with 2850 participants were organized from CIAT headquarters. They dealt with

- ◊ Strategic and operational planning;
- ◊ Networking;
- ◊ Exchange of scientific information, and discussion of research issues;
- ◊ Linkage with farmers; and
- ◊ Miscellaneous matters.

The following is an inventory of these events arranged under the above headings and, when feasible or pertinent, by research programs[1].

STRATEGIC AND OPERATIONAL PLANNING

There were 16 events of this kind with 414 participants. They amounted to 22% of all events. There were on average 25.9 participants per event (coefficient of variation 77.1%). These were the third largest events after networking and scientific conferences.

◊ **Think tank on science and technology.** CIAT, 12-14 September 1988; 40 participants.

Germany	=	1
Italy	=	1
Northern Ireland	=	1
Switzerland	=	1
United Kingdom	=	1
United States	=	9
CIAT	=	26

◊ **Expert consultation on collaborative strategies with national agricultural research and development systems.** CIAT, 3-7 October 1988; 15 participants.

Argentina	=	1
Colombia	=	1
El Salvador	=	1

---

[1] Conferences organized by CIAT's decentralized bean projects in Africa, Central America, and the Andean Region are not reported here unless held at, or orlganized from, headquarters.

Guatemala	=	1
United States	=	1
CIAT	=	10

◊ **Consultation on the Cassava Program's strategic plan.** CIAT, 30-31 March 1989; 16 participants.

Netherlands	=	1
United States	=	2
CIAT	=	13

◊ **Consultation on the Cassava Program's strategic plan.** CIAT, 10-12 May 1989; 18 participants.

Brazil	=	3
Colombia	=	2
Ecuador	=	3
Paraguay	=	1
CIAT	=	9

◊ **Consultation on the Rice Program's strategic plan.** CIAT, 6-7 April 1989; 14 participants.

Brazil	=	2
Colombia	=	2
Cuba	=	1
Ecuador	=	1
United States	=	2
IRRI	=	2
CIAT	=	4

◊ **Workshop on collaboration among NARS and CIAT's Rice Program.** Montevideo, Uruguay, 17 March 1990; 25 participants.

Argentina	=	2
Brazil	=	3
Colombia	=	3
Cuba	=	2
Dominican Rep.	=	1
Mexico	=	1
Panama	=	1
Peru	=	1
Uruguay	=	2
IITA	=	1

IRRI	=	2
CIAT	=	6

◊ **Consultation on the Tropical Pastures Program's strategic plan.** CIAT, 10-12 April 1989; 16 participants.

Brazil	=	2
Colombia	=	3
Costa Rica	=	2
Netherlands	=	1
New Zealand	=	1
Peru	=	2
United States	=	2
CIAT	=	3

◊ **Consultation on the Tropical Pastures Program's strategic plan.** Los Baños, The Philippines, 11-12 May 1989; 6 participants.

People's Republic of China	=	1
Malaysia	=	1
Sri Lanka	=	1
Thailand	=	1
The Philippines	=	1
CIAT	=	1

◊ **Consultation on the Bean Program's strategic plan.** CIAT, 24-29 April 1989; 35 participants.

Brazil	=	1
Colombia	=	1
Ecuador	=	1
Germany	=	1
Guatemala	=	2
Honduras	=	1
Mexico	=	1
Uganda	=	1
United States	=	4
Zaire	=	1
CIAT	=	21

◊ **Expert consultation on CIAT's strategic plan.** CIAT, 3-4 September 1990; 27 participants.

Argentina	=	1
Brazil	=	1
Chile	=	1
Colombia	=	2
Costa Rica	=	2
United Kingdom	=	1
United States	=	1
Uruguay	=	1
FAO	=	1
CIAT	=	16

◊ **Workshop on strategies for the development of CIAT's Seed Unit.** CIAT, 16-17 February 1987; 31 participants.

Bolivia	=	1
Brazil	=	1
Colombia	=	4
Guatemala	=	1
Honduras	=	1
Mexico	=	1
Peru	=	1
Sweden	=	1
Trinidad Tobago	=	1
United States	=	4
FAO	=	1
CIMMYT	=	2
CIP	=	1
CIAT	=	11

◊ **Consultation on a project proposal on "Rice Integrated Pest and Crop Management".** CIAT, 12-13 June 1990; 19 participants.

Bolivia	=	1
Brazil	=	3
Colombia	=	2
Ecuador	=	3
Peru	=	2
Venezuela	=	2
IRRI	=	1
CIAT	=	5

◊ **Consultation on a project proposal for the "Development of Sustainable Agropastoral Systems for the Acid Soils Savannas of the American Tropics".** CIAT, 14-15 June 1990; 12 participants.

Bolivia	=	1
Brazil	=	2
Colombia	=	2
Venezuela	=	2
CIAT	=	5

◊ **Second Meeting of the Advisory Committee to the UNDP-GLO-87-001 Project "Human Resources Development for Generation and Transfer of Root and Tuber Crop Technology".** CIAT, 22-26 January 1990; 13 participants.

India	=	1
Mexico	=	1
Nigeria	=	1
United States	=	1
CIP	=	1
IITA	=	1
CIAT	=	7

◊ **Participatory planning by objectives workshop for beans in the Andean Region.** CIAT, 30 July - 2 August 1990; 36 participants.

Bolivia	=	3
Chile	=	1
Colombia	=	5
Ecuador	=	6
Peru	=	5
Venezuela	=	3
CIAT	=	13

◊ **Workshop on sustainable agriculture on the hillsides of Central America: Opportunities for interinstitutional cooperation.** Coronado, Costa Rica, 13-16 August 1991; 91 participants.

Brazil	=	1
Costa Rica	=	38
Dominican Rep.	=	1
El Salvador	=	6
Germany	=	1
Guatemala	=	8
Honduras	=	6

Mexico	=	1
Netherlands	=	1
Nicaragua	=	7
Panama	=	4
Peru	=	1
Switzerland	=	3
United States	=	4
CIAT	=	6
CIMMYT	=	3

NETWORKING

There were 26 events of this category with 1351 participants. They were both the most numerous category (35.6% of all events) and the largest events on average (52.0 participants per event; coefficient of variation 66.3%).

Beans

◊ **International Bean Trials Conference.** CIAT, 12-16 October 1987; 72 participants.

Argentina	=	2
Bolivia	=	1
Bulgaria	=	2
Burundi	=	1
Brazil	=	8
Chile	=	1
Colombia	=	4
Costa Rica	=	4
Dominican Rep.	=	1
Ecuador	=	2
Ethiopia	=	1
El Salvador	=	1
Guatemala	=	1
Honduras	=	1
Iran	=	1
Kenya	=	1
Malawi	=	1
Mexico	=	3
Nicaragua	=	1
Paraguay	=	1
Peru	=	1
Rwanda	=	1
Uganda	=	1

United States	=	5
Venezuela	=	2
Zaire	=	5
CIAT	=	19

◊ **Central American bean breeders workshop.** CIAT, 19-21 October 1987; 15 participants.

Argentina	=	1
Brazil	=	2
Costa Rica	=	3
El Salvador	=	1
Mexico	=	1
Nicaragua	=	1
CIAT	=	6

◊ **International bean breeders workshop. CIAT**, 7-12 November 1988; 74 participants.

Argentina	=	1
Australia	=	1
Brazil	=	8
Canada	=	1
Colombia	=	3
Costa Rica	=	1
Cuba	=	2
Dominican Rep.	=	1
Ecuador	=	1
El Salvador	=	1
Ethiopia	=	2
France	=	1
Germany	=	1
Guatemala	=	2
Honduras	=	2
Mexico	=	5
Peru	=	2
Rwanda	=	1
Somalia	=	1
Tanzania	=	3
Uganda	=	1
United States	=	7
Venezuela	=	1
CIAT	=	25

◊ **International conference on snap beans in developing countries.** CIAT, 16-20 October 1989; 54 participants.

Angola	=	1
Argentina	=	1
Brazil	=	2
Chile	=	1
Colombia	=	7
Costa Rica	=	1
Egypt	=	1
Ethiopia	=	2
India	=	2
Indonesia	=	1
Iran	=	1
Kenya	=	4
Netherlands	=	2
People's Republic of China	=	1
Spain	=	1
Taiwan	=	1
The Philippines	=	1
Turkey	=	2
United States	=	4
FAO	=	1
CIAT	=	17

◊ **Workshop of the Advanced Bean Research Network.** CIAT, 11-14 September 1990; 89 participants.

Argentina	=	2
Australia	=	1
Belgium	=	2
Brazil	=	1
Canada	=	2
Chile	=	1
Colombia	=	3
Costa Rica	=	3
France	=	2
Germany	=	2
Guatemala	=	2
Hungary	=	1
Italy	=	1
Kenya	=	1
Mexico	=	4

Peru	=	1
United Kingdom	=	4
United States	=	18
Uruguay	=	1
FAO	=	2
CIAT	=	35

◊ **International bean trials conference.** CIAT, 21-25 October 1991; 82 participants.

Argentina	=	2
Australia	=	1
Bolivia	=	2
Brazil	=	9
Bulgaria	=	1
Chile	=	1
Colombia	=	14
Costa Rica	=	3
Cuba	=	2
Ecuador	=	2
El Salvador	=	2
Guatemala	=	2
Honduras	=	2
Mauritius	=	1
Mexico	=	5
Peru	=	5
South Africa	=	1
United States	=	2
Uruguay	=	1
Venezuela	=	1
CIAT	=	22
CIMMYT	=	1

◊ **II meeting on grain legumes in the Andean Region, RELEZA II.** CIAT, 24-29 June 1991; 100 participants.

Bolivia	=	3
Colombia	=	19
Ecuador	=	10
El Salvador	=	1
Mexico	=	3
Mozambique	=	1
Nicaragua	=	2
Panama	=	1

Peru	=	16
Venezuela	=	2
CIAT	=	42

Cassava

◊ **Workshop to establish communication links among integrated cassava projects.** CIAT, 7-8 April 1988; 30 participants.

Brazil	=	1
Colombia	=	3
Cuba	=	1
Ecuador	=	2
Mexico	=	2
Nicaragua	=	2
Panama	=	1
Paraguay	=	2
CIAT	=	16

◊ **Workshop of the Advanced Cassava Research Network.** CIAT, 6-9 September 1988; 55 participants.

Argentina	=	1
Belgium	=	1
Brazil	=	1
Canada	=	1
Colombia	=	2
Peoples' Republic of China	=	1
Germany	=	1
Japan	=	1
United Kingdom	=	4
United States	=	12
FAO	=	1
IITA	=	2
CIAT	=	27

◊ **Panamerican meeting of cassava breeders.** Cruz das Almas, Bahia, Brazil, 21-25 May 1990; 25 participants.

Bolivia	=	1
Brazil	=	12
Colombia	=	1
Costa Rica	=	1

Cuba	=	1
Dominican Rep.	=	1
Ecuador	=	1
Mexico	=	1
Panama	=	1
Paraguay	=	2
Venezuela	=	1
CIAT	=	2

◊ **Meeting on cooperation in cassava research in the Latin American Subtropics.** Asunción, Paraguay, 16-17 October 1990; 23 participants.

Paraguay	=	20
CIAT	=	3

◊ **III Asian regional workshop on cassava research workshop.** Malang, Indonesia. 22-27 October 1990; 50 participants.

India	=	5
Indonesia	=	11
Laos	=	1
Malaysia	=	2
Myanmar	=	1
People's Republic of China	=	4
Nepal	=	1
Sri Lanka	=	1
Thailand	=	11
The Pilippines	=	4
Vietnam	=	3
United Kingdom	=	1
CIAT	=	5

◊ **II workshop on integrated cassava projects.** Portoviejo, Manabí, Ecuador, 22-26 July 1991; 42 participants.

Argentina	=	1
Bolivia	=	1
Brazil	=	12
Colombia	=	1
Ecuador	=	17
Panama	=	1

Paraguay	=	1
United States	=	2
CIAT	=	6

Rice

◊ **VII International Rice Conference for Latin America and the Caribbean.** CIAT, 11-12 August 1988; 60 participants.

Argentina	=	2
Brazil	=	9
Chile	=	1
Colombia	=	5
Costa Rica	=	1
Cuba	=	2
Dominican Rep.	=	6
Ecuador	=	1
Guyana	=	2
Haiti	=	4
Jamaica	=	4
Mexico	=	2
Panama	=	2
Paraguay	=	1
Peru	=	2
Venezuela	=	4
IITA	=	1
CIAT	=	11

◊ **Brazilian rice breeders workshop.** CIAT, 4-5 August 1988; 17 participants.

Brazil	=	12
CIAT	=	5

◊ **Rice breeders workshop.** CIAT Villavicencio, 8-10 August 1988; 21 participants.

Brazil	=	2
Colombia	=	4
Cuba	=	1
Dominican Rep.	=	2
Ecuador	=	1
Haiti	=	1
Peru	=	2
Venezuela	=	3

IRRI	=	1
CIAT	=	4

◊ **VIII International Rice Conference for Latin America and the Caribbean.** Villahermosa, Tabasco, Mexico, 10-16 November 1991; 167 participants.

Argentina	=	1
Belize	=	1
Bolivia	=	1
Brazil	=	11
Chile	=	1
Colombia	=	8
Costa Rica	=	6
Cuba	=	3
Dominican Rep.	=	10
Ecuador	=	1
El Salvador	=	1
Guatemala	=	2
Guyana	=	1
Jamaica	=	1
Mexico	=	89
Nicaragua	=	1
Panama	=	4
Peru	=	2
The Philippines	=	3
Trinidad Tobago	=	1
Suriname	=	2
United States	=	1
Uruguay	=	2
IRRI	=	1
CIAT	=	13

◊ **III workshop on evaluation and selection of germplasm for Mexico and Central America.** Culiacan, Sinaloa, Mexico, 4-6 November 1991; 26 participants.

Belize	=	1
Costa Rica	=	2
Cuba	=	1
Dominican Rep.	=	4
Ecuador	=	1
Guatemala	=	1
Haiti	=	1
Jamaica	=	1
Mexico	=	7

Nicaragua	=	1
Panama	=	2
Trinidad Tobago	=	1
CIAT	=	3

Tropical Pastures

◊ **V meeting of the Advisory Committee to the International Network for the Evaluation of Tropical Pastures, RIEPT.** Panama, 11-16 May 1987; 35 participants.

Argentina	=	1
Brazil	=	3
Chile	=	1
Colombia	=	1
Costa Rica	=	2
Cuba	=	1
Dominican Rep.	=	2
Ecuador	=	2
El Salvador	=	1
Guatemala	=	1
Honduras	=	2
Mexico	=	2
Nicaragua	=	1
Panama	=	2
Paraguay	=	1
Peru	=	1
Venezuela	=	1
FAO	=	1
CIAT	=	9

◊ **VI meeting of the Advisory Committee to the International Network for the Evaluation of Tropical Pastures, RIEPT.** Veracruz, Mexico, 14-16 November 1988; 53 participants.

Antigua	=	1
Argentina	=	1
Bolivia	=	1
Brazil	=	5
Colombia	=	2
Costa Rica	=	2
Cuba	=	1
Dominican Rep.	=	1
Ecuador	=	2
Guadalupe	=	1

Guatemala	=	1
Honduras	=	1
Mexico	=	6
Panama	=	1
Paraguay	=	1
Peru	=	2
Puerto Rico	=	1
Venezuela	=	2
FAO	=	2
CIAT	=	19

◊ **I meeting of the International Network for the Evaluation of Tropical Pastures, Central American and Caribbean Chapter.** Veracruz, Mexico, 17-19 November 1988; 81 participants.

Antigua	=	1
Brazil	=	2
Colombia	=	2
Costa Rica	=	3
Cuba	=	4
Dominican Rep.	=	1
Ecuador	=	2
Guadalupe	=	1
Guatemala	=	3
Honduras	=	5
Mexico	=	30
Panama	=	3
Paraguay	=	1
Peru	=	1
Puerto Rico	=	2
Venezuela	=	1
FAO	=	2
CIAT	=	17

◊ **Meeting of the Advisory Committee to the International Network for the Evaluation of Tropical Pastures, RIEPT, on "On-farm Pastures Research".** CIAT, 27-29 August 1990; 49 participants.

Australia	=	1
Bolivia	=	1
Brazil	=	4
Colombia	=	3
Costa Rica	=	3
Dominican Rep.	=	1

Ecuador	=	1
Guatemala	=	2
Honduras	=	1
Mexico	=	1
Panama	=	2
Paraguay	=	1
Peru	=	2
United States	=	2
Uruguay	=	3
Venezuela	=	1
CIAT	=	20

◊ **I meeting of the International Network for the Evaluation of Tropical Pastures, Amazonian Chapter.** Pucallpa, Peru, 6-9 November 1990; 63 participants.

Bolivia	=	6
Brazil	=	15
Colombia	=	3
Ecuador	=	4
Peru	=	21
CIAT	=	14

◊ **Meeting of the Executive Committee of the International Network for the Evaluation of Tropical Pastures, RIEPT.** CIAT, 21-23 October 1991; 11 participants.

Brazil	=	1
Colombia	=	1
Costa Rica	=	1
Mexico	=	1
CIAT	=	7

Others

◊ **Follow-up workshop for collaborators in the special project "Evaluation, Selection, and Management of the Legume-Rhizobium Symbiosis".** CIAT, 30 August - 5 September 1987; 44 participants.

Bolivia	=	1
Brazil	=	4
Colombia	=	1
Costa Rica	=	2
Cuba	=	2
El Salvador	=	2
Guatemala	=	4

Honduras	=	1
Mexico	=	3
Panama	=	1
Peru	=	3
United States	=	1
Zambia	=	2
CIAT	=	17

◊ **Workshop to establish a socio-economics network for agricultural research in Central America.** San Jose, Costa Rica, 30 May - 1 June 1990; 13 participants.

Costa Rica	=	2
El Salvador	=	1
Guatemala	=	1
Honduras	=	1
Nicaragua	=	1
Panama	=	1
CIMMYT	=	3
CIAT	=	3

EXCHANGE OF SCIENTIFIC INFORMATION, AND DISCUSSION OF RESEARCH ISSUES

There were 19 conferences of this kind with 657 participants. They were the second most numerous category (26.0% of all events) and third in average event size (34.6 participants per event; coefficient of variation 56.0%).

Beans

◊ **Workshop on snap beans breeding.** CIAT, 11-15 May 1987; 28 participants.

Argentina	=	1
Brazil	=	2
Colombia	=	8
Ecuador	=	1
Guatemala	=	1
Peru	=	1
Spain	=	1
United States	=	2
CIAT	=	11

◊ **International workshop on drought tolerance in *Phaseolus vulgaris*.** CIAT, 19-21 October 1987; 31 participants.

Argentina	=	1
Brazil	=	5
Bulgaria	=	2
Costa Rica	=	1
Cuba	=	1
Ethiopia	=	1
Honduras	=	1
Iran	=	1
Mexico	=	2
Peru	=	1
Uganda	=	1
United States	=	4
Zaire	=	2
CIAT	=	8

◊ **Workshop on common bean anthracnose in Latin America.** CIAT, 6-10 June 1988; 28 participants.

Brazil	=	9
Colombia	=	4
Costa Rica	=	1
Mexico	=	1
Nicaragua	=	2
Peru	=	2
CIAT	=	9

◊ **International workshop on nutritional and acceptability aspects of common beans.** CIAT, 10-11 October 1988; 18 participants.

Canada	=	3
Chile	=	2
Colombia	=	2
Guatemala	=	4
Italy	=	1
CIAT	=	6

Cassava

◊ **Workshop on cassava and sweet potato germplasm exchange, quarantine, and breeding.** CIAT, 8-12 June 1987; 48 participants.

Argentina	=	1
Bolivia	=	2
Brazil	=	9
Colombia	=	2
Costa Rica	=	1
Cuba	=	1
Dominican Rep.	=	2
Ecuador	=	3
Haiti	=	1
Jamaica	=	1
Mexico	=	2
Panama	=	2
Paraguay	=	1
Peru	=	1
Uruguay	=	1
Venezuela	=	1
CIP	=	2
CIAT	=	15

◊ **Workshop on the improvement of the diagnostic capacity for root and tuber crop production systems.** Cartagena, Colombia, 12-17 September 1988; 26 participants.

Argentina	=	1
Brazil	=	3
Colombia	=	4
Cuba	=	1
Ecuador	=	1
Mexico	=	1
Panama	=	2
Paraguay	=	2
Peru	=	4
Uruguay	=	1
CIAT	=	6

◊ **First Latin American seminar on production and utilization of cassava starch.** Santa Catarina, Brazil, 3-6 July 1989; 27 participants.

Argentina	=	1
Bolivia	=	1
Brazil	=	10
Colombia	=	3
Ecuador	=	3
Paraguay	=	6
CIAT	=	3

◊ **ICA-CIAT workshop on cassava field experiments.** CIAT, 27-31 March 1989; 37 participants.

Colombia	=	25
CIAT	=	12

◊ **Meeting on technical guidelines for the safe movement of cassava germplasm.** CIAT, 8-10 May 1990; 10 participants.

Brazil	=	1
Fiji	=	1
Italy	=	1
The Philippines	=	1
United Kingdom	=	1
FAO	=	1
IITA	=	1
CIAT	=	3

◊ **CIP-CIAT workshop on integrated pest management.** Trivandrum, India, 15-22 October 1990; 20 participants from Bangladesh, China, India, Indonesia, Nepal, The Philippines, Sri Lanka and Thailand.

◊ **Collaborative workshop CIP-CIAT-IITA-ICTA on processing, marketing, and utilization of root and tuber crops in Latin America.** Villanueva, Guatemala, 8-12 April 1991; 27 participants.

Colombia	=	3
Costa Rica	=	4
Cuba	=	2
Dominican Rep.	=	1
Ecuador	=	3
Guatemala	=	5
Mexico	=	1

Panama	=	3
Peru	=	2
CIP	=	1
CIAT	=	2

◊ **CIP-CIAT workshop on the improvement of NARS diagnostic capacity for root and tuber crop production systems.** Fortaleza, Ceara, Brazil, 20-24 May 1991; 25 participants.

Argentina	=	3
Brazil	=	9
Colombia	=	1
Dominican Rep.	=	1
Ecuador	=	1
Panama	=	1
Paraguay	=	2
Peru	=	1
Uruguay	=	1
CIP	=	1
CIAT	=	4

◊ **Workshop on advances on cassava starch.** CIAT, 17-21 June 1991; 68 participants.

Argentina	=	1
Brazil	=	4
Colombia	=	40
Ecuador	=	3
France	=	7
Paraguay	=	1
United Kingdom	=	3
Venezuela	=	1
CIAT	=	8

<u>Rice</u>

◊ **ICA-CIAT-FEDEARROZ meeting on techniques for a diagnosis of the Colombian rice industry.** CIAT, 14-15 February 1991; 25 participants.

Colombia	=	15
CIAT	=	10

Tropical Pastures

◊ **International workshop on Centrosema-biology, agronomy, and utilization.** CIAT, 23-27 February 1987; 47 participants.

Antigua	=	1
Argentina	=	1
Australia	=	5
Brazil	=	10
Burundi	=	1
Colombia	=	1
Cuba	=	1
Malaysia	=	2
Mexico	=	1
Panama	=	1
Peru	=	2
United States	=	2
Venezuela	=	1
Zimbabwe	=	1
ILCA	=	1
IRRI	=	1
CIAT	=	15

◊ **Workshop on nutrient cycling in pastures.** CIAT, 10-15 September 1990; 25 participants.

Australia	=	1
Brazil	=	2
Colombia	=	1
Martinique	=	1
New Zealand	=	1
Peru	=	1
South Africa	=	1
CIAT	=	17

Others

◊ **Workshop on systems strengthening for improving seed quality.** Montevideo, Uruguay, 9-13 November 1987; 81 participants.

Argentina	=	7
Belgium	=	4
Bolivia	=	2
Brazil	=	7

Chile	=	4
Colombia	=	6
Costa Rica	=	1
Ecuador	=	2
France	=	1
Guatemala	=	2
Honduras	=	1
Mexico	=	4
New Zealand	=	1
Nicaragua	=	1
Norway	=	1
Panama	=	1
Paraguay	=	2
Peru	=	1
Spain	=	1
Sweden	=	1
United Kingdom	=	1
United States	=	5
Uruguay	=	19
Venezuela	=	1
CIAT	=	5

◊ **Latin American symposium on "Alternative uses as fertilizers of native phosphates in Tropical and Subtropical America".** CIAT, 4-6 November 1987, 17 participants.

Bolivia	=	2
Brazil	=	1
Colombia	=	3
Costa Rica	=	1
Ecuador	=	2
Mexico	=	1
Peru	=	2
Venezuela	=	1
United States	=	3
CIAT	=	1

◊ **Workshop on the development of basic seed production programs.** CIAT, 31 October - 4 November 1988; 69 participants.

Argentina	=	2
Bolivia	=	3
Brazil	=	11
Chile	=	2
Colombia	=	7

Costa Rica	=	2
Cuba	=	1
Dominican Rep.	=	1
Ecuador	=	2
El Salvador	=	1
Guatemala	=	3
Honduras	=	1
Mexico	=	4
Panama	=	1
Paraguay	=	1
Peru	=	4
Uruguay	=	1
Venezuela	=	1
CIP	=	1
CIAT	=	20

LINKAGE WITH FARMERS

There were 8 events of this kind (11% of all events) with 351 participants (43.9 participants per event; coefficient of variation 54.0%).

◊ **Latin American workshop on bean on-farm-research.** CIAT, 16-25 February 1987; 43 participants.

Brazil	=	1
Colombia	=	8
Costa Rica	=	3
Ecuador	=	2
El Salvador	=	1
Guatemala	=	2
Honduras	=	2
Mexico	=	3
Paraguay	=	1
Peru	=	6
CIMMYT	=	3
CIP	=	1
CIAT	=	13

◊ **Workshop on participation of small-scale farmers in the diagnosis for on-farm-research.** CIAT, 8-10 February 1988; 37 participants.

Colombia	=	24
CIAT	=	13

◊ **Training Workshop on methodology for participatory research in production systems; the diagnosis.** CIAT, 29 August - 2 September 1988; 34 participants.

Colombia	=	29
CIAT	=	5

◊ **Training laboratory on techniques for scientist-farmer interactions.** CIAT, 31 October - 3 November 1988; 25 participants.

Colombia	=	12
CIAT	=	13

◊ **Central American workshop on the production and distribution of bean seed for small farmers.** Jutiapa, Guatemala, 1989; 46 participants.

Costa Rica	=	3
Colombia	=	1
Dominican Rep.	=	2
El Salvador	=	4
Guatemala	=	17
Haiti	=	2
Honduras	=	5
Nicaragua	=	4
Panama	=	2
CIAT	=	6

◊ **Seminar: From research to farmers' fields: Case study on new cassava varieties.** CIAT, 3-5 September 1991; 37 participants.

Colombia	=	22
Ecuador	=	2
CIAT	=	13

◊ **Seminar on cassava as an agricultural and food alternative.** Maturin, Venezuela, 22-26 july 1991; 100 participants.

Venezuela	=	95
CIAT	=	5

◊ **Central American workshop on the development of small seed enterprises PROFRIJOL-CIAT-DIGESA.** Jutiapa, Guatemala, 22-26 April 1991; 29 participants.

El Salvador	=	4
Guatemala	=	7
Nicaragua	=	4
Panama	=	4
FAO	=	1
CIAT	=	9

MISCELLANEOUS

There were four events in this category: one public awareness event, and three internal seminars. Total number of participants was 77 (19.3 per event).

◊ **Seminar on genetic resources for Latin American journalists.** CIAT, 11-15 June 1990; 9 participants.

Bolivia	=	1
Brazil	=	1
Ecuador	=	1
Costa Rica	=	1
Guatemala	=	1
IBPGR	=	2
CIAT	=	2

◊ **Internal workshop for updating in biotechnology.** CIAT, 30 April - 4 May 1990; 16 participants.

CIAT	=	16

◊ **Seminar on biotechnology for Tropical Pastures Program staff.** CIAT, 28 January - 1 February 1991; 20 participants.

CIAT	=	20

◊ **Internal seminar on gender analysis in agricultural research.** CIAT, 13-14 June 1991; 32 participants.

Colombia	=	3
CIAT	=	29

USE OF CONFERENCE ROOMS

In addition to being used for CIAT conferences, the Center's conference facilities also serve many other meetings of CIAT personnel, of associate institutions, and of external users who are permitted access to them on a complimentary basis or against payment of a cost-recovery charge.

The collection of statistics on the use of conference rooms only started in the last year of the period under review, i.e. in 1991. Therefore, and with the aim of presenting more than a single year's data, results of 1991-1992 are shown in Tables 1-3.

In 1991 there were 1,234 meetings with 5,779 hours use of conference rooms. Of this, 1,023 were CIAT meetings (83%); 36 (3%) were gatherings of associate institutions; and 175 (14%) were meetings of external users (Table 1).

In 1992 there were 968 meetings with 4,823 hours use of conference rooms. Of this, 736 were CIAT meetings (76%); 13 (1%) were gatherings of associate institutions; and 219 (23%) were meetings of external users (Table 1).

From 1991 to 1992 there was a clear drop in CIAT meetings, whereas the events of external users increased. The reduction reflects the overall downsizing of the Center's activities in the present year.

Use of individual conference rooms followed a similar pattern in both years (Tables 2 and 3): 14-16% of events utilized the two largest conference rooms (capacity 80 and 180 persons); 44-45 % utilized the three rooms of intermediate size (capacity 30 and 40 persons); and 38-42 events were in the two smallest rooms (capacity 12 and 20 persons).

TABLE 1. USE OF CONFERENCE ROOMS 1991 AND 1992.
NUMBER OF EVENTS* AND HOURS OF USE BY TYPE OF USERS.

User		1991		1992	
		No. of events	Hours	No. of events	Hours
CIAT	Research	324	1,249	286	1,187
	Training	236	1,592	146	888
	Visitors	61	212	64	172
	Administration	285	844	151	481
	CRECIAT-PROCIAT	117	203	89	142
	Subtotal	1,023	4,100	736	2,870
Associate Institutions	INTSORMIL	24	168	5	33
	IBPGR	2	5	4	36
	CIMMYT	9	35	1	8
	IFDC	1	2	3	27
	Subtotal	36	210	13	104
External	Complimentary	46	360	88	725
	Non-complimentary	129	1,109	131	1,124
	Subtotal	175	1,469	219	1,849
Total		1,234	5,779	968	4,823

* In events longer than one day, each day was registered as one event

TABLE 2. USE OF CONFERENCE ROOMS 1991.
NUMBER OF EVENTS* BY TYPE OF USER AND CONFERENCE ROOM

User		Rooms (Capacity)							Total
		Auditorium (180)	Nariño (80)	Muisca (40)	Calima (40)	Tairona (30)	Tumaco (20)	Quimbaya (12)	
CIAT	Research	14	28	35	35	52	76	84	324
	Training	7	32	67	49	13	25	43	236
	Visitors	0	2	7	11	10	17	14	61
	Administration	5	29	25	16	76	84	50	285
	CRECIAT-PROCIAT	6	25	6	10	26	23	21	117
Associate Institutions	INTSORMIL	6	6	3	4	0	2	3	24
	IBPGR	0	0	0	0	1	1	0	2
	CIMMYT	0	2	0	0	0	7	0	9
	IFDC	0	0	0	0	0	0	1	1
External	Complimentary	0	9	9	10	13	4	1	46
	Non-Complimentary	13	11	26	42	20	6	11	129
TOTAL		51	144	178	177	211	245	228	1,234
%		4	12	14	14	17	20	18	

* In events longer than one day, each day was registered as one event.

TABLE 3. USE OF CONFERENCE ROOMS 1992.
NUMBER OF EVENTS* BY TYPE OF USER AND CONFERENCE ROOM

User		Rooms (Capacity)							Total
		Auditorium (180)	Nariño (80)	Muisca (40)	Calima (40)	Tairona (30)	Tumaco (20)	Quimbaya (12)	
CIAT	Research	3	16	28	35	34	61	109	286
	Training	0	6	38	7	17	48	30	146
	Visitors	0	17	6	7	8	11	15	64
	Administration	3	15	16	17	23	41	36	151
	CRECIAT-PROCIAT	12	17	9	17	11	11	12	89
Associate Institutions	INTSORMIL	0	3	1	0	0	0	1	5
	IBPGR	0	0	0	0	0	0	4	4
	CIMMYT	0	0	0	1	0	0	0	1
	IFDC	3	0	0	0	0	0	0	3
External	Complimentary	12	9	20	10	20	13	4	88
	Non-Complimentary	4	14	10	53	46	4	0	131
TOTAL		37	97	128	147	159	189	211	968
%		4	10	13	15	16	20	22	

* In events longer than one day, each day was registered as one event.

VISITORS OFFICE

The following is an account of the activities performed by the Visitors Office since its incorporation in the former Training and Communications Support Program. Results will be presented for the years October - September 1989-90, 1990-91 and 1991-92. Incompleteness of earlier records precludes their inclusion.

VISITORS

Audiences

Three audiences are distinguished:

1. Donors and their constituency, that is, visitors from donor institutions and persons who are perceived as being donors' constituents.

2. Partners and their constituency, i.e., members of CIAT partner institutions and persons who are perceived as being partners' constituents.

3. Members of communities related to CIAT's interests.

Number of visitors by audience

During the period October 1989 - September 1992, 10,082 persons visited CIAT (Table 4). Of these, 78 were from donor agencies or related to the donor community; 1,021 were from partner institutions or related to them (705 from Colombia; 316 from other countries); and 8,983 were from other communities related to CIAT's interests (8,516 from Colombia; 467 from other countries).

Yearly averages were 287 international and 3,074 national visitors. Clearly the vast majority of visitors (91.5%) came from CIAT's host country, and among them, most were community members (84.4%), that is, the bulk of the Visitors Office's activities was in support of public awareness in Colombia.

Four per cent of Colombian visitors (excluding CIAT partners) were key community leaders or persons in strategic positions for CIAT's linkage to the local community (Table 5). About 20% were members of the general community. And Approximately 75% were students.

Performance statistics

On average, 203 visitors groups and 247 individual visitors came to CIAT every year, that is, 0.9 groups and 1.1 individual visitor per working day (Table 6).

PRINCIPAL STAFF APPLICANTS, PERSONNEL IN INDUCTION AND RELATIVES OF PERSONNEL

In recent years the Visitors Office attended some 40 to 50 staff applicants and personnel in induction per year (Table 7). Further, during 1989/90 and 1990/91, the Office implemented the visit of 13 groups, with a total of 1,452 members of employes' families who gathered at CIAT on week-ends in social and sporting events. Finally, in 1992 the office managed a visit of 45 senior staff spouses to CIAT to become acquainted with the Center's new strategy and activities.

TABLE 4. CIAT VISITORS. October 1989-September 1992.

	1989-90			1990-91			1991-92			TOTAL
	GROUP VISITS		INDIVIDUAL VISITORS	GROUP VISITS		INDIVIDUAL VISITORS	GROUP VISITS		INDIVIDUAL VISITORS	
	GROUPS	VISITORS		GROUPS	VISITORS		GROUPS	VISITORS		
DONORS AND CONSTITUENCY	-	-	18	4	13	19	4	9	19	78
PARTNERS AND CONSTITUENCY Colombian	14	153	43	27	403	21	10	80	5	705
Not-Colombian	2	10	67	11	85	55	12	61	38	316
COMMUNITY MEMBERS Colombian	145	2,745	173	155	2,644	87	168	2,812	55	8,516
Not-Colombian	9	98	46	25	103	49	22	124	47	467
SUBTOTAL Colombian	159	2,898	216	182	3,047	108	178	2,892	60	9,221
Not-Colombian	11	108	131	40	201	123	38	194	104	861
TOTAL	170	3,006	347	222	3,248	231	216	3,086	164	10,082

TABLE 5. CIAT VISITORS FROM COLOMBIA. October 1989-September 1992.

	1989-90 COMMUNITY		1990-91 COMMUNITY		1991-92 COMMUNITY		TOTAL	
	CALI/PALMIRA	OTHER	CALI/PALMIRA	OTHER	CALI/PALMIRA	OTHER	No	%
COMMUNITY LEADERS	59	7	14	11	33	1	125	1.5
COMMUNITY/CIAT LINKS	41	-	83	5	116	2	247	2.9
GENERAL COMMUNITY								
Urban	381	67	256	158	344	93	1,299	15.3
Rural	12	87	162	48	62	103	474	5.6
STUDENTS								
Universities	689	781	434	899	539	982	4,324	50.8
High Schools	535	50	561	24	333	111	1,614	19.0
Primary Schools	209	-	76	-	148	-	433	5.1
TOTAL	1,926	992	1,586	1,145	1,575	1,292	8,516	

TABLE 6. GROUP AND INDIVIDUAL VISITS TO CIAT. October 1989-September. 1992.

	1989-90	1990-91	1991-92	Mean
VISITING GROUPS	170	222	216	203
VISITORS IN GROUPS	3,006	3,248	3,086	3,113
VISITORS GROUP^{-1}	17.7	14.6	14.3	15.3
INDIVIDUAL VISITORS	347	231	164	247
GROUPS DAY^{-1}*	0.7	0.9	0.9	0.9
INDIVIDUAL VISITORS DAY^{-1}*	1.5	1.0	0.7	1.1

* Referred to 235 working days year^{-1}

TABLE 7. PRINCIPAL STAFF APPLICANTS, PERSONNEL IN INDUCTION, AND RELATIVES OF PERSONNEL ATTENDED BY THE VISITORS OFFICE. October 1989-September 1992.

	1989-90	1990-91	1991-92
PRINCIPAL STAFF APPLICANTS	12	6	13
PERSONNEL IN INDUCTION	43	32	28
EMPLOYEES FAMILIES	1,217	235	-
PRINCIPAL STAFF SPOUSES	-	-	45

Draft

Training
for Tropical Agricultural Research and Development
1987 - 1991

CIAT
Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

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1987 - 1991

CIAT
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Training for Tropical Agricultural Research and Development

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Strenghthening agricultural research and development systems in developing countries through training

The strategies

To enhance NARDS through training CIAT followed three strategies:

- To develop or strengthen **institutional components** of research and technology-flow systems;
- To develop **integrated** research and technology-flow **systems**; and
- To develop or strengthen research and technology flow **capacities related to specific R&D projects or project-like endeavors.**

The choice of these approaches depended on the needs or opportunities in the various NARDS, and the degree of development of the NARDS' commodity programs.

The first strategy focused on specific components of existing or emerging research and technology-flow systems; but without paying particular attention to the whole system or to the links among its various components. For systems with rather incipient development this meant establishing or maintaining a minimum critical mass of researchers and professionals devoted to furthering the flow of technology towards farmers. For stronger systems it meant training strategically selected candidates who would substantially improve the effectiveness or efficiency of specific research or technology transfer teams.

With the second strategy attention was paid to the full range of research and technology-flow functions for a given commodity at the country or regional level, and to the integration amongst research and technology transfer.

By the third strategy institutions or inter-institutional arrangements were enabled to face well defined research or development challenges, or to tackle specific problems related to a given commodity.

The conceptual distinction between strategies facilitates understanding CIAT's efforts to strengthen NARDS through training. However, the limits among strategies were often blurred; and combinations of strategies rather than single strategies were frequently used.

The processes

Training modalities

Training was provided at CIAT, in the regions, and in-country.

At CIAT, training was offered in the form of intensive introductory commodity-specific research and production courses; in individualized on-the-job programs; in specialized courses; and as research programs leading to a formal higher degree such as M.Sc. or Ph.D.

At the regional level and in-country, training was supplied as short courses, and as sequences of short courses, implemented in collaboration with local institutions.

Training at CIAT

Introductory research and production courses (ic)

These were regular events aimed at providing an introduction to **commodity-specific** research and deployment of production technology. They combined theory and practice, and were strongly problem-solving oriented. Instructors were CIAT's senior scientists with the assistance of their research associates and assistants. Course coordination and logistics were attended by training associates specialized by commodities. Very intensive, the courses covered research in all disciplines represented in CIAT's research programs. Their duration commonly varied between one and two months; shorter versions, however, were also implemented more recently in the cassava and rice programs. The number of participants varied around 20 per course.

Introductory research and production courses followed by individualized training (ic+it)

Participants of the introductory research and production courses had the opportunity, after the course, to stay on for an individualized on-the-job training program in a specific research discipline. In these programs they would work under the supervision of one of CIAT's senior scientists to learn discipline-specific methods and R&D approaches by actually performing research. Such programs would last from a few weeks to several months.

From 1987 onwards this "ic+it" training "package" increasingly substituted for the introductory research and production courses, i.e., only exceptionally would trainees be accepted to participate in only such a course; the norm had become that entry level researchers and technology intermediaries would participate in the combination of ic+it.

Individualized training (it)

Individualized on-the-job training programs alone—that is, not preceded by an introductory course—were customized to overcome shortcomings in knowledge and skills that would prevent individual NARDS professionals from fully discharging their job responsibilities. Such programs would last from a few weeks, for instance to learn a specific technique, to several months for more profound training in a research discipline or field of interest. Similarly to the "it"-component of the "ic+it" package, each trainee in on-the-job training had a CIAT senior scientist as program advisor and supervisor.

Specialized courses (sc)

Group training in specialized topics was offered in CIAT's various research programs and support units in response to specific needs in the NARDS. Some examples were courses on pastures evaluation under grazing; on the organization and management of integrated cassava production, processing and marketing projects; on breeding and genetics for experienced bean breeders; and on various specialized aspects of seed multiplication and distribution. The duration of such events varied around one month. As all CIAT training, they were problem-solving oriented; and a sound balance between theory and praxis was always sought. Senior scientists and their associates were the instructors, while training associates managed the logistics. Participants would be around 20 per course.

Training for higher degrees (M.Sc. and Ph.D.)

Opportunities for NARS scientists to carry out research programs leading towards obtaining a formal postgraduate degree were available permanently in CIAT's research programs. Trainees would fulfill their academic requisites with any recognized university in industrialized or developing countries, and perform their research activities at CIAT under the supervision of a senior scientist.

Regional and in-country

Regional and in-country courses refer only to Latin America and the Caribbean. Those held in Africa were decentralized to the regional projects of CIAT's Bean Program. Therefore, they are reported by them.

Regional courses

Short training courses for participants from several countries were offered in various locations. Except for their international audience they were similar to the in-country courses described next.

In-country courses

Beginning in the early 1980s CIAT increasingly organized, or participated in, short in-country training courses (one to two weeks duration). Initially these events focused on the production of the commodities in CIAT's mandate. However, they soon diversified along program-specific lines.

Events staged by the cassava program became oriented preferentially towards cassava production processing and utilization (or processing and utilization only), on the one hand, and towards integrated pest management, on the other.

Courses led by the Bean Program concentrated on OFR, and on artisanal seed production. They mostly comprised sequences of two or three short events (or phases). Trainees would return to consecutive events after interim periods (inter-phases) in which they implemented action plans, and applied learnings, from the preceding event.

Rice Program-related courses focused on cost-reducing rice production technologies. And Pastures Program-related events fostered the development of forage seed supply mechanisms.

All in-country courses were organized in collaboration with one or more national institutions. They had a local coordinator, and a CIAT training associate in charge of coordinating the Center's participation. CIAT's contribution varied from training associates giving logistics support and contributing some subject-matter expertise, to major involvement of senior scientists, their research associates, and training associates. However, substantive participation of senior scientists in in-country training events declined with time, except in cassava-related events where it remainded approximately constant.

Training materials from CIAT (manuals and audiotutorials) were an important input to all these events.

Audiences and complementarity among training modalities

The various training modalities addressed different segments of the NARDS continuum from research to technology transfer and utilization. Introductory R&D courses and the "ic+it" package served entry-level researchers, and technology transfer specialists who would interact with researchers.

Individualized and higher degree training usually served more advanced researchers. However, some development workers also received individualized training, and some entry level researchers proceeded directly to higher degree training.

Regional and in-country training addressed needs closer to the utilization of new technologies.

Identification and selection of training candidates

For training at CIAT

Candidates identification varied over time and with NARDS state of development.

At the beginning, when national commodity research programs were often nonexistent or in very early stages of development (particularly so for cassava and pastures, less for beans, and least for rice), CIAT had to accept training requests from the NARDS **reactively**. That is, CIAT had little participation in the identification of candidates; the Center would only maintain as much quality control as possible on who would be accepted eventually for training, by rather mechanically applying selection criteria (such as level of education, track record, affiliation with a recognized NARDS institution, etc.) to chose among candidates.

At this stage, training opportunities at CIAT were mainly supply driven, i.e., offered according to what CIAT thought would be required in the incipient national programs. Advertising of training opportunities at CIAT was then fundamental to get the NARDS' reply.

As national commodity programs took shape, and international commodity-specific research networks emerged, CIAT's participation in the identification and selection of training candidates became more **proactive**. Candidates would be identified and evaluated in close collaboration between NARDS leaders and CIAT staff (outposted and headquarters researchers, and training associates); program priorities would be set by CIAT's program leaders in coordination with the TCSP; priorities across programs would be set by the TCSP in close coordination with CIAT's directors. Moreover, training opportunities offered at CIAT moved from being supply-driven to become demand-led, i.e., training events and individualized programs were increasingly designed according to clearly identified needs in the evolving NARDS. To advertise training opportunities, consequently, became less important, and even unnecessary.

Meeting training needs of strong and autonomous NARS had some elements of the two previous situations in common. On the one hand, when any of these strong institutions would be collaborating with CIAT, the identification and meeting of training needs would follow patterns similar to those of evolving NARDS, i.e. training needs and candidates would be identified proactively by collaborating CIAT and NARS staff. On the other hand, when these NARS were doing research autonomously they still could express training needs to be met by CIAT, but then CIAT would respond reactively to their request without much say in who should benefit from the training.

A pattern similar to the previous time-related trend occurred among NARDS at any given time. Identification and selection of candidates would be reactive on CIAT's part with respect to incipient national programs; it would be proactive with NARDS which would be collaborating closely with CIAT; and it would again be rather reactive with strong and autonomous NARS.

For in-country training

In-country training needs and candidates were either exclusively established by the NARDS, with CIAT responding reactively, or they were defined through NARDS-CIAT interactive assessment in relation to collaborative ventures such as networks (e.g. PROFRIJOL and PROFRIZA for beans in Central America and in the Andean region; RIEPT for tropical pastures) or projects and project-like efforts (such as cassava integrated projects or rice "national plans").

Involvement of CIAT staff in training

Research staff

Since the mid to late 1970s training has been an activity of all CIAT scientific staff rather than of a group of training specialists. This is illustrated by an assessment of the time devoted to training by CIAT's staff, made in 1987 (Figure 1).

Close to 80% of senior researchers spent over 50 hours yearly on training, and half of them spent more than 150 hours. More than half of the research associates spent more than 50 hours yearly on training, and nearly one fifth spent more than 150 hours.

