

IICA



Consultant Final Report
IICA/EMBRAPA-PROCENSUL II

ISOLATION, IDENTIFICATION AND TAXONOMY WORKSH
ON Phytophthora spp.

IICA
PM-A4/
BR-89
Q10

ESCRITÓRIO NO BRASIL

00001626

ISOLATION, IDENTIFICATION AND TAXONOMY WORKSHOP
ON Phytophthora spp.

IICA
PM-A4/1312
no. 89-010
BV-004270 C.2

Ribeiro, Olaf K.

Isolation, identification and taxonomy workshop on Phytophthora spp. Consultant final report IICA/EMBRAPA-PROCENSUL 11/por Olaf K. Ribeiro.-Brasília : IICA/EMBRAPA, 1989.

p. (IICA: Série Publicações Miscelâneas, A4/BR 89-010)

ISSN 0531-0591

I. Doença de Planta-Phytophthora. I. Título.
II. Série.

CDU 632.4
AGRIS H20

APRESENTAÇÃO

A reprodução e difusão dos Relatórios de Consultores, no âmbito restrito das Diretorias das Unidades do Sistema Nacional de Pesquisa Agropecuária, vinculado à EMBRAPA, tem como objetivo principal o de divulgar as atividades desenvolvidas pelos consultores e as opiniões e recomendações geradas sobre os problemas de interesse para a pesquisa agropecuária.

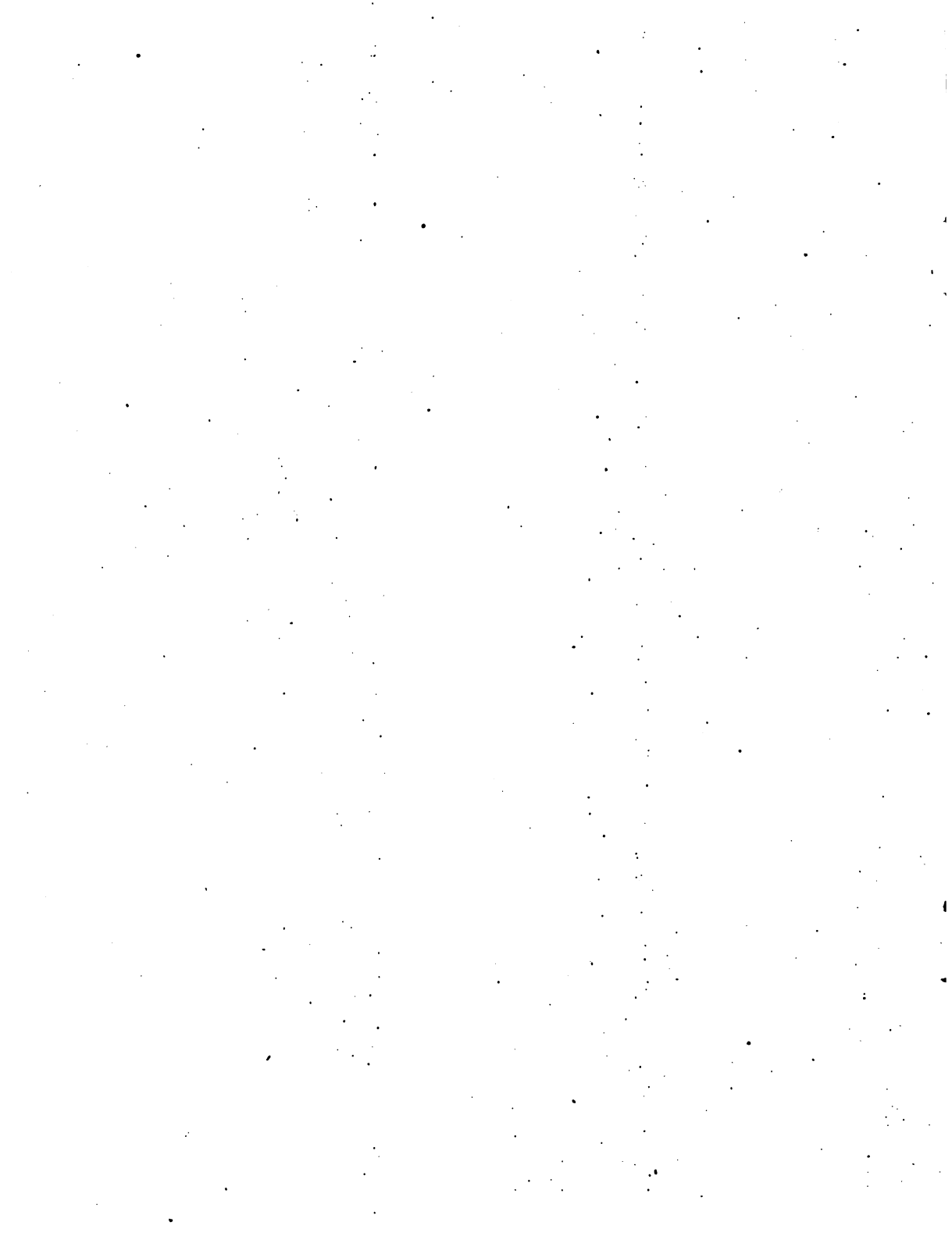
As atividades de consultoria são realizadas no âmbito do Projeto de Desenvolvimento da Pesquisa Agropecuária e Difusão de Tecnologia na Região Centro-Sul do Brasil - PROCENSUL II, financiado parcialmente pelo Banco Interamericano de Desenvolvimento - BID e a EMBRAPA conforme os contratos de Empréstimo 139/IC-BR e 760/SF-BR, assinados em 14 de março de 1985 entre o Governo Brasileiro e o BID.

