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Consultant Final Report
IICA/EMBRAPA-PROCENSUL II

RESEARCH ON APPLE DISEASES IN BRAZIL

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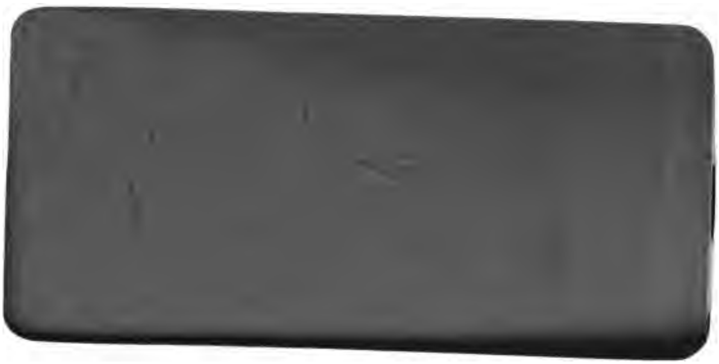

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Série Publicações Miscelâneas Nº A4/BR-87-029
ISSN-0534-0591

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Alan L. Jones

Brasília, maio de 1989

INSTITUTO INTERAMERICANO DE COOPERAÇÃO PARA A AGRICULTURA
EMPRESA BRASILEIRA DE PESQUISA AGROPECUARIA

Jones, Alan L.
Research on apple diseases in Brazil. Consultant final report IICA/EMBRAPA-Procensul II/ por Alan L. Jones.-Brasília : IICA/EMBRAPA, 1989.
16 p. (IICA. Série Publicações Misceláneas, A4/BR87-029)
ISSN 0534-0591

1. Doença de Planta - Maçã. I. Título. II. Série.

AGRIS H20
CDU 632:633.65

APRESENTAÇAO

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 consultoría 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 Emprestimo 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/EMBRAPA CONTRACT

CONSULTANT FINAL REPORT

1. Consultant's full name: *Alan L. Jones*
2. Specialist in: *Fitopatogista*
3. Title of IICA Project: *2.SB.3.*

4. EMBRAPA Program for which consultancy is provided:

PROGRAMA : *PROCENSUL II*

SUBPROGRAMA: *Investigação Vegetal*

IICA Project Activity Code: 2.SB.3.02	Administrative Code: R 4884 B1B 03102
Title of Activity of IICA Project corresponding to this consultancy	*Cooperation with EMBRAPA on research in the area of Crop Production*

CONSULTANT CONTRACT PERIOD	DUTY LOCATION (Center)
September 9 th. to october 4th	*CNPFT, Pelotas*
CONTRACT EXTENTION PERIOD (If any)	DUTY LOCATION (Center)

5. Financial support: *PROCENSUL II*

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I. Introduction

The consultation was conducted from September 18 to October 5, 1988, including four days for travel to and from Brazil. September 20 to 22 were spent at the Centro Nacional de Pesquisa de Fruteiras de Clima Temperado (CNPFT) near Pelotas and September 23 to October 3 were spent at the Campo Experimental de Vacaria - CNPFT. Seminars on apple scab were presented at CNPFT - Pelotas on September 22 and at Caxias do Sul on September 30. The remaining time was spent in discussions with Dr. Rosa Maria Valdebenito Sanhueza and in visiting apple orchards near Caxias do Sul, Vacaria, and Fraiburgo.

The consultant appreciates the excellent background information provided in two letters from Dr. Rosa Maria Valdebenito Sanhueza prior to the consultation and for her serving as my counterpart, for arranging visits to orchards and packing facilities, and for her kind and generous hospitality. Her insights were critical to a productive process and she is to be commended for all of the effort invested in this review. The consultant also appreciates the orientation and information provided by Dr. Bonifacio Nakasu during my visit to CNPFT - Pelotas.