Such an evaluation was not repeated in later years. However, it is safe to assume that scientists' commitment remained unaltered as witnessed by the yearly figures of courses delivered and persons trained which, if anything, grew after the survey had been made.

Training staff

Training staff in the TCSP had a specialized coordinating and support role within the Center-wide training function.

Coordination

The TCSP program leader coordinated training activities with each research program and across programs, monitoring the congruence of training with program and Center institutional development objectives.

Support

Training associates

There were two training associates for each of CIAT's commodity research programs (beans, cassava, rice,and tropical pastures), and one for CIAT's Seed Unit. Although they reported to the TCSP, they were closely integrated to the research programs, to the extent of being physically located in the programs.

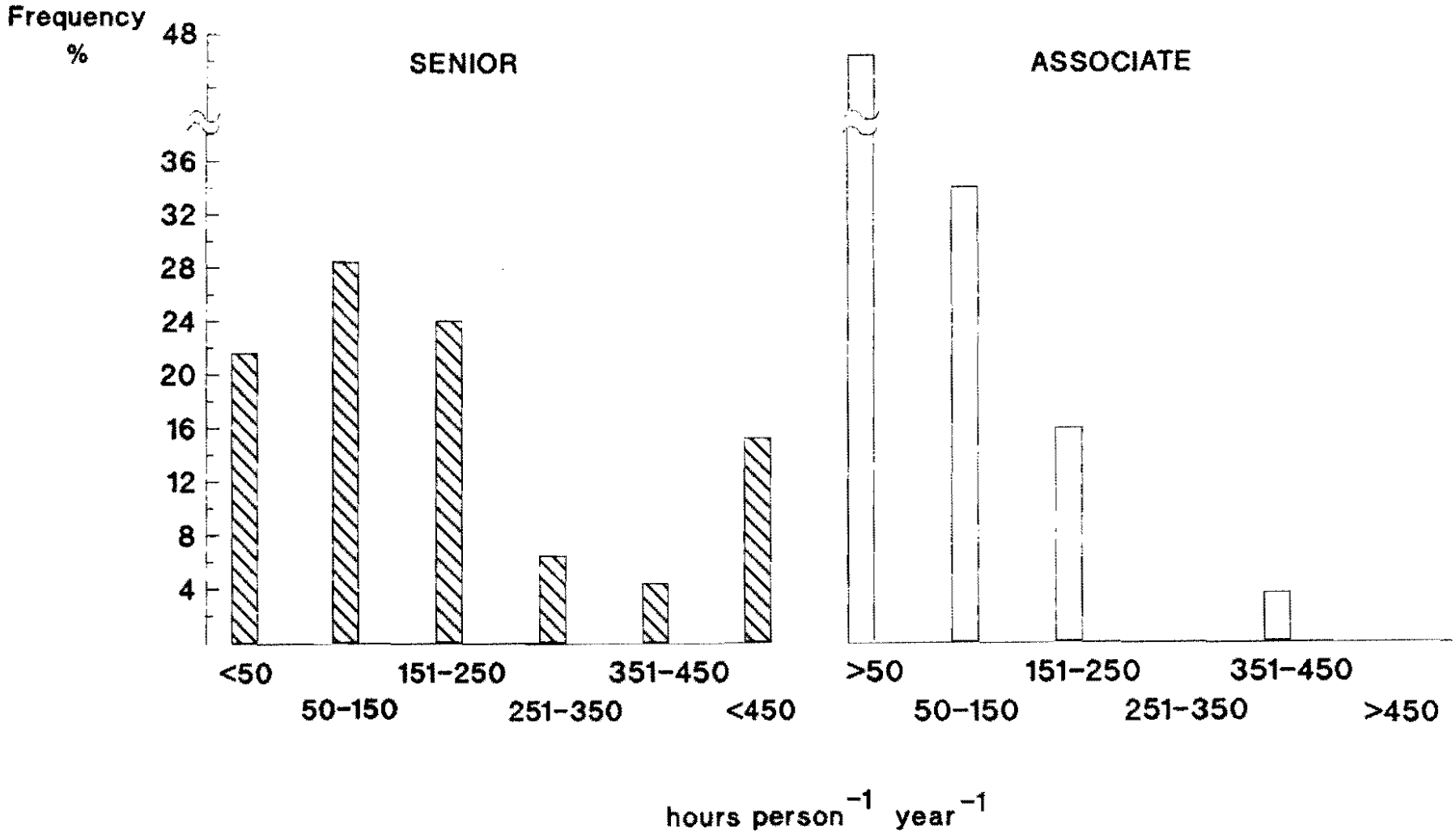

Figure 1. Time devoted by CIAT's scientists to training. Figures obtained in 1987 from 46 senior and 56 associate researchers based at CIAT headquarters

Thus they had first hand knowledge and experience in program objectives and activities, which was fundamental to guide them in their strongly decentralized relations with NARDS. Their responsibilities were:

- The identification of training needs for in-country events, and of candidates for training at CIAT (in collaboration with NARDS personnel and CIAT headquarters and outposted research staff);
- The coordination and logistics of courses at CIAT; and
- The coordination and logistics of in-country courses.
- Providing subject-matter expertise in in-country training; and
- Evaluating training events.

Registrar

The registrar was responsible for

- Advertising training opportunities offered by CIAT;
- Supporting the selection of training candidates by collecting and screening information from in-country and CIAT sources;
- Supporting the TCSP leader in coordinating individualized training programs with research staff;
- Negotiating with NARDS the sharing of training-costs;
- The logistics of moving trainees between CIAT and their home institutions;
- Supporting the TCSP leader in overseeing the well-being of trainees at CIAT.

Orientation Officer

The orientation officer was responsible for:

- Liaising with local migration authorities in trainees matters;
- Trainees' well-being while at CIAT:
    - Integration in the CIAT community;
    - Integration in the local community;
    - Social programs;
    - Health care.

Education specialist

A senior research fellow in education was in charge of a special project for the development of a commodity-specific training capacity in the NARDS (see separate report).

In addition to attending project duties, the education specialist provided andragogical (adult education) support to training at CIAT and in-country, and developed and administered training evaluation instruments.

Funding sources

For training at CIAT

1. Costs to CIAT's Research Programs and Units.

   Training costs incurred by CIAT's Research Programs and Units, e.g. personnel and trainees' research costs, were covered from programs' core funds.

2. TCSP overhead costs.

   The TCSP's overhead training costs, such as personnel, services, equipment and materials, were covered by the Program's core funds.

3. Costs of trainees transport, living expenses, health, and training materials.

   Three funding sources concurred in covering direct trainees' costs (approximately 0.5 M US$ yearly - 1991 Dollars): CIAT core, CIAT special projects, and the trainees' mother institutions (with their own funds or with financial aid from third parties).

   Approximately one third of direct trainees' costs were financed from CIAT core resources, one third was shared to varying extents with the NARDS, and the rest was funded from external sources (75% UNDP; 25% Swiss Technical Cooperation).

For in-country training

Local costs of in-country training were attended by the NARDS and by CIAT's Regional Projects. The participation of CIAT research staff was funded by the research programs. And the participation of CIAT training staff, as well as the provision of CIAT training materials, were funded from TCSP core resources, and from TCSP special projects.

The output

Persons trained by research programs and units

An overview of the number of trainees—by training modality and by region—is presented in this section. A detailed annotated account of trainees by program/unit, country, and subject of training is given thereafter.

The figures for people trained in in-country courses may be overestimated, as some persons may have participated in more than one course being counted as one individual in each case (the identity of participants was not always recorded in in-country events). The bias, however, is felt to be slight.

The number of people trained at CIAT, on the other hand, is accurate because full identity records exist for each trainee. Persons who participated in more than one event were counted only once.

Overview by programs and units

Beans

At CIAT 246 persons were trained for Bean R&D (Table 1).

Emphasis was given to individualized training. Only 22 persons (8.9%) participated exclusively in group training, either introductory (12 trainees) or specialized (10 persons), while all others (224; 91.1%) participated in individualized programs, either alone—"it", "it more than once", M.Sc., and Ph.D. (163; 66.3%)—or in combination with some group training—"ic+it", "(ic+it)+others" (61; 24.8%)—.

Most of the trainees were from Latin America and the Caribbean (197; 80.1%), increasing numbers came from Africa (44; 17.9%), and a few were from other developing regions (4 from Asia, and 1 from eastern Europe).

Nearly a thousand persons (982) participated in in-country and regional training courses and workshops (Table 1), all in Latin America and the Caribbean (in-country training in Africa was the exclusive responsibility of CIAT's Regional Projects there; they report separately). Such a large number is the outcome of 34 in-country and 3 regional courses. However, as most of the courses consisted of more than one event (courses in phases), there were altogether 65 events.

Table 1. Persons Trained for Bean R&D by Training Modality

Training Modality	Latin America and The Caribbean	Africa	Other developing countries	Total
ic	12			12
ic + it	55	3		58
(ic + it) + others	2			2
it	100	41	4	145
it more than once	4			4
it + sc	1			1
sc	10			10
M.Sc.	11			11
Ph.D.	2		1	3
Total at CIAT	197	44	5	246
In-Country Courses	909	Reported by		909
Regional Courses	73	Regional Projects		73
TOTAL	1179	44	5	1229

Cassava

177 persons were trained at CIAT for cassava R&D (Table 2); 139 (78.5%) were from Latin America and the Caribbean; 37 (21%) from Asia; and one (0.6%) from Africa. Nearly half (85; 48.0%) participated exclusively in group training events: 24 (13.6%) in introductory research and production training ("ic"); and 61 (34.5%) in specialized courses ("sc", "sc more than once", and "ic+sc").

Another 663 people were trained in 26 in-country courses (28 events), for a grand total of 840 trainees (Table 2).

Table 2. Persons trained for cassava R&D by training modality

Training Modality	Latin America and The Caribbean	Asia	Total
ic	5	19	24
ic + it	8	7	15
(ic + it) + others	3		3
ic + sc	2		2
it	53	7*	60
it more than once	4		4
it + sc	3		3
sc	53		53
sc more than once	6		6
M.Sc	1	4	5
Ph.D.	1	1	2
Total at CIAT	139	38	177
In-Country Courses	663		663
TOTAL	802	38	840

* Includes one trainee from Africa (Uganda)

Rice

For Rice R&D 141 persons from Latin America and the Caribbean were trained at CIAT, and 334 in 16 in-country courses (Table 3).

Training at CIAT was mainly individualized—"ic+it", "it", M.Sc. and Ph.D. (115; 81.6%).

Table 3. Persons trained for rice R&D by training modality (Latin America and the Caribbean)

Training modality	Persons trained
ic	8
ic + it	54
it	57
sc	18
M.Sc.	2
Ph.D.	2
Total at CIAT	141
In-Country Courses	334
Total	475

Tropical pastures

184 persons from Latin America and the Caribbean, and one each from Africa and Asia were trained at CIAT for R&D in Tropical Pastures (Table 4). Most of this training was individualized (140; 75.3%). The rest was introductory (24; 12.9%) and specialized (22; 11.8%) group training.

Another 304 people were trained in 13 in-country courses and workshops (14 events).

Table 4. Persons trained for tropical pastures R&D by training modality (Latin America and the Caribbean)

Training modality	Persons trained
ic	24
ic + it	82
(ic + it) + others	2
ic + sc	8
it	39*
it more than once	2
it + sc	1
sc	14
M.Sc.	10
Ph.D.	4
Total at CIAT	186
In-Country Courses	304
Total	490

* Includes one person each from Africa and Asia

Seeds

At CIAT's Seed Unit 191 persons received training, mainly in specialized group events (132; 69.1%). An additional 232 people were trained in 8 in-country courses (Table 5).

Biotechnology

Eighty-one professionals were trained in biotechnology; about half in specialized courses and half in individualized programs (Table 5).

Table 5. Persons trained in seeds, biotechnology and various research support subjects (Latin America & the Caribbean)

Training Modality	Seeds	Biotechnology	Others
it	45[1]	35[2]	25
sc	132	41[2]	20
it + sc	13	3	
M.Sc.	1		
Ph.D.		2	
Total at CIAT	191	81	45
In-Country	232		
TOTAL	423	81	45

[1]Includes one person from Africa
[2]Includes one person each from Asia and Eastern Europe

Other training

Twenty-five professionals were trained at CIAT in individualized programs in various areas other than the above programs and units. Ten persons were trained in genetic resources, two in information-documentation, one in grain quality assessment (for rice and beans), five in soil fertility and fertilization, six in biometrics, and one in experimental stations management.

Twenty social scientists were trained in a specialized course to enable them to:

- Evaluate agricultural technology **ex ante** and **ex post facto**;
- Set priorities for agricultural research; and
- Conduct technology demand, adoption and impact studies.

Overview across programs

The grand total of professionals from developing countries trained at CIAT is 1067 (Table 7). For in-country training the total is 2515 (Table 6). Altogether then, 3582 persons from agricultural research and development institutions in developing countries were trained from 1987 to 1991.

TABLE 6.

CIAT TRAINING FOR LATIN AMERICA AND THE CARIBBEAN

PERSONS TRAINED

Training modality		Beans	Cassava	Rice	Tropical pastures	Seeds	Biotech.	Others	Total
ic[1]	n	12	5	8	24				49
	%	6.1	3.6	5.7	13.0				5.0
sc[2]	n	10	61	18	22	132	39	20	302
	%	5.1	43.9	12.8	12.0	69.5	50.6	44.4	31.0
it[3]	n	175	73	115	138	58	38	25	622
	%	88.8	52.5	81.6	75.0	30.5	49.4	55.6	63.9
TOTAL CIAT	n	197	139	141	184	190	77	45	973
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
In-Country[4]	n	982	663	334	304	232			2515
TOTAL	n	1179	802	475	488	422	77	45	3488

[1]Includes exclusively ic

[2]Includes sc; sc more than once; and ic + sc

[3]Includes ic + it; (ic + it)+ others; it; it more than once; it + sc; M.Sc.; Ph.D.

[4]Includes in-country courses and regional courses

TABLE 7.

PERSONS TRAINED AT CIAT, DISTRIBUTION BY HOME REGION

		Beans	Cassava	Rice	Tropical pastures	Others	Total
Latin America & Caribbean	n	197	139	141	184	312	973
	%	80.1	78.5	100.0	98.9	98.4	91.2
Africa	n	44	1		1	1	47
	%	17.9	0.6		0.5	0.3	4.4
Asia	n	4	37		1	2	44
	%	1.6	20.9		0.5	0.6	4.1
Eastern Europe	n	1				2	3
	%	0.4				0.6	0.3
TOTAL	**n**	246	177	141	186	317	1067

The operational training strategy had one feature in common across programs: training by means of introductory courses only—which had been very popular in earlier years—amounted to only 5% of all training (referred to number of trainees) (Table 6).

There was variation among programs in the degree of individualized or group training (Table 6). Individualized training predominated in Beans (88.8%), Rice (81.6%), and Tropical Pastures (75.0%); in Cassava and Biotechnology group and individualized training was about half and half; whereas in the Seed Unit over two thirds of the trainees participated in specialized courses.

With regard to the regional origin of the trainees (Table 7), training at CIAT obviously served largely Latin America and the Caribbean (91.2% of trainees). This is no surprise given both CIAT's location and its regional mandate in two out of its four research programs. Rather, it is encouraging to see that despite the difficulties involved in bringing trainees from Africa and Asia to CIAT, particularly due to the high travel costs, in Beans and Cassava about one of every five trainees came from outside the region.

Higher degree students from developing and industrialized countries

Higher degree training of researchers from developed countries will be reported later. However, a comparative view of higher degree training of candidates from developing and developed countries yields some insights which are relevant here (Table 8).

Altogether, 64 researchers completed higher degree research programs: 23 in Beans, 14 in Cassava, 6 in Rice, 16 in Tropical Pastures, and 5 in Research Support Units. Nearly two thirds of them (42; 65.6%) came from developing countries. Slightly more than half of the programs were of M.Sc. level (33; 51.6%).

Among Ph.D. students more than half were from industrialized countries (18; 58.1%). Among M.Sc. candidates, by contrast, the majority was from developing countries (29; 87.9%).

Among trainees from developing countries more than two thirds did M.Sc. research (29; 69.0%). This trend was reversed among students from developed countries: 81.8% (18) did Ph.D. research.

Table 8. Higher degree thesis research at CIAT. Number of students from developing and from industrialized countries, by CIAT program.

Program	Developing countries		Industrialized countries		Total		
	M.Sc.	Ph.D.	M.Sc.	Ph.D.	M.Sc.	Ph.D.	Total
Beans	11	3	2	7	13	10	23
Cassava	5	2	2	5	7	7	14
Rice	2	2		2	2	4	6
Tropical Pastures	10	4		2	10	6	16
Others	1	2		2	1	4	5
Subtotal	29	13	4	18	33	31	64
Total	**42**		**22**			**64**	
Percentage of Subtotal	69.0	31.0	18.2	81.8			
Percentaje of Grand Total	45.3	20.3	6.3	28.1	51.6	48.4	
	65.6		34.4				
Percentaje within degree	87.9	41.9	12.1	58.1			

Some issues on higher degree training of Latin American students

Predominance of M.Sc. over Ph.D. candidates among researchers from developing countries.

Under CIAT's institutional strengthening strategy, it has been the Center's policy to fund higher degree researchers from the NARDS—that is, professionals who actually are on the payroll of a NARDS member institution—, but not free-lance students.

This may have set the pattern for more candidates doing M.Sc. than Ph.D. research: a lengthy Ph.D. program may be too costly in forgone benefits for the employer. However, language constraints may be even more important in contributing to this pattern. Ph.D. programs are not being offered in the region; consequently foreign language proficiency (usually English) is required for Ph.D. studies. This eliminates a large proportion of Latin American candidates.

Inefficiency of coupling an alien anglo-saxon post-graduate model with the local first degree model.

The post-graduate system of M.Sc. and Ph.D. degrees originated in the anglo-saxon world. There, it is an integral and logical component of the education system. Post-graduate training complements short first university degrees.

In Latin America, however, first university degrees were modeled from the beginning on the napoleonic engineering system, e.g. agronomic engineering, which requires around six years for completion.

The anglo-saxon M.Sc. was imported in order to correct some qualitative deficiencies in the Latin American educational system—particularly a scarcity of research in the Universities (especially in the agricultural careers). This was effective in some cases; but it also introduced an inefficiency by adding a further step in an already lengthy education.

Adding only an M.Sc. step may not have been perceived as being too costly. However, when one further and more lengthy step is added in the way of Ph.D. studies, the system becomes strongly inefficient. If—for the sake of the argument—allowance of two-years settling-in periods is made after completion of each educational step (two years between graduation and initiating an M.Sc. program; and two years between finishing an M.Sc. program and starting Ph.D. studies), then an amazing stretch of some 17 years can become interposed between first entering university and completing the requisites for a Ph.D. This same stretch can extend to as little as six years in the UK.

The excessive time required to obtain a Ph.D. degree may have contributed to the predominance of M.Sc. programs among higher degree candidates from developing countries discussed in the previous point.

The inefficiency of joining an anglo-saxon postgraduate training system with a napoleonic undergraduate system points towards the need of a profound evaluation of alternatives for correcting some of the deficiencies in Latin America's agricultural education system. A careful look should be taken at the first degree system, whether it can be improved, and perhaps shortened, and by what means.

CIAT's model; a relevant alternative for post-graduate research training in Latin America.

In the above context, CIAT's training program has provided a relevant alternative. First, CIAT offered effective short term training. Next, the initial training was complemented with longer term on-the-job support (visits exchange with CIAT scientists; collaborative research with CIAT; participation in networks), which further helped the trainees improving their capacities.

However, this is neither exclusive of other avenues for improvement, nor should it be seen as more than a partial and temporary solution, until more in-depth structural adjustments can be made.

Annotated account of trainees by country, within Programs and Units

Beans

Training served to develop human capital in the various regional or subregional bean projects and activities in Mexico, Central America and the Caribbean (PROFRIJOL); the Andean Region (PROFRIZA); the Southern Cone of South America; and Africa. In the first three, support from CIAT headquarters was provided through training at CIAT, and by participation of research and training staff in the organization and delivery of regional and in-country training events. In the last one, support from headquarters was through training at CIAT, while regional and in-country training was delivered by project and NARDS staff. In all cases, training was complemented with monitoring and advisory visits to NARDS by bean program staff.

Thus, human resources were enabled to

- Diagnose and prioritize production problems (training in economics/social sciences);
- Evaluate alternative technologies, and their adoption and impact (training in economics/social sciences);
- Provide genetic remedies to biotic and abiotic stresses (training in breeding);
- Protect beans from, and evaluate genetic solutions to, biotic stresses (training in pathology, entomology, and virology), and abiotic stresses (training in plant nutrition and physiology);
- Diagnose production problems and evaluate technologies with farmers (training in OFR);
- Foster the flow of seed-embodied technologies to farmers (training in artisanal seed production, and in complementary aspects of seed production and distribution); and to
- Improve plant nutrition through biological nitrogen fixation (training in soil microbiology).

Mexico, Central America and The Caribbean

Costa Rica

A strong effort was made to strengthen research and technology diffusion, and to integrate these two functions throughout Costa Rica's interinstitutional bean program which includes the Consejo Nacional de la Producción (Cons.Nac.Prod.), the Ministry of Agriculture (Min.Agr.), the National University (Univ.Nacional), and the University of Costa Rica (Univ.C. Rica).

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Economics	Cons.Nac.Prod.	it	0.6
	IICA	it	0.8
Breeding	Min.Agr.	it	2.2
Breeding+Soil microbiol.	Min.Agr	it+it	2.3+3.6
Breeding	Univ.C.Rica	it	0.6
Pathology	Cons.Nac.Prod.	it	1.9
	Min.Agr.	it	2.3
	Min.Agr.	it+M.Sc.	1.0+12.0
	Univ.Nac.	it	0.8
Soils-nutrition	Cons.Nac.Prod.	it	3.7
Soils microbiol.	Univ.C.Rica	it	1.0
Agronomy-seed prod.	Cons.Nac.Prod.	it	2.9
On farm research	Cons.Nac.Prod.	it	2.4
	Cons.Nac.Prod.	it	1.7
	Cons.Nac.Prod.	it	1.7

Regional training

- Two professionals from the CNP participated in a regional Bean Research and Production Course held in Sololá, Guatemala, from 17 to 28 October 1988.
- Six professionals (1 Org.Nac.Semillas, 3 MAG, 2 CNP) participated in a regional CIMMYT-CIAT OFR course held in three phases (25-30 Sept. 1989, 19 Nov-1 Dec 1989, 19-23 Feb 1990). The first two phases took place in San Isidro del General, the third one in Heredia, Costa Rica.
- Two professionals from the CNP participated in a regional Bean Production Technology and OFR Methodology course held in Danlí and El Zamorano, Honduras, from 23 July until 3 August 1990.

In-country training

- The last two phases (6 days each) of a three-phases course on bean production and on-farm promotion of new bean varieties were held in San José; Jan and Aug 1987; 28 participants from MAG (18), Univ. of Costa Rica (2), Consejo Nacional de la Producción (6), Inst. Nac. de Seguros (1), and Centro Agrícola Cantonal de Puriscal (1).
- Course on bean production agronomy. San Isidro, 1989. Five days; 24 participants (16 MAG; 8 CNP).

Cuba

Strategic support was given to plant nutrition research and to technology diffusion.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Soils microbiol.	Inst. Inv. Hort.	it	1.6

In-country training

- Course on bean production. Holguín, 1987; 13 days; 35 participants (31 Min.Agr.; 4 MIDINRA, Nicaragua).

Dominican Republic

The national agricultural R&D institution (SEA) was supported by training researchers at CIAT and extensionists in regional and in-country courses.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Breeding	SEA	sc	1.3
Entomology	SEA	it	2.0
Virology	SEA	it	2.1
OFR	SEA	it	1.8
Agronomy-seed prod.	SEA	it	3.7

Regional training

- One professional from the SEA participated in a regional CIMMYT-CIAT OFR course held in three phases (25-30 Sept 1989, 19 Nov-1 Dec 1989, 19-23 Feb 1990). The first two phases took place in San Isidro del General, the third one in Heredia, Costa Rica.
- Two professionals from the SEA participated in a regional Bean Production Technology and OFR Methodology course held in Danlí and El Zamorano, Honduras, from 23 July until 3 August 1990.

In-country training

- Course on bean research, and technology transfer and promotion. San Juán de la Maguana, 1987; 13 days duration; 28 participants from SEA.
- Course on bean production technology. San Juán de la Maguana, 28 Oct-1 Nov 1991; 36 participants from SEA. This event was delivered by the newly established subregional team of trainers in bean production for extensionists.

El Salvador

Throughout the country, key research and technology diffusion functions were intensively strengthened, and integrated among them. A more detailed description of this project-like institutional development is presented among the case-histories in the companion document on institutional development.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Economics	CENTA	it	0.9
Breeding	CENTA	it	0.9
Virology	Univ. El Salvador	it	1.3
Entomology	CENTA	it	1.4
	CENTA	it	4.4
Soils microbiol.	CENTA	ic+it	5.0
	Univ.El Salvador	ic+it	4.6
	Univ.El Salvador	it	4.1
Agronomy-seed prod.	CENTA	ic+it	5.0
	Min.Agr.	it	2.9
On farm research	CENTA	it	2.0
	CENTA	it	2.0
On farm research	Min.Agr.	it	1.8
On farm research +Economics	Min.Agr.	it+it	1.7+1.2

Regional training

- Two professionals from the MAG participated in a regional Bean Research and Production Course held in Sololá, Guatemala, from 17 to 28 October 1988.
- One professional each from CENTA and the MAG participated in a regional CIMMYT-CIAT OFR course held in three phases (25-30 Sept 1989, 19 Nov-1 Dec 1989, 19-23 Feb 1990). The first two phases took place in San Isidro del General, the third one in Heredia, Costa Rica.
- Two professionals from the MAG participated in a regional Bean Production Technology and OFR Methodology course held in Danlí and El Zamorano, Honduras, from 23 July until 3 August 1990.

In-country training

- Course on OFR. San Vicente, three phases (Apr. 86, Aug. 86, Jan. 87); respectively 10, 10, and 6 days; 13, 10, and 9 participants from MAG.
- Course on artisanal seed production. San Vicente, two phases (Aug. 87, Jan. 88; 5 days each); respectively 25 and 20 participants from MAG.
- Course on the agronomy of new bean varieties. San Vicente, two phases (Aug. 87, 5 days; Jan. 88, 6 days); respectively 34 and 29 participants from MAG.
- Workshop on the diagnosis of bean production problems. Santa Ana, two phases (Oct. 87, 8 days; May 88, 5 days); respectively 21 and 8 participants from MAG.
- Course on artisanal seed production. Santa Ana, two phases (Aug. 88, Nov. 88; 5 days each); respectively 18 and 15 participants from MAG.
- Course on the management and dissemination of new varieties. San Salvador, Jun. 1990; 5 days duration; 19 participants from MAG. The event also served to prepare action plans by the participating institutions.
- Course on bean production. San Andrés, 1991. Delivered by the newly established subregional team of trainers in bean production for extensionists; 11 days; 26 participants from MAG.

Guatemala

Strong support was given to the improvement of DIGESA's (Dirección General de Servicios Agrícolas) OFR capacity; to strengthening the seed system (see SEEDS); and to bean technology diffusion in general. The breeding and crop protection research capacity was strengthened selectively.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Economics	DIGESA	it	0.6
	ICTA	it	0.5
Breeding	ICTA	sc	1.5
Pathology	ICTA	M.Sc.	12.1
Entomology	Univ.El Salvador	it	3.7
Res.& Prod.	ICTA	ic	1.4
On farm research	DIGESA-Jutiapa	it	1.8
	DIGESA-Chimaltenango	it	1.8
	DIGESA-Zacapa	it	1.7
	DIGESA-Jutiapa	ic+it	5.0
	INACOP-Petén	it	1.8
	ICTA-Suchitepequez	ic+it	3.0

Regional training

- 24 professionals (17 DIGESA, 5 ICTA, 1 INACOP, and 1 Esc. Agr. Sololá) participated in a regional Bean Research and Production Course held in Sololá, Guatemala, from 17 to 28 October 1988.
- Two professionals from ICTA participated in a regional CIMMYT-CIAT OFR course held in three phases (25-30 Sept 1989, 19 Nov-1 Dec 1989, 19-23 Feb 1990). The first two phases took place in San Isidro del General, the third one in Heredia, Costa Rica.
- Two professionals from ICTA and one from INACOP participated in a regional Bean Production Technology and OFR Methodology course held in Danlí and El Zamorano, Honduras, from 23 July until 3 August 1990.

Haiti

The newly established subregional training capacity started to serve the NARDS.

Regional training

- One professional each from PRB and MAE participated in a regional Bean Production Technology and OFR Methodology course held in Danlí and El Zamorano, Honduras, from 23 July until 3 August 1990.

In-country training

- Course on Bean Production. Cape Haitien, 27-31 May 1991; 17 participants (15 MARNDR; 1 Fac. Agr.; 1 FAO). Delivered in collaboration with the newly established subregional team of trainers in bean production for extensionists.

Honduras

Training concentrated on developing an integrated bean research and technology diffusion system. Particular attention was given to OFR, artisanal seed production, and entomology.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Economics	SRN-El Paraíso	ic+it	4.7
Breeding	EAP	it	1.3
Breeding+Entomology	SRN-El Paraíso	sc+it	1.5+1.2
Breeding	SRN-El Paraíso	it	0.4
Pathology	SRN-El Paraíso	ic+it	5.2
Entomology	EAP	M.Sc.	3.4
	EAP	it	0.7
	EAP	it	4.0
	SRN-El Paraíso	ic+it	4.6
	SRN-Copán	it	4.1
Agronomy-seed prod.	SRN-El Paraíso	ic+it	4.6
On farm research	SRN-Fco. Morazán	it	1.8
OFR	SRN-Olancho	ic+it	2.8

Regional training

- Two professionals from the SRN participated in a regional Bean Research and Production Course held in Sololá, Guatemala, from 17 to 28 October 1988.
- Four professionals from the SRN participated in a regional CIMMYT-CIAT OFR course held in three phases (25-30 Sept 1989, 19 Nov-1 Dec 1989, 19-23 Feb 1990). The first two phases took place in San Isidro del General, the third one in Heredia, Costa Rica.

- Five professionals from the SRN and one from the EAP participated in a regional Bean Production Technology and OFR Methodology course held in Danlí and El Zamorano, Honduras, from 23 July until 3 August 1990.

In-country training

- OFR course in three phases. Danlí (27 Oct-7 Nov 1986; 11-15 May 1987; 16-25 Nov 1987); 29, 21, and 23 participants from SRN.

- Course in two phases on artisanal seed production. Danlí (8-12 Aug 1988; 28 Nov-2 Dec 1988); participants from SRN (22 in phase I, and 7 in phase II) and farmers (21 in phase II).
- OFR course in three phases. Danlí (14-25 Nov 1988; 10-19 July 1989; 23-28 April 1990); 13, 25, and 11 participants from SRN.
- Workshop for the evaluation of artisanal seed production. Danlí, 18-20 Feb 1991; 21 participants from SRN.
- Course on bean agronomy. Danlí 22 July-1 August 1991; 26 participants from SRN. Held in collaboration with the newly established subregional team of trainers in bean production for extensionists.
- Workshop on artisanal seed production. Danlí, 21-23 Oct 1991; 23 participants from SRN, and 16 farmers.

Mexico

Breeding and OFR were supported throughout the country in the otherwise self-sufficient NARI (INIFAP).

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Economics	-------	it	3.8
Breeding	INIFAP-Chihuahua	sc	1.5
	INIFAP-Durango	ic+it	4.9
	INIFAP-Jalisco	sc	1.5
	INIFAP-Mexico	sc	1.5
	INIFAP-Oaxaca	ic+it	5.1
	INIFAP-S.L. Potosí	it	1.8
	INIFAP-Veracruz	ic+it	5.1
Pathology	U.Aut. Chapingo	Ph.D.	16.2
Soil microbiol.	INIFAP-Mexico	it	2.4
Res.& Prod.	INIFAP-Sinaloa	ic	1.1

Professionals trained in	Institution	Modality	Length (months)
Res.& Prod.	INIFAP-Sinaloa	ic	1.1
On farm research	INIFAP-Durango	ic+it	2.9
	INIFAP-Jalisco	it	1.9
	INIFAP-Jalisco	it	1.7
	INIFAP-Tabaso	ic+it	3.0
On farm Research	INIFAP-Veracruz	it	1.7
	INIFAP-Veracruz	it	2.0
Seed production	INIFAP-Chiapas	ic+it	4.6
	INIFAP-Zacatecas	ic+it	4.6

Regional training

- One professional from INIFAP-Chiapas and one from INIFAP-Veracruz participated in a regional Bean Production Technology and OFR Methodology course held in Danlí and El Zamorano, Honduras, from 23 July until 3 August 1990.

In-country training

- Course on bean research for the Mexican plateau. Zacatecas, 24-28 Sept 1990. 26 participants (24 INIFAP; 1 Univ. Aut. Nuevo León; 1 Colegio Postgrad. Chapingo).

Nicaragua

The bean NARDS was strengthened throughout the country. Particular emphasis was given to the build up of OFR and a bean seed supply.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Breeding	MIDINRA-Estelí	sc	1.5
	MIDINRA-Estelí	M.Sc	14.5
	MIDINRA-León	it	1.7
Pathology	MIDINRA-Granada	ic+it	5.0
	MIDINRA-León	it	2.2
Grain quality	MIDINRA-Managua	it	0.8
Soils-nutrition	MIDINRA-Managua	ic+it	4.9
Agronomy-seed prod.	MIDINRA-Chinandega	ic+it	4.7
	MIDINRA-Estelí	ic+it	4.9
	MIDINRA-Granada	ic+it	5.7

Professionals trained in	Institution	Modality	Length (months)
Seed production	CNIGB-Estelí	ic+it	5.1
	DGTA-Segovia	ic+it	4.8

Regional training

- Two professionals from MIDINRA participated in a regional Bean Research and Production Course held in Sololá, Guatemala, from 17 to 28 October 1988.
- Two professionals from MIDINRA participated in a regional CIMMYT-CIAT OFR course held in three phases (25-30 Sept 1989, 19 Nov-1 Dec 1989, 19-23 Feb 1990). The first two phases took place in San Isidro del General, the third one in Heredia, Costa Rica.
- Three professionals from MAG participated in a regional Bean Production Technology and OFR Methodology course held in Danlí and El Zamorano, Honduras, from 23 July until 3 August 1990.

In-country training

- OFR course in three phases. Managua, 6-17 July 1986; 25-29 Aug 1986; 2-8 Feb 1987. Participants from MIDINRA (23, 28, and 11).
- Course on bean production. Managua, 11-15 April 1988; 33 participants (31 MIDINRA; 2 CARE).
- OFR course in four phases. Managua, 3-15 Oct 1988; 15-19 May 1989; 7-11 Aug 1989; 7-10 May 1990. Participants from MIDINRA (29, 17, 27, and 18).
- Course on bean production. Estelí, 15-19 April 1991; 24 participants from MAG (former MIDINRA). Held with the newly established subregional team of trainers in bean production for extensionists.
- Course in two phases on artisanal seed production. Estelí, 10-15 Feb 1991; 26-31 Aug 1991. Participants from MAG (25 and 29). Held with the newly established subregional team of trainers in bean production for extensionists.
- Course on bean production agronomy. Jinotepe, 16-26 Sept 1991; 18 participants from MAG. Held with the newly established subregional team of trainers in bean production for extensionists.

Strengthening the bean seed supply was emphasized.

Panama

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Agronomy	IDIAP	M.Sc.	2.6
Agronomy-seed prod.	IDIAP	ic+it	4.8
	IDIAP	ic+it	5.1

Regional training

- Four professionals from IDIAP participated in a regional CIMMYT-CIAT OFR course held in three phases (25-30 Sept 1989, 19 Nov-1 Dec 1989, 19-23 Feb 1990). The first two phases took place in San Isidro del General, the third one in Heredia, Costa Rica.
- One professional from MIDA and one from the CNS participated in a regional Bean Production Technology and OFR Methodology course held in Danlí and El Zamorano, Honduras, from 23 July until 3 August 1990.

In-country training

- Course in two phases on artisanal seed production. Caisan, 1-7 Oct 1989; 22-26 Jan 1990. Phase I, 24 participants (5 CNS; 1 BDA; 3 IDIAP; 7 MIDA; 8 farmers); phase II, 22 participants (4 CNS; 1 BDA; 3 IDIAP; 8 MIDA; 6 farmers).
- Workshop for the evaluation of artisanal seed production. Volcán, 5-8 March 1991; 21 participants (6 CNS; 9 MIDA; 6 IDIAP).

Andean region

Bolivia

Seed production was a priority. Bean development in Santa Cruz is further described as one of the case-histories in the companion document on institutional development.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Pathology	UAGRM	it	2.7
OFR+Agronomy-seed prod.	UAGRM	(ic+it)+it	2.9+2.9
Agronomy-seed prod.	IBTA	ic+it	4.9
	ASOPROF	it	1.6

Colombia

Entry-level training in bean research and production was provided to newly integrated teams of bean workers in the Coffee Growers Federation and in the Cauca Valley Authority. The NARI's (ICA) already well established bean research capacity was strengthened further. Particular attention was given to the development of ICA's OFR capacity.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Economics	-------	M.Sc.	3.7
Breeding	ICA-Antioquia	sc	1.5
	ICA-Córdoba	sc	1.5
Pathology	ICA-Antioquia	it	1.2
Pathology	Secr. Agr. Antioquia	it	1.1
Entomology	ICA-Bolívar	it	2.1
Soil microbiology	ICA-Antioquia	it(x2)	3.6+1.5
Univ.Nac.Cund.	M.Sc.	13.1	
OFR	ICA-Antioquia	it	1.7
On farm research	Secr.Agr.Antioquia	ic+it	2.9
	Com. Cafet.-Caldas	ic+it	3.0
	ICA-Cauca	ic+it	3.1
	ICA-Cauca	ic+it	2.9
	ICA-Nariño	it	2.0
	ICA-Nariño	ic+it	3.1
	ICA-Santander	it	1.7

Professionals trained in	Institution	Modality	Length (months)
Res.& Prod.	FEDECAFE-Caldas	ic	1.3
	FEDECAFE-Caldas	ic	1.3
	Com.Cafet.-Caldas	ic	1.1
	Com.Cafet.-Caldas	ic	1.1
	CVC-Valle	ic	1.1
	CVC-Valle	ic	1.3
	CVC-Valle	ic	1.1

Ecuador

The NARI's (INIAP) bean breeding capacity to overcome biotic stresses was strengthened (training in breeding, pathology, and entomology). The development of a bean seed supply was strongly supported.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Breeding	INIAP-Cuenca	sc	1.6
	INIAP Pichincha	ic+it	4.5
Pathology	INIAP-Pichincha	it	2.9
Entomology	MAG-Loja	it	1.0
	INIAP-Quito	it	3.4
Agronomy-seed prod.+pathology	INIAP-Cuenca	it+it	2.9+0.4
Agronomy-seed prod.	INIAP-Ibarra	ic+it	4.8
	MAG-Pichincha	ic+it	.8
On farm research+agronomy. -seed prod	INIAP-Chimborazo	(ic+it)+it	3.2+1.8

In-country training

- Course in three phases on artisanal seed production. Ibarra, 10-14 Oct 1988; 14-19 Aug 1989; 21-27 Jan 1990). Phase I, 23 participants (5 PROTECA; 7 MAG; 2 INIAP; 9 farmers); phase II, 14 participants (5 PROTECA; 7 MAG; 2 INIAP); phase III, 14 participants (5 PROTECA; 7 MAG; 2 INIAP).
- Course in two phases on new bean varieties promotion and seed production with farmers participation. Cuenca, 2-10 Oct 1989; 14-20 Jan 1990. Phase I, 19 participants (4 MAG; 6 PROTECA; 2 INIAP; 7 NGOs); phase II 16 participants (4 MAG; 6 PROTECA; 2 INIAP; 4 NGOs).

- Course in two phases on new bean varieties promotion and seed production with farmers participation. Loja, 26-31 March 1990; 9-13 July 1990. Phase I, 14 participants (5 MAG; 1 PROTECA; 2 INIAP; 2 Univ. Nac. Loja; 4 NGOs); phase II, 13 participants (4 MAG; 1 PROTECA; 2 INIAP; 2 Univ. Nac. Loja; 4 NGOs).

Peru

The NARI's (INIAA) bean breeding capacity to overcome biotic stresses was strengthened (training in breeding, pathology, and entomology). A multi-institutional capacity for Rhizobium research and inocculum production was established (training in soil microbiology). OFR and the development of a bean seed supply (training in agronomy for seed production, and in artisanal seed production; see also SEEDS) were firmly supported.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Genetic resources	INIAA-Ica	ic+it	4.9
Breeding	INIAA-Cajamarca	ic+it	4.3
	INIAA-Cuzco	sc	1.5
	INIAA-Ica	sc+M.Sc.	1.5+7.8
Pathology	INIAA-Cajamarca	it	2.3
	INIAA-Cajamarca	it	0.4
Entomology	INIAA-Lambayeque	it	1.1\
Soil microbiol.	U.S.C.H. Ayacucho	ic+it	3.5
	Univ. Nac. Cajamarca	ic+it	4.9
	IVITA-Cajamarca	it	0.8
	INIAA-La Libertad	it	6.9
Agronomy	INIAA-Lambayeque	M.Sc.	10.4
Agronomy-nurseries	INIAA-Lambayeque	it	2.5
Agronomy-seed prod.	INIAA-Ayacucho	ic+it	4.9
	INIAA-Ica	ic+it	5.0
	INIAA-La Libertad	it	2.9
	INIAA-Lima	it	2.9
	Sp.Proj. Piura	ic+it	4.3
On farm research	INIAA-Cajamarca	it	1.9
	INIAA-Huánuco	it	1.7

In-country training

- Course in two phases on artisanal seed production. Cuzco, 17-21 Oct 1988; 7-12 May 1989. Phase I, 20 participants (10 INIAA; 1 Univ. La Cantuta; 9 farmers); phase II, 24 participants (14 INIAA; 10 farmers).

- OFR course in three phases (24-28 Oct 1988, Cajamarca; 6-16 March 1989, Santa Cruz; 2-14 Sept 1989, Lima). Participants from INIAA: 23 in phase I, 21 in phase II, and 17 in phase III; one participant from Univ. La Cantuta in phase I.
- Course in two phases on new bean varieties promotion and seed production with farmers participation. Chincha, 2-7 July 1990; 26 Nov-1 Dec 1990. Phase I, 24 participants (10 NGOs; 1 INIAA; 3 Min.Agr.; 10 farmers); phase II, 27 participants (12 NGOs; 1 INIAA; 3 Min.Agr.; 11 farmers).

Venezuela

The NARI's (FONAIAP) initiative to strengthen the flow of bean technology to farmers was supported by training key professionals at CIAT (training in OFR, agronomy for seed multiplication, soil microbiology).

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Pathology	FONAIAP-Barinas	it	0.4
Soil microbiol.	FONAIAP-Sucre	it	2.7
Agronomy-seed prod.	FONAIAP-Anzoát.	ic+it	5.0
	Sem.APROSA Anzoát.	it	2.9
On farm research	FONAIAP-Guárico	ic+it	3.1
	FONAIAP-Lara	ic+it	3.2

Southern cone

Argentina

Support went to bean breeding in the Northwest (training in breeding), and to work with small farmers in the Northeast (training in OFR).

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Breeding	E.E.A.O.B.	it	0.2
	E.E.A.O.B.	it+M.Sc.	0.4+2.0
	Scr. A. Agr.	Salta ic+it	6.1
On farm research	INTA-Misiones	ic+it	2.9

Brazil

The capacity for seeking genetic solutions to biotic and abiotic stresses (breeding, pathology, physiology), and the service to small farmers (OFR) were enhanced throughout the country's bean-producing regions. Training at the national bean research center was improved by giving on-the-job assistance in the organization and implementation of a course for bean researchers.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Breeding	BA EPABA	it	1.9
	GO EMBRAPA-CNPAF	it	1.5
	GO EMBRAPA	it	1.5
	GO EMGOPA	M.Sc.	14.5
	ES EMCAPA	it	3.1
	PE IPA	it	2.2
	PR IAPAR	it	0.9
	PR IAPAR	it	4.0
	SC EMPASC	ic+it	4.9
	-------	Ph.D.	2.5
Pathology	RS EMBRAPA	it	2.6
	SC EMPASC	it	3.8
Physiology	BA EMBRAPA	it	2.8
	RS IPAGRO	it	5.2

Professionals trained in	Institution	Modality	Length (months)
Soil microbiol.	GO EMGOPA	it	6.8
	GO EMGOPA	it	6.8
Agronomy	GO EMGOPA	ic+it	2.4
Res.& Prod.	GO EMBRAPA	ic	1.2
On farm research	AL EPEAL	it	2.1
	BA EPABA	it	1.7
	GO EMGOPA	ic+it	2.9
	ES EMCAPA	it	2.1
	MG EMATER	it	2.1
	SC ACARESC	it	1.7
	SC ACARESC	it	2.1
	SC EMPASC	it	1.7

In-country training

- Course on bean production for researchers. CNPAF, Goiania, 12-28 April 1989; 17 participants (2 CNPAF; 1 EMGOPA; 1 EMPAER; 1 EMPARN; 1 EMPASC; 1 EPA; 1 EPACE; 2 IAPAR; 1 IPA; 2 IPAGRO; 1 UEPAE; 1 Univ. Londrina).

Chile

Support was given strategically to bean breeding in the NARI (INIA).

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Breeding	INIA	it	5.8
	INIA	ic+it	5.8

Paraguay

The capacity to work with small farmers, especially in the evaluation of bean varieties and for multiplying superior materials, was strengthened in the national extension service (SEAG).

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Pathology	Min.Agr.	ic+it	5.3
Entomology	CRIA	ic	1.1
OFR	Min.Agr.	ic+it	2.9
	Min.Agr.	it	1.7
	SEAG	ic+it	2.9
	SEAG	ic+it	2.9
	SEAG	it	2.1
	SEAG	it	2.1

In-country training

- Course in three phases on bean production. San Lorenzo, 15-24 June 1987; 16-28 Feb 1988; 18-22 Jul 1988.); 24 participants from SEAG.
- Workshop on bean diseases and management of on-farm trials. San Lorenzo, 3-7 Jul 1989; 23 participants from SEAG.
- Course on artisanal seed production. San Lorenzo, 20-25 Nov 1989; 13 participants from SEAG.

Africa

Training at CIAT

The capacity to seek genetic solutions to biotic and abiotic stresses was enhanced through customized training at CIAT of key researchers from African NARS.