As opiniões dos consultores são inteiramente pessoais e não refletem, necessariamente, o ponto de vista do IICA ou da EMBRAPA.

A coordenação dos Contratos IICA/EMBRAPA agradeceria receber comentários sobre estes relatórios.



Horacio H. Stagno
Coordenador Contratos IICA/EMBRAPA



**INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE
IICA/ENBRAPA CONTRACT**

CONSULTANT FINAL REPORT

1. Consultant's full name: *Olaf K. RIBEIRO*
2. Specialist in: *Phytopathology*
3. Title of IICA Project: *2 SB.3*
4. ENBRAPA Program for which consultancy is provided:

*PROGRAMA : PROCENSUL II
SUB-PROGRAMA: 02-PESQUISA VEGETAL*

IICA Project Activity Code: <i>2.SB.3.02</i>	Administrative Code: <i>R 4894 B1E C3102</i>
Title of Activity of IICA Project corresponding to this consultancy	<i>Cooperation with ENBRAPA in crop research</i>
CONSULTANT CONTRACT PERIOD	DUTY LOCATION (Center)
<i>9 to 28 May, 1988</i>	<i>CNPFT, Pelotas - RS.</i>
CONTRACT EXTENSION PERIOD (If any)	DUTY LOCATION (Center)

5. Financial support: *PROCENSUL II*

Report prepared by OLAF K. RIBEIRO Ph.D. - Plant Pathologist.

Acknowledgements

I would like to thank Dr. Jose Franciso Martins Pereira - Director of EMBRAPA-CNPFT, Pelotas and Dra. Maria do Carmo Raseira - Chief of Technical Services, EMBRAPA-CNPFT, Pelotas for providing me with excellent facilities and support during the entire PHYTOPHTHORA workshop and seminars. Their cooperation was much appreciated.

Cooperating Staff

I would also like to thank Dra. Rosa Maria Valdebenito Sanhueza - plant pathologist (EMBRAPA/CNPFT, Vacaria), and Dr. Joel Fortes - plant pathologist (EMBRAPA-CNPFT, Pelotas), for their excellent job in coordinating the workshop and ensuring that all materials and equipment was in place before my arrival thus ensuring that the workshop would begin at the time and date scheduled.

SUMMARY

Plant Pathologists from Brasil, Uruguay, and Chile were given an intensive workshop on the isolation, identification and taxonomy of Phytophthora spp., a devastating pathogen of many of the world's major food crops.

Visits were also made to several orchards in the states of Rio Grande De Sul and Santa Catarina to examine the root rot problems prevalent in the apple growing areas.