Certainly, in my short visit to the Campo Experimental de Vacaria - CNPFT and to apple orchards in the region, I did not have the possibility to learn all of the factors impacting upon the current program on apple diseases. Thus, some of my comments and recommendations may be based on misperceptions. With this understanding, I offer the following report in the hope that it may help CNPFT, EMBRAPA to develop a better vision of the future and to reach goals that were previously thought unattainable.

II. Review of research on apple diseases

The apple industry in Brazil is new. In establishing the industry, every effort was made to incorporate the newest technology and private companies have made large investments in orchards and storage facilities. There will be a challenge to develop a "leading edge" momentum to the pathological and horticultural research needed to maintain the strength of the apple industry in Brazil.

The Campo Experimental de Vacaria - CNPFT has a strong trust on disease problems important to the apple industry in the region. The accomplishments during the last 3 years in the identification of several disease problems of apple and in initiating studies on their epidemiology and control were impressive considering the short time that a plant pathologist has been stationed at Vacaria. Although the industry apparently appreciates this research effort, it has yet to support it with research grants.

A. Scab prediction and control

Examination of apples coming out of cold storage indicated scab was adequately controlled in 1987 with current spray schedules. The main complaint was the large number of sprays per season needed to control scab. It was apparent that 1988 will be a difficult year for scab control because of the long and frequent wet periods during an unusually wet spring.

In comparing the rates for fungicides used in Brazil and in the United States, the amount of fungicide applied per hectare was similar for the sterol-inhibiting (SI) fungicides fenarimol and triforine, but the amount for the protectant fungicides captan and mancozeb used in Brazil was about one-half the amount used in the United States. For example, Captan 50% WP in used at 3.7 kg/ha in Brazil and 6.7 kg/ha in the United States (it is actually recommended at 9 kg/ha but most growers use about 6.7 kg/ha). Although low rates can be effective, timing of the spray applications is more critical and usually more frequent applications are required with low than with high rates. By using higher rates of protective fungicides, it may be possible to reduce the number of spray applications per season

Development of a warning system for apple scab has been initiated and the system is expected to increase in scope as experience is gained. This is a logical first step in scientific timing of fungicide sprays for scab. Scab infection periods are predicted based on the duration of wetting from rain and the mean temperature during the wet period. Before such a system can be fully implemented, a reliable instrument is needed to measure and record temperature and duration of wetness. Due to the large variation in climate from location to location, a minimum of 3-4 instruments is needed in each apple growing area.

A warning system is an effective tool for increasing grower awareness of apple scab and its control. When risks of scab infection are high, scab control can be improved by switching from protectant to SI fungicides after critical periods are identified. By switching at critical times, the total cost of the spray program is reduced over that of programs consisting only of SI fungicides. If carried out effectively, warning systems can foster the development of goodwill between grower, research, and extension groups. The frequency of long wet periods in Brazil precludes significant reductions in the number of spray applications in most years

Once a warning system is validated, it becomes a function of extension to operate and maintain. There needs to be a clear understanding of the responsibility of research and of extension in the program. Researchers should not be responsible for the day to day operation of the system or for preparing the warnings. It is reasonable to expect a research plant pathologist to assist in the training of the extension personnel conducting the program.

B. Summer diseases

Fungicides are needed during summer to prevent losses of fruit caused primarily from infections by Glomerella cingulata (bitter rot) and by Botryosphaeria spp. Fruit rot problems are expected to increase as cankers caused by these fungi become established in the orchards.

Research at the Vacaria station has established that both perithecial and conidial strains of Glomerella are present in Brazil and that inoculum of this fungus is airborne following rain. Research is planned for this summer to determine if spores are waterborne during the rain. The recent recognition in Brazil that the benzimidazole fungicides are not affective for the control of bitter rot agrees with similar conclusions in the southern United States.