Country	Professionals trained in	Institution	Modality	Length (months)
Angola	Breeding	IIA	it	2.3
	Physiology	IIA	it	4.1
	Pathology	Fac.C.Agr.	it	3.4
	Agronomy	IIA	it	4.3
	On farm research	Fac.C.Agr.	ic+it	2.5
Burundi	Pathology	ISABU	it	3.1
Ethiopia	Breeding	Inst. Agr. Res.	it	2.1
		Alemaya Univ.	it	2.7
		IAR Awasa Ctr.	it	2.7
	Pathology	Sc. Phytopath. Lab	it	1.9
	Soil microbiol.	Alemaya Univ.	it	1.3
Kenya	Breeding	KARI	it	2.7
		KARI	it	2.7
		KARI	it	2.8
		KARI	it	0.4
		KARI	it	0.4
	Pathology	KARI	it	2.5
		KARI	it	2.5
Malawi	Physiology	Univ.Malawi	it	1.2
	Soil microbiol.	Bunda College	it	0.9
	Bean quality	Univ.Malawi	it	0.9
Mozambique	Breeding	SEMOC	ic+it	5.1
	On farm research	INIA	ic+it	3.4
Rwanda	Breeding	ISAR	it	2.9
	Soil microbiol.	ISAR	it	1.5
Somalia	Breeding	Agr. Res. Stn	it	2.1
	Entomology	Ntl Univ.	it	1.6

Country	Professionals trained in	Institution	Modality	Length (months)
Tanzania	Breeding	Lyamungu Res. Stn	it	2.5
		TARO	it	1.7
		Sokoine Univ.	it	1.6
	Virology	Trop. Pest. Res. I.	it	1.9
Uganda	Breeding	Kawanda Res.Stn	it	2.8
		Kawanda Res.Stn	it	0.8
	Pathology	Kawanda Res.Stn	it	1.3
	Entomology	Min.Agr.	it	2.9
Zaire	Breeding	Progr. Ntl Legum.	it	3.0
		Progr.Ntl Legum.	it	3.0
	Pathology	Progr.Ntl Legum.	it	3.0
		INERA	it	2.7
	Soils-nutrition	INERA	it	4.1
Zambia	Breeding	Min.Agr.	it	0.5
		Msekera Res.Stn	it	0.8
Zimbabwe	Breeding	Crop Breed. Inst.	it	0.6
	Soil microbiol.	Dept. Res. Spec.	it	2.5
		Other regions		
Bulgaria	Virology	Maritza Res.Inst.	it	2.4
Iran	Breeding	Markazi Arak R.C.	it	3.4
		Seed Pl. Impr. Ctr	it	3.4
		Seed Pl.Impr.Ctr	it	3.1
P. R. China	Breeding	S. China Agr. Univ.	Ph.D.	8.3

Cassava

In Latin America, cassava institutional development through training aimed at:

- Developing a minimum capacity for research and integrated projects development in countries where this capacity was weak and/or cassava is a crop of relatively secondary importance;
- Strengthening the research capacity in countries where it already had been established and where cassava is a major crop; and
- Supporting integrated cassava projects were they were in place or being developed.

Training at CIAT headquarters was complemented with the participation of CIAT's research and training staff in the organization and delivery of regional and in-country training events, and with monitoring and advisory visits to NARDS by CIAT's Cassava Program staff.

In Asia, cassava institutional development through training focused on countries where cassava is an important source of food or income. The aim was:

- To develop national research capacity where it was incipient; and
- To strengthen national research capacity where it had already been established.

Training was provided either at CIAT (courses and individualized on-the-job training), or in the region under the supervision of CIAT's outposted scientists (research training for higher degree thesis, and on-the-job training in collaborative experiments) .

Thus, human resources were enabled to:

- Diagnose and prioritize cassava production, processing, and marketing problems (training in economics/social sciences);
- Evaluate the adoption and impact of new technologies (training in economics/ social sciences);
- Research cassava pest and disease problems (training in pathology; virology; and entomology, with emphasis on IPM);
- Seek genetic solutions to biotic and abiotic production constraints (training in breeding; physiology; pathology; virology; and entomology);
- Research cassava problems on-farm with farmers participation (training in agronomy/OFR);
- Establish seed multiplication and supply systems (training in seed supply);
- Implement new cassava processing techniques (training in utilization/ processing); and
- Formulate, organize, and support integrated cassava production, processing, and marketing projects (training in cassava projects).

Latin America

Argentina

A baseline capacity for addressing cassava disease problems, and for integrated cassava projects was established.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Entomology	MAG-Chaco	sc	0.6
Pathology	INTA	it	1.0
Cassava projects	INTA	sc	0.6

Bolivia

A baseline capacity for cassava processing, and for cassava projects was established. Awareness training on cassava projects was provided in the eastern lowlands.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Utilization/processing	IBTA	ic+it	1.7
	UAGRM	ic+it	1.7
Cassava projects	PROJECT 412 UN	sc	0.3

In-country training

- Course on integrated cassava projects. Chapare, 1991; 5 days; 23 participants (IBTA 16; UNDP Proj. 2; Univ. M. San Simón 2; ASPRO-SINAHI 1; PDAR 1; Univ. G. R. Moreno 1).

Brazil

A R&D team to fight two specific diseases—root rots and the micoplasma-like witches' broom—was established in northern and northeastern Brazil (training in pathology). This is the subject of a case-history in the companion document on institutional development.

Cassava IPM was strongly supported (training at CIAT and in-country).

Concerted efforts were made to establish integrated cassava projects in northeastern Brazil. They included awareness training for decision makers and researchers; in-country courses on cassava production, utilization, and processing; in-country training on seed supply (see SEEDS); and training at CIAT in cassava projects, cassava utilization and processing, and cassava agronomy and OFR.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Agronomy/On farm research	CE EPACE	it	0.8
	PA EMBRAPA	it	1.6
Pathology	AM EMBRAPA	it	1.0
	AM EMBRAPA	t	1.0
	BA EMBRAPA-CNPMF	it	1.0
	CE EMATERCE	it	1.2
	CE EMATERCE	it	1.2
Pathology+Entomology	CE EPACE	it	1.2+0.8
Pathology	CE EPACE	it	1.2
	PA EMBRAPA	it	1.5
	PB EMATER	it	1.0
	PE IPA	it	1.2
Physiology	BA EMBRAPA	it	2.0
Virology	DF EMBRAPA	it	0.7
Virology	PE IPA	it	1.5
Entomology IPM	BA EPABA	sc	0.6
	BA EMBRAPA	ic+it	3.4
	PR IAPAR	sc	0.8
	SC EMPASC	sc	0.6
Breeding	PE EMBRAPA	it	1.0
Utilization/processing	BA EMBRAPA-CNPMF	it	1.7
	CE EMATERCE	sc	0.8
	DF EMBRATER	sc	0.6
Cassava projects	BA EMBRAPA	sc	0.6
	BA EMATER	sc	0.6
	CE EMATERCE	sc	0.6
	PB EMEPA	sc	0.6
	PE PRORURAL	sc	0.6

Awareness training on cassava potential and opportunities for integrated projects:

- One group event in 1987 for 22 researchers and decision makers from EMAPA, EMATER, EMATERCE, EMBRAPA, EMEPA, EPABA, EPACE, EPEAL, IPA, and PROJETO NORDESTE, mainly, but not exclusively from northeastern Brazil. Technical staff were updated on cassava production, processing, and utilization in this four-weeks training workshop.

  Simultaneously they prepared an integrated cassava project proposal which then was discussed and adjusted with decision makers.

- An eight-days study tour in 1989 on integrated cassava projects for 19 decision makers from the Secr. Agr. of Bahia, Ceará, Paraiba, and Pernambuco; EMBRAPA, SUDENE, and Banco Nordeste. Visits were made to projects in Ecuador and the Colombian North Coast; and to CIAT headquarters.

In-country training

- Course on cassava utilization and processing. Ceará, 1987; 11 days; 21 participants from EMATER and other northeastern institutions.
- Course on cassava utilization and processing. Ceará, 1988; 3 days; 35 participants from EMATERCE (30) and EPACE (5).
- Course on cassava production and processing. Porto Alegre, 1988; 3 days; 31 participants from EMATER-RS.
- Course on cassava production and IPM. Fortaleza, 1989; 8 days; 26 participants from EMATERCE (20) and EPACE (6).
- Workshop on technological aspects in associative cassava projects. Fortaleza, Ceará, 1988; 5 days; 25 extensionists from EMATERCE.

Colombia

National IPM capacity was strengthened. The flow of technology to farmers in integrated cassava projects was strongly fostered through training in Agronomy/OFR, and in seed multiplication and supply. New integrated cassava projects were supported through training—at CIAT and in national courses—in cassava utilization/processing; integrated cassava projects; and cassava production, processing, and marketing.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Breeding	ICA Bolívar	it	1.0
Pathology	Secr.Agr.Antioquia	it	1.7
Physiology	ICA Bolívar	ic+it	0.9
Economics+Agronomy/	ICA Cundinamarca	it+sc	0.6+0.1

Professionals trained in	Institution	Modality	Length (months)
On farm research			
Entomology IPM	Secr.Agr.Antioquia	it+sc	1.1+0.6
	CENICAFE Caldas	it	0.4
Entomology IPM	ICA Cauca	sc	0.1
	ICA Córdoba	sc	0.2
	ICA Córdoba	sc	0.1
	ICA Córdoba	sc	0.1
Entomology IPM+Agr/OFR	ICA Córdoba	sc(x3)	0.2+0.1+0.4
Entomology IPM	ICA Córdoba	sc	0.1
	ICA Valle	sc	0.6
	Univ. Nac. Valle	sc	0.6
	Univ. Nac Valle	sc	0.6
	ICA Antioquia	sc	0.1
	ICA Atlántico	sc(x3)	0.1+0.1+0.2
	ICA Bolívar	sc(x2)	0.1+0.1
	ICA Bolívar	sc	0.4
	ICA Bolívar	sc	0.4
	ICA Bolívar	sc	0.4
	ICA Bolívar	sc	0.4
Agronomy/OFR+Pathol.	ICA Bolívar	(ic+it)+it	0.4+1.2
Agronomy/OFR	ICA Cauca	it	0.6
	COM.CAFET.Cauca	it	0.6
	COM.CAFET.Cauca	it	0.6
	COM.CAFET.Cauca	it	0.6
	ICA Córdoba	sc(x3)	0.1+0.1+0.2
	ICA Córdoba	sc(x3)+ic	0.1+0.1+0.2+0.3
	ICA Córdoba	sc	0.1
	ICA Córdoba	sc	0.1
	Univ. Córdoba	sc	0.4
	Secr. Agr. Meta	it	0.8
	ICA Sucre	sc(x3)	0.2+0.1+0.2
	ICA Valle	sc	0.1
Seed supply	ICA Caquetá	sc	0.1
	ICA Cesar	sc	0.1
	MAIZENA Córdoba	sc	0.1
	ICA Cundinamarca	sc	0.1
	ICA Magdalena	sc	0.1
	ICA Meta	sc	0.1
	ICA Quindío	sc	0.1
	PROACOL Valle	sc	0.1
	ICA Valle	sc	0.1

Professionals trained in	Institution	Modality	Length (months)
Seed processing	ICA Valle	sc	0.1
	ICA Tolima	sc	0.1
Utilization/processing	Com. Cafet. DRI Caldas	it	1.3
	ICA Cesar	it	0.1
Utilization/process/Agr.	ICA Santander	it	1.2
Utilization/processing	ICA Santander S.	it	0.1
Cassava projects	Com.Cafet. Cauca	sc	0.6
Cassava projects	Cund.Secr.Int.Pop.Pres	sc	0.6

In-country training

- Course on cassava production and marketing. Montería, 1988; 12 days; 30 participants from CORFAS (9), ICA (3), SENA (3), CECORD (3), FINANCIACOOP (2), DRI (1), Univ. Córdoba (1), CRR (1), and CIAT trainees from Argentina (3), Ecuador (3), and Mexico (1).
- Course on cassava production and processing. Armenia, 1989; 3 days; 32 participants: 10 from ICA, 2 from Univ. Caldas, and 20 independent practitioners.
- Course on cassava production, processing and marketing. Tol, 1989; 11 days; 24 participants from ICA (5), SENA (3), CECORA (4), DRI (5), CORFAS (5), and FINANCIACOOP (2).
- Course on cassava production, processing and marketing. Granada, 1990; 9 days; 31 participants (ICA 6; INCORA 2; SENA 5; CORPORACION ARARACUARA 3; CAJA AGRARIA 5; CORFAS 2; COOP. GIRASOLES 1; PNR 1; Univ. de los Llanos 2; Secr.Agr. 3; COARAUCA 1).

Costa Rica

Support in agronomy/OFR was given to public development activities that included cassava production.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Agronomy/OFR	Inst. Desarr. Agr.	ic	0.8
Agronomy/OFR	Min.Agr.	ic+it	1.2

Cuba

The strong Cuban cassava research capacity was reinforced through training at CIAT of strategically selected scientists. Two sets of two in-country courses were the final contributions to activities for facilitating the flow of technology to farmers that had been initiated earlier. Thereafter this type of training was assumed by the national program.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Pathology	INIVIT	it	2.1
Agronomy	INIVIT	it	2.1
Economics	Min.Agr.	it	0.8
Utilization/processing	Min.Agr.	it	1.1

In-country training

- Course on cassava production. Santo Domingo, 1987; 10 days; 14 participants from the Ministry of Agriculture and other state agencies.
- Course on cassava utilization. Santo Domingo, 1987; 10 days; 10 participants from the Ministry of Agriculture and other state agencies.
- Course on cassava utilization in animal nutrition. Holguín, 1988; 11 days; 10 participants from the Ministry of Agriculture and other state agencies.
- Course on cassava production. Holguín, 1988; 11 days; 22 participants from the Ministry of Agriculture and other state agencies.

Ecuador

Training at CIAT supported the Union of Farmers Associations for Cassava Production and Processing (UAPPY); and strenghtened the NARI (INIAP) so that it might eventually take over the support to cassava projects. In-country training was in support of integrated cassava projects in Portoviejo, Manabi.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Entomology IPM	INIAP	sc	0.6
Cassava projects+util/proc	FUNDAGRO	sc+it	0.6+2.0
Cassava projects	INIAP	sc	0.8
Production/utilization	UAPPY	ic	0.4
	UAPPY	ic	0.4
	Univ. Tec. Manabi	ic	0.4
	Fund. Ad. Com.	it	0.7

Professionals trained In	Institution	Modality	Length (months)
Utilization/processing	INIAP	it(x2)	2.0+0.9
	INIAP	it	1.3
	INIAP	it	2.0
Utilization/processing	UAPPY	it	0.9
	UAPPY	it(x2)	0.9+0.7
	UAPPY	it	0.9
	UAPPY	it(x2)	0.9+0.7
	UAPPY	it(x2)	0.9+0.7
	UAPPY	it	0.7
"Seed production"	UAPPY	sc	0.4
	UAPPY	sc	0.4
	UAPPY	sc	0.4
Alternative seed supply	UAPPY	sc	0.9

In-country training

- Course on cassava production and utilization. Portoviejo, 1987; 3 days; 26 participants from MAG (7), INIAP (12), DRI (3), ECAE (2), UTM (1), and CRM (1).
- Course on rapid propagation. Portoviejo, 1988, 1989. Two phases of 4 and 7 days, approximately 2.5 months apart. 11 participants from INIAP (8), UAPPY (2), and MAG (1)

Guatemala and Honduras

Occasional training requests from Guatemala's NARI (ICTA) and Honduran NGOs were met.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Breeding	GU ICTA	ic+it	1.3
Utilization/processing	HO C. Desarr. Ind.	it	0.9
	HO F. Ebert. St.	it	0.9

Mexico

Training follow-up was given to earlier efforts in support of integrated cassava projects.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Breeding	INIFAP	it	2.2
Utilization/processing	Inst. Tec. Est. Sup.	Ph.D.	5.7

In-country training

- Course on cassava production and processing. Hopelchén, Campeche, 1988; 6 days; 24 participants (12 local extensionists and 12 farmers).

Nicaragua

A national attempt to improve cassava production and utilization was supported.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Agronomy/On farm research	MIDINRA	it	1.5
Entomology IPM	DGTA	sc	1.1
Utilization/processing	MIDINRA	sc	0.8

In-country training

- Course on cassava production and processing. Managua, 1987; 5 days; 20 participants (MIDINRA 13; Bco. Nac. Desarrollo 2; Empr. G. Argello 1; Centro Exptl El Recreo 1; Centro Protección Vegetal 1; Inst. Sup. Agrop. 1; Est. Exp. Ral González 1).

Panama

A baseline capacity for integrated projects was developed. Support was provided to tackle a specific local cassava pest, the root burrower bug ***Cyrtomenus bergi****.*

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Production/utilization	MIDA	ic	0.4
Entomology IPM	IDIAP	sc	0.6
Cassava projects+Prod.	IDIAP	sc+ic	0.6+0.4
	MIDA	sc+ic	0.6+0.4

In-country training

- Course on the management of **Cyrtomenus bergi** in two phases of three and five days respectively. Divisa, Riohato, 1988, 1989; 23 participants (IDIAP 10; MIDA 5; Banco de Desarrollo 6; Private Enterprise 2).

Paraguay

In the mid 1980s Paraguay lacked a R&D capacity for cassava despite having the world's largest per capita cassava production and consumption. During 1987-1991 a concentrated effort completed the development of such a capacity which had been initiated slightly earlier. This is described further among the case-histories in the companion document on institutional development.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Agronomy/On farm research	CRIA	it	1.2
	CRIA	it	0.8
	SEAG	it+M.Sc.	2.1+0.9+0.3
Pathology	Min.Agr.	it	2.9
	Ntl Univ	it	3.4
Entomology	SEAG	sc	1.0
Utilization/processing	CERI	ic+it	1.7
	Coop. Cnl. Oviedo	it	1.2
	SEAG	it	1.9
	SEAG	it	1.7
Agronomy/OFR+Projects	SEAG	it+ic+sc	2.9+0.4+0.6
Agronomy/OFR+Projects	SEAG	it+ic+sc	1.9+0.4+0.6

In-country training

- Course on cassava production and processing. San Lorenzo, 1987; 11 days; 31 participants (SEAG 28; Comp. Agr. San Alberto 1; INTA, Argentina, 1; private enterprise 1).
- Course on cassava production and processing. San Lorenzo, 1988; 17 days; 30 participants (SEAG 23; CRIA 1; CERI 1; IAN 1; Inst. Agrop. 1; INTA, Argentina, 3).
- Updating on cassava production and utilization. San Lorenzo, 1988; 3 days; 14 participants from SEAG.
- Course on cassava production and processing. San Lorenzo, 1990; 12 days; 30 participants (SEAG 19; MAG 6; IAN 1; INTA, Argentina, 4).
- A sequence of two training workshops, of 5 days each, on data management and analysis. San Lorenzo, 1990; participants 14 Agronomy/OFR professionals from SEAG (11), MAG (2), and CRIA (1).

In-country awareness training on cassava production and processing was provided.

Peru

In-country training

- Course on conservation of fresh cassava. San Ramón, June, 1987; 3 days; 12 participants (Programa de Desarrollo Rural 8; CIPA 2; Pichis Palcazu Project 1; farmer 1).
- Course on cassava production and processing. Pucallpa, 1987; 4 days; 53 participants (CIPA XXIII 23; CIPA XXIV 1; Corp. Deptl. Desarrollo 4; Región Agraria XIII 2; Inst. Técnico Superior 3; Proj. Pichis Palcazu 1; CENFOR 1; COAR 1; ONA 1; IVITA 1; GRANGE 1; Colegio Agrario 1; Univ. Nac. Ucayali 3; farmers 10).

A base-line capacity for cassava processing was established.

Puerto Rico

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Utilization/processing	Admin. Serv. Agr.	it	1.9

Venezuela

Occasional training requests were met.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Breeding	FONAIAP	ic+it	1.3
Agronomy	Proc. Agua Viva	it	0.9

Asia

The capacity of seeking solutions to cassava production problems, and of promoting cassava production and processing was enhanced through

- Specialized training at CIAT of key researchers from Asian NARS.
- Higher degree (M.Sc. and Ph.D.) training in the region, under CIAT scientists supervision, of promising young scientists; and particulary.
- On-the-job training of scientist involved in joint CIAT-NARS research projects.

Training at CIAT and regional higher degree training

Country	Professionals trained in	Institution	Modality	Length (months)
India	Res.& Prod.	CTCRI	ic	1.1
		CTCRI	ic	1.2
	U./processing	CTCRI	it	1.0
Indonesia	Res.& Prod.	Univ. Brawijaya	ic	1.1
		Univ. Brawijaya	ic	1.1
		Malang Res. Inst.	ic	1.1
	U./processing	SURIF	it	5.9
Laos	Res.& Prod.	Tagnone Feedmill	ic	1.1
		Ntl/Agr.Res.Ctr.	ic	1.1
Malaysia	Agronomy	Agr.Res.Ctr.	ic+it	1.1
Peoples Republic of China				
	Agronomy	S.China A. Tr. Cr.	ic+it	1.7
		Guangxi Subtrop. Crops Res. Inst.		
		Crops Res. Inst.	ic+it	1.7
		Guangxi St. F. Br.	ic+it	1.7
		Upland Cr. Res. I.	ic+it	1.7
	Physiology	Jiangsu Agr. Coll.	it	1.9
Srilanka	Res.& Prod.	Ctrl Agr. Res. I.	ic	1.1
Thailand	Res.& Prod.	Field Cr.Res.I.	ic	1.1
		Field Cr.Res.I.	ic	1.1
		Rayong Fld Cr.Ctr	ic	1.1
		Rayong Fld Cr.Ctr	ic	1.1
		Dept. Agr.	ic	1.1

Country	Professionals trained in	Institution	Modality	Length (months)
Thailand	Breeding	Sriracha Res.Stn	M.Sc.+ic	12.0+1.1
		Field Cr.Res.I.	M.Sc.	21.3
		Rayong Fld Cr.Ctr	M.Sc.	31.0
	Agronomy	Sriracha Res.Stn	M.Sc.	24.0
The Philippines	Res.& Prod.	Visayas Coll.	ic	1.0
		Visayas Coll.	ic	1.0
		Univ. Los Baños	ic	1.1
		Root C. Res. Ctr.	ic	1.1
		Root C.Res.Ctr.	ic	1.0
	Entomology	Visayas Coll.	it	0.8
		Root C.Res.Ctr.	it	5.4
	Pathology	Root C.Res.Ctr.	it	5.3
	Breeding	Visayas Coll.	Ph.D.	36.0
Vietnam	Res.& Prod.	Agr. Coll. No 3	ic	1.5
	Agronomy	Inst.Agr.Technol.	ic+it	1.7
		Inst.Agr.Technol.	ic+it	1.7
		Other regions		
Uganda	U./processing	Makerere Univ.	it	1.6

On-the-job training in the region

In Asia, CIAT has not implemented in-country training that could be compared to cassava (and other commodity) in-country courses in Latin America or to bean in-country courses in Africa. CIAT's outposted cassava team was too small for such a training strategy to be advisable; and an alternative of supporting Asian in-country courses from CIAT headquarters would have been too costly. Therefore, CIAT's outposted staff, rather than training NARS scientists in formal group events, opted for training them on-the-job, on their home ground, while executing joint research projects.

Summarized information on the output follows. Due to late compiling of the data, this information could not be included in the overview on training output nor in the gender analysis.

Training through collaborative cassava agronomy projects

Trainees are either agronomist or soil scientist

Country	Institution	No. of experiments	No. of persons
India	Central Tuber Crops Res. Inst., Trivandrum	0	2
Indonesia	Bogor Res. Inst. Food Crops, Bogor	4	1
	Brawijaya Univ. Malang	1	2
	Malang Res. Inst. Food Crops, Malang	2	1
Malaysia	Malaysian Agric. Res. Inst., Kuala Lumpur	1	2
P. R. of China	Guangxi Subtrop. Crops Res. Inst., Nanning	2	4
	Upland Crops Res. Inst., Guangzhou	1	1
	South China Acad. Trop. Crops, Hainan	4	2
Sri Lanka	Central Agric. Research Inst., Peradeniya	3	1
Thailand	Field Crops Research Inst., Rayong	6	2
	Soils Division, Dept. Agric., Bangkok	0	1
	Kasetsart Univ., Bangkok	3	4
The Philippines	Phil. Root Crop Res. Train. Center, Leyte	4	3
	Bohol Experiment Station, Bohol	3	2
	UPLB - La Granga Research Station, Negros Occ.	2	1
Vietnam	Inst. Agric. Science HCM City	3	2
	Agric. College No. 3, Bac Thai	2	2

Training through collaborative cassava varietal improvement projects

Trainees are cassava agronomist and breeders

Country	Institution	No. of experiments	Persons trained
Indonesia	Brawijaya Univ., Malang	5	3
	Umas Jaya Farm, Lampung	5	2
P. R. of China	South China Academy of Tropical Crops, Hainan	6	3
	Upland Crops Res. Inst. Guangzhou	4	3
	Subtropical Crops Res. Inst., Nanning	4	2
Thailand	Field Crop Res. Inst. Dept. Agr.	17	7
	Kasetsart University	3	2
The Philippines	Phil. Root Crops Research Center, VISCA, Leyte	5	2
	Inst. Plant Breeding, UPLB	3	1
Vietnam	Inst. Agric. Sci., South Vietnam	6	2
	Agr. College No.3, North Vietnam	5	2

Rice

Three institutional development strategies were followed to enhance the rice R&D capacity in Latin America through training:

- Developing a minimum research and development capacity in countries where this capacity was weak and/or rice is a crop of relatively secondary importance;
- Strengthening the research capacity in countries where it already had been established and where rice is a major crop; and
- Supporting integrated "national rice plans" were they were in place or being developed.

Particular emphasis was placed on integrated crop management, i.e., the development and deployment of mutually complementary genetic and management technologies to reduce production costs while sustainably increasing production.

Training at CIAT headquarters was complemented with the participation of CIAT's research and training staff in the organization and delivery of regional and in-country training events, and with monitoring and advisory visits of CIAT's Rice Program staff to national programs.

Thus, human resources were enabled to:

- Diagnose and prioritize rice production constraints (training in economics/ social sciences);
- Evaluate alternative technologies, and their adoption and impact (training in economics/social sciences);
- Provide genetic remedies to biotic and abiotic stresses (training in breeding);
- Protect rice from, and evaluate genetic solutions to, biotic stresses (training in pathology, entomology, virology, and agronomy), and abiotic stresses (training in soils and agronomy); and
- Optimize the use of resources for production (training in agronomy; soils).

Bolivia

The research capacity for rice production and breeding of the agricultural research institute of Santa Cruz, CIAT, was strengthened.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Breeding	CIAT	ic+it	1.7
Res.& Prod.	CIAT	ic	1.1

Brazil

Brazil's strong federal and state rice research capacity was strategically supported (training in breeding; pathology; entomology; and agronomy).

The Brazilian organization PROVARZEAS had been given training assistance in previous years in support of its effort to improve rice production in seasonally flooded lands (varzeas). The assistance was concluded with a specialized course at CIAT, and two in-country courses.

Training at the national rice research center was improved by giving on-the-job assistance in the organization and implementation of a course for rice researchers.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Economics	GO EMBRAPA	it	0.9
Breeding	GO EMBRAPA	it	1.0
	MT EMPA	ic+it	3.7
	MT EMPA	ic+it	3.8
Breeding	RO EMBRAPA	it	1.6
	RS IRGA	it	1.4
	RS IRGA	ic+it	3.7
Pathology	GO EMBRAPA	it	0.6
	MT EMPA	it	1.0
Entomology	MT EMPA	it	1.0
	RS EMBRAPA	it	0.4
Agronomy	GO EMBRAPA	it	0.3
	MG EPAMIG	it	0.3
	RS IRGA	ic+it	3.8
Agronomy-seed prod.	GO EMBRAPA	it	0.8

Professionals trained in	Institution	Modality	Length (months)
Irrigated Rice Prod.	CE EMATER	sc	1.2
	DF EMBRATER	sc	1.2
	ES EMATER	sc	1.2
	ES EMATER	sc	1.2
	GO EMATER	sc	1.2
	GO EMATER	sc	1.2
	MA EMATER	sc	1.2
	MA EMATER	sc	1.2
	MG EMATER	sc	1.2
	MG EMATER	sc	1.2
	MG RURALMINAS	sc	1.2
	MS EMPAER	sc	1.2
	MS EMPAER	sc	1.2
	MT EMATER	sc	1.2
	PI EMATER	sc	1.2
	RJ EMATER	sc	1.2
	RJ EMATER	sc	1.2
	RS EMATER	sc	1.2

In-country training

- Course on irrigated rice. Brasilia, 1987; 4 days; 21 participants from PROVARZEAS.
- Course on rice production in "Varzeas" held with EMBRATER, PROVARZEAS, EMPASC, and ACARESC. Ararangu, Santa Catarina, 1987; 18 days; 18 participants from PROVARZEAS, 2 from FEDEARROZ, Colombia, and 2 from the Rice Growers Association of Chiriquí, Panama.
- Course on rice production. CNPAF, Goias, 1990; 19 days; 19 participants from Univ. Fed.-AC, EMBRAPA-AM, COBRAPE/CIA-GO, EMBRAPA-GO (2), EMBRAPA/CNPAF-GO (2), EMGOPA-GO (2), Coop. Valle Paracatu-MG, EMBRAPA/UEPAE-MT, IPA-PE, EMBRAPA-PI, EMBRAPA/UEPAE-PI, ACARESC-SC, Ctro. Ciencias Agrovet.-SC, Inst. Agr. Campinas-SP, RURALTINS-TO (2).

Chile

*The national rice **research** capacity was further strengthened, concluding a task initiated in previous years.*

*The **flow** of new technology to rice farmers was supported through two in-country courses held in southern Chile in collaboration with the NARI (INIA).*

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Breeding	INIA	it	1.5
Agronomy	INIA	ic+it	2.2
Soils	INIA	ic+it	2.4

In-country training

- Course on rice production held with INIA in Linares in 1988; 11 days duration; 25 participants (22 extensionists from Talca, Parral, and Linares; one seed specialist; one professional from the milling industry; one from Talca University).
- Course on rice production held with INIA in Chillán in 1990; 10 days duration; 29 participants (INIA 5; the rice milling industry 6; cooperatives 6; credit institutions 2; private enterprise 6; technical advisors 4).

Colombia

The NARI's (ICA) rice breeding capacity was strengthened to work with new acid-soil-tolerant germplasm.

The national rice growers association FEDEARROZ runs a strong technology transfer system, and is increasingly moving into rice research. The development of FEDEARROZ's cadre of professionals was strongly supported.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Breeding	FEDEARROZ-Cesar	ic+it	3.9
	ICA-Meta	it	1.8
	ICA-Meta	it	2.0
	ICA-Meta	ic+it	3.8
	---------	M.Sc.	6.1
Pathology	FEDEARROZ-Tolima	ic+it	5.0

Professionals trained In	Institution	Modality	Length (months)
	FEDEARROZ-Valle	ic+it	3.8
	ICA-Córdoba	ic+it	3.8
Virology	--------	Ph.D.	1.6
Entomology	FEDEARROZ-Cund.	ic+it	3.8
	FEDEARROZ-Tolima	ic+it	3.8
Soils	ICA-Meta	ic+it	3.9
Agronomy	FEDEARROZ-Antioquia	ic+it	3.8
	FEDEARROZ-Cund.	ic+it	4.8
	FEDEARROZ-Tolima	ic+it	5.9
Res.& Prod.	ICA-Caquetá	ic	1.1
Prod. Technology	Int. Nac. Arauca	it	0.4
	Int.Nac.Arauca	it	0.4
	Int.Nac.Arauca	it	0.4

In-country training

- Course on rice production for extensionists in the Cauca Valley held with ICA. Cali, 1987; 5 days; 24 participants from Cauca Valley (13), Santander (1), Cundinamarca (1), ICA-Bogotá (3), ICA-Girardot (1), ICA-Ibagué (2), ICA-Neiva (2), and ICA-Tolima (1).

Costa Rica

An occasional training request from the Ministry of Agriculture was met.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Agronomy	Min.Agr.	ic+it	3.7

Cuba

Strategically selected researchers were trained to reinforce the well-established national rice program.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Breeding	Inst. Nac. Inv. Arroz	ic+it	3.8
	Min.Agr.	it	0.5
Biotechnology	INIVIT	it	0.7
Pathology	Inst. Nac. Inv. Arroz	it	0.5
Entomology	Inst. Nac. Inv. Arroz	it	2.0
	INIVIT	it	0.7
	Min.Agr.	it	1.1
Agronomy	Inst. Nac. Inv. Arroz	it	3.5

Dominican Republic

Strong support was given to rice research and production in conjunction with the Caribbean Rice Improvement Network, CRIN (see also the companion report on the development of national and subregional training capacity).

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Economics	Secr. Est. Agr.	it	1.1
Breeding	Ctr. In. Arroc.	ic+it	3.9
Entomology	Secr.Est.Agr.	it	2.0
Agronomy	Secr.Est.Agr.	it	3.6

In-country training

- Course on irrigated rice production. Bonao, Sept-Oct 1988; 6 weeks; 25 participants from ODVA, Haiti (2), Min.Agr., Cuba (2), INDRHI, D.R. (1), IAD, D.R. (4), and SEA, D.R. (16).

Ecuador

Training was an integral part of the "National Rice Plan" in which the national rice research and technology transfer capacity was strengthened integrally with CIAT's technical support (see also the companion report on the development of a national and subregional training capacity).

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Economics	INIAP	(x2)it	1.1+1.1
Breeding	INIAP	ic+it	3.8
	INIAP	ic+it	3.8
Entomology	INIAP	it	2.0
	MAG	it	0.9
	MAG	it	0.9
	MAG	it	0.9
Agronomy	INIAP	ic+it	3.8
	MAG	ic+it	3.4
	MAG	ic+it	3.8
Res.& Prod.	MAG	ic	1.7
Leader updating	INIAP	it	0.9
	MAG	it	0.4

In-country training

- Course on rice production held with INIAP and PNA. Boliche, Guayaquil, 1987; 12 days; 25 participants from INIAP-DRI (2), INIAP-MAG (5), and MAG-PNA (15 from 8 locations).
- Course on rice production technology. Portoviejo 1991; 5 days; participants 12 technology transfer professionals from Centro de Rehabilitación de Manabí (7), PROTECA (3), AGRIPAC (1), and Productora Manabita (1). Delivered by the recently established team of trainers in rice technology.
- Course on rice production technology. Guayaquil, 1991; 5 days; participants 13 technology transfer professionals from PROTECA (10) and CEDEGE (3). Delivered by the recently established team of trainers in rice technology.

El Salvador and Nicaragua

The research capacity of the two NARIs (CENTA in El Salvador and ICTA in Guatemala) was strengthened.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Pathology	SAL CENTA	it	4.1
Agronomy	SAL CENTA	ic+it	3.8
Breeding	GU ICTA	ic+it	3.9
	GU ICTA	ic+it	3.8
Agronomy	GU ICTA	ic+it	3.8
	GU ICTA	ic+it	3.8
Res.& Prod.	GU ICTA	ic	1.7

In-county training

- Course on rice production held with ICTA and DIGESA in 1988 in Sacapa, Guatemala; 12 days duration; 22 participants from ICTA (9), DIGESA (8), National University (3), and CENTA, El Salvador (2).

Haiti

A training need of the Artibonite Valley Development Agency was met. National rice production also received training support through the Caribbean Rice Improvement Network (see also the companion report on the development of national and subregional training capacity, under Dominican Republic).

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Agronomy	ODVA	it	2.1

Honduras

The NARI's (SRN) rice research and technology transfer capacity was strengthened.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Breeding	SRN	ic+it	3.7
Agronomy	SRN	ic+it	3.7
	SRN	ic+it	3.7
	SRN	ic+it	3.7

In-country training

- Course for rice breeders, 1988. Five days; 15 participants from across the country met to unify germplasm evaluation criteria and to coordinate the flow of information among them.

Mexico

The NARI's (INIFAP) capacity was strengthened throughout the country with emphasis on the humid tropics.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Breeding	INIFAP-Campeche	ic+it	3.8
	INIFAP-Colima	ic+it	3.7
	INIFAP-Jalisco	it	3.0
	INIFAP-Quint.Roo	ic+it	3.7+1.9
	INIFAP-Tabaso	it	2.0
Pathology	INIFAP-Morelos	it	4.0
	INIFAP-Morelos	it	0.6
	INIFAP-Oaxaca	it	2.0
Entomology	INIFAP-Tabaso	ic+it	3.7
Agronomy	INIFAP-Quint.Roo	it	0.4
	Bco Mexico-Tabasco	ic+it	3.6
Agronomy	INIFAP-Tabaso	it	0.4
	INIFAP-Tabaso	ic+it	3.8
Res.& Prod.	INIFAP-Morelos	ic	1.3
	INIFAP-S.L.Potosí	ic	1.7

In-country training

- Course on rice production in the humid tropics. Held with INIFAP. Ezna, Campeche, 1987; 12 days. Participants: 26 researchers, technology transfer agents, and development officers from Campeche (7), Colima (1), Mexico D.F. (2), Morelos (4), Nayarit (1), Quintana Roo (2), Tabasco (7), and Veracruz (2).

Nicaragua and Panama

Public sector rice research was supported in both countries.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Breeding	NK MIDINRA	ic+it	4.0
	NK MIDINRA	it	2.2
Entomology	NK MIDINRA	ic+it	3.7
Agronomy	NK MIDINRA	ic+it	3.8
Pathology	PG IDIAP	it	0.7
Entomology	PG Univ.Panama	it	2.7
Agronomy	PG IDIAP	it	0.7
	PG IDIAP	it	0.7
Res.& Prod.	PG Univ.Panama	ic	1.8

Peru

An earlier major effort to strengthen the NARI's (INIAA) rice research capacity was complemented.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Breeding	INIAA	ic+it	3.8
	INIAA	Ph.D.	19.1
	INIAA	ic+it	3.8
Entomology	INIAA	ic+it	3.7
Agronomy	INIAA	ic+it	3.8
Res.& Prod.	INIAA	ic	1.7

Trinidad and Tobago

Strategic support was given to national rice research.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Agronomy-weeds	Min.Agr.	M.Sc.	13.7
Entomology	CARONI Res.Stn	it	0.4
	Univ. West Indies	it	0.3

Venezuela

The "National Rice Plan" was launched, bringing together the efforts of the Venezuelan NARI (FONAIAP) and several farmers organizations (APROSCELLO, APROSELLAC, APROSIGUA) under an interinstitutional National Rice Council. Training systematically addressed the human resources development needs of this effort. A more detailed account is given under the case histories in the companion document on institutional development.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Breeding	APROSIGUA	ic+it	3.9
	APROSCELLO	ic+it	3.9
Pathology	FONAIAP	it	0.8
Entomology	FONAIAP	it	0.5
	APROSCELLO	it	0.6
	Inst. Univ. Tec.	it	3.5
	APROSCELLO	it	3.6
Agronomy	APROSCELLO	ic+it	3.9
	APROSCELLO	ic+it	3.8
	FONAIAP	ic+it	3.9
	APROSELLAC	it	2.9
	APROSELLAC	it	2.9
Soils	APROSCELLO	ic+it	3.9

In-country training

- Course on irrigated rice production. Acarigua, 1989; 12 days; 19 participants from APROSCELLO (9), APROSELLAC (1), FUDECO (2), FONAIAP (4), SERVIMIC (1), UCLA (1), and UCV (1).
- Course on irrigated rice production. Acarigua, Portuguesa, 1990; 8 days. Participants: 18 local private practitioners.

- Course on irrigated rice production. Calabozo-Acarigua, 1991; 13 days. Participants: 22 local technology transfer officers from 11 institutions/ organizations (public, private, farmers organizations, credit institutions).
- Course on irrigated rice production. Calabozo, 1991; 5 days. Participants: 23 local technology transfer officers from 16 institutions/organizations (public, private, farmers organizations, credit institutions).

Tropical pastures

Institutional development through training in Tropical Pastures served the International Network of Tropical Pastures Evaluation for Latin America and the Caribbean (RIEPT), and some other institutions in the region.

As the RIEPT evolved, training shifted from meeting the needs for agronomic evaluation of pastures to increasingly address

- The evaluation of pastures under grazing;
- The study of production systems, and the use of improved legume-based pastures in them; and
- The development of a seed supply to spread the newly developed pastures.

However, some countries and institutions remained in initial stages of pastures research. For them, introductory training in pastures R&D was still provided.

Training was offered mainly at CIAT headquarters. However, in-country training, in collaboration with national institutions, increased gradually, especially for developing a seed supply.

By both, training at CIAT and in-country, human capital was enabled to:

- Initiate activities in, or advance, tropical pastures research and development (training in pastures R&D);
- Evaluate forages in agronomic trials (training in agronomy; pathology, entomology; soils and plant nutrition; germplasm characterization);
- Evaluate forages under grazing (training in pastures management-quality; pathology; entomology; soils and plant nutrition; ecophysiology);
- Conduct research on pasture establishment and pasture rehabilitation (training in pasture establishment; plant nutrition and soil fertility);
- Evaluate and foster the nitrogen fixing capacity of forage legumes (training in soils microbiology);
- Evaluate pastures in farming systems (training in on-farm pasture evaluation; economics); and
- Promote the seed supply of forages (training in seed multiplication, quality, physiology).

Antigua

Support was given to seed supply development.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Seeds	CARDI	it	1.9

Argentina

CIAT's methods for tropical forages research were shared with scientists from subtropical pastures research programs.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Pastures R&D	INTA-Córdoba	ic	1.9
	MAA-Misiones	ic	1.9
Agronomy	INTA-Formosa	M.Sc.	11.0
Mgmt-Quality	INTA-Corrientes	t	1.0
	INTA-Entre Ríos	it	1.3

Barbados

Entomological research was supported.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Entomology	CARDI	it	1.0

Belize

Seed supply development was supported.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Seeds	Min. Agr. Lands	it	2.1

Bolivia

Pastures evaluation under grazing, and seed supply development in Cochabamba were strengthened. Support to pastures research in Santa Cruz and the Beni was also provided.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Soils-nutrition	Univ. San M. Simón Sta Cruz	ic+it	7.7
Agronomy	IBTA-Beni	ic+it	7.0
Mgmt-Quality	La Violeta-Cochabamba	ic+it	3.5
	La Violeta-Cochabamba	it	4.9
Entomology+Gen.Res.	BTA-Cochabamba	M.Sc.+it	10.7+0.5
Seeds	SEFO-Cochabamba	ic+it	4.0
	SEFO-Cochabamba	ic+it	5.6
	SEFO-Sta. Cruz	it	0.9

Brazil

Pastures research and development was strengthened in Brazil's savannas and humid tropics.

Training focused on pastures evaluation under grazing (mgmt-quality); on spittle bug research (entomology) to address the main pest of Brachiaria grasses; and on seed supply. However, some entry-level research training was also provided.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Pastures R&D	MG EMATER	ic	2.2
	MS Univ. Federal	ic	2.1
Agronomy+Seeds	DF EMBRAPA	it+(ic+it)	11.0+3.1
Mgmt-Quality	AM EMBRAPA	ic+sc	1.7+1.7
	BA CEPLAC	it	0.6
	DF EMBRAPA	sc	1.1
	DF EMBRAPA	sc	1.1
	MG EMBRAPA	sc	1.5
Mgmt-Quality	MG EPAMIG	ic+it	3.8
	MS EMBRAPA	sc	1.1
	PA EMBRAPA	sc	1.1
	PA EMBRAPA	sc	1.1
	RO EMBRAPA	ic+it	8.2

Professionals trained In	Institution	Modality	Length (months)
Entomology	DF EMBRAPA	it	0.8
	MS EMBRAPA	it(x2)	0.8+0.8
	PA EMBRAPA	it	0.8
Pasture dvlp.+Gen.Res.	DF EMBRAPA	it+it	12.0+1.1
Genetic res.	PA EMBRAPA	it	1.6
Soil microbiol.	BA CEPLAC	ic+it	5.4
Seeds	BA CEPLAC	ic+it	5.1
	PA EMBRAPA	it	2.8

Colombia

Training strengthened all aspects of Colombia's pastures R&D system, not only in the acid soils savannas, but also in other livestock producing lowland and mid-altitude areas.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Pastures R&D	ICA-Antioquia	ic	1.9
	CENICAFE-Caldas	ic	1.9
	Univ. Amazonas.-Caquetá	ic	2.4
	ICA-Córdoba	ic	1.9
	IANuc. Cundinamarca	ic	2.0
	ICA-Meta	ic	2.0
	ICA-Meta	ic	2.0
	ICA-Meta	ic	1.2
	CA-N. Santander	ic	2.0
	ICA-Valle	ic	1.8
	Univ. Nac.-Valle	ic	2.2
	Univ. Nac-Valle	ic	4.1
	FEDECAFE-Tolima	ic	1.8
Agronomy	ICA-Caldas	ic+it	3.6
	CA-Cauca	ic+it	3.6
	ICA-Huila	ic+it	3.6
	Univ. Nac-Antioquia	M.Sc.	12.0
Entomology	ICA-Meta	ic+it	3.1
Ecophys.+Mgmt-Quality	ICA-Caquetá	(ic+it)+sc	5.5+1.0
Ecophysiology	Univ. Javeriana-Cund.	M.Sc.	1.4
	Univ. Tec. Llanos-Meta	it	6.0
Soils-nutrition	ICA-Valle	Ph.D.	in progr

Professionals trained in	Institution	Modality	Length (months)
Mgmt-Quality	SENA-Antioquia	it	0.6
	SAA-Antioquia	ic+sc	3.4
	SAA-Antioquia	it	0.6
	SAA-Antioquia	it	1.9
	FEDECAFE-Caldas	sc	1.1
	FEDECAFE-Caldas	ic+sc	3.4
	ICA-Caquetá	sc	1.1
	ICA-Cundinamarca	ic+it	5.9
	C. Araracuara-Guaviare	ic+it	3.7
	Secr.Agr.-Meta	ic+it	6.1
	ICA-Meta	sc	1.1
	ICA-Valle	sc	1.1
	ICA-Valle	M.Sc.	18.8
	-------	M.Sc.	19.6
Prod. System	ICA-Antioquia	ic+it	5.0
	ICA-Antioquia	ic+it	4.9
	Univ. Caldas	ic+it	3.4
	ICA-Caquetá	ic+it	3.1
	ICA-Caquetá	ic+it	3.8
	ICA-Córdoba	ic+it	3.4
	ICA-Cundinamarca	Ph.D.	2.2
	SDA-N.Santander	ic+it	4.9
	Univ. de la Paz-Santander	it	0.4
	-------	Ph.D.	33.1
Seeds	ICA-Meta	ic+it	4.1

In-country training

- Seminar on pastures for acid soils in Antioquia, Colombia. Medellín, 1989; 3 days; 32 participants from Secr.Agr.Antioquia, Univ. Nac. Medellín, SENA, and CORNARE.
- Training workshop on pastures establishment, development and management. Carimagua and Puerto López, 1989; 10 days; 29 participants from ICA-CRECED, Banco Ganadero, INCORA, SENA, and Secr. Agr. Meta.
- Training workshop on pastures establishment, development and management. CIAT and Florencia, 1990; 10 days; 17 participants from Nestle (7), INCORA (2), Univ. Amazonia (1), Fondo Ganadero Caquetá (2), SENA (1), Banco Ganadero (1), Fondo Ganadero Valle (1), ICA (1), and without affiliation (1).

