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# DEVELOPMENT OF PLANT PROTECTION CURRIULA IN SOUTH AMERICA (Out - Line)*

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The development of Plant Protection curricula involving Plant Pathology and Entomology in unified progams at agricultural research institutes, universities, and schools of agronomy in South America is in the beginning stages. Unfortunately, a lack of information regarding most countries does not allow a descriptive analysis on the establishment and development of plant protection programs throughout the Americas. Only plant pathology and entomology are registered as plant protection disciplines in South America.

NORLA & VALIELA[3] (1976) stated in "Contributions to the History of Plant Pathology in South America, Central America, and Mexico," that plant pathology was first started in South America with the immigration of European and North American specialists during the past century. The scientists were mostly invited by national governments to study important plant disease problems. They settled into their respective host countries and developed programs in plant pathology. Lefeurve, a Frenchman, founded a school in Chile in 1877. Carolus Spegazzine, an Italian, developed a school in Argentina in 1879. A German, Franz Benecke developed a school in Brazil in 1895. It is interesting to note that these scientists were biologists dedicated to plant protection studying both plant insect and disease problems.

COSTA[1] (1975) reports that plant pathology started in Brazil with the work of Franz W. Dafert, an Austrian scientist who was the first director of the Imperial Agronomic Station, founded by Emperor Pedro II in 1887. Shortly after the foundation of the Agronomic Station, Franz Benecke was the first pathologist assigned to the newly developed pathological section.

Earlier, however, isolated scientists initiated substantial work in plant pathology. Emilio Augusto Goëldi (1887) first described the genus **Meloidogyne**, a plant parasitic nematode, and its type species **M. exigua Goëldi** 1887 on coffee trees. Sugar cane gummosis was described by F. M. Dranert in 1869.

In the beginning of this century plant pathology activities in Brazil continued to be carried out by scientists knowledgeable in both plant pathology and entomology. Outstanding experimenters include Adolph Hempel, an American and Gregorio Bondar, a Russian. According to OLIVEIRA[4] (1974) through the Federal Act 15189 the first regulations on plant protection were established by the Brazilian Ministry of

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Agriculture in 1921. In 1922 through the concerted efforts of entomologists and plant pathologists, the Ministry of Agriculture created the Plant Protection Directory aimed mainly at plant protection inspection work. Later this group was renamed the Plant Protection Agency and the position of Pest and Disease Manager was created. Several distinguished scientists including Cincinnato Rory Gonçalves, Josue Deslandes, Jefferson Rangel, and Charles F. Robbs have held this position. Today the position of Plant Pest and Disease Manager no longer exists although many eminent scientists support the re-establishment of this position.

Brazilian entomologists and plant pathologists have made many contributions to theirs respective sciences. Basic research was developed by such scientists as Ahmes Pinto Viegas, a plant pathologist from Campinas Agronomic Institute, Chaves Batista, a plant pathologist from the Institute of Mycology and the Federal Rural University of Pernambuco, and Angelo Moreira da Costa Lima, an entomologist and professor of the original National School of Agronomy. Contributions in applied research were made by the entomologist Carlos Moreira and A. A. Bitancourt, a plant pathologist.

Acoording to THURSTON[6] (1974) following World War II, South American countries initiated intensive work in many areas of agriculture. Some countries, especially those depending upon the cultivation of the soil for its economy and for food for its people, initiated activities with outside agencies such as the Organizations of the American States, the Food and Agricultural Organization of the United Nations. U.S. Agencies for International Development, the Rockefeller Foundation, and various private foundations and universities to support research programs and technical training. In addition, international crop development centers were organized. In South America these included the International Potato Center in Lima, Peru; and the International Center of Tropical Agriculture in Cali, Columbia. The international centers have as their motto improved agricultural technology for increased food production. These centers produce publications, recommendations, improved and diverse plant germplasm and trained personnel.

In Brazil the areas of plant pathology and entomology were greatly enhanced through cooperative efforts between the Brazilian government and American universities. Worthy of mention is the agreement between the University of São Paulo – Luiz de Queiroz Schoool of Agriculture at Piracicaba, S. P. and Ohio State University. Through this agreement the first master's degree program in plant pathology was created under the technical guidance of the American plant pathologist, Clyde C. Allison. The first master's degree program in entomology was developed with the technical cooperation of Roger Williams, an Ohio State University entomologist. The Federal University of Viçosa, Minas Gerais and Purdue University developed similar programs. Both agreements were made under the auspices of the U. S. Agenay for International Development. Presently these two Brazilian universities offer Ph.D. degrees in both plant pathology and entomology.

Through the assistance of an international cooperation system, some South American countries have reached agricultural techniological levels comparable to the most advanced world centers. The National Institute of Agricultural Technology of

Argentina[5] started its first master's degree program in plant pathology in 1966. This international course of plant pathology had technical and financial support from several foreign institutions including the Organization of American States, the Rockefeller Foundation, the British Council, the Biological Institute of São Paulo, and others. Professors who have contributed to the development of this program include Dr. Albert Eugene Dimond, Dr. James Horsfall, Dr. C. E. Yarwood, Dr. Euripides Malavolta, and Victoria Rossetti. The Federal University of Brazilia, D. F., under the leadership of Dr. J. C. Dianese initiated a master's degree in plant pathology in 1975. In 1979 the Agrarian University of La Molina initiated the first master's degree course in plant pathology and entomology in Peru. This program also offers specialization in plant pathology for undergraduates. The Central University of Venezuela offers both master's and Ph.D. programs in entomology and a master's in plant pathology.

The organization of curricula for master's programs in plant pathology and entomology in South American follows the North American concept. In the plant pathology programs, courses in mycology, plant bacteriology, nematology, virology, principles of plant pathology, plant pathology methods, plant disease control, principles of epidemiology, and physiology of microorganisms are emphasized. In entomology programs the most frequent disciplines include insect morphology and physiology, insect taxonomy, insect ecology, principles of toxicology, acarology, chemical and biological control and control of insects. Basic courses for both areas of specialization include biochemistry, plant physiology, and plant beeding.

The creation of graduate courses in plant protection integrating the disciplines of plant pathology and entomology, was initiated in Brazil in 1976 through the offer of a master's degree program at the Federal Rural University of Pernambuco (UFRPE) under the leadership of Professor R. M. de Moura with support of the Ministry of Education. This program resulted from a need for preparing professors for integrated programs of plant protection positions in the Ministry of Agriculture, State Departments of Agriculture, and private industry. The curriculum includes basic courses in entomology and plant pathology in addition to the degree requirements as stated in the university policy. A total of 30 credit hours and a thesis are required.. Emphasis has been placed on sugar cane (**Saccharum officinarum**), yams (**Dioscorea ssp**). cassava (**Manihot** sp.), vegetables, and fruit crops. Research programs directed toward thesis work are developed with support from other universities including the University of Georgia and North Carolina State University. The latter provides assistance to the Federal Rurral University of Pernambuco through the International **Meloidogyne** Project.

Through agreements with the Ministry of Agriculture, the Federal Rural University of Pernambuco offers a specialization in plant protection for a total of 400 hours of lecture and laboratory. The curriculum includes plant pathology, nematology, economic entomology, pesticide classification utilization, and plant protection legislation. Finally it can se stated that in developing countries, the existence of plant insect and disease managers as researchers or extension experts is justified by five basic reasons:

1. Fewer employment opportunities for persons with expertise in either plant pathology or entomology alone;
2. Need for greater production of food;
3. Reduction of expenses for importation of pesticides;
4. Orientation of farmers on the use of pesticides;
5. To stimulate the initiation of insect pest and disease management programs.

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