Captan, folpet, and mancozeb are among the fungicides used to control the summer diseases in Brazil, but further refinement in the spray program may be needed to reduce problems with postharvest diseases. The choice of the most appropriate fungicide(s) to use in summer is complicated by the potential of selecting benzimidazole-resistant *Penicillium expansum* (see: Postharvest diseases), by the spectrum of diseases to be controlled (scab, bitter rot, Botryosphaeria rot), and, if fruit are to be exported, by the fungicides registered in the country where the fruit will be sold.

C. Postharvest diseases

Current control programs have reduced but not eliminated postharvest losses from *Penicillium* spp. and from *Alternaria* spp. A significant problem that remains is how to control the buildup of benzimidazole-resistant strains of *P. expansum*.

Defining the source of benzimidazole-resistant strains is important to the ultimate solution of this problem. In apple production areas of the Western United States, benzimidazole fungicides are only used postharvest. They are not used during the growing season because of concerns of developing benzimidazole-resistant strains of *P. expansum*. In the Eastern United States, benzimidazole fungicides are used in the orchard and in postharvest treatments. The postharvest treatment is usually combined with the scald inhibiting compound diphenylamine (DPA). The combination is more effective than a benzimidazole fungicide used alone for control of blue mold (Rosenberger and Meyer. 1985. Phytopathology 75:74-79). Although different strategies have been adapted in the respective regions, data to support one approach over the other are lacking. As DPA is not registered in Brazil, combinations of DPA and a benzimidazole fungicide are not possible beyond the experimental stage.

Moreover, the removal of benzimidazole-fungicides from spray schedules in Brazil is not desirable. Benzimidazole fungicides are needed for improved control of Botryosphaeria rot during the last 6-8 weeks of the growing season. Benzimidazole fungicides will be even more important if the registration of captan is changed to prevent its use within 30 or 60 days of harvest.

D. Soilborne diseases

Rosellinia, *Sclerotium*, and *Xylaria* have been identified as important causes of tree death in Brazilian apple orchards. A new bulletin has been prepared and published by EMBRAPA to aid growers in the identification of these soilborne problems. Losses from these diseases are expected to increase as foci expand from tree-to-tree through root contact in densely planted orchards. Spread of the pathogens on nursery stock may contribute to this disease increase. Unless a control method is developed, good orchard sites may be lost due to the buildup of these pathogens in the soil.

Little is known about these pathogens beyond their ability to kill woody plants including apple. Control measures have not been developed. The current work on biological control with *Trichoderma* could generate new scientific information and result in procedures for reducing spread and losses from these diseases. *Trichoderma* also helps in the control of *Phytophthora cactorum*, another important soilborne disease problem in Brazil and throughout the world.

III. Recommendations

A. Apple scab research

Evaluate an electronic scab predictor from the United States for used in Brazil.

Brazilian growers are particularly interesting in having the electronic predictor evaluated by EMBRAPA because they know the instrument is in use in Chile. However, because it rains more frequently in Brazil, it will not be possible to reduce the number of sprays for scab to the extent possible in Chile.

Evaluation should include monitoring actual infection periods with potted apple trees, monitoring of ascospore discharge periods with spore traps, and monitoring duration of leaf wetness and temperature during the wet periods with standard weather instruments. Also, consider timing after-infection spray treatments based on predictions given by the predictor.

Although predictors could be used in Brazil without critical evaluation, an evaluation would give research, extension, and growers more confidence in this approach to the identification of scab infection periods.

Expand the existing fungicide trials to include protective in addition to curative treatments.

The availability of an orchard at the Campo Experimental de Vacaria - CNPFT for fungicide evaluation is an area of strength that has not been utilized to the fullest extent possible. Currently, 10 treatments are being evaluated. By improving the spray equipment, it should be possible to expand the fungicide testing program to about 30 treatments. In addition to carrying out fungicide tests requested by commercial firms, trials with test objectives of potential importance to the region but not specifically requested by commercial firms should also be conducted. A person should be trained to carry out the day-to-day operation of the fungicide trials so the research plant pathologist can concentrate on other areas of research.