It is proposed in this report that Dra. Rosa Maria Valdebenito Sanhueza head a program on soilborne pathogens of fruit trees and be provided technical support and equipment to carry out the necessary research. The importance of soilborne plant pathogens in food production worldwide cannot be overemphasized. Implied in this proposed program is development of quarantine measures and nursery inspections to prevent the dissemination of soilborne plant pathogens.

Support for travel to at least one international conference each year is proposed. This is the quickest and most economical way for scientists to gain information, make personal contacts, and keep up with the latest research in their areas of expertise.

Other suggestions are detailed in the report below.

Consultant's Activities

PART I :PHYTOPHTHORA WORKSHOP

I conducted a week long in-depth workshop for the isolation, identification, and taxonomy of Phytophthora species. Phytophthora is a fungus pathogen of major importance in the cultivation of food crops, forest trees and ornamentals worldwide. Phytophthora is now becoming an increasingly important factor in several crops in Latin America.

The workshop included hands-on experience in the laboratory with over a dozen Phytophthora species, as well as daily lectures and discussions on all aspects concerning the genus Phytophthora. A schedule of the complete program is attached. A 72-page manual on the Isolation, Identification and Taxonomy of Phytophthora spp. prepared by the consultant was given to each participant.

Participants in this workshop included plant pathologists from EMBRAPA, Chile and Uruguay.

RESULTS

Participants attending the workshop had all experienced, and were presently experiencing major problems with Phytophthora in potatoes, sweet peppers, citrus, apples, raspberries, cacao, figs, guava, etc.

At the conclusion of the workshop all participants felt that they had gained a great deal of expertise in the recognition of diseases caused by Phytophthora spp. as well as being able to identify the Phytophthora spp. involved.

All participants voted to continue corresponding with each other through an informal newsletter sharing ideas, research results, problems, and other matters pertaining to Phytophthora. It was also tentatively proposed that this group meet again in Jan. 1990 at Pontificia Universidad Catolica de Chile, Santiago, Chile. Prof. Dr. Bernardo Lattore offered the use of his laboratory facilities for the workshop participants.

PART II Field Survey of PHYTOPHTHORA root rot problems

A. Rio Grande do Sul

1. I visited with pathologist Dr. Antonio Perazzolo (Caxias do Sul), and attended an Agr. Cooperative growers meeting. I also had the opportunity to inspect an apple orchard with severe Phytophthora root and crown rot. Some recommendations were made as to the best approach toward controlling Phytophthora in this area. In the afternoon, I gave a lecture to several agronomists and discussed various methods for controlling root rot problems.

2. Dra. Rosa Maria Sanhueza arranged and accompanied me on visits to several apple orchards in the states of Rio Grande do Sul and Santa Catarina. These visits were most informative and gave me a good opportunity to personally interact with the growers and get an idea of their concerns and problems in trying to produce a quality apple crop.

3. Talks were also given to local agronomists and growers.

4. I also spent some time in Dra. Rosa Maria Sanhueza's laboratory at EMBRAPA-CNPFT, Vacaria examining Phytophthora cultures and confirming diagnosis already made by Dra. Sanhueza. We also held daily consultations on the research presently being conducted in her laboratory and future directions to maximize research with the facilities available.

Uruguay

Since the opportunity presented itself, I also made a short visit to Montevideo, Uruguay (at my own expense), to meet with plant pathologists- Eng. Agr. Cristina Monteiro and Luis Rebellato. We inspected apple and citrus orchards to look at the extent of Phytophthora root and crown rot and discussed various control options with the orchardists. Extensive discussions were also held with the above-named pathologists on various aspects of Phytophthora pertaining to epidemiology and control.

PART III Universidade Federal de Vicosa

At the conclusion of the IICA/EMBRAPA workshop, I visited with faculty and students in the Department de Fitopatologia, Universidade Federal de Vicosa at the request of Dr. Kiyoshi Matsuoka. I participated in several discussions with graduate students working on various aspects of Phytophthora spp. causing serious diseases of sweet peppers and potatoes in Brasil. reviewed their current research, and gave a seminar on "Phytophthora Diseases and Control", to the faculty and students in the department.