- Training workshop in two phases on pastures establishment, development and management. Puerto López, Ago (6 days) and Nov (3 days) 1990; 33 participants from ICA (5), SENA (1), INCORA (1), Univ. Llanos (2), Fondo Ganadero Meta (1), Banco Ganadero (3), INTERCOR (1), private enterprise (3), no affiliation (11), Min.Agr. of Costa Rica (2), Univ. Costa Rica (1), CATIE Costa Rica (1), and Banco de Mexico (1).
- Study tour, pastures seed multiplication project. Villavicencio, 1988; 5 days; 33 participants from 4 Seed Companies, Caja Agraria, Banco Ganadero, ICA-CRECED, ICA-CRI La Libertad, and ICA-Seed Certification.
- Study tour, pastures seed multiplication project. Valledupar, 1989; 2 days; 12 participants from 3 Seed Companies, Caja Agraria, Banco Ganadero, ICA, and ICA-Seed Certification.

Costa Rica

Training targeted pastures agronomy and seed supply.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Pastures R&D	MAG	ic	2.1
Agronomy	MAG	ic+it	4.3
Agronomy	MAG	ic+it	5.9
Agronomy	MAG	ic+it	5.9
Mgmt-Quality	MAG	ic+sc	3.4
Seeds	MAG	it	2.1
Soil microbiol.	CNP	it	1.1

In-country training

- Workshop on pastures seed supply development. Atenas, 1990; 5 days; 19 participants from Costa Rica (3 MAG, 1 Ofic. Nac. Semillas, 1 CNP, 1 COOPEAGRI, 1 Hacienda La Pacífica, 1 Seed Enterprise), Belize (1 Min.Agr.), Nicaragua (1 Dirección Nacional de Tecnología Agropecuaria), Honduras (1 SRN), Panama (1 IDIAP), and Peru (1 INIAA).
- Workshop on pastures seed supply development. Atenas, 1991; 5 days; 20 participants from Costa Rica (12 MAG, 1 CATIE, 1 Ofic. Nac. Semillas, 1 CNP, 1 COOPEAGRI, 1 Hacienda La Pacífica), Honduras (1 SRN), Nicaragua (1 Min.Agr.), and Panama (1 IDIAP).

Cuba

The well-established national program was reinforced by training strategically selected researchers.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Ecophysiology	Min.Agr.	ic+it	5.4
Ecophysiology	Min.Agr.	ic+it	5.4
Mgmt-Quality	Min.Agr.	ic+it	4.8
Prod. System	Min.Agr.	ic+it	3.2
Seeds	In. Inv. Pastos	it	0.4

Ecuador

Training targeted some weak areas in the NARI's (INIAP) pastures research team. The capacity to work on BNF was specifically enhanced. Special training requests from the Ministry of Agriculture and others were met.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Pastures R&D	PROFOGAN	ic	2.2
	PROFOGAN	ic	2.1
	Min.Agr.	ic	2.0
Pastures R&D	Min.Agr.	ic	1.8
Economics	FUNDEAGRO	it	0.7
	Min.Agr.	it	1.3
	Dir. Nac. Forestal	it	1.7
Agronomy	INIAP	ic+it	6.4
Soil microbiol.	INIAP	it	1.1
	INIAP	it	1.1
	INIAP	it	1.1
Prod. System	INIAP	ic+it	4.3
Seeds	INIAP	ic+it	3.4

El Salvador

The Livestock Development Center's capacity to produce seeds was strengthened.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Seeds	Ctr. Desarr. Gan.	ic+it	3.5

Guatemala

Specific training needs in DIGESA and ICTA were met upon request.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Pastures R&D	DIGESA	ic	2.0
Agronomy	ICTA	ic+it	5.5
Prod. System	ICTA	ic+it	3.8

Honduras

Pastures R&D capacity in the NARI (SRN) was strengthened throughout the country.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Economics	SRN-Fco Morazán	ic+it	3.6
Agronomy	SRN-Atlántida	ic+it	6.4
Mgmt-Quality	SRN-El Paraíso	ic+it	4.8
	SRN-Fco Morazán	ic+it	6.2
Prod. System	SRN-Comayagua	ic+it	4.3
	SRN-Olancho	ic+it	4.3
	SRN-Cortés	ic+it	3.5
Seeds	SRN-Cortés	ic+it	4.8
	SRN-Fco Morazán	ic+it	4.7

Mexico

The whole spectrum of the NARI's (INIFAP) pastures R&D was strengthened in the humid and sub-humid tropics. More details are presented under the case-histories in the companion document on institutional development.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Pastures R&D	INIFAP-Guerrero	ic	1.0
Soils-nutrition	INIFAP-Chiapas	ic+it	6.6
	INIFAP-Guerrero	ic+it	7.1
	INIFAP-Veracruz	ic+it	8.2
Agronomy	INIFAP-Campeche	ic+it	4.7
	INIFAP-Guanajuato	ic+it	6.8
	INIFAP-Quintana Roo	ic+it	2.2
Agronomy+Mgmt-Quality	INIFAP-Quintana Roo	ic+it	3.5+1.0
Agronomy	INIFAP-Tabasco	ic+it	6.8
	INIFAP-Veracruz	ic+it	6.8
Agronomy	UNAM-Veracruz ic+it		4.6
Agronomy	INIFAP-Yucatán	ic+it	6.8
Mgmt-Quality	INIFAP-Quintana Roo	ic+it	6.1
	INIFAP-Sinaloa	ic+sc	3.4
	INIFAP-Tabasco	ic+it	6.2
Mgmt-Quality	INIFAP-Tabasco	ic+sc	3.3
	CtrIEEG-Veracruz	it	0.8
	INIFAP-Veracruz	sc	1.1
	UNAM-Veracruz	sc	0.9
	INIFAP-Yucatán	ic+it	6.1
Soil microbiol.	Fert. Mexicanos-DF	it	5.6
	INIFAP-Quintana Roo	it	1.4
Genetic Resources	INIFAP-Coahuila	it	1.1

In-country training

- Workshop on advances in pastures, and in pastures seed supply development. Cuernavaca, 1990; 15 days; 20 participants from Mexico (16 INIFAP, 1 Bco. Mexico), El Salvador (1 Ctr. Desarrollo Ganadero), Guatemala (1 ICTA), and Nicaragua (1 Dir. Gen. Tec. Agropecuaria).

Nicaragua

The NARI's (MIDINRA) pastures R&D capacity was integrally strengthened.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Soils-nutrition	MIDINRA-Managua	ic+it	7.7
	MIDINRA-Managua	ic+it	7.7
Agronomy	MIDINRA-Juigalpa	ic+it	3.4
	MIDINRA-Chontales	ic+it	3.4
Mgmt-Quality	MIDINRA-Matagalpa	ic+it	5.0
Seeds	MIDINRA-Managua	ic+it	4.3
	MIDINRA-Dran	ic+it	3.6
Genetic Resources	MIDINRA-Estelí	ic+it	4.3

Panama

Customized support was given to the NARI's (IDIAP) pastures research capacity, and seed supply was fostered.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Agronomy	IDIAP	ic+it	4.3
Mgmt-Quality	IDIAP	sc	1.1

In-country training

- Workshop on strategies for improving pastures seed supply in Panama. Santiago, 1987; 5 days; 17 participants from ANAGAN (3), Com. Nac. Semillas (3), MIDA (1), BDA (1), Univ.Panama (1), INA (1), IDIAP (5), and from Costa Rica (2 MAG).

Paraguay

A specific training need was met upon request.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Genetic Resources	SEAG	it	0.4

Peru

Peru was a focal point for humid tropics pastures research in the RIEPT during the reporting period. Training support strongly underpinned this role.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Soils-nutrition	FUNDEAGRO-Ucayali	ic+it	2.9
	INIAA-Ucayali	ic+it	6.1
	Min. Pres.-Ucayali	ic+it+M.Sc.	5.4+12.0
	Univ. La Molina-Lima	ic+it	4.1
	Univ. Ucayali	ic+it	5.4
Agronomy	INIAA-IVITA-Ucay.	ic+it	3.1
	---—	ic+it+M.Sc.	2.7+15.0
Pathology	IVITA-Ucayali	M.Sc.	16.2
Mgmt-Quality	Univ. La Molina-Lima	ic+it	4.3
	INIAA-Lambayeque	ic+sc	3.8
Mgmt-Quality+Seeds	INIAA-Ucayali	sc+it	1.1+0.5
Mgmt-Quality	IVITA-Ucayali	M.Sc.	22.6
	Proj. Pichis Palc.	sc	1.1
	Univ. La Selva-Ucay.	Ph.D.	23.6
Seeds	INIAA-Ucayali	it	1.3
Soil microbiol.	---Ucayali	it	0.9
Prod. System	Proj. Pichis Palc.	ic+it	4.1
	IVITA-Ucayali	it	1.9

In-country training

- Training workshop on pastures establishment, management and production in the Humid Tropics. Pucallpa, 1987; 6 days duration; 31 participants from IVITA (2), INIPA-CIPA (10), INIPA (1), INIPA-SENASE (1), Proyecto Especial Huallaga (2), Proyecto Especial Pichis Palcazu (3), Bco. Agr. Per (6), Ctro. Desarrollo Ganadero (1), Univ. Nac. Ucayali (1), CORDEMAD (1), Univ. La Molina (1), Est. Exp. El Porvenir (1), and Fondo Ganadero Los Cóndores (1).

- Workshop on pastures seeds for the Peruvian forest. Tarapoto, 1988; 5 days; 8 participants from Per: INIAA (3), Univ. Nac. Ucayali (1), IVITA (1), PRODEGAL (1), CORDESAM (1), IST (1); 2 from Ecuador (INIAP); 1 from Mexico (INIFAP); and 1 from Costa Rica (IICA-CIAT).

P.R.China

Training supported the consolidation of a tropical pastures research bridge-head.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Agronomy	Subtrop. Res. Inst.	it	11.4

Uganda

A specific training request from Serere Research Stn. was met.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Agronomy	Serere Research Stn	it	1.7

Uruguay

A specific training need of the National Research Center was satisfied.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Mgmt-Quality	Ctr. A. Boerger	it	1.0

Venezuela

Training supported the NARI's (FONAIAP) tropical pastures research to keep pace with the RIEPT's trend towards evaluating pastures under grazing (training in mgmt-quality; pathology) and in production systems (training in prod. systems; ecophysiology).

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Agronomy	FONAIAP-Anzoátegui	ic+it	3.4
Ecophysiology	FONAIAP-Monagas	ic+it	8.6
Pathology	FONAIAP-Monagas	it	5.8
Mgmt-Quality	FONAIAP-Guárico	ic+it	6.1
	FONAIAP-Trujillo	ic+sc	3.4
	CORPOZULIA-Zulia	it	1.1
Prod. System	FONAIAP-Guárico	ic+it	4.3
	FONAIAP-Anzoátegui	ic+it	3.1
	S. Agr. S. Clara-Monagas	ic+it	3.1

In-country training

- Seminar on methods for agronomic evaluation of tropical pastures. Maturin, Monagas, 1988; 5 days duration; 29 participants from FONAIAP (25), DIPROAGRO (1), MAC-FONAIAP (1), and Univ. Oriente (2).

Seeds

CIAT's Seed Unit developed NARDS human resources through training in pursuit of two institutional development objectives:

- To strengthen national seed supply systems in general; and
- To develop alternative seed supply systems for small-scale farmers crops not served by the established seed industry (typically beans and cassava).

Over time, emphasis shifted from the former to the latter.

Training at CIAT was offered in specialized courses, and in individualized on-the-job-training programs. In-country courses were organized and held with national institutions, with close collaboration of Seed Unit staff and CIAT training associates.

By these means human resources were enabled to:

- Meet research and management needs for basic seed production and distribution (training in basic seeds);
- Establish and manage quality control in the various links in seed multiplication and distribution chains (training in quality control);
- Give technical support to seed processing (training in seed technology) or to the full pre- and post-harvest sequence of seed production and processing (training in production & processing);
- Use and promote small-scale seed processing equipment (training in small-scale technology);
- Promote and technically support alternative seed systems based on small enterprises of organized groups of small-scale farmers (training in small seed enterprises; small seed systems; alternative seed supply); and
- Transfer the above knowledge and skills to other professionals through training (training in seed technology training).

Argentina

Support was given to the postgraduate seed program of the National University of Córdoba; to basic seed production in the Argentine NARI (INTA); and to the national seed certifying entity's training capacity.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Seed technology	Univ. Nac. Córdoba	it	1.5
Seed tech. training	SEAG	sc	1.3
Basic seeds	INTA-Córdoba	sc	1.1
Basic seeds	INTA-Misiones	sc	1.2
Seed technology+ small seed systems	Univ. Nac. Córdoba	it+sc	1.1+1.3

Belize

Support to promote small seed enterprises was provided to the national Federation of Agricultural Cooperatives, and to the Ministry of Agriculture.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Small seed enterprises	Fed. Agric. Coops	sc	0.4
	Min.Agr.	sc	0.4

Bolivia

Support was given to the promotion of small seed enterprises, particularly for bean seed production in Santa Cruz; to quality control in seed production; and to the national seed certifying service's training capacity.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Seed tech. training	Serv. Cert. Sem.	sc	1.6
Seed tech. training	Serv. Cert. Sem.	sc	1.3
Small seed systems	Unidad Sem. Papa	sc	1.3
Small scale technol.	Con. Reg. Sem. S. Cruz	it	0.8
Small scale technol.	ASOPROF	it	0.8

In-country training

- Course on quality control. Santa Cruz, 1987; 5 days; 50 participants.

Brazil

The national seed system was strengthened by training strategically selected professionals. The promotion of alternative seed systems for small farmers was vigorously pursued.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Seed tech. training	GO Secr.Agr.	sc	1.2
	DF Min.Agr.	sc	1.2
Small seed systems	RN EMPARN	sc	1.3
	MA SEPLAN	sc	1.3
	PE EMATER	sc	1.3
	CE EMBRAPA	sc	1.3
	CE Coop. Agr.	sc	1.3
Production & Processing	RS IRGA	sc	1.7
Basic seeds	GO EMGOPA	sc	1.6
Basic seeds	DF EMBRAPA	sc	1.2
Basic seeds	SC EMPASC	sc	1.0

In-country training

- Course on alternative seed supply for small farmers. Organized in collaboration with the Brazilian Small Farmers Support Program (PAPP). Fortaleza, Ceará, 1989; 11 days; 25 participants from seed coordination, agricultural research, and agricultural technology transfer institutions of 10 northeastern states: AL (CEPA, EPEAL); BA (EMATER, EPABA); CE (CEPA, EPACE, EMATERCE); MA (EMAPA, EMATER, SPE); MG (EMATER, EPAMIG); PB (EMATER, EMEPA, UT-PROJ-NE); PE (IPA, SEMEPE); PI (EMATER, EMBRAPA, SEPLAN, SEPLA/SPE/PAPP); RN (CEPA, EMATER, EMPARN); SE (EMPEASE).

Colombia

Training concentrated on (1) handing over seed technology training to national institutions (joint training courses increasingly Colombian-led; training of trainers; and on-going training of national leaders); and (2) the promotion of alternative seed supply systems by institutions working with small-scale farmers.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Basic seeds+seed tech. training+small seed syst.	ICA-Cundinamarca	sc(x3)	1.1+1.2+1.3
Seed technol.& systems	Univ. Nac-Valle	it	13.4
Seed tech. training+ Small seed systems	ICA-Antioquia	sc+sc	1.2+1.3
Seed tech. training	ICA-Valle	sc	1.2
Quality control	Com.Cafet.-Caldas	it	0.4
	ICA-Cundinamarca	it	1.3
Production & Processing	Com.Cafet.-Caldas	it	4.1
	CVC-Valle	it	2.9
	ICA-Cundinamarca	it	0.4
Small seed systems	ICA-Cundinamarca	sc	1.3
	FUNDAEC-Cauca	sc	1.3
	ICA-Santander	sc	1.3
Basic seeds	PROCAMPO-Valle	sc	1.1
	ICA-Valle	sc	1.1
Small scale technol.	Fundación Carvajal	sc	0.9

In-country training

- Course on seed processing. Held at CIAT with ACOSEMILLAS and ICA; 1987; 5 days; 30 participants.
- Course on quality control. Held at CIAT with ASCOES and ICA; 1989; 5 days; 28 participants.
- Course on bean seed supply systems for small farmers. Held at CIAT with ICA; 1989; 5 days; 18 participants from Federación de Cafeteros (8), Caja Agraria (3), ICA (4), CARGILL (1), Secr.Agr.Antioquia (1), and CRESEMILLAS (1).
- Course on production and distribution of cassava planting material. Held at CIAT with ICA; 1990; 5 days; 26 participants from ICA (16), Caja Agraria (6), SENA (2), PNR-CIAT (1), COOAGROARAUCA (1).

Costa Rica

The public sector seed system was reinforced by training strategically selected professionals.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Basic seeds	MAG	sc	1.0
Production & Processing	CNP	it	3.9
Small seed systems	Ofic. Nac. Semillas	sc	1.3
Seed tech. training	CNP	sc	1.3

Cuba

Basic seed and rice seed production, and the national seed training capacity were supported.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Basic seeds	Min.Agr.	sc	1.2
Production & Processing	Inst. Inv. Arroz	it	2.0
Seed tech. training	Serv. Insp. Cert. Sem.	sc	1.3
Seed tech. training	Min.Agr.	sc	1.3

Dominican Republic

The foundations of national seed production were strengthened (basic seeds; quality control; production and processing).

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Basic seeds	Ctr. Inv. Arroc.	sc+it	1.7
Basic seeds	SEA	sc+it	2.6
Quality control	SEA	it	0.9
Quality control	SEA	it	0.9
Production & Processing	CRIN	sc	1.2
Production & Processing	CENATA	it	0.5
Small seed systems	SEA	sc	1.3

Ecuador

Training concentrated on (1) the strengthening of national basic seed production; (2) the support of alternative bean seed production (training in processing; production and processing; small seed systems) (see also BEANS); and (3) the country-wide diffusion of alternative seed supply systems (training in alternative systems, and in seed technology training).

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Basic seeds	INIAP-Guayas	sc	1.1
	INIAP-Los Ríos	sc+it	1.6
	INIAP-Pichincha	sc	1.1
Processing	Bco. Central del Ecuador -Loja	it	0.6
Processing	MAG-Loja	it	0.6
Processing	PREDESUR-Loja	it	0.6
Processing+ Alternative seed supply	MAG-Ibarra	it+sc	0.6+0.9
Production & Processing	INIAP-Quito	it	1.1
Quality control	MAG-Pichincha	it	2.0
Small seed systems	INIAP-Chimborazo	sc	1.3
	MAG-Carchi	sc	1.3
	INIAP-Guayas	sc	1.3
	NIAP-Pichincha	sc	1.3
Alternative seed supply	MAG-Azuay	sc	0.9
	MAG-Azuay	sc	0.9
	MAG-Bolívar	sc	0.9
	MAG-Cañar	sc	0.9
	MAG-Carchi	sc	0.9
	MAG-Chimborazo	sc	0.9
	MAG-El Oro	sc	0.9
	MAG-Esmeraldas	sc	0.9
	FUNDAGRO-Guayas	sc	0.9
	MAG-Guayas	sc	0.9
	MAG-Guayas	sc	0.9
	MAG-Guayas	sc	0.9
	MAG-Loja	sc	0.9
	MAG-Manabí	sc	0.9
	MAG-Manabí	sc	0.9
	MAG-Manabí	sc	0.9
	MAG-Pichincha	sc	0.9
	MAG-Pichincha	sc	0.9
	MAG-P. Central	sc	0.9

Professionals trained In	Institution	Modality	Length (months)
Alternative seed supply	MAG-Tunguragua	sc	0.9
	MAG-Latacunga	sc	0.9
Seed tech. training	MAG-Guayas	sc	1.2
	INIAP-Manabí	sc	1.2
	MAG-Pichincha	sc	1.2
	MAG-Pichincha	sc	1.2

El Salvador

The full cadre of seed specialists of the NARI (CENTA) was trained in two sets of individualized programs. Seed processing plants personnel was trained in-country.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Production & Processing	CENTA	it	3.5
	CENTA	it	3.5
	CENTA	it	3.5
	CENTA	it	3.5
	CENTA	it	3.5
	CENTA	it	4.0
	CENTA	it	4.0
	CENTA	it	4.0
	CENTA	it	4.0
	CENTA	it	4.0
Small seed systems	CENTA	sc	1.3

In-country training

- Course on seed processing plant management. San Salvador, 1987; 12 days; 24 participants.

Guatemala

Basic seed production by the NARI (ICTA) was strengthened. Strong support was given to DIGESA's developing alternative seed supply systems throughout the country, particularly for bean seed production.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Basic seeds	ICTA	sc	1.2
	ICTA	sc	1.2
Production & Processing	DIGESA	it	3.9
	DIGESA	it	3.9
Small seed systems	DIGESA	sc	1.3
	DIGESA	sc	1.3
	DIGESA	sc+it	1.6
Processing	DIGESA	sc	0.6
	DIGESA	sc	0.6
	DIGESA	sc	0.6
Seed tech. training	DIGESA	sc	1.2
	DIGESA	sc	1.2

In-country training

- Course on artisanal bean seed production. Jutiapa, 1987; 5 days; 31 participants.

Guyana

The promotion of small seed enterprises by the national agricultural research institute was supported.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Small seed enterprises	Ntl. Agr. Res. Inst.	sc	0.4
	Ntl. Agr. Res. Inst.	sc	0.4

Haiti

The development of small seed enterprises by NGOs was supported.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Small seed enterprises	ORE	sc	0.4
Small seed enterprises	ORE	sc	0.4
Small seed systems	ODVA	sc	1.3

Honduras

The NARI's (SRN) capacity to support seed supply development and functioning was strengthened throughout the country.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Basic seeds	SRN-Intibuca	sc	1.1
Production & Processing	SRN-Cortés	it	1.8
Processing	SRN-Olancho	sc	0.6
	SRN-Olancho	sc	0.6
	SRN-El Paraíso	sc	0.6
	SRN-El Paraíso	sc	0.6
Small seed systems	SRN-Tegucigalpa	sc	1.3
	SRN-Choluteca	sc	1.3

Jamaica

A request for training in seed quality control was met.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Quality control	CARDI	it	1.0

Mexico

The national capacity of basic seed production, seed multiplication, and seed systems promotion was strengthened.

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Basic seeds	Univ. A. Narro-Coahuila	sc	1.1
	Colegio Postgrad.-Mexico	sc	1.1
	Prod. Nac. Sem.-Jalisco	sc	1.1
	Univ. Chapingo-Jalisco	sc	1.1
	INIFAP-Tamaulipas	sc	1.1
Basic seeds	Northrup King	sc	1.1
Production & Processing	INIFAP-Zacatecas	it+sc	4.6
	INIFAP-Chiapas	it+sc	4.6
Small seed systems	INIFAP-Sinaloa	sc	1.3

Professionals trained in	Institution	Modality	Length (months)
Seed tech. training	Prod. Nac. Sem.-DF	sc	1.4
	Prod. Nac. Sem.-DF	sc	1.4

Mozambique

A seed technologist from an NGO received customized training.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Production & Processing	Conselho Cristao	it	2.2

Nicaragua

The national seed supply capacity was strengthened (see also BEANS).

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Production & Processing	MIDINRA-MAG	it+sc	2.4+0.6
	CNIGB	sc+it	5.1
	DGTA	sc+it	4.8
Small seed systems+ processing	MIDINRA-MAG	sc+sc	1.3+0.6

Panama

Panama developed a strong public sector seed team with ample technical assistance from CIAT (see also BEANS).

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Seed technol.& systems	Com. Nac. Semillas	M.Sc.	10.4
Basic seeds	Com. Nac. Semillas	sc	1.8
Small seed systems	Com. Nac. Semillas	sc	1.5
Production	Com. Nac. Semillas	sc	0.1
Processing	Com. Nac. Semillas	sc	0.6
	MIDA	sc	0.6
	MIDA	sc	0.6
	IDIAP	sc	0.6

Professionals trained in	Institution	Modality	Length (months)
Production & Processing	Com. Nac. Semillas	sc	1.3
Seed tech. training	Com. Nac. Semillas	sc	1.3
	Com. Nac. Semillas	sc	1.3

Paraguay

A trainer was trained for the national seed service.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Seed tech. training	Serv. Nac. Sem.	sc	1.3

Peru

The national capacity for basic seed production and further seed multiplication was firmly supported. Alternative seed systems for small-scale farmers were strongly promoted (see also BEANS).

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Basic seeds	INIAA-San Martín	sc	1.1
	INIAA-Ica	sc	1.1
	INIAA-Lambayeque	sc	1.1
Basic seeds	INIAA-Lima	sc	1.1
	INIAA-Cajamarca	sc+it	1.8
Processing	Fom. Vida-Ancash	it	0.6
	Ctr. Est. Desarr.	it	0.6
	Min.Agr.-Lambayeque	it	0.6
	INIAA-Cajamarca	it	0.2
	Com. Deptl. Sem.-S. Martín	it	0.8
	CORDESA-Arequipa	it	0.8
	Empr. Com. Alim.-Lambay.	it	10.2
Production & Processing	INIAA-Arequipa	sc	1.3
	INIAA-Lambayeque	sc	1.3
Quality control	Empr. Com. Arroz-Amazonas	it	2.0
	Empr. Com. Arroz-Arequipa	it	2.0

Professionals trained in	Institution	Modality	Length (months)
Small seed systems	INIAA-Ica	sc	1.3
	INIAA-Ayacucho	sc	1.3
	INIAA-Cuzco	sc	1.3
	INIAA-Lambayeque	sc	1.3
Seed tech. training	INIAA-Lima	sc	1.3
	CNPA-Lima sc		1.3
Seed tech. training+ quality control	Empr. Com. Arroz-Lambayeque	sc+it	1.3+2.0

Suriname

A capacity to develop small seed enterprises was established in the Ministry of Agriculture.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Small seed enterprises	Min.Agr.	sc	0.4
Small seed enterprises	Min.Agr.	sc	0.4

Trinidad and Tobago

Seed production and processing, and the development of small seed enterprises were supported.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Production & Processing	Min.Agr.	it	0.6
	CARONI Res.Stn	it	0.6
Small seed enterprises	CARONI Res.Stn	sc	0.4
	Ctrl Exp. Stn	sc	0.4

Uruguay

The national seed authority's capacity to assist basic seed production was strengthened.

Training at CIAT

Professionals trained in	Institution	Modality	Length (months)
Basic seeds	Dir. Granos	sc	1.1

Private and public sector seed production and processing were strengthened.

Venezuela

Training at CIAT

Professionals trained In	Institution	Modality	Length (months)
Basic seeds	Des. Agr. Naranjal	sc	1.1
Production & Processing	FONAIAP-Portuguesa	sc	1.3
	APROSEM-Portuguesa	sc	1.3
	APROSELLAC-Guarico	sc	1.3
Small seed systems	FONAIAP-Guarico	sc	1.3

Biotechnology

Training in biotechnological methods was provided in CIAT's Biotechnology Research Unit to NARDS scientists from Latin America and some other developing countries.

In specialized courses, and by individualized on-the-job training, national scientists' capacity was enhanced in:

- Cassava tissue culture for in-vitro conservation and rapid propagation of planting material;
- Rice tissue (anther) culture for increasing breeding efficiency;
- Beans and Tropical Pastures tissue culture and molecular biology for genetic transformation;
- The use of biochemical markers for germplasm characterization; and
- Molecular genetics for strategic germplasm development research.

Argentina

Professionals trained in	Institution	Modality	Length (months)
Cassava			
Tissue culture	Univ. Noreste	sc	0.6
	Private enterpr.	sc	0.4
Rice			
Tissue culture	Univ. Nordeste	it	1.0
Univ. Nordeste	it	3.9	
Tissue culture & molecular genetics	Univ. Córdoba	it	3.9

Bolivia

Professionals trained in	Institution	Modality	Length (months)
Cassava			
Tissue culture	Univ. G. R. Moreno	sc	0.7

Brazil

Professionals trained in	Institution	Modality	Length (months)
Beans			
Molecular genetics	DF EMBRAPA	it	1.1
Cassava			
Tissue culture	PE IPA	sc	0.6
	DF EMBRAPA	it	0.7
	BA EMBRAPA	sc	0.6
Tissue culture & biochem. markers	BA EMBRAPA	it+it	2.6+1.1
Rice			
Tissue culture	RS EMBRAPA	it	2.7

Bulgaria

Professionals trained in	Institution	Modality	Length (months)
Beans			
Molecular genetics	IIPR K. Molkov	sc	0.4
Tissue culture	Wheat & Sunfl. Inst.	it	4.0

Chile

Professionals trained in	Institution	Modality	Length (months)
Rice			
Tissue culture	Univ. Talca	sc	0.4

Colombia

Professionals trained in	Institution	Modality	Length (months)
Beans			
Biochem. markers	ICA-Cundinamarca	it	1.8
	ICA-Cundinamarca	sc	0.6
Biochem. markers Private enterpr.	Antioquia	sc	0.6
Biochem. markers	Univ. Nac. Valle	it	1.3
Biochem. markers & tissue culture	------	Ph.D.	36.6
Molecular biology	FEDECAFE-Cund.	it	1.1
	Univ. Nac. Valle	sc	0.4
Tissue culture	FEDECAFE-Cund.	sc	0.4
	ICA-Antioquia	it	0.4
	ICA-Cundinamarca	it	1.0
	Private enterpr. Antioquia	sc	0.4
	Univ. Nac. Valle	it	1.7
	------	Ph.D.	8.2
Cassava			
Biochem. markers & tissue culture	ICA-Valle	t+sc	1.9+0.6
	Univ. Quindío	it	1.0
Molecular genetics	Ctr. Int. Física	it	1.4
Tissue culture	CENICAFE-Caldas	sc	0.4
	CENICAFE-Caldas	sc	0.4
	ICA-Valle	sc	0.6
	Private enterpr. Cund.	it	2.9
	Private enterpr. Cund.	sc	0.6
	Univ. Nac. Valle	sc	0.6

Professionals trained in	Institution	Modality	Length (months)
Rice			
Biochem. markers	ICA-Tolima	it	1.4
Tissue culture	Univ. Javeriana	sc	0.4
Tropical Pastures			
Biochem. markers	ICA-Valle	it	0.4
Tissue culture	ICA-Cundinamarca	sc	0.4
	Univ. Nac. Antioquia	sc	0.6

Costa Rica

Professionals trained in	Institution	Modality	Length (months)
Beans			
Biochem. markers	CATIE	it	0.8
Molecular genetics	Univ. Costa Rica	it	0.4
Cassava			
Tissue culture	CATIE	sc	0.4
	Min.Agr.	sc	0.6
	CATIE	sc	0.5

Cuba

Professionals trained in	Institution	Modality	Length (months)
Cassava			
Tissue culture	C. Ing. Gen .Biotec.	sc	0.4
	Min.Agr.	ic+it	4.8
	INIVIT	sc+it	0.7+1.5

Dominican Republic

Professionals trained in	Institution	Modality	Length (months)
Tissue culture	Secr.Agr.	it	2.0

Ecuador

Professionals trained in	Institution	Modality	Length (months)
Cassava			
Tissue culture	INIAP-Portoviejo	it	2.9
	Univ. Central	sc	0.4

Guatemala

Professionals trained in	Institution	Modality	Length (months)
Beans			
Biochem. markers	Univ. V. Guatemala	sc	0.4

Guyana

Professionals trained in	Institution	Modality	Length (months)
Cassava			
Tissue culture	CARDI	it	0.9

Iran

Professionals trained in	Institution	Modality	Length (months)
Beans			
Biochem. markers	Gilan Univ.	sc	0.4

Mexico

Professionals trained in	Institution	Modality	Length (months)
Beans			
Biochem. markers	Univ. A. Chapingo	it	2.9
Biochem. markers & tissue culture	Colegio Postgrad.	sc	0.6
Tissue culture	Ctr. Inv. Yucatán	sc	0.4
	Colegio Postgrad.	sc	0.4
	Colegio Postgrad.	it	1.9
	INIFAP-Morelos	sc	0.8
	INIFAP-Tabasco	sc	0.6

Panama

Professionals trained in	Institution	Modality	Length (months)
Cassava			
Tissue culture	IDIAP	sc	0.7
	IDIAP	sc	1.3

Paraguay

Professionals trained in	Institution	Modality	Length (months)
Cassava			
Tissue culture	Inst. Agron. Nac.	sc	0.6
	Univ. Nac.	it	1.7

P.R.China

Professionals trained in	Institution	Modality	Length (months)
Cassava			
Tissue culture	Guangxi Subtrop. Crops Res. Inst.	it	3.3

Peru

Professionals trained in	Institution	Modality	Length (months)
Cassava			
Biochem. markers & tissue culture	L. Gen. Res. Biotec.	it	1.6
Molecular biology	CIP	sc	0.4
	CIP	it	3.3
Tissue culture	Univ. P. R. Gallo	sc	0.3
	Univ. Tumbes	sc	0.4
Rice			
Tissue culture	Univ. M. San Marcos	it	1.0
	Univ. M. San Marcos	it	1.2

Venezuela

Professionals trained in	Institution	Modality	Length (months)
Beans			
Biochem. markers & molecular biology	Univ. Central	sc+it	0.4+1.2
Cassava			
Tissue culture	Ctr. Nac. I. Agrop.	it	1.9
	FONAIAP	it	1.8
	I. I. Est Avanz.	sc	0.4
	I. I. Est Avanz.	sc	0.6
	Univ. Oriente	sc	0.9

Evaluation

There are several dimensions of training that need to be evaluated. Some of them, such as the relevance and novelty of subject matter contents, the quality of the training process, and the learning performance of trainees, can be appraised at the time of training. For this, CIAT has in place a set of standard evaluation mechanisms. Others, such as the effects on trainees' job performance and career development, can only be assessed some time after training. For this, CIAT has performed a mail survey of alumni trained during the years 1987-1991. The training quality control mechanisms will be briefly described next. Thereafter the results of the mail survey will be presented.

Quality control

Until 1988 group training events in each commodity program were evaluated with different instruments and following varying criteria.

No formal evaluation was applied to individualized training, but quality control, through formal and informal interviewing of trainees, was exerted by the training and communications support program leader, the registrar, and the training associates.

In 1989 a standardized evaluation scheme was put in place for all CIAT group training (in-house and in-country). In brief, the scheme has three main components:

1. Trainees evaluate the training process as it unfolds. They assess:
   - The relevancy and applicability of subject matter content;
   - Educational (andragogic) quality;
   - Instructors' communication skills;
   - Training organization and logistics; and the
   - Care of trainees' well-being.

2. The trainees' learning is evaluated through instruments administered by training associates.
3. A final evaluation questionnaire on the training processes in completed by trainees the day before an event closes. The data are immediately tabulated, and the results are presented to the trainees in a group session on the following day. There, face to face feedback is sought, particularly on items which may have received a sub-optimal rating.

High standards of CIAT's training have thus been documented.

Individualized training continues being monitored as before.

Alumni's rating of training at CIAT

A questionnaire was mailed in mid 1992 to all CIAT alumni from Latin America and the Caribbean who had been trained in the Center's four commodity programs during 1987-1991.

The survey intended to assess the effect of training at CIAT upon alumni's job performance and career development. It also aimed at appraising the resources at their disposal. And finally, it inquired about the degree of alumni's contact with CIAT scientists.

Two hundred and fifty-nine questionnaires were returned. The distribution of the respondents by country of origin and year of training are presented in Table 9. The overall rate of reply was 39.2% (259/661). The response rate by Programs was 47.7% for Beans (94/197), 33.8% for Cassava (47/139), 35.5% for Rice (50/141), and 37.0% for Tropical Pastures (68/184).

Table 9. Distribution of respondents by country and by year of training

	Respondent	
Country	n	%
Brazil	69	26.6
Colombia	47	18.1
Costa Rica	20	7.7
Cuba	9	3.5
Dominican Republic	2	0.8
Ecuador	11	4.2
El Salvador	13	5.0
Guatemala	10	3.9
Haiti	2	0.8
Honduras	13	5.0
Mexico	30	11.6
Nicaragua	10	3.9

	Respondent	
Country	**n**	**%**
Panama	11	4.2
Peru	11	4.2
Trinidad Tobago	1	0.4
Year of training		
1987	62	23.9
1988	52	20.1
1989	42	16.2
1990	51	19.7
1991	52	20.1

Effect upon job performance

Alumni were requested to rate the effect of training at CIAT upon their

1. Overall job performance;
2. Capacity to relate their work to farmers' needs;
3. Capacity to innovate in their jobs;
4. Efficiency in discharging their responsibilities;
5. Leadership capacity; and their
6. Capacity to train their support staff.

They were also requested to rate the effect of their training upon

7. The performance of the team of which they are part; and upon
8. The capacity of that team to relate its work to farmers needs.

The rating scale encompassed nine integers, from negative (-2) to positive (+6). Table 10 shows the summarized results.

Table 10. Frequency distribution of scores evaluating the effect of training at CIAT upon trainees' job performance

Nine possible scores, from -2 to 6. **Total respondents = 259**

Effect on	n	% of replies in scores			
		6	5 to 6	4 to 6	3 to 6
Overall job performance	251	25.9	64.1	89.6	97.2
Capacity to relate work to farmers needs	241	24.9	60.2	80.9	93.4
Capacity to innovate	246	22.8	63.4	88.6	96.7
Efficiency	245	26.9	63.7	85.7	94.7
Leadership	235	14.5	48.9	80.0	93.6
Capacity to train support staff	240	26.3	62.1	88.8	95.8
Performance of trainee's team	229	15.3	49.8	80.3	93.4
Capacity of trainee's team to relate work to farmers needs	215	14.9	50.2	77.2	90.2

There were no negative ratings, and hardly any in the low positive scale. Approximately one of every four alumni assigned maximum score to items 1 to 4, and 6; about two out of every three alumni rated these items in the two top scores; and more than four out of five ranked them in the three top score categories. This indicates that alumni recognize training at CIAT as having improved their job performance.

Items 5, 7 and 8 refer to alumni's capacity to affect peers, be it by exerting leadership or through other means of affecting the team of which they are part. Training was not designed to specifically modify these traits. However, it was perceived as also having been beneficial in this domain, although less strongly so than for the more specific job performance parameters. About 15% of alumni gave maximum score to the effect on leadership capacity and team performance; about half rated them in the two top score categories; and three of every four to four out of five ranked them in the three top scores.

There was little variation in responses among alumni from CIAT's various commodity programs, except what seems to be a slight edge of the Beans and Cassava over the Rice and Tropical Pastures Programs (illustrated in Table 11). In the former, a slightly higher proportion of alumni gave top score to the effect of CIAT training on their job performance, while in the latter there was a larger proportion in the second score level. Whether this reflects a difference in training or in the trainees (varying expectations) is unknown.

No variation worth mentioning was detected among the responses from alumni trained in different years.

Table 11. Frequency distribution of scores evaluating the effect of training at CIAT upon trainees' overall job performance; responses by commodity program

Nine possible scores from -2 to +6

Persons trained in	n	% of replies in scores			
		6	5 to 6	4 to 6	3 to 6
Beans	92	31.5	65.2	91.3	96.7
Cassava	46	34.8	71.7	91.3	95.7
Rice	46	19.6	63.0	84.8	97.8
Tropical Pastures	67	16.4	58.2	89.6	98.5
All Programs	251	25.9	64.1	89.6	97.2

Effect upon career development

Alumni were requested to rate the effect of training at CIAT according to whether it had

1. Increased their prestige among colleagues;
2. Increased their access to resources;
3. Contributed to them being promoted;
4. Facilitated their participation in international activities;
5. Contributed to their being granted awards or mentions.

Scores were in integers on a scale from zero (no effect) to six (strong effect).

Results are summarized in Table 12.

Table 12. Frequency distribution of scores evaluating the effect of training at CIAT upon trainees' career development

Seven possible scores from 0 (no effect) to 6 (strong positive effect)
Total respondents = 259

Effect on	n	% of replies in scores			
		6	5 to 6	4 to 6	3 to 6
Prestige among colleagues	247	25.9	62.8	79.4	91.9
Increased access to resources	237	14.8	40.5	62.4	76.8
Promotion	228	10.5	29.4	46.5	61.8
Access to international activities	228	15.8	36.8	52.6	65.8
Granting of awards and mentions	209	6.3	18.2	37.8	50.7

Alumni acknowledged that training at CIAT had

- Increased their prestige among colleagues (two out of three ranked this effect in the two top scores);
- Influenced their access to resources (40% responses in the two top scores; 62% in top three scores);
- Facilitated their participation in international activities (37% responses in the two top scores; 53% in top three scores); and that
- There had been an effect upon their being promoted, albeit less marked than for the previous items.

Given that in any scientific community awards and mentions go to only a fraction of its members, it is interesting to note that 6 to 18% of 209 respondents acknowledged that training at CIAT had a strong effect on their being granted distinctions (scores 6 and 5).

It may be concluded that among respondents to the questionnaire, training at CIAT had a favorable influence upon their career development.

Resources at alumni's disposal

Alumni recognized that training at CIAT enabled them for a better job performance. Resources at their disposal, if plentiful, may allow full expression of this potential; whereas if they are scarce they may dampen its realization. Alumni were requested to rate their resources (human, material, and financial) on a scale of nine integers from 1 (extreme dearth) to 9 (plentifulness). Results are summarized in Table 13.

Clearly, alumni are burdened by a scarcity of resources. Less than one out of every five perceives resources as plentiful or nearly so, whereas one of every three perceives them as limiting to extremely limiting. In this context of poverty, financial resources appear to be the scarcest; material resources (infrastructure and equipment) are slightly less scarce; while availability of human resources is intermediate between the other two. These results confirm common knowledge about NARDS suffering from lack of resources, particularly so of operational funds.

Table 13. Frequency distribution of scores assigned by CIAT alumni to the availability of resources for discharging their job responsibilities

Nine possible scores from 1 (extreme dearth) to 9 (plentifulness)
Total respondents = 259

Resources	n	% of replies in scores		
		1 to 3	4 to 6	7 to 9
Human	239	33.9	47.8	18.4
Material	249	30.9	46.6	22.5
Financial	242	43.8	42.2	14.1

Contact with CIAT scientists

To what extent do alumni stay in contact with CIAT scientists? Responses to the questionnaire (Table 14) indicate that a few have lost contact completely, whereas a third of them keep close contact, while between one third and half maintain occasional contacts. Whether these results are extrapolable to non-respondents is unknown.

Contact through correspondence (Table 15) varies between 11%, of respondents with occasional contact, and 44%, among those with close contact with CIAT scientists.

Regular receipt of CIAT publications (Table 15) is acknowledged by 70% of alumni who stay in close contact with CIAT scientists, 52% of those with occasional contact, and 33% of those who lost direct contact. These figures appear to be low. They may reflect some of the difficulties with CIAT's mailing list that are being addressed by the ongoing conversion into a distribution data-base (see companion report on the Information System for Institutional Relations and Development).

Table 14. Degree of alumni's contact with CIAT scientists since training

	Alumni trained in			
Degree of contact	Beans	Cassava	Rice	Tropical Pastures
Close*	38.3	34.0	22.0	32.4
Occasional**	45.7	51.1	34.4	45.6
None	7.5	4.3	30.0	13.2
Not stated	8.5	10.6	14.0	8.8
n	94	47	50	68

* Have joint research projects with, or are regularly visited by, CIAT scientists.

** Maintain sporadic contacts with CIAT scientists.

Table 15. CIAT alumni's correspondence with CIAT scientist, and reception of CIAT publications, according to degree of contact with CIAT scientist

Degree of contact with CIAT scientists	Corresponds with CIAT scientists (%)	Receives CIAT publications (%)
Close*	43.5	70.6
Occasional**	11.3	52.2
None		33.3
Not stated	23.1	65.4

* Have joint research projects with, or are regularly visited by, CIAT scientists

** Maintain sporadic contacts with CIAT scientists

Linking Researchers from Industrialized Countries to International Research

Training at CIAT gives young agricultural scientists from industrialized countries an opportunity to obtain first hand experience in international agricultural research.

It may or may not lead to a formal higher degree such as M.Sc. or Ph.D. When it does not, an individualized on-the-job training program is prepared by the trainee and a CIAT senior scientist advisor. In M.Sc. and Ph.D. programs the students come to CIAT following recommendation from a recognized university or research institute. Their admission is contingent upon their field of interest fitting into CIAT's research priorities.

The direct costs of training researchers from industrialized countries are covered by the candidates' institutions or by others. This avoids competition for scarce core resources with candidates from developing countries. Research costs are usually covered by CIAT's research programs.

Thirty-seven researchers from 11 industrialized countries completed training programs at CIAT between 1987 and 1991 (Table 16). Fifteen participated in on-the-job training, four worked for their M.Sc. degrees and 18 completed Ph.D. research programs.

Table 16. Training at CIAT of professionals from industrialized countries. Number of trainees 1987-1991.

Country of Origin	Type of training			
	On-The Job	M.Sc.	Ph.D.	TOTAL
Belgium	2			2
Canada		1	3	4
Denmark		2		2
France			1	1
Germany	4		3	7
Italy	1		1	2
Netherlands	2			2
Spain	3			3
Switzerland			2	2
United Kingdom	2		2	4
U.S.A.	1	1	6	8
Total	**15**	**4**	**18**	**37**
Women, %	53.3	100.0	38.9	51.4

Introducing Colombian Agricultural Science Students to Research

The presentation of a research thesis is a partial requisite for obtaining an engineering degree, such as agricultural engineer (the basic agricultural university degree), in Colombia.

CIAT offers agricultural engineering aspirants the opportunity of doing their thesis research work at the Center, under joint supervision of a University and a CIAT scientist.

Hundred-eighty-nine such research projects were implemented over the period 1987-1991, covering the whole spectrum of CIAT's research activities (Table 17). Many a student thereafter took up research as a career; and it has not been rare for some of them to join CIAT as junior researchers.

Table 10. Number of undergraduate research thesis of Colombian students in agricultural and related sciences done at CIAT 1987-1991. Gender distribution among undergraduates.