Expansion of the trials to include protective type programs should begin as soon as possible. After-infection spray programs are too risky where orchards cannot be sprayed in less than one-days time. Large growers must use protective sprays to control scab. The protective spray program should include standard protectant alone and in combination with SI fungicides. It is suggested that the treatments be applied with a handgun to single tree plots replicated four times. Only treatments considered effective enough for commercial use need to be evaluated with airblast equipment.

Evaluate whether higher rates of protective fungicides will increase the level of disease control and reduce the number of sprays.

As noted earlier, one concern about the current apple scab program is the large number of sprays required for satisfactory control of apple diseases. It should be possible to reduce the number of application by using rates for protectant fungicides similar to those currently used in the United States. I suggest two or three protectant type fungicides be applied at low (Brazilian) and at high (US) rates on a 7-day interval in spring and a 10-14 day interval in summer. Combinations of SI fungicides with protectants at low (current Brazilian) rates should be included for comparison. The objective is to develop a program that is effective most years on a 7-14 days schedule. In practice, this recommendation and the preceding recommendation can be combined.

B. Summer diseases

Evaluate the effectiveness of control programs for summer diseases developed in the United States under conditions in Brazil.

A spray schedule developed in North Carolina has been provided to Dr. Rosa Maria Valdebenito Sanhueza. Experience with these diseases is the United States indicate that the late season sprays are critical for good control because the fruit increase in susceptibility as they ripen. Also, fruit with russet are more susceptible to Botryosphaeria rot than fruit without russet. In the last four sprays, captan is considered the most effective fungicide. Where mancozeb is used, the addition of a benzimidazole fungicide has improved the control of Botryosphaeria rot.

Expand current research on the epidemiology of Glomerella cingulata. Define sources of inoculum, when spores are disseminated and under what conditions, and the duration of infection periods at different temperatures and stages of ripening.

The conditions necessary for infection of fruit with G. cingulata have not been established. Experiments in low temperature incubators are important for defining the duration of wetting required at different temperatures for infection to fruit. By combining information on when spores are available with information on conditions required for infection, it should be possible to predict infection periods. Once a tentative model is developed, it should be tested under field conditions. The after-infection activity of various fungicides also needs to be determined. Models for predicting fruit infection by Glomerella and by Botryosphaeria should be combined since infection from these pathogens often occurs at the same time.

Determine the practical value of a model for predicting infection periods for Botryosphaeria. Establish the models effectiveness in identifying infection periods and for timing of fungicide sprays.

Recently, a model was developed at North Carolina State University that indicates the duration of leaf wetness necessary at a given temperature for a specific level of infection to leaves and to fruit. The model should be validated as described by Arauz and Sutton (1989. Phytopathology 79:in press). Equipment needed for validation are included among the items recommended in the next section of this report. The effectiveness of after-infection sprays timed based on predicted infection periods should be determined.

Continued research on Botryosphaeria is particularly important because losses of fruit in storage from orchard infections continue to be a problem in the region.

C. Postharvest diseases

Determine the role of using benzimidazole fungicides in the orchard on the development of resistance problems in cold storage.

The current level of understanding of the source of benzimidazole-resistant *P. expansum* is very limited -- including the role of orchard sprays with benzimidazole fungicides for other pathogens on the buildup of resistant *P. expansum*. A significant contribution could be made if the work could determine how quantitatively important inoculum from various sources (infected fruit on the orchard floor, inoculum from soil and debris, from bulk boxes, etc.) is to subsequent disease severity.

D. Soilborne diseases

Expand current research on the potential use of *Trichoderma* and other biological control agents for the control of soilborne diseases of apple.

The research on control of soilborne pathogens with *Trichoderma* following fumigation with methyl bromide is of excellent quality and support for this research should not be allowed to deteriorate. Additional effort to define the benefits of this practices would help convince growers to utilize this new technology and could stimulate a private firm to undertake commercial development of this control method.