CONCLUSIONS

PART I - PHYTOPHTHORA WORKSHOP

It is the opinion of this consultant that all participants had attained a high level of technical expertise in handling Phytophthora. The degree of expertise varied considerably within the group since some participants were exposed to Phytophthora for the first time while others already had a good working knowledge of this pathogen.

Phytophthora is a notoriously difficult pathogen to work with and requires considerable experience to be able to identify species in the genus (Ribeiro, 1978; Erwin et al, 1983). Consequently, all participants need to be constantly working with this pathogen in the laboratory to gain the level of familiarity required to be able to accurately identify Phytophthora spp.

PART II - Field diagnosis of PHYTOPHTHORA diseases

Phytophthora was found to be a much bigger problem in apple orchards than I had anticipated. This is mainly due to the widespread use of the Phytophthora-susceptible rootstock M106 and planting of Phytophthora-infected nursery trees.

Orchardists I talked to were aware that they had a Phytophthora or root rot problem. They were eager to learn as much as possible on the best approach to control this problem in their orchards. Dra. Sanhueza is doing an excellent job of providing them with information, setting up research plots, and developing control methods despite her many other duties.

SUGGESTIONS and RECOMMENDATIONS

1. It is the opinion of this consultant that a pathologist be allocated on a fulltime basis to study the root rot and other soilborne problems in tree fruit crops in Brasil. Because of her extensive experience with root rots, Dra. Rosa Maria Valdebenito Sanhueza would be the logical choice to head such a program. It is not possible for her to be able to devote her time to soilborne problems as well as conduct research in all other diseases of fruit trees. A qualified pathologist is required to perform all other tasks that Dra. Sanhueza now performs.

Technical staff support and equipment will also be necessary to correctly implement this program.

One of the priorities of the soilborne diseases program would be to make an extensive survey of the apple growing regions of Brasil to ascertain the extent of the root rot problems caused by Phytophthora, Rosellinia, Xylaria, Corticium, Fusarium, etc. and the relative importance of each pathogen in the economics of fruit production.

* Needed immediately are a minimum of two incubators and a microscope fitted with epifluorescent illumination and a camera. These are essential for research work on the epidemiology and ecology of Phytophthora spp. Other equipment will have to be requested by Dra. Sanhueza once the program is initiated.

2. A quarantine program must be implemented as soon as possible to inspect nursery plants imported from other areas. This is particularly important to prevent the introduction of devastating pathogens such as Erwinia amylovora, the cause of Fire Blight of fruit trees (Van Der Zwet & Keil, 1979).

3. Initiate epidemiological studies of the Phytophthora spp. present in apple orchards with a view of developing a sound control program. Further encouragement must be given to programs in biological control. An excellent beginning has been made in this aspect by Dra. Sanhueza who has developed the fungus Trichoderma for use in apple replant situations (Sanhueza, 1987).

2A. A nursery inspection program must also be initiated to ensure that Phytophthora-infected plants are not sold to orchardists. Infected rootstock is usually symptomless and is thus easily overlooked by the orchardist.

State or Federal regulations need to be implemented as soon as possible to prevent the sale of Phytophthora-infected trees. The apple industry in Brasil is now substantial and great economic losses will occur unless measures are immediately taken to prevent the continued dissemination of Phytophthora and other soilborne plant pathogens.

Once Phytophthora is introduced into the orchard soil, it is virtually impossible to completely eradicate the pathogen. The same is true of pathogens such as Rosellinia and Xylaria.

4. Since Phytophthora appears to be prevalent in a large number of orchards, the planting of apple trees on very susceptible rootstock such as M106 must be discouraged.

6. The problem of burr knots is becoming increasingly important. It is advisable to allocate a plant physiologist to work with Dra. Rose Maria Sanhueza to try and resolve this problem as quickly as possible.

7. Every encouragement must be given to EMBRAPA plant pathologists to publish their findings in International Journals to obtain international recognition for their research. It is also important for Brazilian plant pathologists to be given support to travel to at least one international meeting or conference each year. There is no substitute for the interaction, personal contacts and exchange of information obtained by attending international meetings. It is the quickest and most cost effective way to keep in touch with advances in one's particular area of expertise.