Subject	Number of Thesis	Women %
Economics - Social Sciences	5	25.0
Biotechnology	23	52.2
Entomology	25	
Pathology	23	
Virology	1	
Subtotal	49	53.1
Physiology	13	
Grain Quality	7	
Soil Microbiology	3	
Genetic Resources	9	
Subtotal	32	71.9
Breeding	22	50.0
Agronomy-Agroecology/Stn. Op.	30	
Soils-Nutrition	4	
Pastures Management	6	
Cassava Utilization/Processing	12	
Pastures Systems	5	
Subtotal	47	36.2
Seeds	11	18.2
Total	**189**	**48.7**

Draft

Development of Subregional Capacities for Training in Commodity Production Problem Solving

December, 1992

Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

Gender Distribution Among CIAT Trainees

Gender Distribution Among CIAT Trainees from Developing Countries

Variation among disciplinary fields

Gender distribution varied widely among the trainees' disciplinary fields (Table 18).

The proportion of women was highest among trainees in biotechnology and in social sciences. Among the former, half of the trainees were women; in the social sciences 39.6% were women.

Disciplinary fields that imply a substantial amount of laboratory work ranked next in terms of a high proportion of women trainees. In the crop protection disciplines 27.1% of trainees were women. In a group integrated by physiology, grain quality research, soil microbiology, and genetic resources, 33.9% were women trainees.

Among trainees in plant breeding 18.3% were women.

In a group of disciplines in which more field than laboratory work is common—agronomy-OFR; soils-nutrition; pastures management; pastures systems; cassava utilization/processing; cassava projects—9.0% of trainees were women. Seeds, with 10.1% women, ranked very close to this group.

Finally, the proportion of women was lowest among trainees in the introductory—non-specialized, field-oriented—commodity research and production courses (7.1%).

The differences among disciplinary fields are marked. Whether they are due to gender preferences, to discriminatory recruiting in the NARDS (or earlier in student or professional life), or to a combination of them, cannot be established without research. However, CIAT's selection of training candidates is not felt to be a source of variation in gender distribution as the selection criteria are gender-neutral.

Table 18. Gender distribution by discipline or field of interest among professionals from developing countries trained at CIAT. 1987-1991.

	n		
	Total	**Women**	**Women %**
Economics-Social Sciences	40	16	
Biometrics	6	2	
Information Documentation	2	1	
Subtotal	48	19	39.6
Biotechnology	82	41	50.0
Entomology	65	16	
Pathology	57	13	
Virology	7	6	
Subtotal	129	35	27.1
Physiology	13	2	
Grain Quality	3	3	
Soil-Microbiology	27	10	
Genetic Resources	16	5	
Subtotal	59	20	33.9
Breeding	109	20	18.3
Agronomy-OFR	203	20	
Soils-Nutrition	20	1	
Pastures Management	52	6	
Pastures Systems	21	0	
Cassava Projects	15	1	
Utilization/Processing	32	3	
Subtotal	343	31	9.0
Seeds	227	23	10.1
Research-Production (non/specialized)	70	5	7.1
Total	**1067**	**194**	**18.2**

Gender Distribution Among Colombian Agricultural Sciences Student-Trainees

It is interesting to compare the gender distribution among Colombian agricultural sciences thesis-students (Table 17) with the distribution among researchers from developing countries (Table 18). Both groups have been trained in the same CIAT programs and disciplinary sections.

Among undergraduates the unweighted gender distribution was close to a 1:1 ratio; among researchers 18.2% were women. The disciplinary gender distribution differences were much less among students than those described above for NARDS researchers. However, the tendency towards lesser participation of women in more field-oriented disciplines and in seeds, found among researchers, was still apparent among students, albeit at a higher absolute level of women participation. In the remaining disciplines there actually were slightly more women than men (73 women—55.7%—among 131 students).

The gender-neutrality of CIAT's selection of trainees could be tested among a subgroup of student trainees coming from the Faculty of Agriculture at Palmira. In the mother population (which was unknown at the time of selecting students) 37.6% of 234 students were female; among 96 students selected by CIAT 37.5% were female. The result sustains the hypothesis of gender-neutral selection.

Gender Distribution Among Trainees from Industrialized Countries

Slightly more than half the trainees from developed countries (51.4%) were women (Table 16).

Acronyms and abbreviations

ACARESC = Associação de Crédito e Assistencia Técnica Rural do Estado de Santa Catarina (BRAZIL)

ACOSEMILLAS =Asociación Colombiana de Semillas (COLOMBIA)

AC = Acre State (BRAZIL)

Admin. Serv. Agr. = Administración de Servicios Agrícolas (PUERTO RICO)

Agr. Coll. No. 3 = Agricultural College (VIETNAM)

AGRIPAC = (ECUADOR) Full name unknown

Agronomy-seed prod. = Agronomy-seed production

Agr. Res. Ctr. = Agricultural Research Center (MALAYSIA)

Agr. Res. Stn. = Agricultural Research Station (SOMALIA)

AL = Alagoas State (BRAZIL)

AM = Amazonas State (BRAZIL)

ANAGAN = Asociación Nacional de Ganaderos (PANAMA)

APROSCELLO = Asociación de Productores de Semilla Certificada de los Llanos Occidentales (VENEZUELA)

APROSELLAC = Asociación de Productores de Semillas de los Llanos Centrales (VENEZUELA)

APROSEM = Asociación de Productores de Semillas (VENEZUELA)

APROSIGUA = Asociación de Productores del Sistema Guárico, Venezuela (VENEZUELA)

ASCOES = Asociación Colombiana de Especialistas en Semillas (COLOMBIA)

ASOPROF = Asociación de Productores de Semilla de Fríjol (BOLIVIA)

ASPRO-SINAHI = Asociación de Productores de Harina de Yuca-SINAHI (BOLIVIA)

BA = Bahia State (BRAZIL)

Bco. Agr. Perú = Banco Agrícola del Perú (PERU)

Bco. Central del Ecuador = Banco Central del Ecuador (ECUADOR)

Bco. México = Banco de México (MEXICO)

Bco. Nac. Desarrollo = Banco Nacional de Desarrollo (NICARAGUA)

BDA = Banco de Desarrollo Agropecuario (PANAMA)

Biochm. markers = Biochemical markers

BNF = Banco Nacional de Fomento (ECUADOR)

Cald. = Caldas Department (COLOMBIA)

C. Araracuara = Corporación Araracuara (COLOMBIA)

CARDI = Caribbean Agricultural Research and Development Institute (ANTIGUA, BARBADOS, JAMAICA, GUYANA)

CARONI Res. Stn. = Caroni Research Station (TRINIDAD & TOBAGO)

Cassava projects+Prod. = Cassava projects+Production

CATIE = Centro Agronómico Tropical de Investigación y Enseñanza (COSTA RICA)

C. Desarr. Ind. = Centro de Desarrollo Industrial (HONDURAS)

CE = Ceará State (BRAZIL)

CECORA = Central de Cooperativas de la Reforma Agraria (COLOMBIA)

CECORD = (COLOMBIA) Full name unknown

CEDEGE = Comisión de Estudios para el Desarrollo de la Cuenca del Río Guayas (ECUADOR)

CENATA = Centro Nacional de Tecnología Apropiada (DOMINICAN REPUBLIC)

CENICAFE = Centro Nacional de Investigaciones del Café (COLOMBIA)

CENFOR = Centro Forestal (PERU)

CENTA = Centro de Tecnología Agrícola (EL SALVADOR)

Centro Exptl. El Recreo = Centro Experimental El Recreo (NICARAGUA)

CEPA = Comisão Estadual de Planejamento Agricola (BRAZIL)

CEPLAC = Centro de Pesquisas do Cacau (BRAZIL)

CERI = Centro de Estudios Rurales de Itapua (PARAGUAY)

CIAT = Centro de Investigación Agrícola Tropical (BOLIVIA)

CIAT = Centro Internacional de Agricultura Tropical (COLOMBIA)

CIMMYT = Centro Internacional de Mejoramiento de Maiz y Trigo (MEXICO)

C. Ing. Gen. Biotec. = Centro de Ingeniería Genética y Biotecnología (CUBA)

CIP = Centro Internacional de la Papa (PERU)

CIPA = Centro de Investigación y Promoción Agropecuaria (PERU)

CNIGB = Centro Nacional de Investigación en Granos Básicos (NICARAGUA)

CNP = Consejo Nacional de la Producción (COSTA RICA)

CNPA = Consejo Nacional de Productores de Arroz (PERU)

CNPAF = Centro Nacional de Pesquisa Arroz e Feijão (BRAZIL)

CNPMF = Centro Nacional de Pesquisa de Mandioca e Fruticultura (BRAZIL)

CNS = Comité Nacional de Semillas (PANAMA)

COAR = (PERU) Full name unknown

COARAUCA = Cooperativa de Arauca (COLOMBIA)

COBRAPE/CIA-GO = (BRAZIL) Full name unknown

Colegio Postgrad. Chapingo = Colegio de Postraduados de Chapingo (MEXICO)

Com. Cafet. Caldas = Comité de Cafeteros de Caldas (COLOMBIA)

Com. Deptl. Sem. = Comité Departamental de Semillas (PERU)

Comp. Agr. San Alberto = Compañía Agropecuaria San Alberto (PARAGUAY)

Con. Reg. Sem. S. Cruz = Consejo Regional de Semillas de Santa Cruz (BOLIVIA)

COOAGROARAUCA = Cooperativa Agrícola Integral de Arauca (COLOMBIA)

COOPEAGRI = Cooperativa Agroindustrial y Ganadera de San Isidro (COSTA RICA)

Coop. Cnl. Oviedo = Cooperativa Coronel Oviedo (PARAGUAY)

COOP. GIRASOLES = Cooperativa Girasoles (COLOMBIA)

Coop. Valle Paracatu = Cooperativa do Vale de Paracatu (BRAZIL)

CORDEMAD = Corporación Departamental de Desarrollo Madre de Dios (PERU)

CORDESA = Comité Regional de Desarrollo de Arequipa (PERU)

CORDESAM = Corporación Departamental de Desarrollo de San Martín (PERU)

CORFAS = Corporación Fondo de Apoyo de Empresas Asociativas (COLOMBIA)

CORNARE = Corporación del Río Nare (COLOMBIA)

Corp. Deptl. Desarrollo = Corporación Departamental de Desarrollo (PERU)

CRECED = Centro Regional de Capacitación, Extensión, y Difusión de Tecnología (COLOMBIA)

CRESEMILLAS = Semillas a Crédito. Caja de Crédito Agrario. (COLOMBIA)

CRI = Centro Regional de Investigación (COLOMBIA)

CRIA = Centro Regional de Investigación Agrícola (PARAGUAY)

CRIN = Caribbean Rice Improvevement Network (DOMINICAN REPUBLIC)

CRM = Centro de Rehabilitación de Manabí (ECUADOR)

Crop Breed. Inst. = Crop Breeding Institute (ZIMBABWE)

CRR = (COLOMBIA) Full name unknown

Ctr. A. Boerger = Centro de Investigaciones Agronómicas Alberto Boerger (URUGUAY)

Ctr. Desarr. Gan. = Centro de Desarrollo Ganadero (EL SALVADOR)

Ctr. Desarrollo Ganadero = Centro de Desarrollo Ganadero (PERU)

Ctr. Est. Desarr. = Centro de Estudios para el Desarrollo (PERU)

Ctr. Nac. I. Agrop = Centro Nacional de Investigaciones Agropecuarias (VENEZUELA)

CtrIEEG = Centro de Investigación, Enseñanza y Extensión en Ganadería Tropical (MEXICO)

Ctrl Exp. Stn = Central Experimental Station (TRINIDAD & TOBAGO)

Ctr. Inv. Arroc. = Centro de Investigaciones de Arroz (DOMINICAN REPUBLIC)

Ctr. Inv. Yucatán = Centro de Investigaciones de Yucatán (MEXICO)

CTCRI = Central Tuber Crops Research Institute (INDIA)

Ctrl. Agr. Res. I. = Central Agricultural Research Institute (SRI LANKA)

Ctro. Ciencias Agrovet. = Centro de Ciencias Agroveterinarias (BRAZIL)

Cund. = Cundinamarca Department (COLOMBIA)

Cund. Secr. Int. Prop. Pres = Secretaría de Integración Popular de la Presidencia, Cundinamarca (COLOMBIA)

CVC = Corporación Autónoma Regional del Cauca (COLOMBIA)

Dept. Agr. = Department of Agriculture (THAILAND)

Dept. Res. Spec. = Department of Research and Specialist Services of the Agronomy Institute (ZIMBABWE)

Des. Agr. Naranjal = Desarrollos Agrícolas Naranjal A.C. (VENEZUELA)

D.F. = Distrito Federal (BRAZIL, MEXICO)

DGTA = Dirección Nacional de Tecnología Agropecuaria (NICARAGUA)

DIGESA = Dirección General de Servicios Agrícolas (GUATEMALA)

DIPROAGRO = (VENEZUELA) Full name unknown

Dir. Granos = Dirección de Granos (URUGUAY)

Dir. Nac. Forestal = Dirección Nacional Forestal (ECUADOR)

DRI = Programa de Desarrollo Rural Integrado (COLOMBIA, ECUADOR)

EAP = Escuela Agrícola Panamericana (HONDURAS)

ECAE = (ECUADOR) Full name unknown

Ecophys. = Ecophysiology

EEAOB = Estación Experimental Agropecuaria Obispo Colombres (ARGENTINA)

EMATER = Empresa de Extensão Rural (BRAZIL)

EMATERCE = Empresa de Assistencia Tecnica e Extensão Rural de Ceará (BRAZIL)

EMBRAPA = Empresa Brasileira de Pesquisa Agropecuaria (BRAZIL)

EMBRATER = Empresa Brasileira de Assistencia Tecnica e Extensão Rural (BRAZIL)

EMCAPA = Empresa Capixaba de Pesquisa Agropecuaria (BRAZIL)

EMEPA = Empresa Estadual de Pesquisa Agropecuaria da Paraiba S.A. (BRAZIL)

EMGOPA = Empresa Goiania de Pesquisa Agropecuaria (BRAZIL)

EMPA = Empresa de Pesquisa Agropecuaria do Estado de Mato Grosso (BRAZIL)

EMPAER = Empresa de Pesquisa, Assistencia Tecnica e Extensão Rural do Mato Grosso do Sul (BRAZIL)

EMPARN = Empresa de Pesquisa Agropecuaria do Rio Grande do Norte S.A. (BRAZIL)

EMPASC = Empresa Catarinense de Pesquisa Agropecuaria S.A. (BRAZIL)

EMPEASE = Empresa de Pesquisa Agropecuaria de Sergipe (BRAZIL)

Empr. Com. Alim. Lambay. = Empresa Comercializadora de Alimento de Lambayeque (PERU)

Empr. Com. Arroz = Empresa Comercializadora de Arroz (PERU)

Empr. G. Arguello = Empresa Agroindustrial Enrique Arguello (NICARAGUA)

EPA = Escritorio de Produção Animal (BRAZIL)

EPABA = Empresa de Pesquisa Agropecuaria da Bahia S.A. (BRAZIL)

EPACE = Empresa de Pesquisa Agropecuaria do Ceara (BRAZIL)

EPAMIG = Empresa de Pesquisa Agropecuaria de Minas Gerais (BRAZIL)

EPEAL = Empresa de Pesquisa Agropecuaria de Alagoas S.A. (BRAZIL)

ES = Espirito Santo State (BRAZIL)

Est. Exp. Raúl González = Estación Experimental Raúl González (NICARAGUA)

Est. Exp. El Porvenir = Estación Experimental El Porvenir (PERU)

Fac. C. Agr. = Faculdade de Ciencias Agrarias do Instituto de Pesquisa Agronómica (ANGOLA)

FAO = Food and Agriculture Organization of the United Nations

Fco. Morazán = Francisco Morazán (HONDURAS)

F. Ebert. St. = Friedrich Ebert Stiftung (HONDURAS)

Fed. Agric. Coops = Federation of Agricultural Cooperatives (BELIZE)

FEDEARROZ = Federación Nacional de Arroceros de Colombia (COLOMBIA)

FEDECAFE = Federación Nacional de Cafeteros de Colombia (COLOMBIA)

Fert. Mexicanos = Fertilizantes Mexicanos (MEXICO)

Field Cr. Res. I. = Field Crop Research Institute (THAILAND)

FINANCIACOOP = Instituto al Financiamiento y Desarrollo Cooperativo de Colombia (COLOMBIA)

Fom. Vida-Ancash = Fomento de la Vida, Ancash (PERU)

FONAIAP = Fondo Nacional de Investigaciones Agropecuarias (VENEZUELA)

FUDECO = Fundación para el Desarrollo de la Región Centro Occidental (VENEZUELA)

Fund. Ad. Com. = (ECUADOR) Full name unknown

FUNDAEC = Fundación para la Aplicación y Enseñanza de las Ciencias (COLOMBIA)

FUNDAGRO =Fundación para el Desarrollo Agropecuario (ECUADOR)

FUNDEAGRO = Fundación para el Desarrollo del Agro (PERU)

GO = Goias State (BRAZIL)

GRANGE = (PERU) Full name unknown

GU = Guatemala

Guangxi St. F. Br. = The State Farm Bureau of Guangxi (PEOPLES REPUBLIC OF CHINA)

Guangxi Subtrop. Crops Res. Inst. = Subtropical Crops Research Institute of Guangxi (PEOPLES REPUBLIC OF CHINA)

HO = Honduras

IAD = Instituto Agrario Dominicano (DOMINICAN REPUBLIC)

IAN = Instituto Agronómico Nacional (PARAGUAY)

IANuc. = Instituto de Asuntos Nucleares (COLOMBIA)

IAPAR = Instituto Agronomico do Paraná (BRAZIL)

IAR Awasa Ctr. = Institute of Agricultural Research - Awasa Center (ETHIOPIA)

IBTA = Instituto Boliviano de Tecnología Agropecuaria (BOLIVIA)

ic = Introductory research and production courses

ic + it = Introductory research and production courses followed by individualized training

ICA = Instituto Colombiano Agropecuario (COLOMBIA)

ICTA = Instituto de Ciencia y Tecnología (GUATEMALA)

IDIAP = Instituto de Investigaciones Agropecuarias Panamá (PANAMA)

IIA = Institute for Agronomic Research (ANGOLA)

IICA = Instituto Interamericano de Cooperación para la Agricultura (COSTA RICA)

I.I. Est. Avanz. = Instituto de Investigaciones de Estudios Avanzados (VENEZUELA)

IIPR K. Molkov = (BULGARIA) Full name unknown

INA = Instituto Nacional de Agricultura (PANAMA)

INACOP = Instituto Nacional de Cooperativas (GUATEMALA)

INCORA = Instituto Colombiano de la Reforma Agraria (COLOMBIA)

INDRHI = Instituto Nacional de Recursos Hidráulicos (DOMINICAN REPUBLIC)

INERA = Institut National Pour l'Etude et la Recherche Agronomique (ZAIRE)

Ins. Nac. Inv. Arroz = Instituto Nacional de Investigaciones del Arroz (CUBA)

INIA = Instituto Nacional de Investigaciones Agropecuarias (CHILE)

INIA = Instituto Nacional de Investigaciones Agropecuarias (MOZAMBIQUE)

INIAA = Instituto Nacional de Investigación Agraria y Agroindustrial (PERU)

INIAP = Instituto Nacional de Investigaciones Agropecuarias (ECUADOR)

INIFAB = Instituto Nacional de Investigaciones Forestales y Agropecuarias (MEXICO)

INIPA = Instituto Nacional de Investigaciones y Promoción Agraria (PERU)

In. Inv. Pastos = Instituto de Investigaciones en Pastos y Forrajes (CUBA)

INIVIT = Instituto de Investigación en Viandas Tropicales (CUBA)

Inst. Agr. Campinas = Instituto Agronómico de Campinas (BRAZIL)

Inst. Agr. Res. = Institute of Agricultural Research (ETHIOPIA)

Inst. Agr. Technol. = Institute of Agriculture & Technology (VIETNAM)

Inst. Agron. Nac. = Instituto Agronómico Nacional (PARAGUAY)

Inst. Agrop. = Instituto Agropecuario (PARAGUAY)

Inst. Desarr. Agr. = Instituto de Desarrollo Agropecuario (COSTA RICA)

Inst. Inv. Hort. = Instituto de Investigaciones de Horticultura (CUBA)

Inst. Nal. de Seguros = Instituto Nacional de Seguros (COSTA RICA)

Inst. Sup. Agrop. = Instituto Superior Agropecuario (NICARAGUA)

Inst. Tec. Superior = Instituto Técnico Superior (PERU)

Inst. Tec. Est. Sup. = Instituto Técnico de Estudios Superiores (MEXICO)

Inst. Univ. Tec. = Instituto Universitario de Tecnología, Guárico (VENEZUELA)

Int. Nac. Arauca = Intendencia Nacional de Arauca (COLOMBIA)

INTA = Instituto de Tecnología Agropecuaria (ARGENTINA)

INTERCOR = International Colombian Corporation Resources (COLOMBIA)

IPA = Empresa Pernambucana de Pesquisa Agropecuaria (BRAZIL)

IPAGRO = Instituto de Pesquisas Agronomicas (BRAZIL)

IPM = Integrated Pest Management

IRGA = Instituto Riograndense do Arroz (BRAZIL)

ISABU = Institut des Sciences Agronomiques du Burundi (BURUNDI)

ISAR = Institut des Sciences Agronomiques du Rwanda (RWANDA)

IST = Instituto Superior Tecnológico (PERU)

it = Individualized training

IVITA = Instituto Veterinario de Investigaciones Tropicales y de Altura (PERU)

Jiangsu Agr. Coll. = Jiangsu Agricultural College (PEOPLES REPUBLIC OF CHINA)

KARI = Kenya Agricultural Research Institut (KENYA)

Kawanda Res. Stn. = Kawanda Research Station (UGANDA)

Lambay. = Lambayeque (PERU)

L. Gen. Res. Biotec. = Laboratorio de Recursos Genéticos y Biotecnología (PERU)

Lyamunga Res. Stn. = Lyamunga Research Station (TANZANIA)

MA = Maranhão State (BRAZIL)

MAA = Ministerio de Asuntos Agrarios (ARGENTINA)

MAC = Ministerio de Agricultura y Cría (VENEZUELA)

MAE = = Ministere de l'Agriculture et d'Elévage (HAITI)

MAG = Ministerio de Agricultura y Ganadería

MAIZENA = Industrias del Maíz S.A. (COLOMBIA)

Malang Res. Inst. = Malang Research Institute (INDONESIA)

MARITSA RES. INST. = Maritsa Vegetable Crops Research Institute (BULGARIA)

Markazi Arak R.C. = Markazi Agricultural Research Center (IRAN)

MARNDR = Ministere de L'Agriculture des Resources Naturelles et du Developpement Rural (HAITI)

Mesekera Res. Stn. = Mesekera Research Station? (ZAMBIA)

MG = Minas Gerais State (BRAZIL)

Mgmt-Quality = Management Quality

MIDA = Ministerio de Desarrollo Agropecuario (PANAMA)

MIDINRA = Ministerio de Desarrollo Agropecuario y Reforma Agraria (NICARAGUA)

Min. Agr. = Ministerio de Agricultura

Min. Agr. Lands = Ministry of Agriculture and Lands (BELIZE)

Min. Pres. = Ministerio de la Presidencia (PERU)

MS = Mato Grosso do Sul State (BRAZIL)

M.Sc. = Master of Sciences

MT = Mato Grosso State (BRAZIL)

NARI = National Agricultural Research Institute

NARS = National Agricultural Research System

NARDS = National Agricultural Research and Development System

NGO = Non Governmental Organization

NK = Nicaragua

N. Santander = Norte de Santander Department (COLOMBIA)

Ntl. = National

Ntl. Agr. Res. Centr. = National Agricultural Research Center (LAOS)

Ntl. Agr. Res. Inst. = National Agricultural Research Institute (GUYANA)

Univ. Nac. Valle = Universidad del Valle (COLOMBIA)

ODVA = Organisation pour le Developpement de la Vallee de l'Artibonite (HAITI)

Ofic. Nac. Semillas = Oficina Nacional de Semillas (COSTA RICA)

OFR = On-farm Research

ONA = Organización Nacional Agraria (PERU)

ORE = Organisation for the Rehabilitation of the Environment (HAITI)

PA = Pará State (BRAZIL)

PAPP = Programa de Apoio aos Poquenos Produtores

PB = Paraiba State (BRAZIL)

PDAR = Programa de Desarrollo Alternativo Regional (BOLIVIA)

PE = Pernambuco State (BRAZIL)

PG = Panamá

Ph.D. = Doctor of Philosophy

PI = Piaui State (BRASIL)

PNA = Programa Nacional del Arroz (ECUADOR)

PNR = Plan Nacional de Rehabilitación (COLOMBIA)

PR = Paraná State (BRAZIL)

PRB = (HAITI)

P.R.CHINA = Peoples Republic of China

Private enterpr. = Private enterprise (ARGENTINA, COLOMBIA)

PREDESUR = Programa Regional de Desarrollo del Sur (ECUADOR)

PROACOL = Procesadora Agrícola Colombiana (COLOMBIA)

PROCAMPO = Productividad para el Campo (COLOMBIA)

Proc. Agua Viva = Procesadora Agua Viva (VENEZUELA)

PRODEGAL = Proyecto de Desarrollo Ganadero Especial - Huallaga - San Martín (PERU)

Prod. Nac. Sem. = Productora Nacional de Semillas (MEXICO)

Prod. Systems = Production systems

PROFOGAN = Proyecto de Fomento Ganadero (ECUADOR)

PROFRIJOL = Programa Cooperativo Regional de Frijol para Centroamérica, México y el Caribe

PROFRIZA =Programa Regional de Frijol para la Zona Andina

Progr. Ntl. Legum. = Programme National des Legumineuses (ZAIRE)

Proj. Pichis Palc. = Proyecto Especial Pichis Palcazu (PERU)

PROTECA = Proyecto de Tecnología Agropecuaria (ECUADOR)

PROVARZEAS = Projeto Varzeas (BRAZIL)

Quint. Roo = Quintana Roo State (MEXICO)

Rayong Fld. Cr. Ctr. = Rayong Field Crop Research Center (THAILAND)

R&D = Research and Development

Res. & Prod. = Research and Production

RIEPT = Red Internacional de Evaluación de Pastos Tropicales (International Network of Tropical Pastures Evaluation)

RJ = Rio de Janeiro State (BRAZIL)

RN = Rio Grande do Norte State (BRAZIL)

RO = Rondonia State (BRAZIL)

Root C. Res. Ctr. = Root Crops Research Center (THE PHILIPPINES)

RS = Rio Grande do Sul State (BRAZIL)

RURALMINAS = Fundação Rural Mineira (BRAZIL)

RURALTINS-TO = Fundação Rural de Tocantins (BRAZIL)

SAA = Secretaría de Agricultura (COLOMBIA)

S. Agr. S. Clara-Monagas = Secretaría de Agricultura de Santa Clara - Estado Monagas (VENEZUELA)

SAL = El Salvador

sc = Specialized training courses

SC = Santa Catarina State (BRAZIL)

Sc. Phytopath. Lab. = Scientific Phytopathological Laboratory (ETHIOPIA)

S. China Agr. Univ. = South China Agricultural University (PEOPLES REPUBLIC OF CHINA)

S. China A. Tr. Cr. = South China Academy of Tropical Crops (PEOPLES REPUBLIC OF CHINA)

SDA-N. Santander = Secretaría de Desarrollo Agropecuario, Norte de Santander (COLOMBIA)

SE = Sergipe State (BRAZIL)

SEA = Secretaría de Estado de Agricultura (DOMINICAN REPUBLIC)

SEAG = Servicio de Extensión Agrícola Ganadera (ARGENTINA, PARAGUAY)

Secr. Agr. = Secretaría de Agricultura

Scr. A. Agr. Salta = Secretaría de Asuntos Agrarios (ARGENTINA)

Secr. Agr. Antioquia = Secretaría de Agricultura de Antioquia (COLOMBIA)

Secr. Est. Agr. = Secretaría de Estado de Agricultura (DOMINICAN REPUBLIC)

Seed tech. training = Seed techonology training

Seed Pl. Impr. Ctr. = Seed Plant Improvement Center (IRAN)

SEFO = Empresa de Semillas Forrajeras (BOLIVIA)

Sem. APROSA Anzoat = Semillas APROSA (Asociación de Productores de Semillas de Anzoátegui) (VENEZUELA)

SEMEPE = (BRAZIL) Full name unknown

SEMOC = Sementes de Moçambique (MOZAMBIQUE)

SENA = Servicio Nacional de Aprendizaje (COLOMBIA)

SENASE = Servicio Nacional de Semillas (PERU)

SEPLA = Serviço de Planejamento (BRAZIL)

Serere Research Stn. = Serere Research Station (UGANDA)

Serv. Cert. Sem. = Servicio de Certificación de Semillas (BOLIVIA)

Serv. Insp. Cert. Sem. = Servicio Inspección de Certificación de Semillas (CUBA)

Serv. Nac. Sem. = Servicio Nacional de Semillas (PARAGUAY)

Sokoine Univ. = Sokoine University (TANZANIA)

SERVIMIC = (VENEZUELA) Full name unknown

S.L. Potosí = San Luis Potosí

small seed syst. = small seed systems

Soil Microbiol. = Soil Microbiology

Sp. Proj. Piura = Proyecto Especial Chira Piura (PERU)

Sriracha Res. Stn. = Sriracha Research Station (THAILAND)

SRN = Secretaría de Recursos Naturales (HONDURAS)

St. Cruz = Santa Cruz Province (BOLIVIA)

SUDENE = Superintendencia do Desenvolvimento do Nordeste (BRAZIL)

SURIF = Sukamandi Research Institute for Food Crops (INDONESIA)

TARO = Tanzania Agricultural Research Organization (TANZANIA)

TCSP = Training and Communications Support Program

TO = Tocantins State (BRAZIL)

Trop. Pest. Res. I = Tropical Pesticides Research Institute (TANZANIA)

UAGRM = Universidad Autónoma Gabriel René Moreno (BOLIVIA)

UAPPY = Unión de Asociaciones de Productores y Procesadores de Yuca (ECUADOR)

Ucay. = Ucayali (PERU)

UCLA = Universidad Centro-Occidental Lisandro Alvarado (VENEZUELA)

UCV = Universidad Central de Venezuela (VENEZUELA)

UEPAE = Unidade de Execução de Pesquisa de Ambito Estadual (BRAZIL)

UNAM = Universidad Nacional Autónoma de México (MEXICO)

UN = United Nations

UNDP Proj. = United Nations Development Programme Project (BOLIVIA)

Unidad Sem. Papa = Unidad de Producción de Semilla de Papa (BOLIVIA)

Univ. = Universidad (University)

Univ. A. Chapingo = Universidad Autónoma de Chapingo (MEXICO)

Univ. A. Narro = Universidad Antonio Narro (MEXICO)

Univ. Aut. Nuevo León = Universidad Autonóma Nuevo León (MEXICO)

Univ. Fed. AC = Universidade Federal de Acre (BRAZIL)

Univ. La Molina = Universidad Agraria La Molina (PERU)

Univ. M. San Simón = Universidad Mayor de San Simón (BOLIVIA)

Univ. M. San Marcos = Universidad Mayor de San Marcos (PERU)

Univ. Nacional = Universidad Nacional

Univ. Nac. = Universidad Nacional

Univ. P.R. Gallo = Universidad Pedro Ruiz Gallo (PERU)

Upland Cr. Res. I. = Upland Crops Research Institute (PEOPLES REPUBLIC OF CHINA)

U./processing = Utilization/processing

U.S.C.H. = Universidad Sán Cristobal de Huamanga (PERU)

UTM = Universidad Técnica de Manabí (ECUADOR)

UT-PRO-NE = Unidade Técnica de Projetos do NE (BRAZIL)

Visayas Coll = Visayas College of Agriculture (THE PHILIPPINES)

Wheat&Sunfl. Inst. = Wheat and Sunflower Institute (BULGARIA)

Draft

Development of Subregional Capacities for Training in Commodity Production Problem Solving

December, 1992

CIAT
Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

Development of Subregional Capacities for Training in Commodity Production Problem Solving

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FOREWORD

1. In this presentation entitled "Development of subregional capacities for training in commodity production problem solving", I shall briefly refer to three major topics: One, the scenario in which the strategy for the development of the capacity for training was generated; the components of the strategy and the results derived from its application, both in terms of this products and in regards to the institutionalization of subregional capacities for training in commodity production problem solving. Finally, I would like to present some ideas on how this strategy could be expanded, improved and transferred to other institutions within the CGIAR System.

   All those aspects of my presentation which are not clear to you can be better explained by visiting our materials and products expo which will be open at the Calima Room during this week.

The Scenario

In this part I would like to refer to the components of the scenario in which the idea of generating a strategy for the development of subregional capacities for training was formulated.

2. Throughout its history CIAT has helped train specialists in the generation of technologies to improve the production of four commodities products. Many of these specialists are currently responsible for adaptive and applied research in countries where these products are important.

2.1 As training has strongly contributed to strengthen the capacity of NARDS to develop and test production technologies it has also had an impact on technology transfer. Some training activities both at CIAT and in-countries were devoted to the application of technology transfer strategies and methods. Today, some of the beneficiaries of this type of training are in charge of extension programs. This is how, when in 1989 the Training and Communications Support Program began to formulate a strategy for the development of subregional and national capacities for training in commodity production problem solving, we found cadres of well trained specialists who were leading research and extension activities in their countries.

2.2 CIAT is now focusing its attention towards strategic research. Training therefore will take new directions. We can no longer expect that the new version of training follows the traditional patterns. New methods and tools will need to be used to continue strengthening the capacity of NARDS to produce and transfer technologies.

2.3 Developing subregional and national capacities for training in commodity production problem solving seems thus far a reliable alternative to devolve training to national programs. This presentation is dedicated to describe and analyze our efforts to make such devolution possible.

3. A large number for formulations regarding the development of the training capacity are described in the literature on education; most of them referring to teacher training. Very few papers are found which refer to developing the capacity for training in research and development environments. Any substantive documents are found to specifically refer to the topic within the agricultural research and development milieu.

5. As a part of the scenarios in which the strategy was to be developed and tested, we found that national research and development institutions and regional research and

development institutions and regional research networks had been working on the diagnosis of commodity production problems and had formulated national commodity development plans. In the regions where an strategy has to be applied CIAT's scientific staff always had an important role in the formulation of such diagnostic studies and plans.

6. On the other hand, as we were in the process of studying participating countries and regions we found that either a regional network or another type of inter-institutional mechanism was already in place and able to support and even coordinate some of the efforts conducive to the application of the strategy.

7. As we reviewed national or regional plans we also found that amongst stated priorities, training was always present. In most cases training was already underway and a significant part of budgets was being applied to finance training per se or other training related activities. In one particular case the application of our strategy served as a mechanism to fulfill the training objectives stated in the network plan.

8. Needless to say, strong linkages between CIAT's scientific staff and training personnel with national research and development leaders were them to guarantee the success in the application of the strategy. Linkages grew strong throughout the years tanks to the establishment of cooperative research efforts and the individualized and grouped training activities carried out at CIAT and in-countries.

9. On our part we had a comparative advantage to attempt the formulation of a strategy oriented to the development of regional capacities for training: A cadre of scientists and training associates many of them with life-long experience in commodity production research and training a young group of professionals in intensive process of

training to become experts in instructional materials design and with use of advanced desk-top publishing technologies; a well established information system able to facilitate the planning development and evolution of training events, and education specialist with life-long experience in adult education and training and the trusting and open minded leadership to carry out all activities.

10. THE STRATEGY

10.1. Purpose and Objectives

The strategy's overall purpose is to contribute to augment the efficiency in the generation and transfer of agricultural technology by improving the capacity of the professionals involved and by strengthening the links between research and extension services.

The strategy seeks to strengthen the capacity of national institutions to cooperatively operate subregional training systems for adaptive research and technology transfer. To achieve this objective activities were designed and tested to:

- Promote the formation or consolidation of interinstitutional mechanisms to establish permanent subregional training systems.

- Train the instructor needed in these subregional training system by applying methods proved to be effective by CIAT.

- Develop, with trainees, training materials to be used by the new trainers and trainees.

10.2 Sites where the strategy was tested and applied.

Originally, between April 1989 and June 1991 the strategy components were tested in the Dominican Republic where a group of ten rice trainers were trained as such and a set of five instructional packages were developed. A second test and adjustment of the strategy was carried out in Ecuador where twelve rice trainers were trained and six instructional packages for training were developed. These efforts as well as manu other later to be described were generously backed up by the rice program scientific staff and coordinated by the IDSP training associates and education specialist.

In July 1991 we received the support of the Interamerican Development Bank to apply the strategy in three geographical regions which led us to the establishment of an equal number of subregional training systems:

(1) A subregional bean training system for Central America, Mexico, The Dominican Republic and Haiti;

(2) A subregional cassava training system for Southern Brazil, Paraguay and Northern Argentina; and

(3) A subregional rice training system for Venezuela, Colombia and Ecuador.

10.3 The institutionalization of training

In order to ensure the institutionalization of subregional and national training systems trainers-to-be were selected from national agricultural research institutes, ministries of agriculture, state universities and private agricultural research and development sector. From its onset a consensus from national institutional authorities was reached to

establish subregional training programs. In Central America, Mexico and Haiti, the institutionalization process has taken place under the umbrella of PROFRIJOL the regional bean research network which comprises eleven countries and ten major research and development institutions. A similar process has taken place with the support of the Southern Cone Cassava Research Network which involves institutions such as INTA in Argentina, the Ministry of Agriculture and the National Research Center for Cassava and Fruit Research (CNPMF) from Brazil as well as the research and development institutions from the three southern states involved. (Santa Catarina, Rio Grande do Sul and Panama).

In the northern andean zone the support to establishment of training systems has been obtained from FEDEARROZ and ICA in Colombia, from INIAP, PNAR and PROTECA in Ecuador and from the FONAIAP and the National Rice Council from Venezuela.

10.4 The selection of trainers to be

Trainers were selected following a set of five criteria: Technical knowledge and skill in a specific area of content; a natural ability to communicate; personal commitment to participate in all phases of training and to continue as active members of the subregional and/or national training system from there after, institutional commitment to let the participant take part in all training activities and a balance in national participation to ensure that all countries of each subregion have a significant representation.

Final selection of participants was done through interinstitutional meeting carried out at a regional or national level depending on the circumstances. One of the most difficult tasks of this process was to match the selection of experts with the

commodity production problems already identifies in the diagnosis and development plans and prioritized during the planning, integration and support meeting held with institutions leaders.

10.5 The strategy components

Training of trainers was conducted making emphasis on the reinforcement of teaching skills with the systematic introduction of adult education principles and techniques. The overall strategy is learning by doing: the trainers learn to plan, develop and evaluate a course by planing and organizing one they will later teach to a group of extensionists; they learn to prepare instructional materials by making them for use in real courses, under the direction of CIAT's instructor and they learn to apply the

practical learning principles and methods by actually participating in setting up demonstrative and training lots and by designing practical exercises to be used in classroom, laboratory and field situations by their future trainees.

The application of the strategy with all the specific components which follow will have covered a two year period by March 1993, to train 87 trainers for the three subregional training systems and to produce a total of 30 instructional packages for use in training extensionists.

10.6 The three phases of training trainers.

The first component of the strategy is a rapid appraisal of training needs and available resources for training (1.1). A basic need participating institutions usually identify is the lack of appropriate, updated materials to conduct training both in formal courses and in field training activities for extension agents and farmers.

Training needs, on the other hand, refer to critical problems (pests management, weed control, fertilization, etc.) which constitute severe production drawbacks.

The identification of resources shows the work force dedicated to research and extension activities and allows for a selection of specialists who may be trained as trainers.

Once training needs and resources are identified a train-the-trainer workshop is carried out in one of the participating countries (1.2). By the time training begins, institution leaders, participants and all other people involved in the strategy have received a complete set of guidelines about the training process, their responsibilities and clarification of what can be expected from the strategy.

The train-the-trainer workshop is a two-week activity usually conducted in a place far away from the daily routines. It is designed to accomplish two objectives:

- Develop knowledge and skills to plan, carry out and evaluate training events and
- Develop the ability to design training materials.

Materials produced during the train-the trainer workshop, are called "learning units". They comprise up-to-date information related to the identification, evaluation and management of previously identified commodity problems. During the workshop participants design from four to seven instructional units. These include information on local and regional validated research results, exercises to be conducted during training sessions, illustrations, charts, and learning evaluation instruments.

After the workshop, materials are brought to CIAT to undergo a first edition (1.3). Professionals from the instructional materials unit, prepare a clean version of the learning units and advise authors on different aspects laking a this point. Materials are then sent to authors so that they can make adjustments and new contributions in their home countries. Revisions come back to CIAT and are incorporated to the master copy of the learning units. CIAT's instructional materials section has been provided with microcomputer technologies and software to efficiently revise training materials and make final originals through desk-top publishing facilities.

Phase two of the training for trainers process is composed of two sequential activities:

- A training laboratory and

- A course for extension agents (2.1)

The laboratory and the course are usually conducted in a different host country of the region. During the lab, trainers have a new opportunity to review instructional materials, refine audiovisual aids, select printed material to be handed out to the trainees and strengthen interaction skills through a technique called "microteaching". The lab gives each participant the opportunity to present information before his colleagues and CIAT's project team (including program staff), as if they were a real audience of trainers. These presentations are videotaped so as to provide the trainer-to-be with an opportunity to observe his performance, identify communication problems and refine interaction skills. CIAT's staff, project personnel and training team members serve as sources of feedback. Using previously designed observation instruments they make suggestions on content, exercises, evaluation instruments and other training components such as the teaching aids, and resources to carry out classroom, laboratory and field practices.

Right after the one-week laboratory has finished, a group of some twenty extension agents gather close to a research station to take a course in which trainers will apply the learning

methodologies they have learned and use the instructional units and teaching aids they have prepared. It is important to note that well ahead phase two takes place, host country leaders and trainers have prepared practice sites, specimens, green house samples and all other on-farm related resources to provide an adequate scenario for training and learning activities during the course.

Different course components are evaluated by project personnel and CIAT's program staff members to provide local coordinators and trainers with adequate feedback on their performance. Trainees also have the opportunity to evaluate trainers and the quality of the training event by means of evaluation instruments particularly designed for this purpose.

After phase two is completed, instructional units are ready to undergo a new revision which is also carried out by scientific staff from CIAT and from other research institutions, by style editors and by CIAT's Instructional Materials Section. Here again, reviewers send materials for adjustment by authors.

In the interim, before phase three, trainers have the opportunity to participate in local and regional production technology courses (2.2). By doing this, they have a chance to practice learned skills, make adjustments to their performance and refine training materials.

Phase three has two components:

- Elaboration of a training project and
- A final revision of instructional materials (learning units, slides, overhead transparencies and audiovisual aids) (3.1).

These two activities are usually carried out at CIAT's headquarters. This is a final opportunity for trainers to adjust the content and other components of the instructional packages.

The final revision of training materials is done by a small group of trainers, usually the learning unit coordinators, During two weeks these coordinators have a close interaction with CIAT staff training associates and the instructional materials team. The objective is to revise all instructional package components before they go out for publication.

The design of the training project usually runs parallel to the final adjustment of instructional packages. During a two week period, a team of trainers and network representatives design a training project which intends to carry out a training campaign to cover a high percentage of the region's extension agents in order to upgrade them in the management of technology production problems which were identified from the onset of the strategy.

The exercise covers the study and application of project design models including the Logical Framework and other instruments for an adequate project design, so as to guarantee the motivation of financing local and/or international donor agencies to which the project is to be presented.

By the end of phase three, instructional materials are ready for publication and training teams are in place to start their campaign in favor of extension agents in the region.

Follow up activities by CIAT's project team include attendance to training events carried out by trainers in order to provide feedback for a true application of adult learning principles and the provision of additional training documents and media which help to upgrade the training performance of trainers.

Phase 1
Basic training and production of instructional materials

1.1

Rapid appraisal of needs and available resources

- *Commodity production problems*
- *Technology transfer needs*
- *Human resources available*

1.2

Workshop for training trainers

- *Developing skills*
- *Designing materials*

1.3

Editing of training materials

- *Scientific and technical aspects*
- *Audiovisual support*

Phase II
Advanced training and practice

2.1

Training laboratory and production technology course

- *Trying out the course*
- *Real course*

2.2

Participation in In-country courses

- *Instructional materials trial and adjustment*

Phase III
Edition and publication of Learning Units and Design of Training Project

3.1

Final edition and publication of materials

- *Revision of style*
- *Instructional packages*

3.2

Writing of training projects

11. Results and products

Before reporting a series of results and products which have been obtained from the application of the training strategy, I would like to note that we have completed all three phases for the Central American Subregion. In the other two, the remaining activities will be carried out during the first trimester of 1993. Nevertheless, we already have information regarding major accomplishments as well as difficulties which will be further analyzed in this presentation.

11.1 Objectives vs results and products

Objective One	Results
To promote the formation of interinstitutional mechanisms to establish permanent subregional training systems.	1. The bean training team for Central America, Mexico and Haiti has been recognized by authorities in participating countries and institutions. Today they are called upon to be the trainers in almost all major courses taught in the region. 2. The training project, developed during phase three has received the necessary economic support by the Swiss Development Cooperation, and PROFRIJOL, the regional bean research network has accepted to coordinate all project's activities. 3. In the case of rice trainers for Colombia an interinstitutional committee to coordinate all training activities was created in February 1991

and has coordinated all phases of training and two courses taught to 45 extension agents for rice.

4. In Venezuela a National Council for Rice was created as the application of the training strategy was in progress. Today the training project has received the support of the Ministry of Agriculture using resources from the World Bank. The group of seventeen trainers has received full support from all participating institutions.

5. In the case of Ecuador, an interinstitutional committee composed by representatives of PROTECA, the Agricultural Technology Program, INIAP, the National Agricultural Research Institute and the PNAR, National Rice Program, was formed to coordinate training activities. Changes in priorities at the central level have not helped in the development of the training strategy as was planned.

6. In the Southern Cone, the young cassava research network has been providing the necessary support to the application of the strategy. We hope that, as the network grows stronger it will be able to take full responsibility for the training activities. EMBRAPA, the Brazilian research institution

has sent observers to evaluate possible applications of CIAT's strategy for training in other commodity areas. Reports presented by observers are very positive in this regard. The CNPMF's Executive Director has been providing advice to the CIAT project team in different aspects of the application of the strategy. The center involvement is so high that the head of the cassava program is currently coordinating the activities to be carried out during 1993, namely a course to be taught by brazilian trainers and phase three of the strategy.

Objective Two

Train the instructors needed for these subregional training systems by applying methods proven to be effective by CIAT.

1. The application of the strategy has resulted in the training of twenty one trainers for bean training in Central America, twenty four for training in cassava production technologies and forty trainers for rice. The numbers of instructors are those initially calculated to take care of training in major problem areas. Nevertheless, when the Central American and the Venezuelan projects were written authors decided to include a series of activities designed to train an additional group of trainers needed to deal with important topics not included in the strategy for a variety of reasons.