I also suggest consideration be given to the evaluation of solarization (solar pasteurization) as a substitute for the methyl bromide. Soil solarization of an existing orchard in Israel with apple trees infected with *Rosellinia* reduced disease considerably over a 24 month period (see: Sztejnberg et al. 1987. Plant Disease 71:365-369). Solarization is highly effective in controlling several soilborne pathogens in semiaired regions (se: Katan. 1980. Plant Disease 64:450-454). Whether this approach would provide comparable results in soils with higher moisture content needs to be established.

E. Other

Enhance the experience and ability of Dr. Rosa Maria Valdebenito Sanhueza to conduct research on apple diseases by providing her the opportunity for a short term visit to the United States to consult with researchers who are conducting research which may be incorporated into her own program of work.

She should visit Dr. Turner B. Sutton, Department of Plant Pathology, North Carolina State University, Raleigh for a minimum of 2 weeks in late July or August. The purpose would be to see how similar the summer disease problems in North Carolina are to those in Brazil and to gain experience in working with the pathogens and with spore trapping equipment.

In addition, a week (about one day at each location plus travel time) should be set aside to visit the following scientists or laboratories: Dr. Keith S. Yoder, Winchester Fruit Research Station, 2500 Valley Ave., Winchester, Virginia; Dr. Ken Hickey, Pennsylvania State University Fruit Research Laboratory, Biglerville, PA; Dr. Charles L. Wilson, Appalachian Fruit Research Laboratory (of USDA), Kearneysville, West Virginia; and the new research laboratories of E. I. de Pont de Nemours & Co., Agricultural Chemicals Department, Barey Mill Plaza, WM3-162, Wilmington, Delaware 19898.

If this trip is made in 1989, time should also be allocated to attend the Annual Meeting of the American Phytopathological Society in Richmond, Virginia, from August 20-24, 1989.

The trip would provide her with new insights and should stimulate new approaches to managing apple diseases and antagonist populations.

IV. Needed equipment and facilities

The current facilities for fruit pathology research at the Campo Experimental de Vacaria - CNPFT are limited primarily to items needed for the diagnosis of fungal diseases. Equipment are available for preparing standard culture media, for making isolations, and for the identification of fungi that produce fruiting bodies. It was obvious from data in drafts of manuscripts that these facilities have been well utilized during the last 3 years. However, the current facilities greatly limit the scope of research that can and should be done at a field station with a well trained plant pathologist. Additional investment to expand the current facilities is important to the solution of many disease problems in the region. Without such facilities, it will be difficult for the plant pathologist to conduct the quality of research needed to publish in international journals.

The kinds of equipment and facilities I am recommending are of a type commonly found at field research stations.

Apple scab predictors

Recommended instrument is the "The Predictor" with optional printer but without rain gauge from Reuter-Stokes, Inc., Edison Park, Twinsburg, Ohio, 44087. It is essential to have a fresh Duracell ID9180 industrial grade 6-volt alkaline lantern battery to install in the unit at the beginning of each season. Lower grade batteries will not power the unit for the entire season and may cause the unit to function in an erratic manner.

"Pest Caster", a instrument manufactured by the Neogen Corp., Lansing, Michigan, is specifically not recommended. This instrument has not performed satisfactorily in Michigan for the last 3 years.

Microscopes

The microscope facilities at Vacaria are currently adequate, but the binocular microscope is on loan from Entomology and a micrometer is on loan from a university in Caxias. Both the binocular microscope and the American Optical compound microscope are essential for the identification of fungal pathogens. They are also essential for quantification of spores in studies on epidemiology.

I recommend the purchase of a basic binocular microscope with 10X wide-field eyepieces and a 0.7 to 4.2X zoom lens. Both American Optical and Bausch & Lomb make good zoom binocular microscopes.