GENERAL CONCLUSIONS

The apple industry in Brasil is fast approaching the level of quality required for exporting fruit to overseas markets. In the U.S., there is now great interest in the feasibility of importing Brazilian grown apples. It is thus imperative that every effort be made to support this industry by providing and extending the excellent research services presently being provided by EMBRAPA scientists.

* A special note of appreciation is extended to Dra. Rosa Maria Valdebenito Sanhueza for the many hours she spent in arranging and accompanying me on orchard visits throughout the apple growing regions of Brasil.

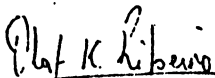
References

Erwin, D. C., S. Barnicki-Garcia, & P. H. Tsao. 1983. PHYTOPHTHORA: Its Biology, Taxonomy, Ecology, and Pathology. Amer. Phytopal. Soc. St. Paul. Minnesota, U.S.A. 390 pp.

Ribeiro, O. K. 1978. A sourcebook of the genus PHYTOPHTHORA. J. Cramer. Vaduz. 420 pp.

Valdebenito-Sanhueza, R. M. 1987. Uso de formildeido e Trichoderma para prevenir a recolonização de solo por Phytophthora em pomares de macieiras. In: Anais Da II Reuniao Sobre Controle Biológico De Doencas De Plantas.. 2. Campinas Função Cargill.

Van Der Zwet, T. & H. L. Keil. 1979. FIRE BLIGHT: A Bacterial Disease of Rosaceous Plants. USDA Handbook #510. 200 pp.



Olaf K. Ribeiro Ph.D.

President &
Consultant Plant Pathologist.

PROGRAMA

Dia 16/05

- Manhã: Apresentação e discussão das diferentes formas morfológicas de Phytophthora usadas em Waterhouse Key. Cada participante deverá praticar o uso da Chave para identificar espécies conhecidas e familiarizar-se com a terminologia usada na Chave.
- Tarde: Demonstração das técnicas de isolamento de Phytophthora em material vegetativo.
- Noite: Seminário sobre os vários tipos de sintomas causados por infecções de Phytophthora, mostrando como distingui-las de problemas causados por outras podridões de raízes, tais como Fusarium, Verticillium, danos por encharcamento ou danos químicos, stress de água, etc.

Dia 17/05

- Manhã: Discussões sobre como identificar espécies proximate relacionadas de Phytophthora, tais como palmivora, cryptogea, erythroseptica, megasperma, etc. Discussões sobre diferenças entre Pythium e Phytophthora
- Tarde: Coletar amostras de solo em torno de plantas com Phytophthora e prepará-las para isolamentos quantitativos de solo de Phytophthora.
- Noite: Seminário sobre Ecologia, Epidemiologia e sobrevivência de Phytophthora spp., na natureza.

Dia 18/05

- Manhã: Verificar as placas de Petri, na sala de incubação, para a produção
- e Tarde: de oosporos e esporângios. Verificar os isolamentos. Transferir qualquer micélio observado que se pareça com Phytophthora, para novo meio com água. Identificar as culturas usando a Chave. Discussão sobre características morfológicas, usadas para identificação de Phytophthora spp.

Dia 19/05

- Manhã: Verificar placas feitas para estimativas quantitativas de Phytophthora e Pythium e distinguir entre Pythium e Phytophthora nestas placas.
- Tarde: Observar outras culturas de Phytophthora. Preparar placas de Petri usando várias outras técnicas para produção de esporângios.
- Noite: Controle químico, cultural e ambiental de Phytophthora.

Dia 20/05

- Manhã: Discussão sobre várias referências utilizadas em identificar Phytophthora spp. e discussão sobre vários tipos de meio para isolamento de Phytophthora spp. Vantagens e desvantagens.
- Tarde: Observação da produção de esporângios e oosporos contendo diferentes meios de cultura. Discussão sobre aspectos gerais.

O Curso foi ministrado pelo Prof. Olaf Kenneth Ribeiro, da Microbiótica Internacional, Inc. Bainbridge Island, Washington, Estados Unidos e Consultor Internacional do CNPq.