2. Trainers have evaluated all training events. Evaluation instruments are used to know their perceptions in regards to training methods, strategies and materials as well as on the performance of trainers. A great majority of them agree that the methodologies employed, the instructional materials and the learning experiences are adequate.

3. On the other hand, courses taught by trainers to extensionists have also been evaluated. Participants in these courses generally evaluate trainers as excellent. When low scores are obtained in one or more dimensions of the trainer's profile, feedback is provided and suggestions on behavioral adjustments formulated by the training associate who usually attends courses with follow up and evaluation functions.

Objective Three

Develops, with trainees, training materials to be used by the new trainers and their trainees.

1. A total of 30 instructional packages have been planned and 20 of them are now in press for publication. These packages contain the printed and illustrative material, a set of slides and a set of overhead transparencies. Fifteen of them are accompanied by an audiovisual program which summarizes the Unit and can be used at different stages of the training process.

These training materials, developed by trainers themselves under the supervision of CIAT's staff, research associates and training associates contain all the necessary instruments, guides, and formats that instructors and participants in a course need to cover a specific topic.

2. The production of this large set of training materials has been possible through the organization of a desk-top publishing facility and the training of a team of six professionals of the instructional materials section in the production of didactic packages and in the use of advanced desk-top publishing software.

3. A TV production unit has been installed at CIAT for the production of video-tapes. Six videos have been planned; three of them to record all aspects of the training strategy. Three more include presentations on instructional tactics and procedures to serve as reinforcers of the training team. All these materials will be made available to other institutions interested in developing similar strategies.

4. Upon a request of Haiti and a recommendation from the leader of CIAT's bean program, all seven training units are being translated into

French for the use in the island and for subsequent adaptation in francophone Africa.

5. A manual to train trainers has been published. In this book any instructor in the agricultural field finds the basic guidelines to plan, develop and evaluate a training event and to design instructional sequences, and printed and visual materials.

Draft

CIAT Linkages Information Systems

Activity Report

December 1992

For Internal Circulation and Discussion Only

CIAT

Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

Draft

CIAT Linkages Information Systems

Centro Internacional de Agricultura Tropical
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INTRODUCTION

To plan, coordinate, monitor, account for, and evaluate CIAT's various institutional linkage activities, an information system has been in place since the Center's inception. As time went by, the system's components grew in number and variety. Also, with the increasing incorporation of computer technology many of the system's components were mechanized. By both technical progress, and the coalescence of separate institutional relations and development (IRD) support activities in a single division, the opportunity for linking-up the diverse information system components into a more formally integrated information system has arisen. The present report informs on progress towards this end.

INTEGRATED RELATIONAL DATABASES

An IRD INFORMATION SYSTEM (**IRD-IS**) with 12 databases, which are in various degrees of development, is being put together (Figure 1).

PERSONS

At the center of the system is **PERSONS**, a data-base on persons who have been or are linked to CIAT. PERSONS carries the passport information on each entry, tells which of the other databases carries information on the respective entry, and allows access to these data-bases. Access through PERSONS, however, is not exclusive; each database can be accessed directly through multiple ways of entry.

TRAINEES, CONFERENCE PARTICIPANTS, AND VISITORS

Three databases inform on the programs and activities of persons who came to CIAT for training or as visitors, or who participated in CIAT conferences.

TRAINEES informs on CIAT trainees: when they have been trained; in what program, discipline or field of interest; under what training modality; funded by whom.

CONFERENCE PARTICIPANTS informs on participants in CIAT conferences: what conference (title, objectives), where, when, with whom else. Future entries will also carry information on the sources of funding of conferences and of each participant.

Both TRAINEES and CONFERENCE PARTICIPANTS are fully operational and linked to PERSONS.

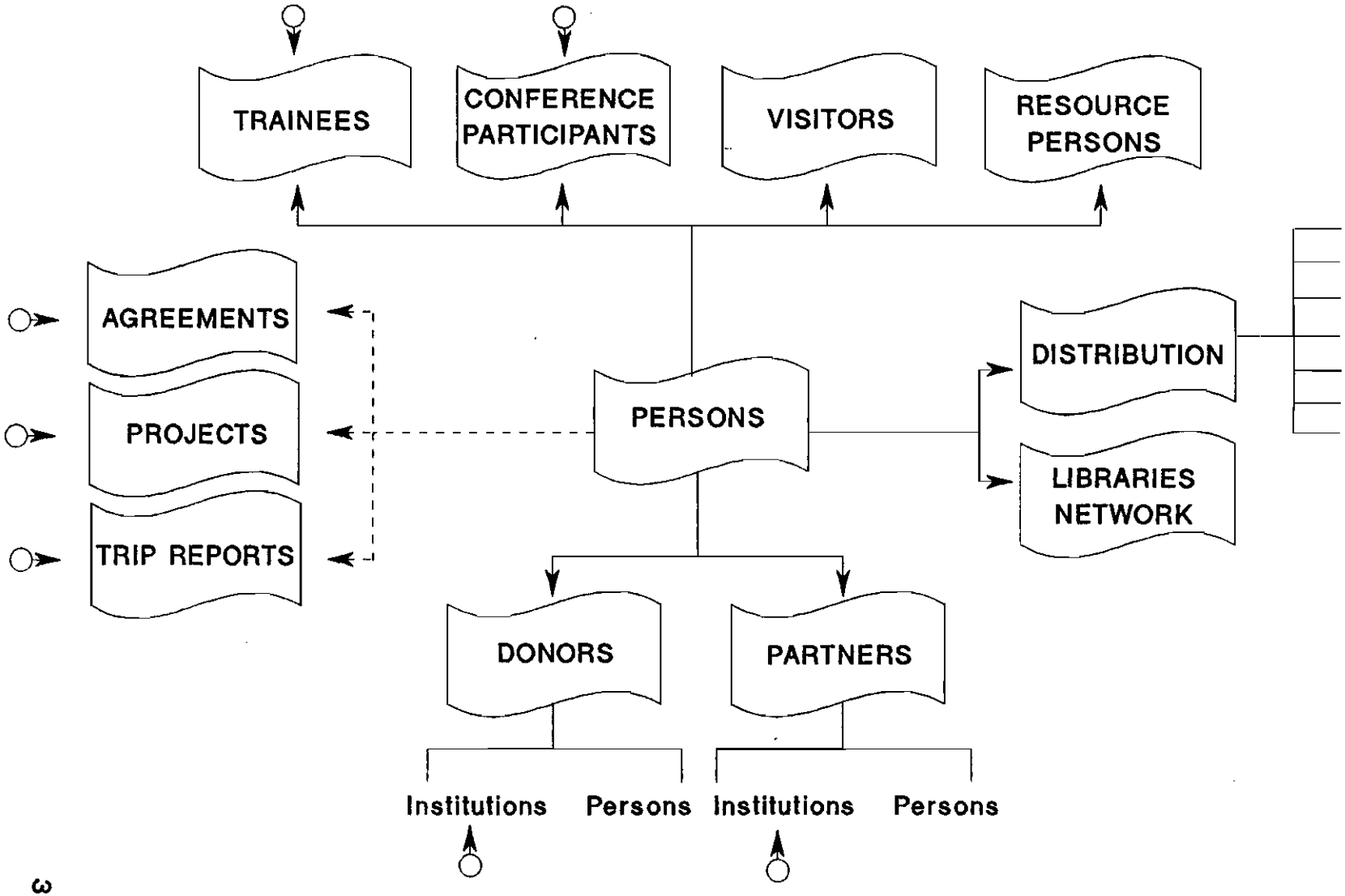
VISITORS informs on who has visited CIAT, when, and what areas. It is operational but not yet linked to PERSONS. Further development of this database, to include more details on the visitors' program while at CIAT, is pending.

RESOURCE PERSONS

Presently, each Director's Office, and each research Program has its own way of keeping record of resource persons. It is foreseen to offer a Center-wide data-base, **RESOURCE PERSONS**, linked to PERSONS and to the rest of the IRD-IS.

FIGURE 1.

INSTITUTIONAL RELATIONS INFORMATION SYSTEM
RELATIONAL DATABASES



DISTRIBUTION

DISTRIBUTION replaces CIAT's former mailing list. It is operational and linked to PERSONS. However, conversion of mailing list to data-base entries is still in progress. The process of conversion from the former mailing list to the DISTRIBUTION is worth describing.

From a mailing list to a distribution data-base

Over the years CIAT had assembled a mailing list of over 15,000 entries. Inclusion criteria had not been set explicitly; and criteria for a possible segmentation of the audience had not been established either.

Many entries, for which there was a lack of information on how they had originated, appeared to have arisen from occasional visits of the recipients to CIAT, or from equally occasional encounters between the recipients and CIAT staff on travel. There was little pattern in the items to which the recipients were subscribed. In some cases subscriptions had probably been the choice of the recipients; in others they perhaps were suggested by whomever requested the inclusion in the mailing list; for others still, there are indications that the original entries had been amended by clerical staff in attempts to "improve" the mailing list.

Also, there was a time when inclusion in the mailing list responded to a policy of maximizing the distribution of information at the expense of a definition of who should be served with information (and for what reason).

Concern over the insufficient definition of CIAT's mailing list emerged as CIAT increasingly focused its audiences and improved the precision with which it targeted its linkage activities. Considerations of the cost effectiveness of serving an ill-defined clientele further increased the concern.

To address the problem, first a set of categories was defined in order to segment CIAT's audience meaningfully, i.e. in terms of why CIAT was to link with each of the categories, and what information and communication products should consequently be delivered to them. The outcome was eight categories (Table 1).

However, the lack of information on a large proportion of the entries precluded their direct conversion into the newly defined categories. The alternative of surveying the full mailing list entries through a mail questionnaire was rejected for reasons of cost and Center image. Rather, it was thought that, in a stepwise approach, as many as possible entries would be reclassified on the basis of in-house information. Only after having exhausted the in-house capacity for reclassification would a mail questionnaire be sent to the remaining entries.

Before moving into implementation, however, further issues needed addressing. How to control that new entries would follow Center-wide criteria (both on inclusion and on entitlement to subscriptions), and how to maintain the distribution data-base updated? The answer was to establish a reference person system, that is, each entry would be patronized by a CIAT staff member who could give reference on the entry, and who would also assume responsibility for periodically helping the Distribution Office in checking on the actuality of the references under his or her patronage. In some cases, offices rather than individual staff members could assume patronage, e.g. the Project Design Office for donors, the Office of the head of Communications for the press, etc. (Table 1). Entry to the distribution data-base by clients' self-request would be admitted for only one of the eight categories, that is, for the so-called Agricultural Science and Technology System, ASTS. This is the only category with dual entry by either patronage of a reference person or by self-request.

In the step-wise approach to reclassifying entries it was attempted to first clear the way by getting over the more obvious categories such as donors, the press, the international system, libraries, and the CIAT family. Close collaborators were defined by means of a questionnaire to each senior scientist. By this process a large residue of "**orphan entries**" (orphans for lack of a reference person) was left behind. Based on the publications to which they were subscribed, the orphans were tentatively assigned to CIAT programs. The corresponding list is being distributed to each program so that Program staff may adopt orphans, i.e. become reference persons for entries with whom they are acquainted.

By this process a list of definitive orphans will eventually emerge. These residual entries will then become the subject of a mail questionnaire which will give them the opportunity to enter definitively into the ASTS category by self-request. Those who miss this opportunity will be deleted from the distribution data-base.

At the time of writing, the process is most advanced with the Cassava Program where the orphans list is being circulated for adoption. This means that it should be possible to soon take the final step of converting residual orphans into self-requested entries or deleting them.

LIBRARIES NETWORK

Libraries are one of the eight categories in DISTRIBUTION. Two subcategories are distinguished: exchange and high impact libraries. Admission as an exchange library is granted when CIAT is interested in the products being offered in exchange, and when exchange is more beneficial to CIAT than purchase of the products. High impact libraries are those who serve a large clientele which CIAT wants to reach with its own information, that is, they are a means of reaching CIAT's audience with a multiplier effect. CIAT proactively attempts to situate its information in high impact libraries. For this purpose CIAT publications are made available free of charge.

TABLE 1. DISTRIBUTION OF CIAT COMMUNICATION MEDIA. CATEGORIZATION OF RECIPIENTS

CATEGORY	RESPONSIBLE FOR INFORMATION ON CATEGORY	AUTOMATIC MEDIA DISTRIBUTION*
1. DONORS	PROJECT DESIGN OFFICE	CIAT International; CIAT Report; Press Releases; Relevant Country Reports; Season Greatings
2. NARS DECISION MAKERS Ministers of Agriculture, Science, the Environment; NARDS R&D Managers (public, private, NGOs); Research leaders; Influential scientists; Agricultural Universities Governance	INSTITUTIONAL RELATIONS	CIAT International; CIAT Report; Press Releases; Newsletters; Relevant Country Reports, Season Greatings
3. INTERNATIONAL SYSTEM CG-Secretariat; TAC; Sister Centers Governance; Local Representatives of International and Regional Agencies such as FAO, UNDP, USAID, IDB, IICA (in their capacity of field offices - not donors)	OFFICE OF THE ASSISTANT TO THE DIRECTOR GENERAL	CIAT International; CIAT Report; Press Releases; Season Greatings
4. PRESS Newsmedia	HEAD OF COMMUNICATIONS	Press releases; and others as per instructions from Communications Unit

	CATEGORY	RESPONSIBLE FOR INFORMATION ON CATEGORY	AUTOMATIC MEDIA DISTRIBUTION*
5.	CIAT FAMILY CIAT's governance and scientific staff (past and present)	OFFICE OF THE ASSISTANT TO THE DIRECTOR GENERAL (for Board Members) OFFICE OF THE ADMINISTRATIVE ASSOCIATE TO THE DDG - F&A	Member's choice
6.	CLOSE CIAT RESEARCH COLLABORATOR	SENIOR STAFF	Member's choice (subject to approval by Institutional Relations)
7.	ASTS (Agricultural Science and Technology System); related to CIAT's interests - outside 1.-6.	SENIOR STAFF DISTRIBUTION OFFICE (for self-requested entries)	Newsletters
8.	LIBRARIES Exchange High impact network	HEAD OF INFORMATION AND DOCUMENTATION	As per instructions from Information and Documentation Unit

* Recipients are also eligible to receive other materials upon instruction from CIAT Senior Staff (subject to IDS assessment)

DISTRIBUTION meets the needs of serving exchange and high impact libraries. However, the network of high impact libraries fulfills another function for which information on these libraries is being assembled in one further data-base, **LIBRARIES NETWORK**. CIAT receives a very large number of requests from individuals for donation of publications (not only for serials--which often would be granted in the way of subscription to CIAT newsletters--but especially for more costly technical publications). Granting such donations is beyond CIAT's financial capacity on the one hand; and on the other hand, on the ground of level of education, it is often quite doubtful whether the person making the request actually would be able to make full or even good use of the information being provided. Rather than replying negatively, however, the requester is referred to the closest high impact library which carries those CIAT publications which might suit him or her.

AGREEMENTS, PROJECTS, AND TRIP REPORTS

Presently these are three physical archives that contain printed (typewritten) information. New additions are stored in machine-readable form. It is expected to convert the physical files to documentary data-bases in which the user may access information in varying degrees of detail, from just the document title, to an abstract, to the document's full text. Relevant persons referred to in the documents will be entered in PERSONS.

DONORS AND PARTNERS

These are two new additions to be made to IRD-IS. They will contain information on institutions, and on the positions of persons in those institutions. Attempt will be made to also record relevant functional relations among positions within the institutions.

CIAT's Project Design Office is responsible for the donors data-base. The Institutional Relations Liaison Office (former Registrar's Office) is responsible for the partners data-base (as well as for TRAINEES, CONFERENCE PARTICIPANTS, and VISITORS).

Draft

A Retrospective and Prospective View of CIAT's Activities in Institutional Development for Tropical Agricultural Research and Development

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INTRODUCTION

CIAT's business is development-oriented **research.** This is complemented by **institutional development** aimed at (1) enabling partners in developing countries to better perform their duties; (2) contributing to link loose or poorly articulated components of research and development systems to the overall system of which they should be fully functional members; and (3) developing new organizational models (e.g. networks, farmers participatory research, training bodies, etc.). The principle of comparative advantage strictly guides CIAT's involvement in these activities.

Institutional development is a Center-wide effort. Everybody throughout CIAT is directly or indirectly involved in it, whereas Institutional Relations and Development Support provides specialized backstopping in this field.

CIAT's reporting on institutional development has been somewhat fragmentary. On the one hand, it was regularly done on some of the input activities such as training. On the other hand, there have been reports on some specific institutional development endeavors such as commodity-specific networks, or integrated cassava projects. Being presently at the interface between the former CIAT, devoted to commodity research, and the new CIAT, for research on germplasm development and resources management, it appears convenient to systematically take stock of past institutional development experiences across CIAT, with a view towards (1) infering general principles and identifying broadly applicable methods for institutional development; (2) assessing the usefulness of CIAT's institutional development experience for NARDS and for the Center's new endeavors; and (3) identifying emerging institutional development challenges.

This document is only an initial attempt at such a Center-wide retrospective and prospective analysis. It will first make inventory of the various types of institutional assemblages that have been developed. Second, one such assemblage, that is, farmers-linked research and development systems, will be discussed. Third, some emerging institutional development issues will be raised. Fourth, CIAT's institutional development experience will be illustrated with a set of case-histories. Finally, an appraisal across the various case-histories will be made.

INSTITUTIONAL DEVELOPMENT INVENTORY

CIAT has taken on a wide range of institutional development targets, from simple disciplinary research teams to complex research and development systems or to international research networks (Table 1).

TABLE 1. INSTITUTIONAL DEVELOPMENT TARGETS ADDRESSED BY CIAT

1. Disciplinary research teams.

2. Multidisciplinary commodity research teams.

3. Commodity research networks.

4. Integrated commodity research and development systems.

5. Farmers-centered participatory research (not commodity specific).

6. Commodity-specific training "apparatuses".

7. Advanced research networks.

8. Research management.

9. Research support services.

For any such target, the scope of institutional development activites would vary from a small intervention--to enhance an existing system--to a major participation in the development of a new system.

CIAT applies a wide range of activites to institutional development. For simple interventions, a single activity, as for instance training, may suffice. In more involved interventions, a broad array of activities may have to be brought into play. A list of such activities includes training; advising and counselling; joint research; information and communications support; supply of germplasm; research and development promotion; inter-institutional conveening; role modelling; and even the management of new institutional models (e.g. networks). For any particular case, the specific circumstances define which of these activities will be brought into play, and what will be the relative intensity among activities.

DISCIPLINARY RESEARCH TEAMS

Institutional development of disciplinary--plant breeding--research teams was initially central in CIAT's bean and rice programs. But it soon evolved into the next type, that is, into the development of multi-disciplinary commodity research teams. However, institutional development for modern biotechnology can be seen as a new disciplinary target.

The demand for training in biotechnology at CIAT has been growing (see report on biotechnology in "Training for tropical agricultural research and development"). Such an increase raises the issue of how far should CIAT go in meeting the NARS demand which may originate in needs unrelated to CIAT's mandate. This is still an open question.

Support to the development of genetic resources units may also be considered as being disciplinary team development. The number of national genetic resources units is on the increase. CIAT will continue supporting the development of those segments in the units which are related to the resources in the Center's mandate.

MULTI-DISCIPLINARY COMMODITY RESEARCH TEAMS

These teams have been one of the main foci of CIAT's institutional development efforts related to beans, cassava, and rice. Pastures focused more on networking (see below), but some inter-disciplinary national pasture research teams were also established, e.g. in the sub-humid and humid tropics of Mexico (see case-history). By and large, multi-disciplinary commodity research teams are now in place in practically all countries of Latin America and the Caribbean where beans, cassava, and rice are important. Great progress is also being made towards reaching this goal in Africa (beans) and Asia (cassava).

COMMODITY RESEARCH NETWORKS

CIAT has established a substantial number of international research networks. They include (1) germplasm evaluation networks for beans, tropical pastures (RIEPT), and for cassava breeding; (2) subregional commodity research networks for beans (PROFRIJOL, PROFRIZA) and rice (CRIN); (3) a network of integrated cassava projects; and (4) a socio-economics network for Central America and the Caribbean.

INTEGRATED COMMODITY RESEARCH AND DEVELOPMENT SYSTEMS

CIAT contributed widely to developing commodity **research** and/or **development** systems. The following is an inventory by Commodity Programs.

Cassava

CIAT's promotion of integrated cassava projects has been widely publicized. Such projects have been successfully implemented in Colombia, Ecuador, and Brazil (in chronological order). Essentially, they endeavor to establish community-based cassava agroindustries. The main product marketed by these industries are chipped and dried cassava roots, but they may also produce and sell cassava starch, cassava leaf and stem meal, cassava planting material (stakes), and chemically conserved fresh cassava in polythene bags. Institutional development in these projects is highly interinstitutional. It addresses peasant organization, raw material (cassava) production, value adding (cassava processing), and commercialization.

A special case of developing cassava research and development has been Paraguay, where the development side concentrated on improving the production of fresh cassava, rather than on cassava processing (see case-history).

Another particular case was the development of a R&D network for integrated control of cassava root rot in northern and northeastern Brazil (see case-history).

Beans

On-farm-research and artisanal seed production were conspicuous in bean R&D development. El Salvador and Santa Cruz de la Sierra, Bolivia are good examples of this (see case-histories). Similar accomplishments have been achieved in most countries involved in the Central American and Andean bean R&D networks, PROFRIJOL and PROFRIZA.

Artisanal seed production and its evolution into community-based small-scale seed enterprises is a noteworthy story in itself (see the case-history of Santa Cruz de la Sierra; case-studies from CIAT's Seed Unit will also be forthcoming). In brief, artisanal seed production first improved peasant farmers capacity to produce their own seed, and to multiply improved bean varieties. Thence, under CIAT's catalytic influence, enthusiastic national partners encouraged farmers to associate in small enterprises to produce seed for their fellow farmers, and eventually for commercialization beyond their community. CIAT's Seed Unit designed appropriate equipment for such enterprises.

Community-based seed enterprises have a particularly far reaching potential. In addition to fulfilling the aforementioned role, they are a channel for disseminating seed embodied technologies for crops and production systems which are not served by the traditional large-

scale seed industry. They may accelerate the rate of diffusion of new plant varieties among farmers. However, maintenance of their link to plant breeding is a cause for concern in an environment where public sector plant breeding may be dwindling, and private plant breeding may not be interested in peasant farmers crops[1].

Rice

CIAT's Rice Program collaborated with several countries in developing and implementing so called National Rice Plans. These are inter-institutional efforts that link-up rice research, technology transfer, and farmers; occasionally national policy making levels are included in the linkage (see case-history of rice in Venezuela). The northern Andean countries (Ecuador, Colombia, Venezuela), and the Dominican Republic in the Caribbean are the scenarios of this work that still is in progress.

Tropical Pastures

The Tropical Pastures Program moved into integrating research and development more recently than CIAT's other commodity programs. Only after having literally invented legume-based pastures, by bringing wild species into production, could the Program begin to move such prototype technologies into development in farmers fields.

Research and development are presently being linked along two lines: the generation of a seed supply for the new forages (see Tropical Pastures Program report for in-depth review 1991), and on-farm testing of pastures. Both have been defined by the RIEPT as top priorities, thus marking a transition from a germplasm evaluation network towards a commodity research network.

FARMERS-CENTERED PARTICIPATORY RESEARCH

Research on the incorporation of farmers into the agricultural research process (Ashby, 1986, 1990a, 1990b), has generated valuable insights into peasant farmers' rationale for using technology, and into how to link them with, and involve them in, research. The implementation of this research produced (1) organizational models for farmers to do their own research and to benefit from scientists research, and (2) models for institutional support

[1]Dwindling plant breeding in the public sector, compounded by private plant breeding not being interested in peasant farmers' crops, raises other concerns. CIAT could be at the risk of having its germplasm development cut off from the end users. If so, the Center might need to resume breeding finished varieties, which would clash with its new strategy.

to farmers participatory research. Both are spreading spontaneously from the original research sites, on the one hand; and, on the other hand, they are being disseminated actively by Colombian development institutions, especially NGOs, with CIAT's collaboration.

COMMODITY SPECIFIC TRAINING "APPARATUS"

For newly developed institutions and organizations to last, they must have access to a supply of trained manpower. However, well-trained professionals are often scarce in developing countries, and an indigenous training capacity is usually lacking.

Addressing one particularly acute need, that is, the training and up-dating of extensionists in recent technological developments, CIAT has developed a model training "apparatus". Hitherto, the model is commodity-specific (though its basic principles are commodity or subject-matter neutral); the scope is subregional rather than national; and the final product has three main components, (1) a legitimized institutional training body, (2) a cadre of trainers with subject-matter expertise and command of adult education methodology, and (3) appropriate training materials.

Much has been done and said worldwide on the training of trainers. A critical aspect, however, has often been overlooked: trainers must have a legitimate training responsibility. Training must be an activity for which the trainers are responsible, for which they receive incentives and are evaluated. Otherwise, training will be a secondary activity in competition with primary activities, such as research or extension--for which the incumbents will be responsible and accountable above everything else. Being secondary, training will then be left for when there is spare time, that is, for opportunities that should not exist by definition.

In establishing an indigenous training capacity CIAT has resorted to two legitimizing mechanisms: either an international network (e.g. PROFRIJOL) or a national interinstitutional mechanism (e.g. Consejo Consultivo Nacional del Arroz, Venezuela--see case-history) assumes ownership of the new training body.

The process of training the trainers, in brief, is as follows. Subject-matter specialists who also have an inclination (and often a talent) for training are identified from an interinstitutional and international pool of human resources. Then, these specialists are helped to acquire a command of communications skills and of adult education (andragogy) techniques. As an integral part of their andragogic training, the future trainers prepare their own training materials which respond to the priorities identified by their mother institutions. The full process, and actual examples on beans in Central America, rice in the northern Andean region, cassava in the South American subtropics, are described in a companion report.

An important feature of the new training bodies is that the trainers, although recognized--legitimized--as such, continue being active in research and/or extension. This implies that they will have first hand experience of what they help others to learn (the word teaching is avoided because adult education rests on helping others to meet their learning needs rather than on teaching them) and that they are not lost as a research and/or extension resource. The having-first-hand-experience of what is being transmitted overcomes one of the main drawbacks of Latin American superior agricultural education: the teaching of subjects of which the teachers lack experience.

The subregionality of the training bodies deserves additional comments. Small countries will hardly be able to have a fully fledged extensionists training capacity of their own, one in which the trainers have first hand and high quality experience of the training contents. Regional bodies do have this capacity. Further, the pressure on individual trainers for devoting time to training (rather than to research and/or extension) may be reduced in across-countries bodies. Optimization of time allocation between training and other responsibilities should thus be facilitated.

The training materials prepared as a part of the institutional development of subregional training bodies have some peculiarities worth mentioning. First, the subjects addressed respond to the extension priorities recognized in the individual countries which participate in the project, and then consolidated by consensus across countries.

Second, the materials--called "learning units", in congruence with the basic philosophy of helping to learn rather than teaching--are structured as aids for integrally structured learning sequences. Each of them contains a sequential text, guidelines for practical exercises, instructions for evaluating the learning process, and visual aids (slides and over-head projection transparencies), all in loose leaf binders. Their structure allows easy updating and introduction of site-specific adjustments.

Introducing the sets of subject-matter-specific learning units, there is a "mother" learning unit. It deals with the principles of adult education, with how to assess learning needs, and with how to facilitate learning, including how to establish learning sequences and how to design and produce learning units.

ADVANCED RESEARCH NETWORKS

CIAT has catalyzed the integration of advanced research networks on cassava and on beans. Their members apply molecular biology and modern biotechnology to seeking strategic breakthroughs in recalcitrant research problems relevant for developing countries' agriculture. In addition to their specific research outputs, these networks are likely to have a role in the integration of a global agricultural research system (see EMERGING INSTITUTIONAL DEVELOPMENT ISSUES).

RESEARCH MANAGEMENT

It is not in CIAT's mandate to address research management as part of its institutional development activities. However, the aforementioned institutional development actions inevitably impinge upon NARS management levels, and they contribute to their development.

CIAT's participation in the development of national research programs, of integrated research and development programs, and of international networks sets standards and guidelines for national partners, especially through role modelling. In this CIAT is not alone. Other IARCS exert similar influences upon NARS; and ISNAR's work has specifically influenced some NARS. No matter what exactly the contributions of the various players may have been, clear progress in the NARS has been noticeable in recent years in matters such as prioritizing among research options for resource allocation, strategic planning, and being client oriented. The activities and the role model of IARC's socio-economists have been particularly conducive in this respect.

RESEARCH SUPPORT SERVICES

Good research relies on good support services such as biometrics, data-base management, information and documentation, and communications. CIAT is well provided with such in-house support. NARS often are not. Should CIAT engage in trying to develop or strengthen NARS' research support services? Only where the Center may have a comparative advantage. This is fairly limited. Nevertheless, CIAT has occasionally provided training to a limited number of NARS communicators, biometricians, and librarians.

CIAT's role model could be expected to influence NARS research support services. The effect, however, has not been very noticeable, probably because NARS, under the influence of the financial crisis of the 1980s and its aftermath, have usually cut funding of their support services drastically let alone developed them.

INSTITUTIONAL MODELS: AN OUTPUT OF INSTITUTIONAL DEVELOPMENT

CIAT's institutional development activities have served to strengthen (and not infrequently develop) well known institutional models such as disciplinary and interdisciplinary research teams. But further, they have generated **new institutional models** such as networks, integrated commodity research and development teams, community-based agroindustries, farmers participatory research arrangements, and training "apparatuses". Not all can be discussed here. Rather, attention will be given to CIAT's experience with one of them, i.e., integrated systems that link up farmers, research, and development.

FARMERS-LINKED RESEARCH AND DEVELOPMENT (FL-R&D)

TWO SITUATIONS

In the development of integrated systems that link-up research, technology generation, and farmers it may be convenient to deal separately with two different situations:

(1) Peasant farmers; small production units; often low value product; difficult access to credit and to purchased inputs; poorly linked to markets; not organized in common interest groups.

(2) Commercial farmers; larger size production units; product of varying value, often decreasing; may have access to credit and purchased inputs, but input costs often rising; linked to markets; often members of well organized common interest groups, such as growers associations.

The former is typical of bean and cassava production; the latter applies to rice production (especially under irrigation) and to some livestock production systems.

For the sake of brevity, in the rest of this document the two situations shall be referred to as peasant farming and commercial farming.

PEASANT FARMING

Two approaches

Integrated commodity research and development teams, and farmers-centered participatory research converge in support of peasant farmers.

The former follow the on-farm-research (**OFR**) approach in which researchers, extensionists, and social scientists interact with farmers to diagnose and prioritize constraints to the farmers business. Then they look for available solutions--usually technological--, and test them in farmers fields (with variable farmers participation). If no solutions are forthcoming, feedback is given to off-farm research to develop such solutions. The approach is essentially technology driven and relies strongly on off-farm research. It usually is commodity-specific. Technological solutions frequently are components for the enhancement of existing production systems, and often they are centered on seed-embodied technologies complemented with management techniques. Farmers involved in OFR benefit from quick solutions to specific (usually biophysical) production problems.

Farmers participatory research (**FPR**) starts working with farmers, with the aim of improving their lot through enabling them to improve their land-based business. It is socially rather then technologically driven. It links to off-farm technological research, on the one hand

looking for available technologies (in the same way as OFR does), and on the other hand bringing together farmers and off-farm researchers to jointly design technological solutions to farmer-felt needs. It also links to other players, to enable farmers in dimensions other than the technological one, and to link them to their environment, including markets. In addition to providing quick solutions to specific problems in the same way as OFR does, it initiates an open ended process of farmers' social development through enablement to manage their land-based business.

Although the two approaches are quite different from each other, part of the following discussion is germane to both. When there is no need to distinguish among them, reference will be made generically to peasant farmers-linked research and development (**PFL-R&D**).

Technology adoption vs. technology development with farmers

Technology adoption implies the existence of technologies that are waiting to be adopted. This may be inherently inefficient in that technologies are fully developed before assessing whether they will be adopted. In this respect it is interesting to note that corporate industrial R&D tests its prototype technologies or services (which eventually should become marketable products) at very early stages by submitting them to the end users or to conditions close to end use. Thus non-viable projects are aborted early, before much wasteful investment has gone into them. Documented evidence shows that as many as 69 projects fail for every new product that successfully reaches the market (Booz, Allen and Hamilton, Inc., 1968). Agricultural research often seems to assume that all technology development projects must be successful, taking them to completion before testing the product under real farmer's conditions.

In any case, having access to a "supermarket" of technology to chose from, it obviously is sensible to make use of it. However, when it comes to develop new technology it would be better to develop it with farmers on their farms to do justice to their rationale of optimizing resource utilization, which cannot be simulated by on-station research. Off-farm research may, of course, provide inputs to and receive feed-back from FPR.

Small teams work with farmers and link up with off-farm research

Small teams (2-4 persons) of well-trained and highly motivated researchers proved themselves sufficient for OFR and FPR (see, for instance, the case-history of beans in Santa Cruz, Bolivia). But they should be linked to other research teams, such as commodity-specific teams; on the one hand to be able to articulate farmers' demand for technology, when such demand exceeds the capacity of OFR and of farmers to innovate; and, on the other hand to remain cognizant of opportunities for innovation which may lie outside the farmers' horizon.

Links to markets

To prime a cycle of technology demand and utilization--which should lead to sustained growth of farmers' income, or better still, to a sustained process of social development--peasant farmers need to be linked to a market.

Entrepreneurial small-scale farmers may successfully situate their primary produce in a market. However, value-adding to the primary product, and synergism from organization in common interest groups, may make access to markets easier. Community-based agroindustries, such as those developed in integrated cassava projects or in community-based seed enterprises, have the advantage of combining both means.

Coordination and promotion

FPR can be seen as both an activity **and an organization or a system.** The system encompasses farmers, researchers, support organizations, markets, and the links among them. This systemic quality marks a clear-cut difference with other approaches that try to foster the use of technology by farmers, such as on-farm-research, farming systems research, research and extension, etc. However, FPR is not a self-organizing system, and it doesn't arise spontaneously. Consequently, promotion is necessary, at least in the early stages of a FPR module; and the various components and links require an active coordination to develop, function, and interact properly.

The same need for promotion and coordination applies **mutatis mutandis** to commodity specific OFR linked to off-farm research.

There are examples of both formal and informal coordination, but clearly, a strongly proactive coordination has been very evident in all successful cases. Conversely, the lack of a suitable promoter doomed some attempts to develop PFL-R&D.

Some emerging issues

Most PFL-R&D modules are still young, that is, the original promoters-coordinators generally are still there. Mechanisms for ensuring a successful leadership succession may not be in place or have still to show their effectiveness.

Establishing PFL-R&D modules is labor-intensive in highly skilled personnel. How to replicate PFL-R&D modules in large numbers requires further work. CIAT's model of training trainers may be germane to this. However, hitherto, trainers dedicated to beans have focused on commodity production rather than on how to work with farmers. Training these trainers in how to help others to perform FPR needs to be explored urgently.

Existing PFL-R&D modules have been closely linked to off-farm research as part of their still experimental development. What degree of linkage will they need in the future? What degree of linkage to off-farm research would new PFL-R&D replicates require? How would national off-farm research cope with a large demand from numerous PFL-R&D modules?

COMMERCIAL FARMING

Farmers-linked R&D for commercial farming--to be referred to henceforth as **CFL-R&D**--clearly differs from PFL-R&D.

Technology can be developed on-station

On-station research and on-farm technology validation has been successful in producing relevant output for commercial farming. Farmers production conditions are fairly well simulated on station; and on-farm fine tuning of technologies produced on-station has proven itself to be efficient. A requisite for this is that farmers needs must be clearly formulated to and addressed by research (see below, Coordination).

Small research teams reach farmers through large numbers of extensionists

On-station research and on-farm validation of technology can be effectively performed by small research teams. However, diffusion of technology needs the work of large numbers of technology intermediaries. Seed-embodied technologies have spread without such manpower, but integrated crop management--which combines the use of seed-embodied and management techniques--cannot do without actively advising farmers in the field. CIAT's training the trainers model is proving its effectiveness in developing cadres of technology intermediaries (see case-history of rice in Venezuela).

Coordination

Linkage among farmers, research, technology validation, and diffusion needs close coordination. Successful cases usually have an interinstitutional mechanism with strong or predominant representation of farmers organizations (growers associations). Such mechanisms have brought together public sector research; universities; and public and private sector extension. National commodity-specific teams of trainers have been institutionalized within these inter-institutional coordinating bodies. The most noticeable examples are the collaboration on rice between ICA, FEDEARROZ, the University of Tolima, and CIAT in Colombia; and the Consejo Consultivo Nacional del Arroz (National

Consultative Rice Council) in Venezuela (see case-history) which brought together FONAIAP, APROSCELLO, APROSELLAC, and others in an interinstitutional platform with which CIAT interacts (see case-history).

This CFL-R&D model, obviously, is quite different from the public sector research and extension model.

RELEVANCE OF PFL-R&D AND CFL-R&D TEAMS FOR CIAT'S NEW ENDEAVORS

CIAT's germplasm development programs will be less immediately linked to end users than the predecessing commodity programs. If CIAT's work is still to get through to benefit end users, then effective links between research and development at the national level are crucial. This raises the issues of ensuring continuity of rather young FL-R&D teams, and of creating new ones were they do not exist or are not enough in number. Is there a role for CIAT in addressing these issues? If so, what should it be? Compiling CIAT's experience on this matter and making it widely accessible to those interested in, and responsible for, the development of effective national agricultural R&D systems may be an answer to these questions.

Existing FL-R&D teams may become partners with CIAT's agroecological programs in on-site research. And new FL-R&D modules will in all likelihood have to be developed as part of the on-site research activities. In this respect, the Center's institutional development experience wrought over many years is a strong asset in CIAT's new endeavors.

EMERGING INSTITUTIONAL DEVELOPMENT ISSUES

In addition to the already mentioned issues on the continuity and replication of FL-R&D teams, other issues are emerging in relation to (1) agroecological research for sustainable and productive land use, and (2) the development of a global integrated R&D system.

Agroecological and land use research

FL-R&D helps farmers to improve their land-based business. CIAT's substantial experience on how to perform this function will be a strong asset in agroecological on-site research.

However, agroecological on-site research will need to address more than the land-based business of farming. There will be other land-based businesses, e.g. agroforestry and forestry. Further, there will be other land uses such as communal land use, public sector land use,

and land reserves (a non-use). In each land use there may be a need for optimizing the use of resources. And in relevant land-use units, such as micro-basins, there will be a need to optimize the allocation of land to the various land uses.

How will optimization of resources utilization within each land use category be addressed? By whom?

What actions will lead to optimizing the allocation of land to the various land use categories? What institutions will have to come together at the local level? Under what interinstitutional arrangements? And how will the local level link to the relevant off-site levels?

Obviously a whole new generation of institutional development issues and challenges is emerging. Not only need the multifarious institutional players be brought together by ad hoc mechanisms; new long-term interinstitutional arrangements will have to be developed to address research and development for sustainable land use.

Progress is already being made on these new fronts. CIAT, IICA, CATIE, and CIMMYT have come together in a consortium for sustainable agricultural development. Sites for research in the Central American hillsides have been selected. And an organizational model for interinstitutional and highly participatory on-site research and development has been proposed.

Global research and development R&D system

A great challenge, and simultaneously opportunity, is the need to integrate a fully articulated agricultural research and development system.

NARIs are being downsized and decentralized while a large variety of new institutional players (universities, private enterprise, farmers organizations, NGOs, foundations, etc.) are emerging and occupying niches in the research-development continuum. The various niches have to be linked up among them in every country if the R&D continuum is to be effective and efficient.

Regional research and development networks and organizations (e.g. PROCISUR, PROCIANDINO, PROCITROPICOS) have been set in motion. However, they usually bring together only the NARIs, despite their downsizing, decentralizing, and giving up large stretches of their former functions. Consequently, the need for national interinstitutional coordinating fora expands into a need for articulating national interinstitutional arrangements with regional bodies. And both need to link up with international institutions such as the IARCS, and with funding agencies, particularly those that simultaneously operate bilaterally and multilaterally.

It isn't CIAT's business to attempt putting together a global agricultural research and development system. But CIAT, by necessity, integrates components of such a system across the national, regional, and international levels. CIAT's insights, therefore, would be expected to be useful to others with a larger articulating role.

CIAT's activities stretch beyond the boundaries of an agricultural R&D system. As discussed in the previous section, they reach into other land-based R&D. Thus, more players still, and additional functions need to be linked up, further compounding the already mind boggling complexity of the institutional development challenge.

Another institutional development challenge comes from a different front. Molecular biology and biotechnology are increasingly moving from the public to the private sector. As a consequence, information, techniques, and products are increasingly becoming private property. In developed countries, even public sector institutions tend towards applying intellectual property rights to their output. These trends put developing countries at the risk of not having access to dearly needed information, techniques, and products.

CIAT can be an important bridge to help NARS keeping abreast of advanced research. One such mechanism would be the advanced cassava and beans networks; another would be training NARS researchers in biotechnology. This raises the issue whether CIAT would be prepared to meet NARS biotechnology training needs beyond those strictly related to germplasm in CIAT's mandate; and if so, how far? The issue actually exceeds CIAT and applies to IARCs in general. In this regard, CIAT might consider joining efforts with other Centers to play this bridging role. Again, should it? To what extent?

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CASE HISTORIES

DEVELOPMENT OF A PASTURES RESEARCH AND DEVELOPMENT CAPACITY IN THE MEXICAN HUMID AND SUB-HUMID TROPICS

BACKGROUND

The Mexican humid and sub-humid tropics carry over 16 million head of cattle, that is about 44% of the national herd (Peralta and Ramos, 1987). Slightly over one third of this stock is in the sub-humid tropics, while the other two thirds are in the humid tropics.

The productivity of the tropical herd, however, is very low. Data presented by Peralta and Ramos (1987) indicate that the average yearly output per head of cattle in the regional herd is rather similar in the humid and sub-humid tropics: 33.7 kg of beef and 104.1 liters of milk in the humid tropics; 32.1 kg of beef and 116.0 liters of milk in the dry tropics. The output per unit of land, on the other hand is substantially higher in the humid than in the sub-humid tropics. When referred to land in pastures (be they sown or native), the output of beef per hectare is 35.9 kg in the humid tropics, and 19.5 kg in the sub-humid tropics, while the respective output of milk is 111.0 and 70.2 liters. The difference in favor of the humid tropics is due mainly to a higher stocking rate (1.07 vs. 0.61 cattle per hectare of land in pasture).

In the sub-humid tropics only 7% of grazing land is in sown pastures, whereas in the humid tropics 61% is. The sown pastures are exclusively grasses, and their productivity, although higher than the native sward, is still low. Further, these pastures degrade rapidly due to overgrazing and a devastating incidence of spittle bug (Peralta and Ramos, 1987).

THE OPPORTUNITY

To improve the nutritional basis of the Mexican tropical cattle herd is, clearly, a substantial challenge. Improved pastures may be an alternative for such an improvement, particularly if they contain nitrogen fixing legumes.

This was recognized by Mexico's NARI, now INIFAP, in the early 1980s. But at that time the necessary germplasm was not available, and the research capacity to develop it was only incipient. Both constraints were, therefore, addressed.

THE ACTIONS

IDENTIFICATION AND EVALUATION OF ADAPTED GERMPLASM

First, a great variety of grasses and legumes were transferred from CIAT to Mexico to evaluate their adaptability in the many differing environments of the Mexican tropics. A

Mexican Network of Tropical Pastures Evaluation was created; by 1985, 193 ecotypes of 97 forage species had been tested, and 24 Regional Trials (RT) A[2] were in progress. Further, 24 RTB were under way in three major ecosystems; and 4 RTB and 2 RTC were in execution in top priority ecosystems (Peralta, 1986).

Since then, the accumulated total of concluded trials is 31 for RTA and RTB; 18 for RTC; and 4 for RTD (Argel, P., personal communication).

The establishment and conduct of regional trials was a special challenge due to the marked environmental disparities and the strong seasonality in the Mexican tropics. Much adaptation of the methods developed in the South American savannas and Cerrados was necessary, and implemented in close collaboration between national and CIAT researchers.

The tangible output of the methodology development and germplasm evaluation efforts is four cultivars of grasses released formally, and two of legumes released through informal mechanisms (Peralta and Enríquez, 1992):

Grasses	**Cultivar**
Andropogon gayanus	Llanero
Brachiaria decumbens	Chontalpo
Brachiaria brizantha	Insurgente
Brachiaria humidicola	Chetumal
Legumes	
Pueraria phaseoloides	Kudzu
Clitoria ternatea	Tehuana.

[2]The International Network of Tropical Pastures Evaluation (RIEPT) has standardized four types of regional trials (RT) (Toledo, 1982):

* RTA assess the adaptation to the environment of a large number of entries in a few sites.

* RTB assess the productivity of a smaller number of promising materials from RTA in clipping experiments.

* RTC evaluate still fewer outstanding materials from RTB, assessing their capacity to withstand grazing.

* RTD test the most promising materials from RTC, assessing their capacity to sustain animal production in comparison with local checks.

DEVELOPMENT OF A SEED SUPPLY

Without an adequate seed supply there will be little difussion of new pastures technology to farmers. And even research may be hampered by lack of seeds.

In the early stages of the evolving Mexican tropical pastures program, CIAT was an important source of seeds for experimentation (above and beyond germplasm introductions), and local scientists multiplied seeds to meet their immediate research needs. Then, in 1987, INIFAP started a seed research and experimental-seed production project with technical support from CIAT (Figure 1).

Research on seed production (Enríquez and Peralta, 1992) included

* evaluation of crop support systems for seed production of *Centrosema brasilianum*;
* evaluation of the effect of production system on seed harvest of *C. brasilianum*;
* evaluation of nitrogen fertilization and harvesting method on seed yield from *Brachiaria brizantha.*

Ongoing research focuses on fertilization for seed production in *B. decumbens*, *B. brizantha*, *B. dictyoneura*, *Arachis pintoi*, and *C. ternatea.*

In the four-years period 1988-1991 the project produced over 14 MT of seed from 24 accessions/cultivars for experimental purposes (mainly germplasm evaluation), and in support of the release of cultivars.