A fiber optic illuminator system is need with the binocular microscope. A fiber optic system is preferred over traditional fluorescent or tungsten lamp illuminators because they emit high intensity light without the associated problem of heat buildup on the specimen. They cost only slightly more than traditional illuminators.

An eyepiece micrometer disc and a corresponding micrometer for calibration are needed for the compound microscope. These accessories are needed for making spore measurements essential to the identification of most fungi.

Orchard spray equipment

While I was at the station, it was necessary for the scientist-in-charge to ask a local growers for use of his spray equipment because the sprayer for maintaining the station's orchards was broken when sprays for scab were critical. This sprayer had just been repaired the previous week. The station should obtain a new airblast sprayer for routine maintenance of the orchards. This should be a standard orchard type sprayer and not a tractor mounted type.

A separate sprayer is needed for fungicide trials and should be specifically designed for applying experimental chemicals. The sprayer should consist of four 200 liter stainless steel tanks with mechanical agitation; a 15 or 20 gallon per minute pump with pressure gauge etc.; a single cylinder, air-cooled type engine with about 15 horsepower maximum; and a hand spray gun. These items should be mounted on a trailer frame that is pulled by a tractor or on a truck bed. Valves and piping are needed so the operator can switch tanks in the orchard after each treatment is applied. It should be possible to have the sprayer built locally. A photograph of such a sprayer can be found in Ehret et al. 1981. Plant Disease 65:959-961. The increased efficiency of this sprayer for plot work would allow expansion of the fungicide trials.

Inoculation chamber

An inoculation chamber is needed for conducting pathogenicity tests with foliar pathogens, evaluating the protective and after-infection properties of fungicides, evaluating populations for fungicide resistance, and conducting specific epidemiological studies.

A low cost mist system installed in a room or large chamber makes an adequate and effective mist chamber for inoculation. The air atomizing nozzle system outlined in the attached literature has been used successfully for this purpose at Cornell University and at Michigan State University. Two to four nozzles will be needed depending on the size of the room (our system is spray set-up no. 13). A small air compressor, an air regulator and gauge, and a liquid regulator and gauge are also be needed. For year around use, install the chamber in a room that is not too hot in summer or too cold in winter for infection to take place.

Filtration system for collecting spores suspended in water

Water dispersal of conidia can be determined by collecting rainwater and filtering the water through girded filters and counting the conidia in randomly-selected grid squares (see Sutton et al. 1976. Phytopathology 66:1313-1317; Arauz and Sutton. 1989. Phytopathology 79:(in press)). The needed equipment is as follows: filter holders for 25 or 47 mm filters, filtering flasks, vacuum pump, and a supply of filters with grid squares. This equipment should be adequate for counting the conidia of the bitter rot fungus. Staining of the conidia may be required.

Clinical centrifuge

A standard clinical centrifuge is needed for concentrating spore suspensions used in inoculation studies.

Volumetric spore trap

The Burkard seven day recording volumetric spore trap is the standard apparatus used in studies to quantity spores in air. It is critical to studies on the dispersal of spores of Glomerella and Botryosphaeria. One trap is sufficient. Purchase the trap with a vacuum pump for battery operation and order additional DC replacement motors. The running life for this motor is about 4 months. Gelvatal needed to make the adhesive recommended by Burkard should be ordered at the same time.

Controlled temperature incubators

Three low temperature incubators without lights, such as Precision Scientific Model 815, are needed for defining the effect of temperature on infection of fruit by Glomerella and by Botryosphaeria, for growth studies on fungi, and for storage of fungal cultures. In addition, one low temperature incubator with dual timers for programming both light and temperature is needed for growth of fungi that require light for sporulation. The lack of these incubators is a major deficiency in the laboratory facility.

Date: October 10, 1988

Signature: Alan L. Jones
Alan L. Jones

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 ás 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 agronômica 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 própios 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 publicaçào foi reproduzida, em abril de
1989, numa tiragem de 80 exemplares.

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