Programa II. Geração e Transferência de Tecnologia

O Programa de Geração e Transferência de Tecnologia é a resposta do IICA a dois aspectos fundamentais: (i) o reconhecimento, por parte dos países e da comunidade técnico-financeira internacional, da importância da tecnologia para o desenvolvimento produtivo do setor agropecuário; (ii) a convicção generalizada de que, para aproveitar plenamente o potencial da ciência e da tecnologia, é necessário que existam infra-estruturas institucionais capazes de desenvolver as respostas tecnológicas adequadas às condições específicas de cada país, bem como um lineamento de políticas que promova e possibilite que tais infra-estruturas sejam incorporadas aos processos produtivos.

Nesse contexto, o Programa II visa a promover e apoiar as ações dos Estados membros destinadas a aprimorar a configuração de suas políticas tecnológicas, fortalecer a organização e administração de seus sistemas de geração e transferência de tecnologia e facilitar a transferência tecnológica internacional. Desse modo será possível fazer melhor aproveitamento de todos os recursos disponíveis e uma contribuição mais eficiente e efetiva para a solução dos problemas tecnológicos da produção agropecuária, num âmbito de igualdade na distribuição dos benefícios e de conservação dos recursos naturais.

INSTITUTO INTERAMERICANO DE COOPERAÇÃO PARA A AGRICULTURA

O Instituto Interamericano de Cooperação para a Agricultura (IICA) é o organismo especializado em agricultura do Sistema Interamericano. Suas origens datam de 7 outubro de 1942, quando o Conselho Diretor da União Pan-Americana aprovou a criação do Instituto Interamericano de Ciências Agrícolas.

Fundado como uma instituição de pesquisa agrônômica e de ensino, de pós-graduação para os trópicos, o IICA, respondendo às mudanças e novas necessidades do Hemisfério, converteu-se progressivamente em um organismo de cooperação técnica e fortalecimento institucional no campo da agropecuária. Essas transformações foram reconhecidas oficialmente com a ratificação, em 8 de dezembro de 1980, de uma nova convenção, que estabeleceu como fins do IICA estimular, promover e apoiar os laços de cooperação entre seus 31 Estados membros para a obtenção do desenvolvimento agrícola e do bem-estar rural.

Com um mandato amplo e flexível e com uma estrutura que permite a participação direta dos Estados membros na Junta Interamericana de Agricultura e em seu Comitê Executivo, o IICA conta com ampla presença geográfica em todos os países membros para responder a suas necessidades de cooperação técnica.

As contribuições dos Estados membros e as relações que o IICA mantém com 12 Países Observadores, e com vários organismos internacionais, lhe permitem canalizar importantes recursos humanos e financeiros em prol do desenvolvimento agrícola do Hemisfério.

O Plano de Médio Prazo 1987-1991, documento normativo que assinala as prioridades do Instituto, enfatiza ações voltadas para a reativação do setor agropecuário como elemento central do crescimento econômico. Em vista disso, o Instituto atribui especial importância ao apoio e promoção de ações tendentes à modernização tecnológica do campo e ao fortalecimento dos processos de integração regional e sub-regional.

Para alcançar tais objetivos o IICA concentra suas atividades em cinco áreas fundamentais, a saber: Análise e Planejamento da Política Agrária; Geração e Transferência de Tecnologia; Organização e Administração para o Desenvolvimento Rural; Comercialização e Agroindústria, e Saúde Animal e Sanidade Vegetal.

Essas áreas de ação expressam, simultaneamente, as necessidades e prioridades determinadas pelos próprios Estados membros e o âmbito de trabalho em que o IICA concentra seus esforços e sua capacidade técnica, tanto sob o ponto de vista de seus recursos humanos e financeiros, como de sua relação com outros organismos internacionais.

Esta publicação foi reproduzida na Gráfica do Escritório do IICA no Brasil, em Brasília, em janeiro de 1989, numa tiragem de 100 exemplares.

Responsáveis pela reprodução: Jadir José dos Santos e Murillo Sodré da Silva.