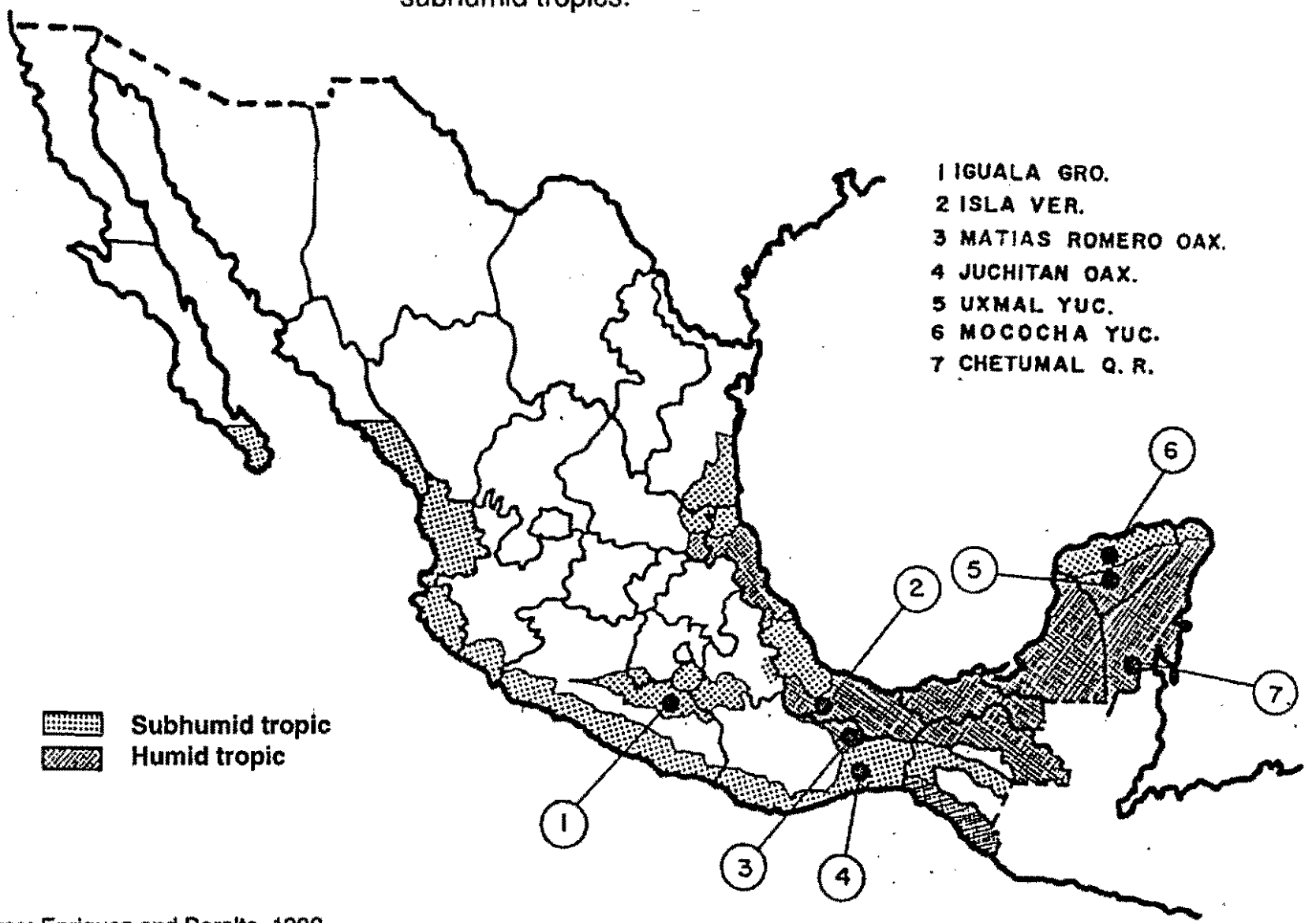
In the immediate future activities will concentrate on the production of basic seed in the pre-release stages for *B. dictioneura*, *A. pintoi*, *C. ternatea*, and *Centrosema pubescens.*

Until 1989, an insufficient availability of seeds to farmers seriously hampered the diffusion of the new forages. However, the opening of the Mexican economy, and an important catalytic role of the seed project's leader, Armando Peralta Martínez, led to importation of forage seeds from Brazil. For the four officially released grasses seed imports jumped from 100 MT in 1990 to 459 MT in 1991 (Enríquez and Peralta, 1992). A newly established private seed enterprise now markets the six cultivars which have been released so far.

RESEARCH ON BIOLOGICAL NITROGEN FIXATION

To fully realize the benefits of legumes in both animal production and soil quality maintenance and enhancement, the nitrogen fixing symbiosis between rhizobia and legumes must be effective. To address this topic, CIAT's Tropical Pastures Program assisted in establishing rhizobiological research in Mexico's Tropical Forages Network (see below, training and institutional development).

Figure 1. Seed research and seed multiplication sites in the Mexican humid and subhumid tropics.



Source: Enriquez and Peralta, 1992.

COMMUNICATION AND TECHNOLOGY TRANSFER

Mexican pastures researchers enthusiastically utilized the communication channels with the scientific community provided by RIEPT and CIAT's publication **Pasturas Tropicales.** In RIEPT proceedings they reported on 30 RTB, 9 RTC, 3 RTD, and 15 support regional trials; to **Pasturas Tropicales** they contributed 20 articles.

To farmers, the Mexican Network disseminates its technological innovations through

* mass media and vulgarization publications;

* field demonstrations;

* and, particularly, via the interaction with regional and local farmers organizations in their annual meetings.

By October 1991 the new pastures had spread to nearly 60,000 ha sown to grasses (11% *A. gayanus*, 10% *B. brizantha*, 77% *B. decumbens*, 2% *B. humidicola*); and 2,500 hectares in legumes (51% *P. phaseoloides*, 49% *C. ternatea*).

TRAINING

The above efforts received systematic training support from CIAT. Entry-level researchers were trained in pastures R&D in general. For agronomic germplasm evaluation and pastures establishment, specialized training in pastures agronomy was provided. As work shifted from RTA and RTB towards pastures evaluation under grazing, and evaluation of animal production potential, training in pastures management and quality was offered. Training in seed production, soils-plant nutrition, and rhizobiology came in support of both regional trials and technology diffusion. And training in forage genetic resources developed human resources for the management of germplasm collections.

Thus, 34 pastures researchers from the Mexican Tropics were trained at CIAT since the early 1980s in (1) general pastures research and production courses (ic); (2) individualized training (it); (3) specialized courses (sc); and in combinations thereof as follows:

Training in general pastures R&D

Trainee from	Training modality	Length of training (months)
Chiapas	ic	1.8
Guerrero	ic	1.0
Jalisco	ic	1.8
Tabasco	ic	1.8

Pastures agronomy

Trainee from	Training modality	Length of training (months)
Campeche	ic+it	4.7
Quintana Roo	ic+it	2.2
Quintana Roo (also trained in pastures management and quality; sc; 1.0 months)	ic+it	3.5
San Luis Potosi	ic+it	5.0
Tabasco	ic+it	6.8
Veracruz	ic+it	6.8
Veracruz	ic+it	4.6
Veracruz	it	0.7
Yucatan	ic+it	6.8
Yucatan	ic+it	10.2

Pastures management and quality

Trainee from	Training modality	Length of training (months)
Quintana Roo	ic+it	6.1
Sinaloa	ic+sc	3.4
Tabasco	ic+it	6.2
Tabasco	ic+sc	3.3
Tamaulipas	ic+it	7.5
Veracruz	it	0.8
Veracruz	(ic+it)+sc	4.3+1.1
Veracruz	sc	0.9
Yucatan	ic+it	6.1
Yucatan	ic+it	7.5

Pastures seed production

Trainee from	Training modality	Lenght of training (months)
Oaxaca	sc	1.1
Tamaulipas	sc	1.2
Yucatan	sc	1.1

Genetic resources

Trainee from	Training modality	Lenght of training (months)
Michoacan	it	3.0
Guerrero	ic+it	4.3

Rhizobiology

Trainee from	Training modality	Lenght of training (months)
Quintana Roo	it	1.4
Veracruz	it	1.0

Soils-Plant nutrition

Trainee from	Training modality	Lenght of training (months)
Chiapas	ic+it	6.6
Guerrero	ic+it	7.1
Veracruz	ic+it	8.2

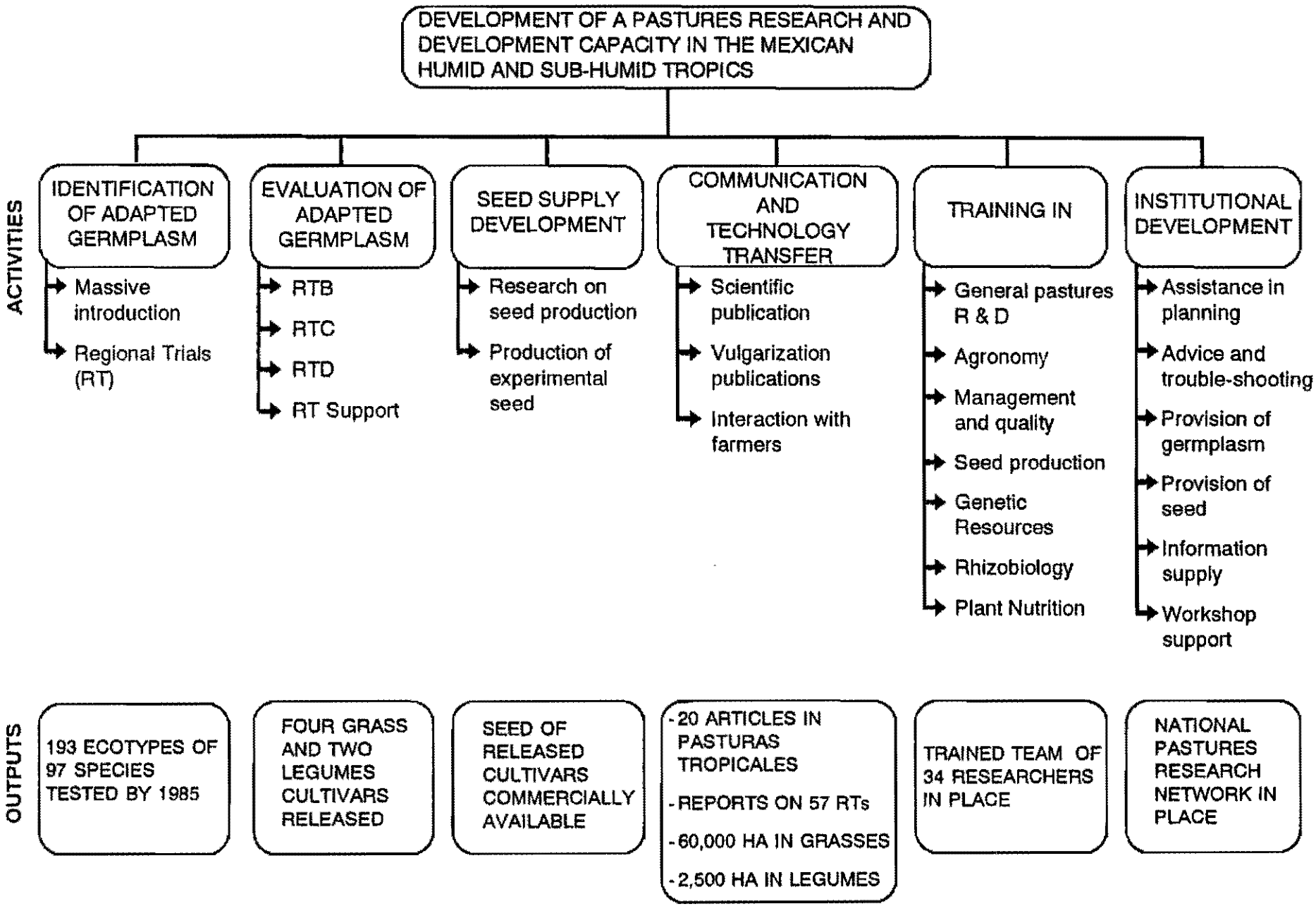
INSTITUTIONAL DEVELOPMENT

A complex set of support activities from CIAT (Figure 2) contributed to build the Mexican interdisciplinary and multi-locational tropical pastures research program while research was being performed and its products delivered.

In addition to human resources development through training, CIAT's support included

* assistance in research planning and experimental design;
* advice and trouble-shooting during the implementation of experiments;
* provision of germplasm, and of experimental and basic seed;
* provision of technical information through Quarterly Analytic Abstracts on tropical pastures, Annual Reports of CIAT's Tropical Pastures Program, **Tropical Pastures**, and services linked to CIAT's specialized information center on tropical pastures;
* assistance in the implementation of a workshop on "Advances in pastures development and tropical forages seed supply" (incidentally, of 18 Mexican participants more than three of every four were CIAT alumni);

Figure 2


DEVELOPMENT OF A PASTURES RESEARCH AND DEVELOPMENT CAPACITY IN THE MEXICAN HUMID AND SUB-HUMID TROPICS
ACTIVITIES
IDENTIFICATION OF ADAPTED GERMPLASM
Massive introduction
Regional Trials (RT)
EVALUATION OF ADAPTED GERMPLASM
RTB
RTC
RTD
RT Support
SEED SUPPLY DEVELOPMENT
Research on seed production
Production of experimental seed
COMMUNICATION AND TECHNOLOGY TRANSFER
Scientific publication
Vulgarization publications
Interaction with farmers
TRAINING IN
General pastures R & D
Agronomy
Management and quality
Seed production
Genetic Resources
Rhizobiology
Plant Nutrition
INSTITUTIONAL DEVELOPMENT
Assistance in planning
Advice and trouble-shooting
Provision of germplasm
Provision of seed
Information supply
Workshop support
OUTPUTS
193 ECOTYPES OF 97 SPECIES TESTED BY 1985
FOUR GRASS AND TWO LEGUMES CULTIVARS RELEASED
SEED OF RELEASED CULTIVARS COMMERCIALLY AVAILABLE
- 20 ARTICLES IN PASTURAS TROPICALES
- REPORTS ON 57 RTs
- 60,000 HA IN GRASSES
- 2,500 HA IN LEGUMES
TRAINED TEAM OF 34 RESEARCHERS IN PLACE
NATIONAL PASTURES RESEARCH NETWORK IN PLACE

* assistance in the implementation of the VI meeting of RIEPT's advisory committee, and the First meeting of RIEPT's Central American and Caribbean Chapter, both in Veracruz; and

* in-country conferences by CIAT specialists.

In this endeavor, over 10 years, 10 CIAT pastures specialists participated in 18 missions to tropical Mexico in a total of 24 person-visits.

LEADERSHIP

A complex integrated effort by CIAT's Tropical Pastures Program (Figure 2) during a full decade contributed to the development, strengthening, and productivity of a National Tropical Pastures Network in Mexico, based mainly on INIFAP, and with the participation of Universities such as the Autonomous University of Chapingo and the University of Yucatan.

The research capacity is in place, the impact in farmers and ranchers fields is taking off. This success, however, would have been impossible without the visionary, able, and untiring work of the institutional leader Dr. Angel Ramos, and the outstanding program leader, Ing. Agr. Armando Peralta.

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DEVELOPMENT OF AN INTEGRATED BEAN TECHNOLOGY GENERATION AND DISSEMINATION SYSTEM IN EL SALVADOR

BACKGROUND

Beans are a major component of people's diet in El Salvador, the smallest country in Central America (approximately 21,000 km^2), and the most densely populated on the American continent (235 persons per km^2). Salvadorians eat beans 2 to 3 times a day every day of the year, for an annual per capita consumption of 15 kg in urban areas, and up to 23 kg in rural areas (van Herpen and Polio, 1991). Most important is the nutritional quality of beans and their relatively low price. Protein content and quality is comparable to the protein source par excellence, beef; but at one fourth the price.

The area sown to beans has grown during the 1980s, from about 55,000 ha in 1980 to approximately 67,000 ha in 1989, at a rate of some 1,500 ha per year ($b = 1,490$ ha $year^{-1}$; $r = 0.89$). Production, however, did not follow this trend. On average it remained constant (about 42,000 MT $year^{-1}$), but with great fluctuations among years do to variable yields. Thus, the lowest and the highest production of the decade 1980-1989 occurred in consecutive years: 24,000 MT in 1988 and 56,000 MT in 1989. The corresponding average yields were 386 kg ha^{-1} and 837 kg ha^{-1}. This gross variation was caused by drought. However, excessive rains also lowered yields badly in 1986 (average yield 585 kg ha^{-1}, as compared to 829 kg ha^{-1} the year before, and 815 kg ha^{-1} the year after).

But bean yields are low even in the absence of catastrophic climatic events. Farmers' landraces have modest yield potential, and they are susceptible to attack by diseases and insects. Lack of a supply of quality seed perpetuates seed borne diseases; farmers' lack of access to pesticides leaves beans a prey to insect attack and disease transmission; and farmers' lack of access to fertilizers and information leaves beans starved by nutrient deficiencies.

THE OPPORTUNITY

In the early 1980s there was an obvious need for improving bean production and productivity through technology generation and dissemination, to increase bean yields, decrease susceptibility to pests and diseases, and make better use of inputs and resources. This was the opportunity for what was to become a fruitful partnership among Salvadorian institutions such as the National Agricultural Research Institute (CENTA, Centro de Tecnología Agrícola) and the Ministry of Agriculture (MAG); CIAT's regional bean project, PROFRIJOL; CIAT's headquarters (Bean Program, Virology Research Unit, Genetic Resources Unit, Seed Unit, Training and Communications Support Program, etc.); and the Institute of Agricultural Science and Technology of neighboring Guatemala (ICTA, Instituto de Ciencia y Tecnología Agrícola).

THE ACTIONS

EARLY RESEARCH

A strong bean research team was assembled at CENTA in the late 1970s and early 1980s; and abundant research output reflected the team's capacity. This clearly showed in a stock-taking seminar held in December 1985 by CENTA where participants learned that 10 new bean varieties had already been produced. However, poor linkage to extension and to farmers was as evident as the team's capacity to produce varieties. None of the new lines had been tested in farmers' fields against farmers' land races. Institutional obstacles, rather than researchers' lack of concern for farmers' needs were at the heart of the problem. Fortunately, the seminar came at a time of positive institutional change. This allowed to usher in on-farm-research (under the Ministry of Agriculture, MAG) linked to CENTA's off-farm research.

ON-STATION-RESEARCH, ON-FARM-RESEARCH, AND ARTISANAL SEED PRODUCTION; DEVELOPMENT OF AN INTEGRATED SYSTEM

A collaborative effort of researchers (from CENTA), extensionists (from MAG) and farmers was started in 1986. It began in San Vicente (Region III, see Figure 3), continued in Santa Ana (Region I), and eventually reached San Miguel (Region IV).

San Vicente

MAG extensionists from all three regions were trained in a first on-farm research course in San Vicente, started in April 1986. Instructors were researchers from CIAT and CENTA, and OFR specialists from ICTA, Guatemala. The event was in three phases (and the corresponding two inter-phases). Individual phases lasted one to two weeks separated by inter-phases of four to five months.

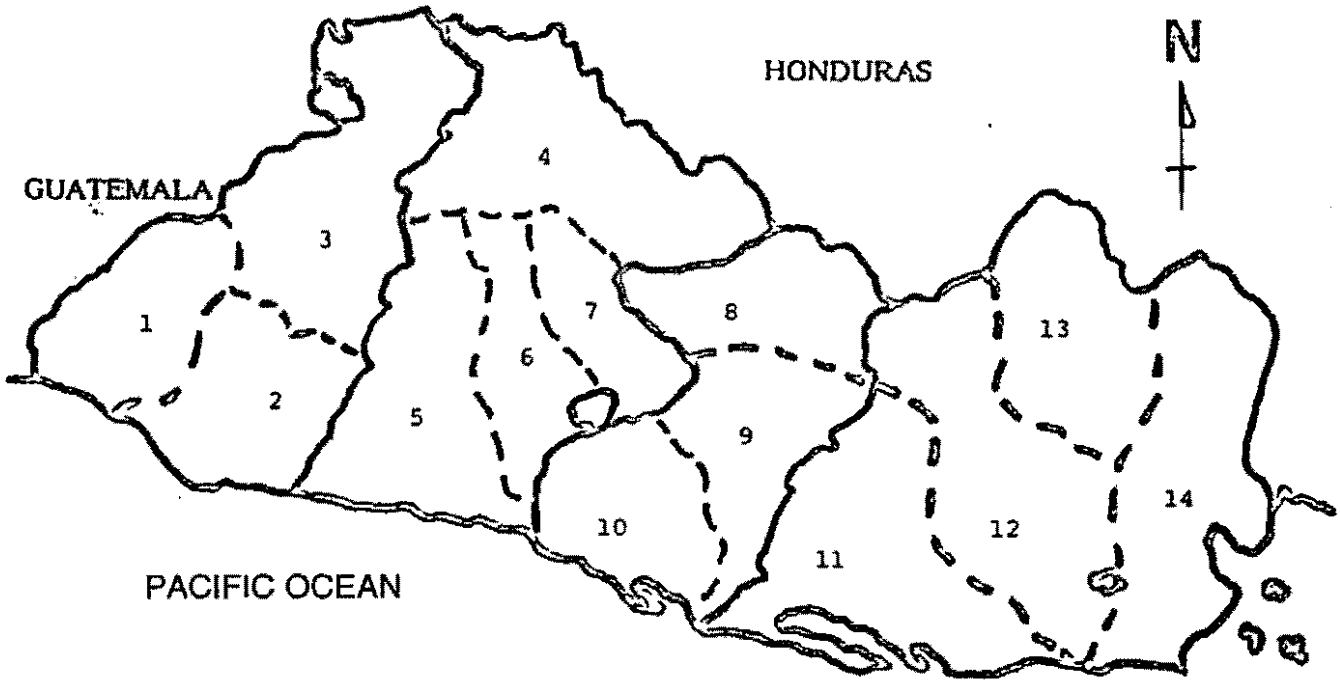
In the first phase extensionists were exposed to OFR principles; to how to do an on-farm-diagnosis; and they prepared action plans for actual diagnoses to be implemented during the first inter-phase in their working places.

In the second phase, participants analyzed the data from their on-farm-diagnoses, prioritized problems, and planned on-farm-trials to be done during the second inter-phase.

During the last phase they analyzed the results from their on-farm-trials and planned follow-up work.

From this course emerged a leader for each of the three regions, and a total of nine extensionists completed the whole training sequence. Promising improved bean varieties were identified, and their agronomy was fine tuned.

Figure 3 . Geographic division of El Salvador



REGION I	REGION III
1 - Ahuachapán	8 - Cabañas
2 - Sonsonate	9 - San Vicente
3 - Santa Ana	10 - La Paz
REGION II	REGION IV
4 - Chalatengo	11 - Usulután
5 - La Libertad	12 - San Miguel
6 - San Salvador	13 - Morazán
7 - Cuscatlán	14 - La Unión

Source : Villegas and Gaona, 1991

To disseminate CENTA-Izalco and RAB 204--the varieties identified as being superior to farmers' land races in the previous event--two other courses were started for 25 MAG extensionists in August 1987: one on the agronomy of new bean varieties, the other on artisanal seed production. Nine local farmers joined the seed course.

Both events were in two phases in coincidence with two sowing seasons.

Santa Ana

A sequence of a two-phases training workshop on the diagnosis of bean production problems and a two-phases course on artisanal seed production was implemented for extensionists in Santa Ana in 1988. There again superior new bean varieties were identified, and their seed multiplied.

San Miguel

In San Miguel the local leader and his colleagues, who had participated in the first OFR course in San Vicente, replicated training sequences similar to those in San Vicente and Santa Ana. For this they were supported by the leaders from the other two regions.

Complementary training at CIAT

The leaders from San Vicente, Santa Ana, and San Miguel received additional OFR training at CIAT, in 1987, 1988 and 1989 respectively.

Results of the integrated team

CENTA's researchers and the newly trained MAG extensionists joined forces for field work. In the first semester of 1988 they planted on-farm yield trials and validation plots in Regions I and III. In addition to CENTA-Izalco and RAB 204, five newer promising CIAT varieties were tested in nine trials and 27 validation plots in Region I, and in six trials and 66 validation plots in Region III. Among the new-generation materials, a high-yielding line resistant to bean golden mosaic stood out: DOR 364.

RAB 204 was released in San Vicente with the name CENTA-Jiboa, in a formal ceremony attended by all technical staff and agricultural leaders of the region.

In 1990, DOR 364 was tested against farmers' landraces in 81 validation plots where it clearly outyielded them. Released under the name CENTA-Cuscatleco, in 1992 it was sown by farmers on 6-7 thousand hectares (approximately 12% of total bean area in El Salvador) (Viana, 1992).

Obviously, the days of researchers locked-in at CENTA's central research station were a thing of the past.

FARMER AND CONSUMER PREFERENCE STUDIES

On-farm-research serves to diagnose production problems which are perceived by farmers as being relevant; and to explore solutions to such problems. However, the acceptability of improved varieties needs to be tested with farmers beyond those involved in the initial diagnosis. Further, consumer acceptance needs equally to be tested. If consumers don't accept a new variety, farmers won't have a market for it. Farmers' and consumers' acceptance of CENTA-Izalco and CENTA-Jiboa was compared with that of a traditional local variety Rojo de Seda (van Herpen and Polio, 1991). In rural areas both new varieties were well accepted (CENTA-Jiboa mainly for reasons of high yield, despite some disadvantage because of relative lateness to harvest). In urban areas, however, only CENTA-Izalco was well received, while CENTA-Jiboa was consistently rated as being inferior to Rojo de Seda and to CENTA-Izalco.

TECHNOLOGY DISSEMINATION

For the spread of new technologies, on-farm-research and artisanal seed production need to be complemented with other means of dissemination, such as demonstration plots, field days, media campaigns, etc. These have been increasingly deployed by the MAG and will not be discussed further. One innovation, however, deserves mentioning for both its cleverness and specific results.

The MAG and the national agricultural development bank (Banco de Fomento Agropecuario) established a farmers contests "Sow and Produce More Beans". Part of the winning price for the first, 1991, contest was a visit to CIAT, which is a telling recognition. But the central story is that 1,200 farmers entered the second (1992) issue of the contest, 110 were awarded prices and mentions, and of them more than 80% entered with CENTA-Cuscatleco, the newly released DOR 364 which had been found to be outstanding in the 1988 field tests. Further, the winning yield in 1991 was about 2,000 kg ha^{-1}, whereas the first three places in 1992 boasted yields of over 3,000 kg ha^{-1}.

TECHNOLOGY ACCEPTANCE

CENTA-Izalco and CENTA-Cuscatleco are well accepted by farmers. CENTA-Izalco was bred by El Salvador's bean team, and released in 1981. However, on-farm-research in 1986 showed that farmers didn't know it, neither was there seed available for its widespread dissemination. But farmers liked CENTA-Izalco, as well as they did initially with CENTA-Jiboa (RAB 204). However, they maintained only the preference for CENTA-Izalco, whereas CENTA-Jiboa lost their favor, probably because of lateness to harvest and of poor acceptance by consumers, as mentioned earlier on. Country-wide adoption statistics are not

available, but in Region I, by 1990 30% of the area in beans (about 13% of national area) was sown to CENTA-Izalco (Henríquez, 1992).

The more recent adoption success of CENTA-Cuscatleco (6-7 thousand hectares) was already mentioned earlier.

At what pace will adoption of varieties continue is difficult to predict. Knowledge about them appears to be spreading among farmers as suggested by the entries of CENTA-Cuscatleco in the national bean contest. However, limited availability of seed is a cause for concern (CIAT, 1992).

BEAN SEED SUPPLY

The on-farm-research efforts which started in 1986 found inadequate bean seed supply to be a major constraint. Artisanal seed production was implemented as an immediate local remedy to this situation, whereas training at CIAT of all CENTA's seed division personnel aimed at strengthening the national seed system. If one assumes that the adoption of CENTA-Cuscatleco in 7,000 ha occurred over 4 years, this would imply that the yearly seed production has been of the order of 120 MT. This is not a negligible amount. But a regular supply of seed still seems to be lacking according to the participants in a recent seminar-workshop on the problems faced by bean cropping, held in May 1991 (CIAT, 1992).

BIOLOGICAL NITROGEN FIXATION

An effective Rhizobium-beans symbiosis for nitrogen fixation could reduce farmers' costs of nitrogen fertilization by an order of magnitude.

Collaborative work between CIAT and the University of El Salvador ((Kipe-Nolt and Pineda, 1988) went as far as successfully developing mixed-strain Rhyzobium inocculants which are effective with many bean genotypes and give bean yield responses equivalent to a fertilization with urea at 180 kg ha^{-1} (34% yield increase over unfertilized control). For fortuitous reasons, however, work at the University was discontinued, thus depriving farmers of a potentially highly beneficial technology.

TRAINING

CIAT gave training support to practically all activities in the development of El Salvador's bean technology generation and dissemination capacity (see the companion document Training for Tropical Agricultural Research and Development, pp.26-27, and 91). From 1987 through 1991 training at CIAT contributed to strengthen bean research capacity in economics, breeding, virology, entomology, rhizobiology, on-farm-research, agronomy for seed production, seed production and processing, and the development of alternative seed systems (25 trainees altogether). This was complemented with the six in-country courses (12

training events) described earlier on, and with the participation of six professionals in three regional courses held in Guatemala, Costa Rica, and Honduras.

Finally, the recently developed regional team of trainers (see companion report on development of subregional training capacities)--which includes three members from El Salvador--held a course on bean production for 26 MAG extensionists in Region II in 1991.

INFORMATION SUPPORT

CIAT's publications distribution database presently includes 17 individual and 17 institutional subscribers to CIAT bean publications. This includes 32 subscriptions to the bean newsletter "Hojas de Frijol", 5 subscriptions to Quarterly Abstract Review, and 15 subscriptions to the Bean Program's Annual Report. Coverage of the Bean Program's Annual Report is adequate. The Abstracts Review distribution may not be broad enough; however, the future of this service is under review (see companion report of the Information Unit). For the newsletter there undoubtedly is a broader audience than the one being presently reached. For instance, only the MAG extensionists trained in OFR and artisanal seed production substantially exceed the number of actual newsletter subscribers. This is part of a larger issue on the future of CIAT's commodity newsletters which needs to be addressed in 1993.

BEAN RESEARCH PUBLICATIONS FROM EL SALVADOR

CIAT's series of national bibliographies includes Beans in Central America and the Caribbean, published in 1990. The chapter on El Salvador contains 19 citations and abstracts of documents published in El Salvador which are available in CIAT's Information Unit. Of these papers 42% have at least one author who is a CIAT alumnus; and of the total number of authors (28) 36% are CIAT alumni.

INSTITUTIONAL DEVELOPMENT

It can be concluded that integrated bean technology generation and dissemination has been developed in El Salvador. The emphasis of this history is on gene-based technology. This should not mislead the reader: the agronomy of bean production is addressed as much as germplasm evaluation; actually they go together in on-farm-research and technology validation. The institutional model, then, is in place. The coverage, however, is not yet adequate (CIAT, 1992). The remaining challenge is how to extend the coverage, how to replicate the capacity for OFR and artisanal seed production which covers some areas of Regions I, III, and IV to the rest of the regions.

The need of an effective production of basic seed and its distribution to seed multipliers (artisanal or others); and the increase of seed multipliers are further remaining challenges.

But the foundations for sustainable progress are in place. There is a critical mass of well trained and motivated professionals. They know how to work interinstitutionally as a vertically integrated technology generation and dissemination team. The flow of germplasm is effective. Improved varieties are spreading, and even better materials are ready to be released (e.g. DOR 482 which is earlier than CENTA-Cuscatleco). Further, the national team is effectively linked to the regional germplasm-centered bean network PROFRIJOL. And PROFRIJOL, in turn, is effectively linked to CIAT. Thus, an institutional model with three strata--national, regional, and international--has successfully been put together.

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DEVELOPMENT OF AN INTEGRATED RICE TECHNOLOGY GENERATION AND DISSEMINATION SYSTEM IN VENEZUELA

BACKGROUND

In the triennium 1979-1981 rice production (paddy) and consumption in Venezuela reached an all-time high of 638,000 MT per year and 26 kg per capita and year (Pulver and Weber, 1987). By 1987, however, the bonanza was over. In February 1987, a seminar on the "Importance of Rice in a Venezuelan Agricultural and Food Strategy" (organized by Venezuela's Central University) heard that

* the demand for rice had slumped;

* high relative prices had converted rice into a luxury rather than a wage good (only the upper social strata continued consuming 17-19 kg of rice per capita while the lower strata had reduced per capita consumption to 12-15 kg per year), while subsidies to wheat and maize made these products an inexpensive alternative to rice;

* subsidized inputs drove input intensive production models which did not care about input productivity; while

* milling and commercialization contributed to the high price of rice by obtaining margins which were way above those of other rice producing countries in Latin America (Pulver and Weber, 1987).

Liberalization of the economy--which at that time already was beginning to be a likely scenario--would bring relative rice prices down, while input prices would rise. In such a situation, rice growing as it was being done in Venezuela would face serious difficulties.

On the institutional side, on the other hand, the rice sector's various components were poorly linked amongst them; and some of them--such as extension or technology transfer--were virtually absent. This situation was perceived as seriously limiting the development of the rice sector.

THE OPPORTUNITY

Several institutions of Venezuela's rice sector, particularly seed producer associations from the two main rice growing areas Portuguesa and Guarico, became interested--in early 1987--in implementing a National Rice Plan similar to those promoted by CIAT in other South American and Caribbean countries. They were willing to make an effort towards interinstitutional integration around a common agenda on rice research and development.

THE ACTIONS

The actions to be described next were, to a large extent, simultaneous efforts along several fronts. There was a need to document and analyze the rice sector's situation. The findings had to be translated into research projects to seek solutions to some of the emerging constraints. Other constraints had to be tackled immediately, trying to influence the policy environment, on the one hand, and validating and transferring existing technological solutions, on the other hand. Farmers' practices and changes in them had to be monitored--to obtain a current picture of how constraints evolved, and technology was being adopted and having an impact. And for almost each and every activity human resources had to be trained. Unfortunately all these actions cannot be told simultaneously--as they were actually happening--. The following account is an arbitrary sequence of the events.

INTERINSTITUTIONAL INTEGRATION

Actors. The most strongly involved institutions were

APROSCELLO, Asociación de Productores de Semilla Certificada de los Llanos Occidentales, Certified Seed Producers Association of the Western Plains;

APROSELLAC, Asociación de Productores de Semilla de los Llanos Centrales, Seed Producers Association of the Central Plains;

FONAIAP, Fondo Nacional de Investigaciones Agropecuarias, National Agricultural Research Fund, the Venezuelan NARI; and

FUDECO, Fundación para el Desarrollo de la Región Centro Occidental, Foundation for the Development of the Central Western Region.

Other institutions involved occasionally were

APROARROZ, Asociación de Productores de Arroz, Rice Growers Association;

APROSIGUA, Asociación de Productores del Sistema Guárico, Producer Association of the Guárico System (irrigation scheme);

ASOPORTUGUESA, Asociación de Productores de Portuguesa, Producer Association of Portuguesa;

ASOVEMA, Asociación Venezolana de Molinos de Arroz, Venezuelan Rice Millers Association;

FUNDACION POLAR, a foundation sponsored by Venezuela's main beer brewing enterprise;

SERVIMIC, Servicio para el manejo integrado del cultivo C.A., a private enterprise for rice integrated crop management; and

UNELLEZ, Universidad Nacional Experimental de los Llanos Occidentales Ezequiel Zamora, National Experimental University of the Western Plains.

Internationally, Colombia's National Rice Growers Federation, FEDEARROZ, also participated in Venezuela's interinstitutional rice development endeavor.

Integration. First, under the leadership of APROSCELLO, the Ministry of Agriculture and the Venezuelan Legislation approved a proposal to establish a National Rice Fund with revenues from a tax on sales of registered and certified rice seed.

Second, action plans coordinated among the principal institutional players (including CIAT) were established and implemented. Research priorities were assigned based on the rice sector diagnosis (see below).

Third, a formal interinstitutional coordinating body, the National Consultative Rice Council, CCNA, Consejo Consultivo Nacional del Arroz, was established.

RICE SECTOR DIAGNOSIS AND MONITORING OF RICE PRODUCTION PRACTICES

A diagnosis of Venezuela's rice sector was completed over the years 1988-89. The effort was led by APROSCELLO and FUDECO who were joined in the implementation by APROARROZ, APROSELLAC, APROSIGUA, and FONAIAP. CIAT (rice economics) played a strong catalytic and advisory role.

Simultaneously with the diagnostic survey, a farm monitoring scheme was put in place which has collected information on farmers' practices and production costs since 1988. Nationally the scheme was coordinated initially by FUDECO and later by the CCNA (in both cases by Ivan Salas). Internationally it interacted closely with CIAT (rice economics) and FEDEARROZ. The latter provided its computer application SACFA which is becoming an international standard through CIAT's intervention; in addition to Colombia and Venezuela it is also being used in Ecuador and Brazil. During the development of the scheme the economists from CIAT and FEDEARROZ, on the one hand, and from Venezuela, on the other hand, visited each other at least three times a year over the period 1988-1990. In addition to informing on research needs and opportunities, the scheme has been able to document a more judicious use of pesticides, seeds, and nitrogen fertilizer--attributable to both increased input costs and the impact of the newly established Rice Plan--while rice yields improved (Ramirez, 1992).

RESEARCH AND TECHNOLOGY TRANSFER

Based on the rice sector diagnosis, the interinstitutional assembly, which eventually was to become the CCNA, assigned the following research priorities

1. Effects of land preparation upon the agronomic behavior of rice; cost-effectiveness of land preparation systems in Guárico and Portuguesa.

2. Rice rooting in the Portuguesa district.

3. Breeding to obtain improved varieties

   * Crossing;
   * Adaptation to acid soils;
   * Introduction of segregating materials.

4. Crop protection. Determination of action thresholds for the various pests in Guárico and Portuguesa.

Further it prioritized

5. Socio-economic monitoring of production processes and technology adoption; and

6. Technology transfer

   * Courses on economic rice production, in relation to the rice sector diagnosis;
   * Individualized training;
   * Validation trials. On-farm demonstrations linked to the training process.

For the four research priorities young professionals were trained at CIAT (see below). Under the guidance of more senior Venezuelan researchers (FONAIAP Portuguesa and Guárico), and with much coaching and counselling from their CIAT advisors (at least two visits per year by CIAT's rice agronomist and entomologist), they established research and demonstration plots on

* Land preparation and fertilization alternatives;

* Weed control and herbicides use;

* Integrated pest control (especially of water weevil and mites);

Progress on breeding was less swift. However, recent developments suggest that it is catching up. Redeployment of human resources; the training at CIAT of one researcher at M.Sc. level, to use anther culture in breeding for blast resistance; and the implementation of the IV Germplasm Evaluation and Selection Workshop for Tropical Latin America in Acarigua,

Portuguesa, and Calabozo, Guarico (in its first edition in a non-CIAT venue) appear to have instilled new impetus to FONAIAP's rice breeding.

Technology transfer was stimulated by credit for rice production coupled with private technical assistance. This was launched simultaneously with field research trials. And both, technical assistance and field trials were simultaneous with training. Researchers and extensionists trained at CIAT and in local courses (see below) set up adaptive research and demonstration plots. These served to follow-up on their training while they were discharging their duties.

Technical assistance to rice producers had been virtually non-existent (exception made of input purveyors who, of course, tried to maximize-rather than optimize--purchased input use), and there was a severe lack of qualified technical advisors. Therefore, about 100 technical advisors were trained in rice technology production in five local courses in 1990-1992 (see training).

IMPACT

The policy and economic environment of rice production has changed substantially in Venezuela since the beginning of the Rice Plan. Changes in production practices and rice yields could, therefore, be attributed to either macroeconomic changes or the Rice Plan. It seems more likely, however, that they have been brought about by both, i.e. by the Rice Plan which coincided with a facilitating environment. Be this as it may, data from Portuguesa (see Alvarez, 1992) show that the use of insecticides has dropped substantially. The percentage of farmers who sprayed three or more times during the rainy season decreased from 65.2% in 1988, to 9.3 in 1989, and to zero in 1990. Conversely, the percentage of farmers not spraying at all went from zero in 1988, to 36% in 1989, and to 16% in 1989. A similar trend occurred in the dry season from 1988-89 to 1989-90. Sprayings against disease agents followed the same pattern as those against insects.

Increasingly less wasteful seed densities were sown. The percentage of farmers using 140 kg of seed per hectare or less increased from 10.9% in 1988, to 32.3% in 1989, to 65.3% in 1990. Nitrogen fertilizer use followed a similar pattern. The percentage of farmers using less than 130 kg of urea per hectare increased from 29.3% in 1988, to 36.8% in 1989, to 64% in 1990.

And all these savings not only did not harm production. Yields actually increased!

TRAINING

CIAT's training support to Venezuela's Rice Plan followed four avenues

1. Individualized training at CIAT of young professionals who would thereafter address the top priority research and development activities;

2. Individualized up-dating at CIAT of professionals in key positions in the rice seed supply system;

3. In-country economic rice production courses; and

4. Development of an indigenous training capacity which would take over the responsibility of training professional field personnel.

1. **Individualized R&D training at CIAT (1988-92).** A list of trainees by discipline, institution, and research site in Venezuela follows

Persons trained in	Institution	CIAT advisor	Length of training (months)
GUARICO			
Agronomy/weeds	APROSELLAC	A. Fischer	3.0
Agronomy/weeds	APROSELLAC	A. Fischer	3.0
Breeding	APROSIGUA	E. Guimaraes	3.9
Entomology	APROSELLAC	A.Pantoja	2.6
Pathology	FONAIAP	F.Correa	0.8
PORTUGUESA			
Agronomy/weeds	APROSCELLO	A. Fischer	3.9
Agronomy/weeds	APROSCELLO	A. Fischer	3.9
Agronomy/weeds	APROSCELLO	A. Fischer	2.0
Breeding	APROSCELLO	E. Guimaraes	4.0
Entomology	APROSCELLO	A. Pantoja	3.7
Entomology	Inst.U.Tecnol.	A. Pantoja	3.6
Entomology (for breeding)	APROSCELLO	A. Pantoja	0.6
Entomology	APROSCELLO	A. Pantoja	0.5
Pathology	UNELLEZ	F.Correa	0.9
Soils-fertilization	APROSCELLO	L. A. León	3.9

In addition to this effort, which concentrates on Guárico and Portuguesa, one researcher from Venezuela's Central University at Maracay, Aragua, is working at CIAT on a M.Sc. project in rice anther culture under Dr. Z. Lentini. This training will serve to increase rice breeding efficiency. The enhanced capacity will be focused on rice blast.

2. Individualized seed training at CIAT.

The rice seed production capacity was strengthened in Guárico and Portuguesa by training one specialist from FONAIAP and one from the farmers associations for each region (APROSELLAC in Guárico and APROSEM in Portuguesa). All four participated in a specialized seed production and processing course for 1.3 months.

3. In-country rice production courses.

There were five courses. The first three had strong CIAT support; the fourth was implemented mainly by local staff; and the final one was delivered by the new team of trainers as part of their own training.
The following were the venues and dates of the five events.

1. Acarigua-Portuguesa and Calabozo-Guarico; 17-29 April, 1989.
2. Acarigua-Portuguesa, 1-8 April 1990.
3. Acarigua-Portuguesa and Calabozo-Guarico; 11-22 March, 1991.
4. Calabozo-Guarico, 28 October - 1 November 1991.
5. Acarigua-Portuguesa, 27 July - 7 August, 1992.

Altogether 104 professionals involved in rice technology transfer participated in these courses. The states and the type of institutions where they work are as follows.

Organizations	STATES				Total
	Portuguesa	Guárico	Lara	Others*	
Banking and Credit	1	1	-	-	2
Farmers Organizations	17	4	-	-	21
FONAIAP	5	8	-	1	14
Ministry of Agriculture	1	-	-	2	3
Not for Profit	6	4	-	-	10
Private Enterprise	13	11	-	2	26
Self-employed Technical Advising	7	1	7	3	18
Regional Development Corporations	1	1	-	2	4
Universities	3	-	1	2	6
TOTAL	54	30	8	12	104

* Includes: Aragua (1), Barinas (3), Carabobo (2), Cojedes (2), Delta Amacuro (1), Federal District (1), Táchira (1), Trujillo (1).

4. Development of an indigenous training capacity.

Training of rice technology intermediaries is a strongly felt need in Venezuela. Therefore, as part of the National Rice Plan, CIAT supported the above in-country courses to rapidly give an initial satisfaction to that need. However, the demand is greater than only for a series of short courses, and CIAT cannot continue meeting that demand directly. Therefore, CIAT proposed to establish a Venezuelan capacity to train rice technology intermediaries.

The CCNA accepted the proposal which, in brief, unfolded as follows (a detailed account is given in a companion document on the development of subregional training capacities).

First, training priorities were established in the CCNA, and candidates to become trainers were identified.

Second, 17 candidates were selected and trained in three phases. Along the phases they developed learning units on five top priority subjects--i.e. the training materials that they would use in their actual activities as trainers--, and they gradually improved their communication skills and their command of adult education principles and techniques. Immediately after the second phase they acted as trainers in the fifth in-country course mentioned earlier on.

The five learning units and the institutions of the 17 trainer-authors are:

1. Rice plant nutrition and fertilization

   FONAIAP-Guárico; FONAIAP-Portuguesa; APROSCELLO-Portuguesa.

2. Weed management

   FONAIAP-Portuguesa; APROSCELLO-Portuguesa; APROSELLAC-Guárico (2).

3. Disease management

   FONAIAP-Portuguesa (2); UNELLEZ-Guárico.

4. Insect pest management

   FONAIAP-Portuguesa (2); FONAIAP-Guárico; Instituto Tecnológico Universitario-Guárico; APROSCELLO-Portuguesa.

5. Vertebrate pest management

   FONAIAP-Portuguesa; FONAIAP-Guárico.

Third, eight decision-makers from APROSCELLO, APROSELLAC, ASOPORTUGUESA, ASOVEMA, CCNA, the Ministry of Agriculture, Polar foundation, and the University Rómulo Gallegos (Guárico) were invited to CIAT. Here, with the assistance of CIAT staff, they prepared the outline of project for the training of extensionists by the new training team. The full version will be completed in Venezuela and submitted before the end of 1992 to national funding sources.

INSTITUTIONAL DEVELOPMENT

An integrated interinstitutional rice technology generation and dissemination system has been established. Research is done by the public sector NARI, FONAIAP, while field trials and demonstration activities are done by staff from farmers organizations and other institutions in collaboration with FONAIAP researchers. Most important, farmers organizations articulate the demand and monitor progress.

The team of researchers is adequate in size. For technology dissemination, however, a much larger number of professionals is required. The ensuing training demand will be attended by the team of trainers developed through CIAT's training of trainers strategy.

COORDINATION AND LEADERSHIP

Effective interinstitutional coordination and strong leadership were vital for the successful development of an integrated rice R&D capacity in Portuguesa and Guárico, the two main rice growing areas of Venezuela.

Leadership put the process in motion and maintained momentum. Vision led to the establishment of the formal coordinating mechanism CCNA. Integration spanned not only relevant institutions but also key fields of action. Thus, technical constraints were tackled at the same time as a favorable micro-policy-environment was opportunistically propitiated taking advantage of a conducive macro-policy-environment.

CIAT's credibility, neutrality, prestige, and technical capacity contributed substantially to bring the system together and make it work.

REMAINING CHALLENGES

Only time will tell whether the emerging rice R&D system is sustainable. There are plenty of weaknesses still to be overcome; of strengths to be consolidated; of imbalances to be corrected. Foreseeable problems are coming up; unforeseeable ones surely will follow.

Research and training still need strengthening. So do inter- and intra-institutional communication and collaboration.

More human resources need to be incorporated while the existing ones need to be developed further.

An inadequate mix of activities and institutional predominance may throw the whole system off-balance.

However, while there is leadership, while there are enough common interests to overcome centrifugal forces, and while there is technical competence, prospects of sustainability are good. These conditions are presently met.

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INTRODUCTION OF THE COMMON BEAN (*Phaseolus vulgaris*) CROP INTO SANTA CRUZ, BOLIVIA. DEVELOPMENT OF A BEAN RESEARCH AND DEVELOPMENT SYSTEM

BACKGROUND

The Department of Santa Cruz in Bolivia's eastern lowlands is frontier land in active development. Royalties from oil fields exploitation drive public investment; entrepreneurial private enterprise is expanding the economy; poverty-driven migrants from the highlands have found a new home as farmers under public land allocation schemes; and more land is being opened. In brief, there prevails a spirit of innovation and progress seeking.

Human nutrition in Santa Cruz suffers from an unbalanced diet due to insufficient protein intake, particularly among the poor.

Agriculture in Santa Cruz is largely seasonal. Most crops are grown in summer, which is the rainy season. This causes distortions in labor availability over time, in income flow on the farms, and in land management (particularly weed control).

THE OPPORTUNITY

In the late 1970s, when Phaseolus beans were practically unknown in Santa Cruz, a visionary agronomist, Ing. Francisco Kempff, thought that they could provide an inexpensive protein source in people's diet. He contacted CIAT and, thus, began the history of the introduction of *Phaseolus vulgaris* into Santa Cruz, which will be summarized in what follows.

INSTITUTIONAL ACTORS

The leading institutional protagonist in this history is the Facultad de Ciencias Agrícolas (Faculty of Agricultural Sciences) of the Universidad Autónoma Gabriel René Moreno (Autonomous University G.R.Moreno), and very specially its Instituto de Investigación Agrícola (Institute of Agricultural Research) "El Vallecito". Henceforth in this document it will be referred to as El Vallecito.

Other major players are

* ASOPROF, Asociación de Productores de Frijol, an association of small-scale bean-farmer associations which involves some 15,000 families.

* CIAT, Centro de Investigaciones Agrícolas Tropicales, the public agricultural research institution of Santa Cruz. This local institution (plus others such as El

Vallecito, have substituted for Bolivia's NARI, IBTA, which does not operate in Santa Cruz. To avoid confusion, henceforth in this document reference will be made to CIAT-SC (CIAT-Santa Cruz) to distinguish it from its international namesake.

* CIAT-DTT, CIAT-Departamento de Transferencia de Tecnología, the technology transfer department of CIAT.

* Clubs de madres, mothers clubs; a grassroot organization.

* CORDECRUZ, Corporación Regional de Desarrollo de Santa Cruz, a parastatal development authority funded with oil royalties distributed by Bolivia's central government.

* PROMASOR, an association of maiz and sorghum growers.

* Regional Seed Certification Office; the local branch of the national seed certification system.

Further players are:

* MEDA, Movimiento Económico de Desarrollo, a mennonite NGO for agricultural development.

* Cooperativa Integral, a small-farmers cooperative initiated by USAID.

* CIPCA, Centro de Investigación y Promoción del Campesino, a jesuit NGO for campesino farmer promotion.

* CARITAS, catholic NGO.

* CEDICA, Centro de Capacitación Campesina, Campesino Training Center, a private philanthropic entity.

In a category of its own is CIAT's Andean Bean Project, PROFRIZA.

THE ACTIONS

The actions can be grouped into the following main activities:

* Establishing a baseline knowledge on bean cropping.

* Introducing the crop to farmers and promoting its diffusion.

* Developing a seed supply.

* Developing the market for beans.

* Integration of an Interinstitutional bean research and development system. These activities but the first were implemented simultaneously and were highly interlinked.

BASELINE KNOWLEDGE ON BEAN CROPPING

Establishing a baseline knowledge on bean cropping was very much the work of El Vallecito. From 1978 onwards Ing. Francisco Kempff and his colleagues tried and selected varieties from international nurseries provided by CIAT; investigated sowing dates and agronomic practices; and characterized local pests and diseases that affect Phaseolous beans. This work was done on-station and in farmers fields.

By 1983 suitable varieties had been identified, multiplied, and made available to farmers. Most important, it was found that beans could be grown in the eastern lowlands during winter, whereas seed could be produced in the mesothermic valleys, to the west of Santa Cruz, in summer. This insight was of high strategic value.

Until then, during winter lowland farms lay fallow and labor was idle. Both were undesirable. Leaving land unproductive during the winter facilitated the proliferation of weeds, thereby leading to a shortening of the productive use of plots in the shifting cultivation pattern within the typical settler farms. And idle farmers had to move away from their farms and families in winter to seek temporary employment elsewhere.

Bean production during winter would create a demand for labor and provide a source of income to farmers. By cultivating the land weeds would be kept down, thereby prolonging the useful life of plots in shifting cultivation. If effective nitrogen fixation would be achieved by beans-rhizobia symbiosis, this would be expected to further lengthening plot utilization.

Seed production in the mesothermic valleys, just in time for the output to be utilized without delay for lowland bean sowing, would offer an attractive alternative of income to farmers who were growing maize and tobacco. Beans also would make a valuable addition to farmers' diet, both in terms of increased variety and protein content.

Beans could be associated with maize, and they might offer a welcome addition to farmers' diet (variety and protein content).

CROP INTRODUCTION AND PROMOTION

Once the baseline knowledge had been developed, a new-generation three-man team of bean enthusiasts--Ings. Juan Ortubé, Marco Koriyama, and CArlos Rivadeneira--took over at El Vallecito and promoted the crop among farmer communities.

Sensitization of farmers and the public at large was sought through radio and television broadcast. During 18 months, the University's television channel transmitted seven flashes a day, concentrated in the evenings.

Direct promotion to farmers started in the Mairana valley, west of Santa Cruz, were beans could be produced ahead of the eastern lowlands. There, a two-pronged strategy was followed. On the one hand, training courses were offered to farmer communities. On the other hand, direct contacts were made with individual farmers in the communities.

Courses were synchronized around the bean production cycle. One month before sowing time a first course would be held with farmers to tell them about beans and bean production, to show them audiovisuals on bean cropping, and to take record of how many of them were prepared to give beans a try. A second course would be held at sowing time to actually show farmers how to sow beans. The last course would be after bean flowering to demonstrate disease control.

Individual contact was with farmers selected on the basis of their willingness to try bean growing under contract with El Vallecito. To these, seed would be delivered in 5 or 10 kg packages (enough to sow 0.1 or 0.2 ha), and pesticides input would be provided on loan. By contract, farmers committed themselves to (1) follow the technical instructions of the El Vallecito team and of collaborating officers from the regional seed certification agency; and (2) to return 2 kg of bean seed for every kg received initially. El Vallecito was committed to give technical assistance, and to buy the harvest, paying seed at 20% above the grain market price. The value of pesticides would be deducted from harvest payment.

Promotion in the lowlands was by a similar procedure as in Mairana, except that production was only for grain, not for seed. Further, CORDECRUZ and a significant number of NGO's joined in to also promote bean production. To these, El Vallecito would give support by supplying seed, by holding courses for the farmer communities, and by providing technical vulgarization publications.

SEED SUPPLY

Until recently most of the bean seed in Santa Cruz was produced by the Mairana Valley scheme (up to approximately 180 farmers, in some 20 communities, sowing up to about 300 ha) and distributed by El Vallecito. Now, ASOPROF, CORDECRUZ, and two private enterprises are operating similar schemes.

The latest development is that a group of farmers in Mairana has established a small seed enterprise. Appropriate equipment was provided by CIAT's Seed Unit; foundation seed is supplied by El Vallecito; technical advice is furnished by the regional seed certification office and El Vallecito; and ASOPROF gives support in administrative matters and for commercialization.

MARKETING AND MARKET DEVELOPMENT

As mentioned earlier on, Phaseolus beans were initially unknown in Santa Cruz. Therefore, a local market had to be developed from scratch. Externally, however, there was the opportunity of entering the Brazilian market. This required establishing the necessary links. Both avenues were pursued.

Bean exports to Brazil

The first attempt to export beans to Brazil ended in utter failure because some links in the chain did not honor their commitments. Nevertheless, after this unpromising start in 1986, exports have been growing exponentially: 100 MT in 1987; 300 MT in 1988 (despite the worst drought in 40 years); 700 MT in 1989; 18,000 MT in 1991.

In 1989, MEDA and Cooperativa Integral coordinated the whole export-oriented chain (seed distribution, credit, commercialization). Thereafter ASOPROF came into being and assumed that responsibility for small-scale farmers, while PROMASOR, and two private enterprises (DITEX and CORDILLERA), commercialized beans for larger farmers. Most recently, ASOPROF continues commercializing small farmers' beans, whereas ESCOFUTURO (private agribusiness) and CADEX (Export Chamber of Santa Cruz) deal with the increasing volumes that now flow from larger bean producers.

Internal market development

Faithful to the vision of Ing. Francisco Kempff and his colleagues, that beans should provide an inexpensive source of protein for the people in the Bolivian lowlands and inter-andean valleys, a project promoting bean consumption is being implemented by

* PROSALUD, an official health promoting entity;
* the Comité Cívico Femenino, a women civic association;
* the Federation of Mothers Clubs of Santa Cruz;
* ASOPROF and El Vallecito;

with the auspices of PROFRIZA.

Project activities include:

* TV projection of videos on the high nutritional value of beans and on the preparation of bean-based dished.
* Meals with bean-based dishes prepared and served in all major farmers gatherings associated with the promotion of bean cropping. On these occasions farmers' wives

would collaborate with and learn from expert cooks from organizations such as PROSALUD.

* Preparation of bean-based dishes at shows such as the XIII National Agricultural Fair, held in Santa Cruz in 1991, where 2,500 visitors tasted such dishes.

* Training workshops for household promoters (held in nine neighborhoods where 40 promoters were trained), and for leaders of mothers clubs (eight workshops; 200 mothers trained).

* Production and dissemination of bean recipes collections; posters; flyers; and training materials for the workshops mentioned in the previous point.

Promotion through the Departmental Federation of Mothers Clubs (250 clubs with some 20 mothers each), through CARITAS (which agglutinates another 90 clubs), and through mennonite voluntaries, is a highly effective mechanism.

In addition to holding specific training workshops, the clubs have monthly gatherings of member mothers and their children. On these occasions meals are served which, of course, include beans.

Recent surveys (Nohra Ruiz de Londoño, personal communication) indicate that per capita consumption of Phaseolus beans, both among bean farming families and in urban Santa Cruz, have already reached a staggering 14 kg yearly. A major achievement indeed!

INTEGRATION OF AN INTERINSTITUTIONAL BEAN RESEARCH AND DEVELOPMENT SYSTEM

El Vallecito started the work on beans in Santa Cruz. Since then, a highly complex array of institutions has become involved in bean-related activities. How did it all happen and what is the present situation?

When the early work in Mairana Valley spread to the eastern lowlands, soon CORDECRUZ and a whole series of NGOs (CARITAS, CEDICA, CIPCA, Cooperativa Integral) encouraged farmers to grow beans. MEDA and CIPCA, followed by CARITAS, were the first to interact formally with El Vallecito, purchasing seed and requesting training of their affiliates. During the bean campaign 1989-1990, MEDA, Cooperativa Integral, and El Vallecito began shaping the idea of creating an association of bean farming communities. Statutes were drafted, institutions were invited to join, and ASOPROF was eventually brought into being in the presence of delegates from CARITAS, CEDICA, CIBCA, MEDA, the Federation of Mothers Clubs, and the coordinator of PROFRIZA.

Another important institutional development was the creation in 1986 of a Regional Seed Council, which establishes and oversees local seed policy in coordination with the National Seed Council. The regional body has eight members: four represent private sector

institutions and another four are from public sector entities (CIAT-SC, CORDECRUZ, Ministry of Campesino and Agricultural Affairs, Universidad Autónoma Gabriel René Moreno). The Council actively promotes high quality seed production through its seed certification service which, is responsible for training, promotion, and interinstitutional coordination, above and beyond only quality control duties. In the development of Santa Cruz's bean seed supply, the seed certification service has been an active partner throughout.

On the technology dissemination front, there are Comités Técnicos Zonales (District Technical Committees) which are responsible for interinstitutional coordination of technology transfer activities. This involves some 120 professionals who deal with bean production. They belong to various private, public, and non-governmental organizations; the body of extensionists of the Departamento de Transferencia Técnica-CIAT-SC is conspicuous among them. El Vallecito is responsible for the training of this cadre of professionals. For this it offers an annual course and monthly follow-up meetings.

In summary, a farmers-linked bean research and development system has come together with four main components El Vallecito, ASOPROF, the Regional Seed Council, and the Comités Técnicos Zonales. The distribution of responsibilities among them has changed in adaptation to the evolving needs.

El Vallecito now concentrates on germplasm selection and adaptive research (together with CIAT-SC which expanded its commodities portfolio to include beans), and on training of technical advisors.

ASOPROF has assumed the responsibility for campesino training, and for promoting bean production and, especially, consumption.

The Regional Seed Council is in charge of fostering the supply of high quality seed.

And the Comités Técnicos Zonales orient the technical advice to farmers through the body of technical staff that exists in the many organizations which deal with bean production.

This national R&D system is linked internationally to PROFRIZA, the CIAT-sponsored bean research network for the Andean Region, and to CIAT headquarters. PROFRIZA supports the participation of Santa Cruz in network projects, and provides technical advice on bean research in general. CIAT headquarters has been providing since the early 1980s, and continues doing so, bean nurseries from which local researchers (with farmers participation) select materials for multiplication and eventual release as superior varieties. All beans in Santa Cruz have originated from these nurseries.

AN EMERGING CHALLENGE

In the early days, the three-man team from El Vallecito was enough to backstop bean research and development in Santa Cruz.

More recently, a complex bean R&D system has come into being, where El Vallecito plays a more strategic role. However, expansion of bean production has bean so enormous in the last three years that there is a risk of the demand for technical support moving ahead too fast for institutional development to be able to cope with the growing needs. Some symptoms of this already happening are showing up (Nohra Ruiz de Londoño, personal communication): chemical inputs are being used inefficiently, and seed supply appears to lag behind demand.

Will the R&D system be able to, at least, keep pace with the expansion, if not staying ahead of it? Or will it become a brake to expansion? The development of a team of well trained trainers might well help to redress the balance.

DEVELOPMENT OF AN INTEGRATED CASSAVA TECHNOLOGY GENERATION AND DISSEMINATION SYSTEM IN PARAGUAY

BACKGROUND

Cassava is well known as a tropical food crop. However, the world's largest per capita cassava production and consumption occurs in **subtropical** Paraguay. There, cassava is the staple food, more important than rice, potatoes and sweet potatoes (*Ipomoea batatas*). Adults of high income consume 130 kg per year; poor people consume 30% more than that (170 kg). In the cities, 77% of consumers buy this perishable food every day.

There are two districts in Paraguay, Paraguarí and Caaguazú, where cassava production is particularly concentrated: 90% of all farmers grow cassava; half of which is consumed on the farm (food, and pig and poultry feed), and half is sold, either fresh or as starch.

THE OPPORTUNITY

When CIAT's Cassava Program came into being, cassava was an under-researched crop world wide. By the mid 1980s this situation had changed drastically in the tropics; but subtropical cassava production continued being under-researched. In Paraguay, in particular, there was no cassava research program, nor was there a technical advisory system which could help farmers to improve the way they produced, utilized, and commercialized cassava. In 1984 formal conversations, to establish a Cassava Technology Generation and Validation Project, began between Paraguay's Agricultural and Livestock Extension Service (SEAG), CIAT, and Canada's International Development Research Centre (IDRC). The Project was approved in late 1985, and field work started in early 1986.

THE ACTORS

The national Agricultural and Livestock Extension Service (SEAG) was the principal actor, seconded by

* Instituto Agronómico Nacional (IAN), the National Agronomic Institute;
* Facultad de Ingeniería Agronómica (FIA-San Lorenzo), the National Faculty of Agronomy;
* Centro Regional de Investigación Agrícola (CRIA), the Regional Agricultural Research Center;

and to a lesser degree by others such as Programa Nacional de Investigación y Extensión Ganadera (PRONIEGA), the National Livestock Research and Extension Program; the Faculty of Chemical Sciences; the National Institute of Technology and Normalization; and the Cooperative of Coronel Oviedo.

On CIAT's side, in addition to the Cassava Program, support was provided by the Training and Communications Support Program, the Biotechnology Research Unit, the Virology Unit, and the Agroecological Studies Unit.

Financial support was provided by IDRC.

THE ACTIONS

Actions were deployed simultaneously on four fronts:

* characterization of cassava production, utilization, and commercialization;
* research and development;
* technology dissemination; and
* training.

CHARACTERIZATION OF CASSAVA PRODUCTION, UTILIZATION, AND COMMERCIALIZATION

CIAT's Agroecological Studies Unit characterized the cassava growing region.

Cassava production, utilization and processing practices and problems were first appraised by "sondeo", followed by an in-depth survey.

The commercialization channels of cassava were characterized; benefits and profitability of the various channels and links were estimated; and types and quantity of physical losses during the commercialization process were diagnosed. Cassava acceptability criteria of buyers and end users were investigated.

RESEARCH AND DEVELOPMENT

Germplasm collection and characterization

A collection of more than 150 cassava accessions was established and replicated in vitro. Most of it has also been incorporated into CIAT's germplasm bank.

The most widely used varieties were characterized with regard to their yield potential, susceptibility to pests and diseases, quality, and earliness.

Wide variation was found among varieties used for fresh root production. Some of them consistently outperformed the rest, not only in yield but also in farmer and user acceptability parameters. The best varieties for fresh root production, however, are not the ones preferred by owners of starch factories.

Production practices and problems

Difficulties in conserving planting material over the annual low temperature period, were found to be a problem which is unique to the subtropical cassava production situation.

Research showed that storage of planting material in vertical, rather than horizontal, position improved preservation. Careful selection of stakes and the standardization of their size (20 cm) were found to further contribute to successful planting.

Loss of soil fertility, and soil erosion stood out in the characterization studies as the paramount production problems. They are so severe that cassava production for the Asunción market has moved some 300 km, from nearby Paraguarí, where soils are exhausted, to Caaguazú, were new land has been opened through forest clearing.

A two-pronged approach was brought to bear on this fundamental challenge. On the one hand, to avoid soil erosion, intercropping alternatives were explored with the aim of protecting the ground, when it is coverless in the early stages of cassava growth, until the cassava canopy closes. On the other hand, to preserve and restore soil fertility, the response of cassava yields to fertilization was investigated, as well as the economic feasibility of fertilization alternatives. The latter is crucial because low cassava prices, compounded by farmers' lack of both capital and access to credit, are a severe constraint to farmers' use of purchased inputs.

No intercropping option of general validity has emerged. Rather, information to be taken into account in farmers' decisionmaking has been developed. Essentially, an interaction between cassava genotype, the genotype of the intercropped species, and farmers' weeding strategy (which depends on labor and capital availability, which are both scarce) has been unraveled. Cassava and maize genotypes for intercropping have been characterized. But for farmers to be able to optimize the management of this complex interaction, a strong technical advisory capacity will be required to help them in their decisionmaking. And further research is needed to strengthen the present knowledge base.

The usefulness of manure on its own and in combination with inorganic fertilizers was investigated. For the more degraded soils of Paraguarí, a combination of manure with application of inorganic fertilizer in bands on the cassava planting ridges was found to be

necessary and feasible. Whereas on the richer soils of Caaguazú, inorganic fertilization is not required. However, in Caaguazú a combination of chemical and manual weeding is recommended, whereas only traditional weeding is sufficient in Paraguarí.

Cassava processing

The cassava commercialization study showed root freshness to be a major acceptability criterion of cassava buyers and end users. It also showed that heavy losses from root deterioration were occurring along the commercialization chain. Conservation of fresh cassava by treatment with thiabendazole and packaging in polythene bags is a technical alternative which, elsewhere (e.g. Colombia), served to reduce such losses and reach the market with a high quality product of extended shelf life. Several successful tests of applying this technique were run through a cooperative in Caaguazú with the participation of farmers, transporters, and retailers. Expansion to a semicommercial scale is now underway.

Chipa is a traditional and highly popular bread made from cassava starch. The market is supplied by artisanal starch factories, most of which are single-owner enterprises run with family labor. Total starch production is estimated at 5,000 MT year^{-1}. Many inefficiencies and a high environmental pollution characterize the production process. Average starch extraction rate of only 59% compares unfavorably with results elsewhere (e.g. Colombia with 80%). To transfer improved technology, a pilot (demonstration) plant using small-scale technology developed in Colombia, has been put in place by a cooperative.

Sun-dried cassava chips for animal feed are a well proven alternative for adding value to cassava roots in some tropical countries such as Thailand, Colombia, Ecuador, and Brazil. Whether it is viable in Paraguay is being explored in a joint project between SEAG and the farmers' cooperative of Coronel Oviedo.

TECHNOLOGY DISSEMINATION

SEAG is organized by regions. There are eight of them; each has a regional center and a variable number of extension agencies (126 in total).

No formal cassava extension program is in place yet. Nevertheless, the information on cassava varietal performance, and the new technological options for cassava production have been developed with extensionists' participation. And representatives from all extension agencies where cassava is important have participated in cassava production and utilization courses (see training). However, whether this has been enough for technology dissemination to be actively pursued or whether more formal arrangements to this end will be necessary cannot presently be answered.

TRAINING

Training at CIAT and in-country strongly underpinned the development of Paraguay's cassava R&D capacity (see the companion document "Training for Tropical Agricultural Research and Development", pp. 52-53). More recently, a project to develop a local capacity for training cassava extensionists was started and is making good progress.

At CIAT. Individualized training programs were tailored to the needs of key cassava workers (12 persons over the period 1987-1991) from SEAG, CRIA, the University, the Ministry of Agriculture, and the farmers' cooperative of Coronel Oviedo. The four leading members of this group were submitted to an iterative training process in which they came to CIAT on three different occasions.

The group's technical competence now encompasses cassava agronomy and OFR; backstopping in entomology and pathology; cassava utilization and processing; and organization of cassava projects.

In-country. Cassava production and processing courses (of 2-3 weeks duration each) were held in 1986, 1987, 1988, and 1990 for a total of 118 extensionists.

A three-days updating workshop on cassava production and utilization for 14 extensionists was held in 1988.

And a sequence of two training workshops, of five days each, on statistical analysis on microcomputers was held in 1990 for 14 participants.

Training of trainers. A subregional training body is being assembled in a collaborative effort among CIAT, Paraguay, southern Brazil, and northeastern Argentina, with financial assistance from the Interamerican Development Bank. The team of trainers will be fully operational in early 1993; by then, operational funds will be sought by submitting a formal project proposal, for the training of extensionists, to international funding sources.

More on this subject can be found in a companion document on the development of subregional training capacities (see also above, "Commodity-Specific Training Apparatus" in the section on Institutional Development Targets and Activities).

INSTITUTIONAL DEVELOPMENT

Although the project summarized so far was conceived for "Technology Generation and Validation for Cassava Production and Industrialization", the main output truly is the integrated cassava R&D system which has been successfully brought together. The mutually complementary roles of research, extension, and some NGOs have been clarified, and productive working interactions established. Professionals in the public sector, particularly

in SEAG, learned to plan, monitor, and evaluate R&D; to elaborate programs; and to submit them for funding. This is a break with the past when they used to administer centrally defined plans and the attached budget.

Further, Paraguayan casava workers have developed international links with their colleagues in Latin America, and especially with those from neighboring Brazil and Argentina. This hasenhanced their capabilities, leaving behind a somewhat parochial outlook.

Will the new system be self-sustaining once the national driving forces are left on their own upon withdrawal of external financial, and to a lesser but still significant extent, technical support? Will local authorities still support cassava R&D? Particularly at a time when most national programs give priority to export crops at the expense of food crops for the internal market?

These are disquieting questions. However, the birth of a network for subtropical cassava R&D which coincided with, and to some extent was a result of, the present project, may come to buttress the still fledgling system. This network links cassava R&D in Paraguay, southern Brazil, and northeastern Argentina. In addition to increasing the efficiency of cassava R&D through synergism across country borders, it may well also serve to add legitimacy to national R&D in the eyes of local decision makers. In this context, CIAT would probably do well in supporting this incipient network which would provide a natural platform to which the Center's strategic research could effectively link.

DEVELOPMENT OF A RESEARCH AND DEVELOPMENT NETWORK FOR THE INTEGRATED CONTROL OF CASSAVA ROOT ROT IN NORTHERN AND NORTHEASTERN BRAZIL

BACKGROUND

In northern and northeastern Brazil cassava is the main source of calories in people's diet, providing about one fourth of the caloric intake. For this, some 720,000 ha are planted in cassava. Unfortunately, root rot affects more than two of every five hectares (approximately 42%). Where it strikes, yield at harvest drops 25% on average. This is equivalent to total loss of production on 75,000 ha. The direct monetary value of the losses is estimated at US$ 240 million every year. The value in human suffering is incalculable, as the losses hit an already malnourished population which has an average caloric deficit of 6-14% in rural areas, and 16-22% in urban areas (Gray, 1982).

A large number (up to 35) and a great variety of pathogens--from bacteria to fungi--are causally related to cassava root rot. They are able to live freely in the soil, where they stay ready to infect cassava whenever favorable environmental circumstances arise. They not only affect cassava roots; they infect the whole plant. Cassava is reproduced from stakes rather than from true seed; so, infected cassava plants yield infected stakes. This constitutes a real multiplier effect for spreading the disease.

There is no simple solution to this ubiquitous problem. Rather, an **integrated control** approach must be followed in which the planting of varieties tolerant to root rot is associated with crop management practices which aim at reducing the population of pathogens in the soil and their possibility of infecting healthy plants.

THE OPPORTUNITY

A severe outbreak of root rot hit the Amazon varzeas (seasonally flooded lowlands) in 1983 causing 60% yield losses in some 84,000 ha of cassava. As a consequence CIAT, CNPMF, and CPAA started a joint project to address the problem. By 1986 cassava root rot was painfully evident in all northern and northeastern Brazil. At that stage the opportunity was seized to network across the region.

THE ACTORS

The following institutions in nine states were gradually incorporated into the network:

STATE	INSTITUTION	ACRONYM
Bahia	Centro Nacional de Pesquisas em Mandioca e Fruticultura	CNPMF
Sergipe	Amidoglucosa (a private enterprise)	----
	Centro Nacional de Pesquisa de Coco	CNP-Coco
	Empresa de Desenvolvimento Agricola, Rural e Operacional	ENDAGRO
Alagoas	Empresa de Pesquisa Agricola Alagoas	EPEAL
Pernambuco	Instituto Pernambucano de Pesquisa Agropecuária	IPA
Paraiba	Empresa Estadual de Pesquisa Agropecuária da Paraiba	EMEPA
	Empresa de Assistencia Técnica e Extensao Rural da Paraiba	EMATER-PA
Ceará	Empresa de Pesquisa Agropecuária do Ceará	EPACE
	Empresa de Assistencia Técnica e Extensao Rural do Ceará	EMATERCE
Para	Centro de Pesquisa Agropecuária do Tropico Umedo	CPATU
Amapa	Centro de Pesquisa Agroforestal	CPAF
Amazonas	Centro de Pesquisa Agroforestal da Amazonia Occidental	CPAA

THE ACTIVITIES

The network performs a complex set of activities over space and time. The various actors complement each other according to their comparative advantages (Table 2). CIAT and CNPMF, provide general strategic research support, and they coordinate the network. Other institutions implement strategic research on specific issues. Site-specific research, such as germplasm evaluation and the development and fine-tuning of crop management practices, is carried out throughout the network. Farmers are strongly involved, to the extent that 87% of all research plots are planted on farms.

ETIOLOGICAL, EPIDEMIOLOGICAL, AND ECONOMIC STUDIES

Root rot results from the interplay of pathogens and environmental circumstances which both vary in space and time. To take on such a moving target an iterative research strategy is followed. General principles of integrated control are worked out from the specificities in the various locations. Feed back to the sites allows adjustments to local control strategies to be made. There, new insights may be gained which may contribute to improve the general understanding of the disease complex; from this, further adjustments to local strategies may emerge; and so the iterations continue.

The identification of pathogens is but one (albeit highly important) component in the characterization of the disease complex. Pathogen transmission mechanisms, pathogen survival, edaphic and climatic conditioning of disease outbreaks, are all equally important subjects on the ongoing research agenda.

On the economics of the disease and its control CIAT is giving guidance to network participants to initiate a research program.

GERMPLASM COLLECTION AND EVALUATION; BREEDING

Promising local materials are collected permanently throughout the network, and they are incorporated into local collections as well as into the collection of the National Cassava Center.

Evaluation of such materials is equally an ongoing process. So far 2,500 clones have been evaluated. Of these, three have been officially released for the varzeas (Mae Joanna and Zolhidinha, in 1990; and EMBRAPA-8, in 1992). Further releases are planned for Para (1993), Paraiba (1994), and others (1995).

Breeding for resistance to root rot agents is done by CIAT, CNPMF, and IPA. The resulting F_1 hybrids are field tested throughout the network.

TABLE 2. DIVISION OF LABOR AMONG MEMBER INSTITUTIONS IN THE RESEARCH AND DEVELOPMENT NETWORK FOR INTEGRATED CONTROL OF CASSAVA ROOT ROT.

STATE	INSTITUTION	NETWORK ACTIVITIES						
		Etiology	Epidemiology	Breeding	Biological Control	Germplasm Evaluation	Agronomy	Technology Disssemination
BAHIA	CNPMF	X		X		X		
SERGIPE	Amido Glucosa CNP-Coco ENDAGRO					X X	X X X	X
ALAGOAS	EPEAL					X	X	X
PERNAMBUCO	IPA			X		X	X	X
PARAIBA	EMEPA EMATER-PA					X X	X X	X X
CEARA	EPACE EMATER-CE		X			X	X	 X
PARA	CPATU				X	X	X	X
AMAPA	CPAF					X	X	X
AMAZONAS	CPAA		X		X	X	X	X
CIAT		X	X	X	X			

CROP MANAGEMENT

Relevant crop management components for root rot control developed so far--and which are being adjusted as general and site specific knowledge is improved--are crop rotations, use of pathogen-free planting materials, drainage and planting on ridges, intercropping, planting time and density, mulching, and harvesting time.

TECHNOLOGY DISSEMINATION

Technology dissemination is actively pursued in six of the states involved in the network. Traditional media campaigns and extension work, which are performed by local extension agencies, will not be discussed here. Only two points will be addressed: the integrated control measures being disseminated, and the production and distribution of planting materials.

Integrated control measures. In the presence of infection, average cassava root yield of 15 clones susceptible to root rot was only 0.1 MT ha^{-1}. By rotation with maize or rice; drainage and planting on ridges; and stake selection and chemical treatment, yield multiplied approximately by sixty-five to 6.5 MT ha^{-1}. Practically the same sixty-fivefold difference in yield was found between a root rot tolerant clone and the 15 susceptible clones, when all were managed in the traditional way. And when the tolerant clone was submitted to the improved crop management package, yields soared to nearly 30 MT ha^{-1}. Demonstration of these means of control is being implemented in the fields of farming community leaders in the Amazonian varzeas, and in Para and Pernambuco. Site-specific packages based on the same principles are being validated in Sergipe, Amapa, Alagoas, Sergipe, and Paraiba.

Cassava stake multiplication and distribution. Some farmers have realized that specializing in the production and commercialization of cassava stakes from superior clones pays off. Consequently, they are enthusiastically purveying planting material to their fellow farmers. Whether this informal mechanism of dissemination is enough or whether more formal ways of disseminating planting materials need to be brought into play, is an open question which deserves to be looked into without delay.

BIOLOGICAL CONTROL

Long term strategic research on biological control of cassava root rot is performed by CIAT, CPATU, and CPAA. Control of root rot causal pathogens with bacteria such as *Pseudomonas putida* and *P. fluorescens* or fungi such as *Trichoderma harzianum* has been shown to be possible. The feasibility of developing this knowledge into usable technologies is being explored.

More generically, strategic research on the interactions between cassava and the environmental microflora, and on the ecology of that microflora may open new avenues for controlling root rots.

TRAINING

More than 35 professionals presently participate in the root rot research and development network. Training was vital to ensure their effectiveness and efficiency. Thirteen of them were trained at CIAT (10 in pathology during the period 1987-1991); seven were trained at CNPMF; and over twenty were trained by CIAT and CNPMF alumni.

INSTITUTIONAL DEVELOPMENT

An effective R&D network on integrated root rot control has been established. Human resources are competent. Review and planning meetings are held annually (the first two were in Manaus and Belen); monitoring tours by CIAT and CNPMF specialists are performed up to four times per year. Research output and technology adoption is satisfactory within the network's direct influence.

Complementarity among international research, national centralized research (CNPMF), national decentralized research (in the various states), and development, is well established (Table 2). Farmers have effectively become a part of the research-development continuum. However, whether technology dissemination beyond the jurisdiction of network participants is occurring, or will take place, cannot as yet be ascertained. Lack of an effective system for the multiplication and distribution of planting material is a special concern.

Overall, the prospects of the network being sustainable are good. There is leadership (provided by CNPMF), and commitment among network members. Scarcity of operational funds and, especially, untimely delivery and bureaucratic administrative rigidities, are, however, concerning. In the past, minor monetary input from CIAT was made available occasionally to overcome such shortcomings at particularly critical moments in the R&D cycle. This made large differences in network performance. If CIAT's emergency financial backstopping goes, and if local financial and bureaucratic constraints remain, the network will find itself in a difficult situation.

REFERENCE

Gray, C.W. 1982. Food consumption parameters for Brazil and their application to food policy. International Food Policy Research Institute. Research Report No.32. September 1982.

COMPARATIVE DISCUSSION OF THE SIX CASES

NARS in Latin America have been widely recognized as often being insufficiently oriented towards the end-user, and as frequently having deficient planning, monitoring, and evaluating processes. Also, many times there is poor linkage among research and development, or an imbalance among the two. The present appraisal across cases will, therefore, look at whether such shortcomings have been overcome or not in these various institutional development efforts.

As mentioned earlier on, NARIs are being downsized and decentralized, while a large variety of new institutional players (universities, private enterprise, farmers organizations, NGOs, foundations, etc.) are emerging and occupying niches in the research-development continuum. In this context, if research and development are to be effective and efficient they will have to be interinstitutional. The view across cases will appraise to what extent have they had an interinstitutional approach.

Finally, the question whether the newly developed R&D systems will be sustainable will be addressed.

ORIENTATION TOWARDS END-USERS

The work on beans in both El Salvador and Santa Cruz, is highly participatory with small-scale farmers. So is cassava research and development in Paraguay. Rice R&D in Venezuela is equally strongly linked to end-users, in this case, organized farmers' associations.

The network for integrated control of cassava root rot in northern and northeastern Brazil, although it addresses a burning farmers' problem, is somewhat more technology driven. Finally, research on tropical pastures in Mexico is supply-driven, that is, scientists are developing new technological alternatives to livestock production on native rangeland, to eventually offer them to farmers.

PLANNING, MONITORING AND EVALUATION

Planning

Participatory planning by objectives--promoted by the Swiss Cooperation for Development, which sponsored the Central American and the Andean Regional Bean Networks--is performed in the bean R&D cases.

The project for cassava R&D in Paraguay also provides for formal planning. The cassava root rot network has yearly planning meetings; and every project within the network is further subject to approval by the National Brazilian Research Plan for Cassava (Plan Nacional de Pesquisa, PNP).

Rice R&D in Venezuela is part of the carefully developed National Rice Plan; whereas in pastures research in Mexico germplasm evaluation follows detailed experimental planning, while seed research and multiplication is part of a formal seed project.

In summary, planning is well taken care of in all six cases.

Monitoring

In both bean R&D cases, monitoring and counselling visits are made regularly by Regional Project Coordinators (PROFRIJOL and PROFRIZA), and by scientists from CIAT headquarters.

Monitoring of cassava R&D in Paraguay is ongoing. CIAT scientists frequently visit with their local colleagues, and the Project is formally reviewed regularly. The Brazilian cassava root rot network is under CNPMF's formal monitoring, while CIAT advisory visits are made up to four times a year.

Pastures research in Mexico, and rice R&D in Venezuela are equally closely monitored by local staff and by CIAT's scientists.

It may be concluded that with regard to monitoring, all six cases are well served.

Evaluation

The suitability of technologies being proposed in the various cases is systematically evaluated in all of them. Impact assessment, however, is less methodical. Estimates of rice technology adoption have been made in Venezuela. The expansion of bean cropping in Santa Cruz, the volume of bean exports, and estimates of bean consumption, have all been recorded. Partial estimates of de adoption of improved bean varieties in El Salvador are available. There are estimates of area sown to new pastures, and of forage seed commercialization in Mexico. Records on the spread of cassava technology in Paraguay, and in the Brazilian root rot network are fragmentary at the best.

Formal economic impact evaluation is yet to be done in all six cases.

BALANCE BETWEEN RESEARCH AND DEVELOPMENT

There is a very good balance between research and development in the Brazilian cassava root rot network. Actually, the entire R&D continuum, from strategic research to technology dissemination is fully integrated (Table 2).

There is good R and D integration on beans in El Salvador and Santa Cruz. In both cases, the national research side is not very strong on its own, but synergy with the Regional Bean Research Networks PROFRIJOL and PROFRIZA makes up for the local weakness.

With regard to cassava in Paraguay, and to rice in Venezuela, the research side is weak relative to the development component. In Paraguay, a strengthening of the incipient subtropical cassava network could have a beneficial effect similar to those of PROFRIJOL and PROFRIZA for beans in El Salvador and Santa Cruz. Rice research in Venezuela should be strengthened.

Pastures research in Mexico deserves special mention. What has been developed, in actual fact, is a research network, not an R&D system. CIAT's Tropical Pastures Program developed an entirely novel research system for bringing wild plant species into cultivation for forage production. Only after having accomplished this formidable task, could the Program move into development, to test its prototype technologies in farmers' fields. What has been developed in Mexico, then, is the research part for bringing wild plant species into forage production under cultivation. Field testing and seed supply development is an additional step in institutional development which is just beginning.

INTERINSTITUTIONALITY

The rice and bean R&D systems developed in Venezuela and Santa Cruz, are highly interinstitutional. They not only integrate research with development, but they also brought together public and private sector institutions, as well as NGOs. In this respect, the two systems may be seen as the most advanced ones towards a new interinstitutional and cross-sectorial, rather than mono-institutional, R&D paradigm.

The cassava root rot network is interinstitutional and multilocational; most of the institutional players, however, are public sector institutions. Nevertheless, not much private sector participation would be usually expected in peasant farmers-linked R&D. But NGOs can make a strong contribution. Their incorporation into the root rot network may be worth exploring.

Bean and cassava R&D in El Salvador and Paraguay is interinstitutional, but mainly public sector. Similar comments as for the cassava root rot network are pertinent for them.

Pastures research in Mexico is still fully in the Latin American NARI tradition, with INIFAP virtually holding the research monopoly. However, this may change soon: INIFAP is being decentralized; and Mexico's economy is being liberalized. Both may modify INIFAP's role and scope, and allow new institutional players to come in. The move from seed production being exclusively in the public sector, to opening the market to imports of forage seeds is a step in this direction.

INSTITUTIONAL SUSTAINABILITY

Will the newly developed institutional R&D assemblages be sustainable?

First, it should be said that institutional sustainability is not a desirable characteristic per se. Rather, society should have the capacity to satisfactorily cope with the need of

agricultural R&D, which does not imply that the same institutions or interinstitutional arrangements should perpetuate themselves indefinitely. However, a certain minimum of sustainability is necessary for institutions and interinstitutional arrangements to be effective and efficient.

In the present wake of deregulation, decentralization, privatization, and promotion of exports, R&D systems that (1) work for small-scale farmers who produce staple foods, and (2) are based on dwindling public institutions, are quite vulnerable--particularly so their research component, for which no substitute is forthcoming outside the public sector.

Against this background, cassava R&D in Paraguay may be at risk. Bean R&D in general is equally exposed; however, El Salvador and Santa Cruz are peculiar in this respect. The El Salvadorian NARI, CENTA, is presently being strengthened rather than weakened. And in Santa Cruz, small-scale farmers organized in ASOPROF have the exceptional capacity to articulate their needs, on the one hand, while, on the other hand, research is not done by the typical NARI, IBTA, but by the local University, and more recently by the strong local research center CIAT-SC (which until recently used to address the research needs of the larger farms sector).

The Brazilian cassava root rot network, being almost exclusively public sector, has suffered from funding difficulties throughout its existence. As mentioned in the case-history, minor support from CIAT utilized in a highly strategic manner, helped to alleviate some of the constraints. They are likely to return in full force once the temporary relieve disappears.

With regard to pastures research in Mexico, the comments made on INIFAP under INTERINSTITUTIONALITY also are relevant here.

Finally, for the rice R&D system brought together in Venezuela, the involvement of end-users in its governance, and the existence of a funding mechanism linked to rice production, are elements that favor institutional continuity.

CONCLUDING REMARKS

This document has presented a succinct view of CIAT's rich experience in institutional development, which spans many different types of institutional assemblages, many types of interventions, the R&D of very different commodities, and manifold countries.

The present document only touched the surface of this richness. In-depth case-studies would surely allow broader and deeper insights, as well as documenting highly useful operational aspects. Such an expansion of this humble initial attempt might be the subject of a special project. The output of such a project would then have to be widely distributed among potential users of the resulting information. Especially for the so called "devolution" of CIAT activities to other institutional players, the availability of such information in an easily accessible way would be most helpful.

For CIAT's immediate future, the broad in-house experience on institutional development is a strong foundation on which to build as the Center faces new and ever more challenging needs of institutional development for resource management research and development.

Draft

Into the Future

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INTO THE FUTURE

IRDS moves into the future with confidence, even though aware of difficult challenges and important issues ahead.

CONFIDENCE

The strategies are set, and their operationalization has been defined. Thus, the course for us to steer is clear.

Our human resources are able and committed.

We look forward with excitement toward the opportunities that undoubtedly will arise from new information and communications technologies which, in all likelihood, will make some of today's dreams come true over the next few years.

Multimedia that combine image, sound, and text will allow quick access to a wealth of information in excess of what whole good libraries could hold until recently. And as part of our daily life, such information treasures will be transferred on-line from one end of the world to the other almost instantaneously.

Optical scanning of images to convert them into machine-readable and retrievable information, almost without a keystroke, will make capturing and re-packaging of information a simple mechanical task.

Writing, illustrating, editing, publishing (in print or on optical media), will all be done on a CIAT-wide network, without wasteful re-keying, while yielding output of high quality and improved communications effectiveness.

Language barriers should crumble before a new generation of machine translation.

The village, as much as the metropolis, will become part of the world's information network.

Training will be greatly facilitated by the emerging communications technology.

Even now face-to-face communications and synergistic collaboration among people and institutions are being facilitated by the ongoing development of participatory methods that can be learned, transferred, and widely disseminated. Full command of such methods is crucial for implementing CIAT's interinstitutional and collaborative research agenda for

sustainable development.

IRDS is determined to stay at the forefront of information-communications technological developments, and to keep abreast with the latest developments in interpersonal communications. We are confident that CIAT's management will provide the necessary support.

IRDS gratefully acknowledges the excellent working relations with our colleagues in CIAT's Research Programs and Units. We consider it a privilege to be able to complement and support their work in pursuit of our shared mission of ALLEVIATING HUNGER AND POVERTY IN THE TROPICS WHILE PRESERVING THE RESOURCE BASE. We are confident that we shall continue enjoying such amicable and fruitful relations.

CIAT, NARDS, and regional research and development organizations have grown and matured together over decades. Mutual complementarity in a global R&D system is becoming increasingly articulated. We are confident that interinstitutional complementarity and integration of national, regional, and international research and development will continue growing stronger. IRDS is delighted by the opportunity to support CIAT management and staff in Center-wide linkage and institutional development activities.

AWARENESS OF, AND RESPECT FOR, THE CHALLENGES AHEAD

Under CIAT's new strategy, the Center will work with new partners, some of whom differ from all those met by CIAT before. The new set of players will come together in new interinstitutional arrangements which will also differ from those in which CIAT was involved before. The need for innovation will be a major challenge, not only for the novelty but also for the risks involved.

CIAT's new research paradigm calls for R&D to be done among partners of equal standing with regard to the importance of their contribution to the overall outcome. This means that some partners cannot be substituted, and any weaknesses they may have must be overcome if the common cause is not to be jeopardized.

Some emerging partners may be weak in terms of their organization, or their human and other resources, or both. Others will be unaccustomed to interinstitutional collaboration. Conflicts of interests may arise among institutions that should collaborate; some may even have traditions of opposition with would-be partners. Some institutions may be unstable.

Will it be possible to work institutions with such weaknesses into productive interinstitutional bodies? Undoubtedly, much participation, much consensus seeking, much learning, and much training need to be done.

New sets of institutional players must be brought together on a common agenda, not only on an ad hoc basis, but also in new long-term interinstitutional arrangements for research and development for sustainable land use.

CIAT is aware of the implications and ready to responsibly confront the difficulties. IRDS is committed to contributing its best in facing the oncoming risky challenges.

Donor relations are a special challenge. Funding for the CGIAR system is not as forthcoming as it used to be. Reference is increasingly made to "donor fatigue." Urgent and enormous new needs for donor funding have erupted as centrally planned economies collapsed. And a widespread illusion, that insufficient food production is no longer a threat, is diverting priorities away from agriculture.

Propitiating donors and their constituencies for a favorable attitude towards CIAT is a vital communications task. Equally important is the submitting to the right donors funding requests that meet the highest standards of technical quality and communications effectiveness. Such proposals must coincide with the donors' priorities. IRDS is fully committed to meeting this challenge (see Documents Nos. 2 and 3 on developments in Public Awareness and Project Development). Success with donors, however, is not guaranteed. This is a cause for concern.

With the advent of resource management research, new users expect new activities and new outputs from IRDS. At the same time, many former activities will continue for germplasm development research.

Against this background of increasing demands, IRDS' core budget is not expected to grow. Creative innovations are already being presented and implemented to adjust to such a difficult situation. Labor-saving technology has been incorporated wherever possible, and more will be brought in whenever possible.

But hardware and software acquisition needs capital; and there are limits to substituting hardware and software for people. When these limits are reached, probably soon, resources commensurate with the tasks at hand will still be needed. With due respect, IRDS would like to share this concern with CIAT's governance and management.